TALWAR AND KACKER

COMMERCIAL SEA FISHES OF INDIA



The coastal and offshore waters of India teem with about 1400 fish species, of which 548 species are commercially significant which are the main concern of this book. This text represents an attempt to describe and quantify the nature of India's sea fishes, and synthesizes the existing knowledge on the systematics, geographical distribution, ecology and yield of these fishes that permanently or temporarily inhabit the seas of India.

This is the only book which presents a modern taxonomic synposis of India's commercial marine fishes. Designed for fishery scientists and planners working in the field of Indian fisheries, this book is also aimed to serve as a reference for professional workers, naturalists and environmental scientists interested in the marine fish fauna of India and adjacent countries. Indexes to Common and Scientific names are given, to facilitiate associating indigenous (vernacular) names with the scientific ones.

COMMERCIAL SEA FISHES OF INDIA

P. K. TALWAR & R. K. KACKER
Zoological Survey of India
Calcutta - 700 016



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FOREWORD

The Zoological Survey of India has in recent years initiated the publication of Handbooks whose purpose is to provide accurate scientific identifications and general information on the groups of Indian animals of economic or applied interest. The present volume is the fourth in the series of "Handbooks" and deals with sea fishes of the country.

Fishery projects in the country certainly need taxonomic information based on the recent work as also the one not yet been published or even still buried in the specialist's literature. The present book, first of its kind, which is a synthesis of the many recent but scattered studies of our marine fishes, hopefully fulfils such a need. The subject of marine fisheries is of considerable importance both to India and the adjacent countries. The senior author of the treatise has painstakingly blended into an integrated whole a mass of scientific knowledge accumulated over the years.

The extension of natural jurisdication of the coastal states over 200 miles seaward, creates new opportunities for fisheries development and management in India. This book would, therefore, undoubtedly be an asset to professional ichthyologists and planners working in the field of Indian fisheries. Commercial fishermen, fish farmers and anglers may also find the book informative and useful. The authors Dr. P. K. Talwar and Dr. R. K. Kacker deserve congratulations.

Department of Environment
Government of India
New Delhi

T N. KHOSHOO
Secretary

EDITOR'S PREFACE

The present volume is the fourth in the series of "Handbooks" published by the Zoological Survey of India, to provide accurate scientific identifications and general information on the groups of animals of economic or applied interest of our country. Since its inception in 1916, the Zoological Survey of India has been the main source for the supply of diversified fish identification data to various academic and scientific agencies, fishery organisations in the country, individual research workers and also to those in the fishing industry. Fisheries cannot be adequately conserved, studied, or even discussed unless a proper identification is made of the stocks comprising it.

A publication entitled "An aid to the identification of the common commercial fishes of India and Pakistan" by the late Dr. K. S. Misra, was published by the Survey in 1962 which received considerable attention from fishery scientists and students of the country and soon went out of print. Subsequently reliable taxonomic synopses on Indian sea fishes is not available. Other works which cover this part of the Indian Ocean are either outdated or cover such a wide area that they are confusing to those without specialist knowledge. In view of these Dr. P. K. Talwar, Superintending Zoologist, was requested to prepare a guide to the Commercial Fishes of Indian Seas. The data presented in this book is the outcome of his sustained efforts over many years.

The text of this work was written entirely by Dr. P. K. Talwar and to Dr. R. K. Kacker, the junior author is due the credit for photographing most of the text-figures presented in this book. I wish to congratulate the authors on this arduous task which I hope will be well received by both the taxonomists and the fishery workers of the country and abroad.

Zoological Survey of India
Calcutta
April 4, 1984

B. K. TIKADER
Director

AUTHORS' PREFACE

In 1962 Dr. K. S. Misra published, through the *Records of the Indian Museum*, a work entitled *An Aid to the Identification of the Common Commercial Fishes of India and Pakistan* which deals with 402 species of freshwater and marine fishes. For many years this work has been outdated and out of print but the demand for it has been so insistent that at length it was decided to rewrite the part pertaining to the marine fishes under the present title.

This book bears little resemblance to *An Aid to the Identification of the Common Commercial Fishes of India and Pakistan*, for it deals with numerous fishes not referred to in that publication, and further, the taxonomic knowledge gained in the intervening years concerning many of our most important fishes has rendered a complete revision and much elaboration imperative. A few of the sea fishes that appeared in Misra's work have not been included since they are not of any economic interest to warrant their inclusion. A considerable proportion of the mistakes made by Indian biologists in nomenclature may be traced to Misra's book. The present book is intended to supplement and in some places correct these studies.

The text of this work was written entirely by the senior author; to the junior author is due the credit for photographing most of the text-figures from published works, presented in these pages. In this work we have endeavoured to furnish a relatively simple means of distinguishing the different kinds of fishes in Indian Seas and to give essential details of only the commercial species and their fishery. The book is a synthesis of the numerous recent but scattered studies on the sea fishes of our region and is intended to fill a need which exists for a modern guide to our economically important sea fishes. The literature on Indian fish and fisheries has been freely consulted, and needless to say, the work has been aided greatly by the numerous recent taxonomic revisions. The text is organized along systematic classification lines, following the scheme proposed by Nelson (1976) but with a few modifications based on recent studies. The approach in this work has not been to regard taxonomy as an end in itself but as a tool for the identification of species, thereby providing the fishery workers in the country with an aid which will allow continued improvement of precision in future data gathering and analysis.

Zoological Survey of India
Calcutta-700 016
14th May, 1984

P. K. TALWAR
R. K. KACKER

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We were fortunate to have had the benefit of criticisms and suggestions from many ichthyologists and would like to thank all of them for the time and trouble which they spent in either correcting and improving the text, providing information or new results prior to publication : Drs. P. J. P. Whitehead, B. B. Collette, J. E. Randall, L. J. V. Compagno, E. Trewavas, S. Dutt, W. Smith-Vaniz, Margaret M. Smith, T. Wongratana, R. J. Mckay, R. L. Haedrich, D. J. Woodland, J. Nielsen, M. L. Bouchot, I. Nakamura, T Sato, P. H. J. Castle, P. C. Heemstra, W. Ivantsoff, R. M. Feltes, P. R. S. B. James and V. Ramaiyan. We are also grateful to Dr. W. Fischer for permission to use figures from FAO publications. A few of the line drawings were executed by Shri D. Pyne, Artist, ZSI, and we are thankful to him for his help. The colour transparencies were most generously provided by the versatile Ichthyologist, Dr. John Randall and it is indeed a pleasure to acknowledge his help. We are thankful to Shri Anil Chandra Saha who most cheerfully and efficiently typed the manuscript.

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INTRODUCTION

India ranks seventh among the major fishing nations of the world and contributes about 45% of the fish landings of the Indian Ocean. The annual catch of sea fishes is presently 1.43 million tonnes and most of the fishing in the country is confined to the 30-50 m. stretch of the continental shelf. The coastal and offshore waters of India teem with about 1400 fish species. Field and museum workers in the country have often voiced an understandable despair at the profusion of Indian marine fishes, the myriad of names that have often been applied to them and the lack of any modern treatment under a single cover. The present contribution hopefully fulfils that need.

The present book deals with the 548 economically significant marine species belonging to 235 genera covering 88 families, of the country and is designed for fish and fishery workers with the aim to provide accurate scientific identifications and some general notes of their fisheries. The nomenclature used here has been based, as far as possible, on the most recent revisionary works. In the species synonymies, in addition to the original citation, Day's references both in the *Fishes of India* (1875-1878) and the *Fauna of British India* (1889) are also given since many of these scientific names are still used by fishery workers within our area. These can easily be retrieved from the Index. The arrangement of orders and families follows Nelson (1976). The fishery information is based on literature and field work. The line drawings have been adopted from FAO publications, Day's *Fishes of India* or regional works, without individually crediting them. The bibliography does not contain all the pertinent literature but rather the more generalised works relied upon for the preparation of this text. For the guidance of readers unaccustomed to characters and terminology of structures used in the description of fishes, a glossary of terms used in the text, with three generalised fish diagrams to illustrate external features useful in identification, are given. Indexes to Common and Scientific Names are also given to facilitate associating indigenous (vernacular) names with the scientific ones.

This work was initiated in early 1977 as a sequel to the need for a revision of Misra's (1962) *An Aid to the Identification of the Common Commercial Fishes of India and Pakistan* which went out of

print very shortly after its publication. The then Joint Director-in-charge of the Zoological Survey of India, Dr. S. Khera suggested revising Misra's work and later agreed for the *de novo* preparation of a work as presented here. Dr. T. N. Ananthakrishnan who succeeded Dr. Khera as Director (1977-80) warmly supported the project and encouraged its progress. The present Director, Dr. B. K. Tikader besides taking active steps for its speedy completion, periodic counselling and supervision, suggested modifications in the get-up such as the inclusion of colour photographs and in the designing of the jacket.

KEY TO FISH-FAMILIES OF ECONOMIC INTEREST

1(a) Five separate gill openings on each side (lateral or ventral) of body [Cartilaginous-fishes]	...	2
(b) Single gill opening on each side of head [Bony-fishes]	...	15
2 (a) Gill openings situated on sides of head [Sharks]	...	3
(b) Gill openings entirely on underside (ventral) of head ; no anal fin [Skates & Rays]	...	11
3 (a) Anal fin present	...	4
(b) No anal fin	...	10
4 (a) Head 'hammer'-shaped	...	**Sphyrnidae**
(b) Head normally formed, not expanded laterally	...	5
5 (a) Eyes with nictitating fold or membrane	...	6
(b) Eyes without nictitating membrane or fold	...	7
6 (a) First dorsal-fin base distinctly in front of pelvic-fin bases	...	**Carcharhinidae**
(b) First dorsal-fin base over or behind pelvic-fin bases	...	**Scyliorhinidae**
7 (a) Nostrils connected to mouth by prominent grooves (nasoral grooves)	...	8
(b) Nasal apertures separate from mouth, no nasoral grooves	...	9
8 (a)) Mouth huge and terminal on head ; gill-openings very large ; eyes behind mouth	...	**Rhinlodontidae**
(b) Mouth small and ventral on head ; gill-openings moderate ; eyes over mouth	...	**Orectolobidae**

9	(a) A distinct keel on each side of root of tail; when tail not keeled, the upper lobe of caudal fin greatly elongated, almost half of total length and having 3rd to 5th gill-openings over pectoral-fin bases	...	**Lamnidae**
	(b) No keel on tail; upper lobe of caudal fin not elongated; gill-openings situated well in front of pectoral-fin bases	...	**Odontaspididae**
10	(a) A spine (often short) in fore part of each dorsal fin	...	**Squalidae**
	(b) Dorsal fins without spines; spine-like tubercles over body	...	**Echinorhinidae**
11	(a) Body shark-like, moderately depressed only; pectoral fins barely enlarged; tail not distinctly marked off from the body sector	...	12
	(b) Body distinctly depressed; pectoral fins broadly enlarged; tail more or less sharply marked off from the body sector	...	13
12	(a) Snout markedly elongate, prolonged into a narrow, flat plate bearing a row of large tooth-like structures (saw-like) on each side	...	**Pristidae**
	(b) Snout wedge-shaped and much prolonged, but not as a blade and without lateral teeth	...	**Rhinobatidae**
13	(a) Eyes and spiracles on top of head; no dorsal fin	...	**Dasyatidae**
	(b) Eyes and spiracles on sides of head; distinct dorsal fin present	...	14
14	(a) Head with two widely separated anterior horn-like projections, resemble ears	...	**Mobulidae**
	(b) Head with one soft fleshy lobe protruding markedly forward under the head, resemble a duck's beak	...	**Myliobatidae**
15	(a) Body asymmetrical, eyes on one side (right or left) of head [Flat-fishes]	...	16
	(b) Body bilaterally symmetrical, eyes on both sides of head	...	19

16	(a)	Dorsal fin with spinous rays, its origin well behind eyes; eyes on right side of head	... **Psettodidae**
	(b)	Dorsal fin with only soft rays, its origin on head at least to eyes	... 17
17	(a)	Preopercular margin free and visible, not concealed by skin/ or scales	.. **Bothidae**
	(b)	Preopercular margin not free, concealed beneath the skin	... 18
18	(a)	Eyes on right side of head	... **Soleidae**
	(b)	Eyes on left side of head	... **Cynoglossidae**
19	(a)	Body long, cylindrical, eel-like; dorsal and anal fins joined to caudal fin; pelvic fins absent [Eels]	... 20
	(b)	Body neither eel-shaped nor much elongated	... 24
20	(a)	Body with minute embedded scales; dorsal, anal and caudal fins well developed; pectoral fins well developed	... **Anguillidae**
	(b)	Body naked (without scales)	... 21
21	(a)	Large canine teeth (often fang-like) on vomer (medially on roof of mouth)	... 22
	(b)	No large canine teeth on vomer	... 23
22	(a)	Pectoral fins well developed	... **Muraenesocidae**
	(b)	Pectoral fins absent; occipital region of head somewhat elevated due to development of strong muscles	... **Muraenidae**
23	(a)	Posterior nostrils opening inside mouth, on upper lip or just above mouth; branchiostegal rays overlapping midventrally; caudal and pectoral fins often absent	... **Ophichthidae**
	(b)	Posterior nostrils not labial but lateral or superior (dorsal); branchiostegal rays long, but not overlapping ventrally; continuous fin around the tail	... **Congridae**

24	(a) Body encased in tough armour of minute to moderate rough scales; first dorsal fin composed of 1 to 3 spines only; gill-openings a small slit in front of pectoral-fin base	...	**Balistidae**
	(b) Not as above	...	25
25	(a) Anal fin with 4 spines; long dorsal fin with 10 to 13 spines; edges of membrane bones serrate or with spines; colour usually reddish	...	**Holocentridae**
	(b) Not as above	...	26
26	(a) Two dorsal fins, the first composed of a single elongated ray on head, the second fin with a large notch in middle	...	**Bregmacerotidae**
	(b) Not as above	...	27
27	(a) Body naked (without scales) and slimy; 3 or 4 pairs of barbels usually around mouth: dorsal fin with only one spine	...	28
	(b) Not as above	...	29
28	(a) Caudal fin forked: small adipose dorsal fin present	...	**Ariidae**
	(b) Caudal fin more or less pointed, confluent with dorsal and anal fins: adipose dorsal fin absent	...	**Plotosidae**
29	(a) Dorsal and anal fins with only soft rays, but no spines	...	30
	(b) Dorsal and anal fins with spines and soft rays; pelvic fin with not more than 6 soft rays, usually abdominal	...	42
30	(a) Small adipose dorsal fin present	...	31
	(b) Adipose dorsal fin absent	...	32
31	(a) Caudal fin trilobed: body semi-transparent	..	**Harpadontidae**
	(b) Caudal fin forked; body pigmented: head distinctly lizard-like	...	**Synodidae**
32	(a) Lateral line when present, situated in upper half of sides of body	...	33
	(b) Lateral line extremely low on sides of body; dorsal, anal and pelvic fins placed far back on body: pelvic fin with 6 soft rays	...	41

33 (a) Dorsal fin long, with 43 to 65 soft rays; no keeled scutes on belly ... 34

(b) Dorsal fin short, never more than 25 soft rays; abdomen often with keeled scutes along ventral midline ... 35

34 (a) Dorsal fin originating on nape, very long continuing almost to caudal fin; first pelvic-fin ray not prolonged; body elongate and compressed ... **Coryphaenidae**

(b) Dorsal fin originating far behind head, not extending to caudal fin; first pelvic-fin ray in adults prolonged; body disc-like, with sharp breast ... **Menidae**

35 (a) Lateral line present; no scutes on belly ... 36

(b) Lateral line absent; belly usually with a sharp keel of scutes ... 39

36 (a) Branchiostegal rays 4; body torpedo-shaped; mouth small, toothless ... **Chanidae**

(b) Branchiostegal rays 10 to 36 ... 37

37 (a) Mouth inferior, with conspicuous overhanging snout; gular plate (below arms of lower jaw) small, reduced to a thin median splint ... **Albulidae**

(b) Mouth terminal or superior; bony gular plate well developed ... 38

38 (a) Pseudobranchiae large; last dorsal-fin ray not elongated; scales small ... **Elopidae**

(b) Pseudobranchiae absent; last dorsal-fin ray filamentous; scales very large ... **Megalopidae**

39 (a) Dorsal fin set well behind midpoint of body; mouth large, with fang-like teeth in both jaws ... **Chirocentridae**

(b) Dorsal fin more advanced, usually at midpoint of body: teeth in jaws small or absent ... 40

40 (a) Articulation of lower jaw behind eye; mouth 'underslung' (inferior); snout strongly projecting and usually pig-like ... **Engraulidae**

(b) Articulation of lower jaw under or before eye; mouth more or less terminal; snout not 'pig-like' ... **Clupeidae**

41 (a) Scales small, usually 130 to 350 in lateral line; mouth large, both upper and lower jaws extended into long beaks fitted with numerous needle-sharp teeth ... **Belonidae**

(b) Scales large, usually 38 to 60 in lateral line; mouth small, only the lower jaw prolonged or none of the jaws prolonged; teeth minute ... 42

42 (a) Lower jaw usually prolonged, much longer than upper jaw: pectoral fins usually short ... **Hemiramphidae**

(b) Jaws short, not prolonged into long beak; pectoral fins strikingly long ... **Exocoetidae**

43 (a) Pectoral fin divided into two parts, the upper with rays attached and the lower with 3 to 15 quite free rays; two widely separated dorsal fins ... **Polynemidae**

(b) Pectoral fins normal, without free rays in lower part ... 44

44 (a) Dorsal fins widely separated; pelvic fins abdominal or subabdominal, markedly behind pectoral-fin base ... 45

(b) Dorsal fins with contiguous bases but where (rather rarely) the fins are separate, the separation is negligible and pelvic fins situated not on belly but near pectoral-fin base ... 47

45 (a) Lateral line well developed; jaws with strong canine teeth ... **Sphyraenidae**

(b) Lateral line absent or rudimentary; teeth in jaws small, feeble, hidden or absent ... 46

46 (a) First dorsal fin with spines; no silvery stripe along sides of body; soft anal-fin rays usually less than 10 ... **Mugilidae**

(b) First fin with 5 to 7 spines; a broad silvery stripe along sides of body; soft anal-fin rays usually more than 10 ... **Atherinidae**

47	(a)	Head strongly flattened, with ridges and spines	... **Platycephalidae**
	(b)	Not as above	... 48
48	(a)	A characteristic occipital hook (used for carrying eggs) in males; lateral line short and rudimentary	... **Kurtidae**
	(b)	Not as above	... 49
49	(a)	Pelvic fin with 2 strong spines separated by 3 soft rays; anal fin with 7 spines	... **Siganidae**
	(b)	Pelvic fin with at most 1 spine	... 50
50	(a)	Anterior part of oesophagus immediately behind last gill arch having lateral sacs (pharyngeal sacs) supplied inside with papillae or longitudinal folds bearing teeth; teeth in a single row in jaws	... 51
	(b)	No toothed saccular outgrowth in gullet	52
51	(a)	Single dorsal fin; pelvic fins absent in adults; scales minute; body very deep and strongly compressed	... **Stromateidae**
	(b)	Two distinct scarcely separated dorsal fins; pelvic fins present; scales large	... **Ariommidae**
52	(a)	Upper jaw non-protrusible; snout often elongated into a long, sword-like process	... 53
	(b)	Upper jaw protrusible	... 57
53	(a)	Caudal fin well developed, lunate or strongly notched; body spindle-shaped; keels present on caudal peduncle	... 54
	(b)	Caudal fin often absent, but when present neither large not lunate-shaped; body oblong to elongate, often ribbon-like; no keels on caudal peduncle	... 56
54	(a)	Pectoral fins placed high on body; pelvic fin with 1 spine and 5 soft rays; snout not elongated into sword-like process; mouth terminal	... **Scombridae**

(b) Pectoral fins placed low on body; pelvic fin reduced (3 rays or fewer) or entirely absent; snout prolonged into a sword-like process; mouth inferior ... 55

55 (a) Pelvic fins long, narrow and rigid; snout prolonged into bill, rounded in cross-section ... **Istiophoridae**

(b) Pelvic fins absent; snout prolonged into a bill, but flattened in cross-section ... **Xiphiidae**

56 (a) Body ribbon-like; no finlets behind dorsal and anal fins; back silvery ... **Trichiuridae**

(b) Body elongate or somewhat fusiform, not ribbon-like; isolated finlets usually present behind dorsal and anal fins; back usually brownish ... **Gempylidae**

57 (a) Caudal peduncle with one or more spines (which, when extended, can form a formidable weapon) or scales covering body minute (scarcely visible to naked eye) and lending a marked roughness to skin, giving the impression of a short bristle; body compressed ... **Acanthuridae**

(b) Caudal peduncle unarmed nor is the skin bristly ... 58

58 (a) Teeth fused to form a pair of beak-like plates in each jaw; scales large; very colourful ... **Scaridae**

(b) Jaw-teeth not parrot-like ... 59

59 (a) Two long barbels on chin; two widely separated dorsal fins ... **Mullidae**

(b) No barbels on chin but when present (as in Sciaenidae) dorsal fin single but notched ... 60

60 (a) Dorsal fin with 6 to 9 free (not connected by membrane) spines, each depressible in a groove; two silvery stripes on sides of body ... **Rachycentridae**

(b) Dorsal fin without isolated spines ... 61

61	(a)	First 2 anal spines detached from rest of fin (these spines sometimes partially or completely embedded in large carangids) ; enlarged, thickened scutes in straight part of lateral line usually present	... **Carangidae**
	(b)	First 2 spines of anal fin not detached from rest of fin	... 62
62	(a)	Anterior rays of soft dorsal and anal fins markedly elongated, giving both fins a sickle shape ; pelvic fins usually small or vestigal ; body deep	... **Monodactylidae**
	(b)	Anterior rays of soft dorsal and anal fins usually not elongated, when elongate they do not give either fin a sickle shape	... 63
63	(a)	Body very deep, its depth more than half of total length ; single dorsal fin, the spines clearly distinguishable	... 64
	(b)	Body oblong or moderately deep, its depth less than half of total length ; when deep-bodied and with single dorsal fin, there are no spines or the spinous rays difficult to distinguish from soft rays	... 66
64	(a)	No procumbent (forward-pointing) spine in dorsal fin ; dorsal fin single and continuous ; body thin, deep and discus-shaped	... **Chaetodontidae**
	(b)	First spine of dorsal fin pointing forword, visible only in juveniles ; spinous part of dorsal fin distinct from soft-rayed part (except in genus *Platax*)	... 65
65	(a)	Anal fin with 3 spines	... **Ephippidae**
	(b)	Anal fin with 4 spines	... **Scatophagidae**
66	(a)	Single dorsal fin with no spines, or spines difficult to distinguish from soft rays	... 67
	(b)	One or two dorsal fins having well developed spines	... 68

67	(a) Pelvic fins present; dorsal fin short, with about 15 rays	...	**Pempheridae**
	(b) Pelvic fins absent in adults (small, near throat in juveniles); dorsal fin very long, with 46 to 51 rays	...	**Apolectidae**
68	(a) Two dorsal fins, well separated, but when close together they are not joined by a membrane	...	69
	(b) Single dorsal fin, often deeply notched between spinous and soft parts but when so divided, the membrane joining the two parts is intact	...	73
69	(a) Anal-fin base considerably longer than second dorsal-fin base	...	**Lactariidae**
	(b) Anal-fin base as long as or shorter than second dorsal-fin base	...	70
70	(a) Anal fin with 3 spines	...	71
	(b) Anal fin with 1 or 2 spines	...	72
71	(a) Caudal fin rounded	...	**Centropomidae**
	(b) Caudal fin forked	...	**Ambassidae**
72	(a) Two distinctly separated dorsal fins, the first fin with 6 to 8 spines, the second with 1 spine and 8 to 14 soft rays	...	**Apogonidae**
	(b) Two dorsal fins (small or no inter-space), the first fin with 9 to 12 spines, and second with 16 to 26 soft rays	...	**Sillaginidae**
73	(a) Pelvic fin with an axillary scale	...	74
	(b) Pelvic fin with no axillary scale; anal fin with 3 spines	...	85
74	(a) Setiform (comb-like) teeth in jaws but canine teeth absent; body thin, deep and discus-shaped	...	**Chaetodontidae**
	(b) Setiform teeth absent, but if present then canine-like teeth also present	...	75
75	(a) Anal fin with 2 spines; lateral line scales extending to hind margin of caudal fin; pores on chin	...	**Sciaenidae**

	(b) Anal fin with 3 spines; lateral line not extending to hind margin of caudal fin	..	76
76	(a) Rounded lobes on second dorsal and anal fins, giving fish the appearance of having 3 tails	...	**Lobotidae**
	(b) Not as above	...	77
77	(a) Mouth strongly protractile	...	78
	(b) Mouth moderately protractile	...	79
78	(a) Upper surface of head with bony ridges and a nuchal spine on nape; gill membranes united with isthmus; head usually naked (small scales on cheek in few species)	...	**Lelognathidae**
	(b) Upper surface of head smooth; gill membranes free from isthmus; head almost entirely scaly	...	**Gerreidae**
79	(a) Distal end of premaxillary overlapping maxillary externally; lateral teeth in jaws molar-like; no teeth on roof of mouth	..	**Sparidae**
	(b) Maxillary not overlapped by hind tip of premaxillary (medial to maxilla)	...	80
80	(a) Each jaw with a regular row of close-set, strong, incisor-like teeth of a peculiar hockey-stick shape, with their bases set horizontally, resembling a radially striated bony plate inside mouth	...	**Kyphosidae**
	(b) No incisor-like teeth in jaws	...	81
81	(a) Suborbital process well developed, sometimes with a spine posteriorly	...	82
	(b) Suborbital process either absent or weakly developed	...	83
82	(a) No teeth on roof of mouth (vomer and palatines); dorsal and anal spines rather weak; a backward-pointing spine on suborbital (below eye) sometimes present	...	**Nemipteridae**

(b) Teeth usually present on vomer and palatines (roof of mouth); dorsal and anal spines moderately strong ... **Lutjanidae**

83 (a) No scales on preoperculum (cheeks); lips thick and fleshy ... **Lethrinidae**

(b) Scales present on cheeks ... 84

84 (a) Caudal fin forked; no pores on chin; no scales between eyes and mouth ... **Pentapodidae**

(b) Caudal fin emarginate or truncate; 2 to 6 distinct pores behind lower lip on chin; scales present between eye and mouth ... **Pomadasyidae**

85 (a) Inner pelvic-fin rays not joined to body by membrane ... 86

(b) Inner pelvic-fin rays broadly joined to body by a membrane ... 88

86 (a) Dorsal and anal fins each with a well-developed basal scaly sheath; dorsal fin with 10 spines ... **Kuhliidae**

(b) Dorsal and anal fins with a low or without a basal scaly sheath ... 87

87 (a) Operculum with 1 to 3 spines, usually flat; mouth large, upper jaw usually reaching to below hind margin of eye; dorsal fin with 7 to 12 spines ... **Serranidae**

(b) Operculum with 1 or 2 strong spines; mouth small or moderate, upper jaw not reaching beyond eye-centre; dorsal fin with 12 to 14 strong spines ... **Teraponidae**

88 (a) Dorsal fin with 2 to 9 spines; edge of preopercle fused to head; colour not bright red ... **Grammistidae**

(b) Dorsal fin with 10 spines; upper edge of preopercle free from head; scales on body rough, difficult to detach; eyes very large; colour usually bright red ... **Priacanthidae**

SYSTEMATIC ACCOUNT

GRADE : PISCES

Fishes constitute almost half of the total number of vertebrates. An estimated 18,818 living species compared with 21,100 extant tetrapods have been described (Nelson, 1976). All individuals of most species of fish live entirely in fresh or marine waters. A few are diadromous, regularly living part of their lives in fresh-water and part in the oceans. Classification as marine, diadromous, or freshwater is impossible except perhaps as a generalization for some species.

KEY TO CLASSES

1 (a) Five to seven separate gill-openings on each side of head ... Chondrichthyes

(b) One gill-opening on each side of head ... Osteichthyes

CLASS : CHONDRICHTHYES

[Cartilaginous Fishes]

SUBCLASS : ELASMOBRANCHII

[Sharks, Skates and Rays]

Sharks and rays or skates, which together with the rabbit-fishes (Chimaera) are often called "Cartilaginous fishes", form a relatively small part of the world's fish fauna. These fishes do not have true bone in the skeleton, which is cartilaginous, mainly soft, but part may be hardened by calcification. Unlike the true bony fishes, they have no overlapping scales, but the skin is covered by variously shaped, usually minute bony plates (denticles) which give it the characteristic sandpaper-like texture (shagreen). There are no sutures in the skull and the skeleton is never ossified. There are 5 to 7 pairs of gill-slits, not covered by an operculum and the males have paired copulatory organs.

The sharks, skates and rays form one of the important commercial fisheries of India, the average annual landings for the last 10 years being 33,442 tonnes. Of this, 16,537 tonnes were landed along the east coast

and 17,605 tonnes along the west coast, and the rest at Andaman and Nicobar, and Lakshadweep Is. Although not very popular, the elasmobranchs are widely used as food either in fresh or cured condition. They are, besides, used for making fish-meal and fish manure. Shark liver-oil is considered to be a good source of vitamins and as such it has considerable medicinal value. Some of the rays and sharks yield huge quantities of oil which, though not utilized for medicinal purpose, is used to a large extent in the leather industry for tanning etc. There is an export trade in dried fins and maws of sharks to some of the Far Eastern countries, the exporting centres being located at Bombay, Madras and Nagapattinam.

KEY TO ORDERS/FAMILIES

1 (a)	Gill-openings lateral; pectoral fins not fused to sides of head [Sharks]	...	2
(b)	Gill-openings ventral; anterior edge of greatly enlarged pectoral fins attached to side of head anterior to five gill-openings; anal fin absent [Order Rajiformes]	...	11
2 (a)	One dorsal fin, far rearward on back; head with 6 or 7 gill-slits on each side [Order Hexaniformes]	...	Hexanchidae*
(b)	Two dorsal fins; head with 5 pairs of gill-slits	...	3
3 (a)	No anal fin [Order Squaliformes]	...	4
(b)	Anal fin present [Order Lamniformes]	...	5
4 (a)	Each dorsal fin preceded by spine (may be short)	...	Squalidae
(b)	No dorsal-fin spines; spine-like tubercles on body	...	Echinorhinidae
5 (a)	Head greatly expanded laterally (hammer-shaped)	...	Sphyrnidae
(b)	Head not greatly expanded laterally, of "normal" shark-shape	...	6
6 (a)	Eyes without nictitating membrane	...	7
(b)	Nictitating eyelid usually present	...	10

7 (a)	Grooves (nasoral) connecting nostrils and mouth	...	8
(b)	No nasoral grooves	...	9
8 (a)	Mouth very wide and terminal on head; eyes behind mouth; caudal fin lunate		Rhiniodontidae
(b)	Mouth small and ventral on head; eyes over mouth; caudal fin not lunate	...	Orectolobidae
9 (a)	A distinct keel on each side of caudal peduncle, when absent the upper lobe of caudal fin greatly elongated about half of total length and the last two gill-slits behind pectoral-fin origin		Lamnidae
(b)	No keel on tail; upper lobe of caudal fin not elongated; gill-slits well in front of pectoral fin	...	Odontaspididae
10 (a)	First dorsal-fin wholly anterior to pelvic fins	...	Carcharhinidae
(b)	First dorsal-fin base over or posterior to pelvic-fin bases	...	Scyliorhinidae
11 (a)	Body shark-like, moderately depressed only; pectoral fins barely enlarged; tail not distinctly marked off from the body sector [Skates]	...	12
(b)	Body distinctly depressed; pectoral fins broadly enlarged; tail more or less sharply maked off from the body sector [Rays]	...	13
12 (a)	Snout extremely prolonged as a flat, narrow and firm blade, edges of which are armed with respectively a single series of large, tooth-like structures (saw-like)	...	Pristidae
(b)	Snout wedge-shaped and much prolonged, but not as a blade and without lateral teeth	...	Rhinobatidae
13 (a)	Tail variable in shape and length, with or without armature of pickles, spines or thorns; if armed, no single greatly enlarged and saw-edged spine (or spines); pseudobranchial folds present at anterior wall of spiracles	...	14

	(b) Tail variable in shape and length, in many cases very long and like a whiplash towards its tip; upper surface of tail usually with one or more greatly enlarged and saw-edged spines; no pseudobranchial folds at anterior wall of spiracles	...	15
14	(a) Disc fleshy towards its margin and thicker than in most other batoids; consistency of body soft and flabby; well developed electric organs along sides of head within anterior part of disc	...	Torpedinidae*
	(b) Disc normally not very thick, margins thin and not fleshy; consistency of body mostly firm; no electric organs	...	Rajidae*
15	(a) Eyes and spiracles on top of head; head part of disc; no dorsal fin	...	Dasyatidae
	(b) Eyes and spiracles on sides of head; head distinctly marked off from body, or anterior margins of pectoral fins forming separate lobes or fins; distinct dorsal fin present	...	16
16	(a) Head with two anterior widely separated horn-like projections (cephalic flippers); teeth minute and in bands in many series	...	Mobulidae
	(b) Head without two anterior horn-like projections; teeth large, flat, and in a few series only	...	Myliobatidae

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* The fishes of the family Hexanchidae represented by the genera *Heptranchias* Rafinesque and *Notorynchus* Ayres; the family Torpedinidae (Electric Rays) represented by the 6 genera, *Bengalichthys* Annandale, *Benthobatis* Alcock, *Narcine* Henle, *Narke* Kaup, *Heteronarce* Regan and *Torpedo Houttuyn*; and the family Rajidae represented by the genera *Breviraja* Bigelow & Schroeder, *Cruriraja* Bigelow & Schroeder, and *Raja* Linnaeus, in our region, are presently of no fishery value.

ORDER : LAMNIFORMES

Medium to very large fishes which occur in all seas, though most numerous in the shallow coastal waters of the tropics. Usually cigar-shaped, with usually two dorsal fins and one anal fin; pectoral fins placed ventrally, not fused with body. Five lateral gill openings. Skin covered with small denticles, rough.

SUBORDER : LAMNOIDEI

FAMILY : RHINIODONTIDAE

[Whale-sharks]

Mouth terminal. Gill openings 5, exceptionally large, the last two slits behind origin of pectoral fin, over fin-base. Teeth very small and weak.

Comprises a single living species which is the largest known fish.

Genus **Rhiniodon** Smith

Rhiniodon Smith, 1828, *Zool. Jour.*, **3** : 2 (type-species : *Rhiniodon typus* Smith) (also spelt *Rhinodon*, *Rhincodon* and *Rhineodon* see Penrith 1972, *Copeia* : 362).

The terminal mouth is the most notable diagnostic character.

Monotypic.

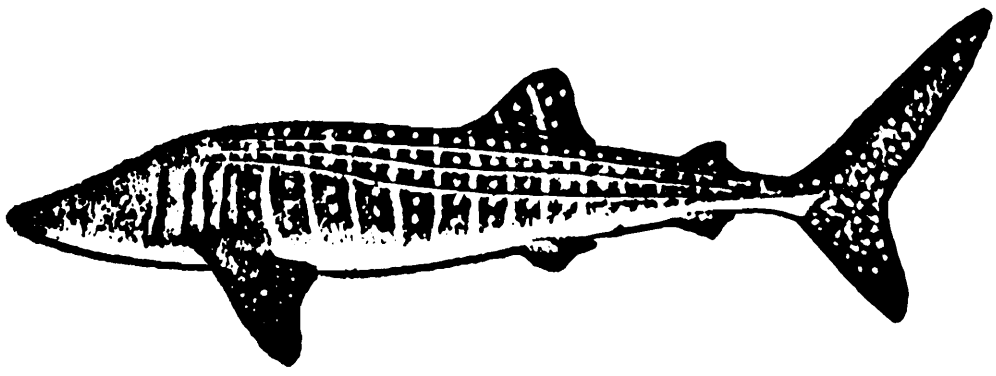
Rhiniodon typus Smith

[Text-fig. 1]

Rhiniodon typus Smith, 1828, *Zool. Jour.*, **3** : 2 (type-locality : Table Bay, S. Africa).

Rhinodon typicus : Day, 1888, *Fishes of India* Suppl. : 811 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 29.

Rhincodon typus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 19, fig. 4.



Text-fig. 1. *Rhiniodon typus* Smith

Common Names :

Whale shark	...	English
Pulli-udumban-sravu, Usman-sravu, Amini-uluvai	...	Tamil
Makara-sravu	...	Malayalam
Karanj, Behiri, Deomushi	...	Marathi

Distinguishing Characters :

A very large shark; body enormous and robust, with a broad and blunt snout. Eyes very small. Mouth very wide and terminal; teeth very small and weak. Caudal peduncle depressed, with strong keel on side that continues forward onto the back; two additional ridges above the main ridge.

Colour : body dark grey, reddish or greenish grey above, with white or yellow spots and transverse stripes; white or yellowish below.

Geographical Distribution : Occurs throughout the tropical parts of the Indian, Pacific and Atlantic Oceans, occasionally straying into higher latitudes.

Fishery Information : These sharks attain about 15 m. or more in length and are esteemed for the large quantity of oil they yield. Frequently caught in our waters. Their immense size makes them an attraction until the effects of decay overcome curiosity.

Family : Orectolobidae

[Carpet or Nurse Sharks]

Mouth small and ventral; nostril connected to mouth by a deep groove (nasoral groove), with a well developed nasal barbel; upper and lower labial furrows present. Eyes over mouth; no nictitating lower eyelid. Head with five small gill-slits, the last two behind origin of pectoral fin and usually very close together, often appearing almost as one. Teeth small and compressed. Spiracles present. First dorsal fin posteriorly placed. Anal fin present, sometimes so close to caudal fin as to appear part of it; no precaudal pits.

Sharks of this family are sluggish, bottom-dwelling, mostly found in shallow water in the tropical regions of the Indo-west Pacific; often strikingly marked. About 11 genera, 3 in our area.

KEY TO GENERA

1 (a) Spiracle minute, its length much less than half eye-diameter	...	**Nebrius**
(b) Spiracle large, its length equal to half or more of eye-diameter	...	2
2 (a) Lower lip-grooves continuous across chin; spiracles under rather than behind eyes	...	**Chiloscyllium**
(b) Lower lip-grooves separate, not tinuous across chin; spiracles behind rather than under eyes	...	**Stegostoma**

Genus **Chiloscyllium** Muller & Henle

Chiloscyllium Muller and Henle, 1837, *Sitzb. Akad. Wiss. Berlin* : 112 (type-species : *Scyllium plagiosum* Bennett).

Spiracles large, about equal to eye-diameter, placed under rather than behind the eyes. Labial furrows on both jaws, the lower continuous across chin forming a distinct fold. Dorsal fins about equal in size. Anal fin small, set far back so as to almost merge with the lower caudal fin.

Several species, three in our area.

KEY TO SPECIES

1 (a) Three dermal median ridges on back of body	..	*C. indicus*
(b) One median dermal ridge only on back of body	...	2
2 (a) Origin of first dorsal fin above middle of pelvic-fin bases; body with 10 dark cross-bars and numerous light spots	...	*C. plagiosum**
(b) Origin of first dorsal fin above ends of pelvic-fin bases; body with 10 to 12 dark cross-bars but with no spots, fading with growth	...	*C. griseum*

* *Chiloscyllium plagiosum* (Bennett) is of no fishery importance in our region.

Chiloscyllium griseum Muller & Henle

[Text-fig. 2]

Chiloscyllium griseum Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 19 (type-locality : India; Japan) ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 7, fig. 2.

Chiloscyllium indicum Day (*nec* Gmelin) (*partim*), 1878, *Fishes of India* : 726, pl. 188, fig. 3; Day (*partim*), 1889, *Fauna Br. India*, Fishes, **1** : 34, fig. 14.



Text-fig. 2. *Chiloscyllium griseum* Muller & Henle

Common Names :

Blackbanded catshark	...	English
Kurangu-sorrah	...	Tamil
Ettee	...	Malayalam
Baravla	...	Marathi

Distinguishing Characters :

Body slender. Mouth slightly arched; short labial grooves in both jaws. Gill-openings narrow, the 4th and 5th slits very close together, the last three over pectoral-fin bases. Origin of first dorsal fin above ends of pelvic-fin bases. A dermal ridge along middle of back of body.

Colour : pale brown; young with 10 to 12 transverse bands on back, all broader than pale interspaces; two large, dark blotches on dorsal fins.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Common in the commercial catches along both the east and west coast of India. Maximum size 80 cm total length.

Chiloscyllium indicus (Gmelin)

Squalus indicus Gmelin, 1789. in : Linnaeus, *Systema Naturae*, 1 : 1503 (type-locality : Indian Ocean).

Chiloscyllium indicum : Day (*partim*), 1878, *Fishes of India* : 726 ; Day (partim), 1889, *Fauna Br. India*, Fishes, 1 : 34.

Chiloscyllium indicus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 9.

Common Name :

Indian catshark	...	English
Bokee-sorrah, Ra-sorrah	...	Telugu
Coruhgun-sorrah	...	Tamil
Baravla	...	Marathi

Distinguishing Characters :

Body slender. Mouth slightly arched ; short labial grooves in both jaws. Gill-openings narrow, the 4th and 5th slits very close. First dorsal fin above ends of pelvic-fin bases. Three rough dermal ridges on back of body.

Colour : pale brown with 11 or 12 dark brown transverse bands on body, each dark band with a few pale spots and obscure darker ones.

Geographical Distribution : India, Sri Lanka to the East Indies.

Fishery Information : Of minor fishery importance in our region.

Genus Nebrius Ruppell

Nebrius Ruppell, 1835, *Neue Wirbelth. Fisthe* : 62 (type-species : *Nebrius concolor* Ruppell = *Scyllium ferrugineum* Lesson).

Spiracles minute, its length a quarter or less of eye-diameter. Origin of first dorsal fin over or in front of pelvic fins.

Two species, one in our area.

Nebrius ferrugineus (Lesson)

[Text fig. 3]

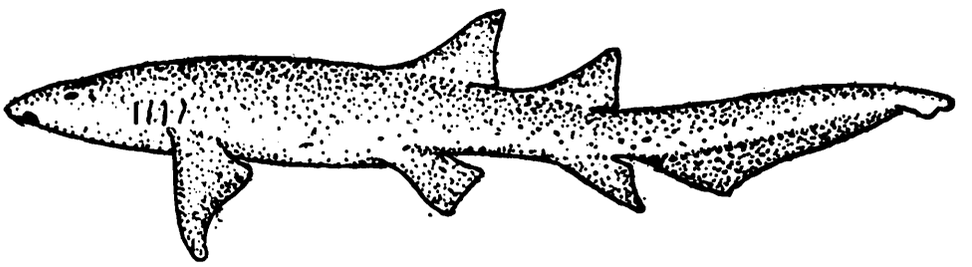
Scyllium ferrugineum Lesson, 1830, *Voy. Coquille, Zool.*, 2(1) : 95 (type-locality : Waigiu).

Ginglymostoma mulleri Gunther : Day, 1878, *Fishes of India* : 725 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 33.

Ginglymostoma concolor (Ruppell) : Day, 1888, *Fishes of India Suppl.* : 811, fig. ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 32, fig. 12.

Nebrius concolor : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 13.

Nebrius ferrugineum : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 13.



Text-fig. 3. *Nebrius ferrugineus* (Lesson)

Common Names :

Giant Sleepy-shark	...	English
Sunera	...	Marathi
Nadammiyaru, Moron	..	Lakshadweep Is.

Distinguishing Characters :

Body moderately elongate. Mouth wide; labial folds well developed in both jaws. Teeth with a large central cusp and 4 to 6 slightly smaller cusps on each side. Gill-slits narrow. Tail long, prominently notched near apex.

Colour : body sandy brown or rusty brown, lighter below, with the fins slightly darkened particularly near the tips.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery value in our area.

Genus **Stegostoma** Muller & Henle

Stegostoma Muller and Henle, 1837, *Sitzb. Akad. Wiss. Berlin* : 112 (type-species : *Squalus fasciatus* Hermann).

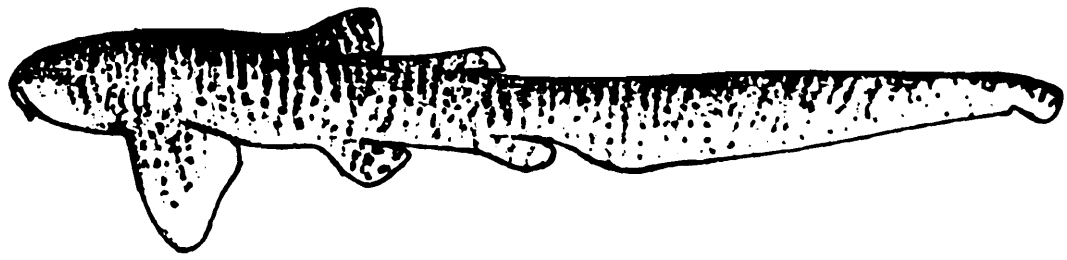
Spiracles large, equal to or larger than eye-diameter, placed behind and on level with eyes. Tail long, about half the total length. Longitudinal ridges along back and sides of trunk (those on sides absent in young specimens). Distinctive pattern of markings.

Monotypic.

Stegostoma fasciatum (Hermann)

[Text-fig. 4]

Squalus fasciatus Hermann, 1783, *Tab. Affin.* : 302 (type-locality : not given).
Stegostoma tigrinum (Bonnaterre) : Day, 1878, *Fishes of India* : 725, pl. 187, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 33, fig. 13
Stegostoma varius (Seba) : Misra, 1969, *Fauna of India*, Pisces (2nd ed), 1 : 15, fig. 3.



Text-fig. 4 *Stegostoma fasciatum* (Hermann)

Common Names :

Zebra-shark	...	English
Pollee-makum, Komarasi, Orookoolti-sorrah	.	Telugu
Corungun-sorrah	..	Tamil
Shinavla	...	Marathi
Shinwala, Magara	...	Gujarati
Poochasurav	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, with a long tail. Second dorsal fin very small. A prominent dorsal ridge present. Lower caudal fin virtually absent.

Colour : Young white or buff, with narrow white cross-bars on head and body between which are white spots ; adults with transverse bands or large rounded black or brown spots.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery value in our area ; fairly common at Madras. Maximum size 350 cms total length.

FAMILY : ODONTASPIDIDAE
[Sand-tiger Sharks]

Two equally large dorsal fins, without spines, the origin of first fin well in front of pelvic fins; anal fin present. No nictitating eyelid. Mouth ventral ; nostrils not connected to mouth with grooves. Head with 5 lateral gill-slits, all well in front of pectoral fin. Small spiracles present. Caudal fin short, strongly asymmetrical; no keels on peduncle, but precaudal pits present.

Two genera, one in our area.

Genus **Eugomphodus** Gill

Eugomphodus Gill, 1851, *Proc. Acad. nat. Sci. Philad.* : 60 (type-species : *Squalus littoralis* Mitchill = *Carcharias taurus* Rafinesque).

Snout flattened. Eyes small, its vertical height less than half as long as first gill-slit. Most of teeth with one basal denticle on each side. Second dorsal fin equal to first dorsal fin in area.

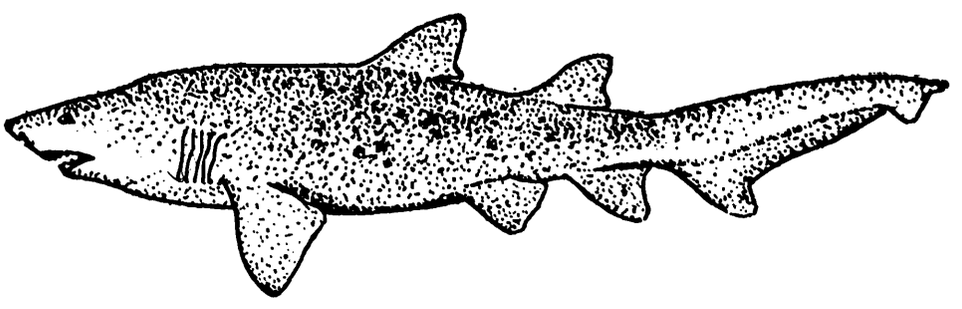
Monotypic.

Eugomphodus taurus (Rafinesque)
[Text-fig. 5]

Carcharias taurus Rafinesque, 1809, *Caratt. animal. piante Sicilia* : 10, pl. 14, fig. 1 (type-locality : Sicily).

? *Carcharias tricuspidatus* Day, 1878, *Fishes of India* : 713, pl. 186, fig. 1 (type-locality : Karachi, Pakistan) ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 22, fig. 5.

? *Odontaspis tricuspidatus* : Day, 1889, *Fauna Br. India*, Fishes, **1** : 27, fig. 8.



Text-fig. 5. *Eugomphodus taurus* (Rafinesque)

Common Names :

Blue-nurse sand-tiger	...	English
Khonodecha	...	Kannada
Waghir	...	Marathi

Distinguishing Characters :

A large shark. Body fusiform, with a flattened snout. Mouth large, extending well behind eyes; distinct labial furrows in both jaws. Spiracles small and difficult to distinguish. Two equally large dorsal fins. Caudal fin not lunate, much shorter than half the total length.

Colour : body light grey above, dull white below, often with yellow or yellow-brown spots.

Geographical Distribution : Atlantic Ocean, Western Indian Ocean and Pacific.

Fishery Information : This species grows to about 60 cm in length and is fairly common on the Bombay-Gujarat coast. The fins are valued and the liver oil is extracted for vitamins.

FAMILY : LAMNIDAE

[Thresher and Mackerel Sharks]

Large-sized sharks of fusiform body. Head with 5 gill-slits. Spiracles absent or, when present, minute. Nostrils completely separate from mouth. No nictitating lower eyelids. Two dorsal fins, without spines; second dorsal fin much smaller than first. Anal fin present, very small. Caudal peduncle with distinct lateral keels, but when absent the upper lobe of caudal fin enormously enlarged, about half the total length.

Five genera, 2 in our area.

KEY TO SUBFAMILIES

1 (a) Caudal fin enormously enlarged, about as long as rest of shark	...	Alopiinae
(b) Caudal fin less than one-third the length of rest of shark	...	Lamninae

SUBFAMILY : ALOPIINAE
[Thresher Sharks]

Large sharks. Last two gill-slits behind the pectoral-fin origin. Caudal fin strongly asymmetrical, the upper lobe greatly elongate, one-half of total length. Caudal peduncle not depressed, without keels; precaudal pits present.

These are active, strong-swimming and deepwater sharks, with the young occurring close inshore Upto 540 cm., harmless to man.

Genus **Alopias** Rafinesque

Aloplas Rafinesque, 1810, *Caratt. animal. piante Siciiia* : 12 (type-species : *Alopias macrourus* Rafinesque = *Squalus vulpinus* Bonnaterre).

Distinguished by enormously long caudal fins, equal to about half of the total length.

Four species recognised of which three species occur in the NW Indian Ocean, viz. *vulpinus, superciliosus* (Lowe) and *pelagicus* Nakamura; more than one species could occur off India according to Dr. L. J. V Compagno. A key to these species is given to facilitate correct determination of the Indian species.

KEY TO SPECIES

1 (a) Hind tip of first dorsal fin about over pelvic-fin origin or in front of it by a distance less than the first dorsal fin-base; less than 15 (usually 10 to 12) teeth on each side of each jaw	...	*A. superciliosus*
(b) Hind tip of first dorsal fin in front of pelvic-fin origin by a distance at least equal to first dorsal fin-base; at least 15 (usually about 20) teeth on each side of each jaw	...	2
2 (a) Teeth markedly oblique, with one or more denticles on outer side	...	*A. pelagicus*
(b) Teeth erect or slightly oblique, without any denticles on outer side	...	*A. vulpinus*

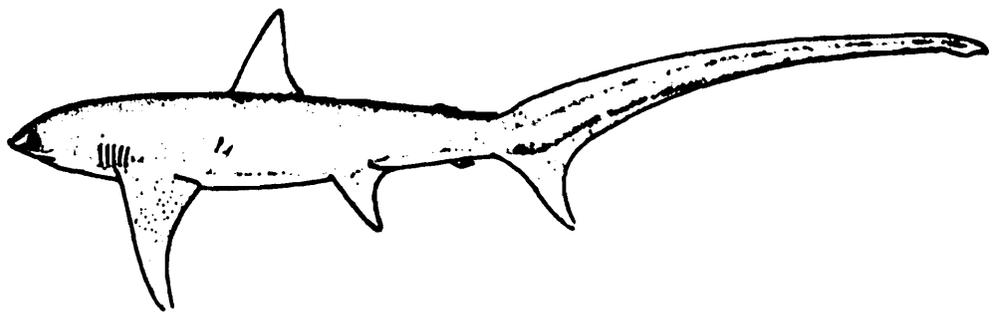
Alopias vulpinus (Bonnaterre)

[Text-fig. 6]

Squalus vulpinus Bonnaterre, 1788, *Tabl. Encyclop. Ichth.* : 9, pl. 85, fig. 389 (type-locality : Mediterranean).

Alopias vulpes (Gmelin) : Day, 1888, *Fishes of India* Suppl. : 810 ; *Day*,* 1889, *Fauna Br. India*, Fishes, **1** : 28, fig. 9.

Alopias vulpinus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 25, fig 6



Text-fig. 6. *Alopias vulpinus* (Bonnaterre)

Common Names :

Thresher-shark	...	English
Nigudigumiyaru	...	Lakshadweep Is.

Distinguishing Characters :

Body torpedo-shaped with the caudal fin greatly enlarged, about as long as rest of body. Mouth short and semicircular, beneath eyes, with short lower labial furrows. Two dorsal fins, the first moderately large, with its base well ahead of pelvic-fins ; the second fin minute and positioned just in front of small anal fin. Upper lobe of caudal fin very long and straplike, about as long or longer than rest of shark : lower lobe short but well developed.

Colour : purplish, bluish-grey or blackish on back and underside of snout, lighter on sides, and abruptly white below : a white area extends from the abdomen over the pectoral-fin bases. Pectoral, pelvic and dorsal fins blackish, purplish or bluish grey.

Geographical Distribution : Warm temperate and subtropical waters of the Atlantic, Indian and Pacific Oceans.

An oceanic species that visits coasts and occurs near the bottom at depths down to 475 m.

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* According to Dr. L.J.V. Compagno, Day's illustration of *Alopias vulpes* does not suggest *vulpinus* but rather the other two species in the NW Indian Ocean

Fishery Information : Of minor fishery value, being taken rather infrequently in our region. Attains a total length of over 20′

SUBFAMILY : LAMNINAE

[Mackerel Sharks, Makos]

Large-sized sharks of fusiform body. Head with 5 gill-slits, all in front of pectoral-fin; no nictitating lower eyelids. Mouth notably long, with distinct upper and lower lip-grooves; teeth large; nostrils not connected to mouth by grooves. Spiracles sometimes absent. Two dorsal fins, the first fin far in advance of pelvic fins; second dorsal fin and anal fin much smaller than first dorsal fin. Caudal fin lunate, less than one-third of total length. Caudal peduncle strongly depressed dorso-ventrally and expanded laterally, with a prominent keel on each side, extending well out on caudal fin; distinct upper and lower precaudal pits present.

The mackerel-sharks are large, widely distributed species that are usually taken offshore. Three genera recognised, one (*Isurus*) in our area. The great white shark, *Carcharodon carcharias* (Linnaeus) is recorded from all oceans, but there is no record from the Indian region. This shark attains a length of about 7 m and is much dreaded, being a maneater, likely to occur in our area.

Genus **Isurus** Rafinesque

Isurus Rafinesque, 1810, *Caratt. animal. plante Sicilia* : 11 (type-species : *Isurus oxyrinchus* Rafinesque) : Garrick, 1967, *Proc. U.S. natn. Mus.*, **118** (3537) : 674 (Revision).

Body fusiform, with an acutely pointed snout. Teeth strong and relatively few in number, alike in both jaws, lanceolate, smooth-edged, with a single cusp. Two dorsal fins, the first fin comparatively large, its origin over or posterior to inner corner of pectoral fin when latter is laid back; origin of anal fin below about the middle of second dorsal-fin base. Caudal fin lunate; caudal peduncle flattened dorso-ventrally, but expanded laterally, with a prominent keel on each side

Probably two species, one in our area.

Isurus oxyrinchus Rafinesque

[Text-fig. 7]

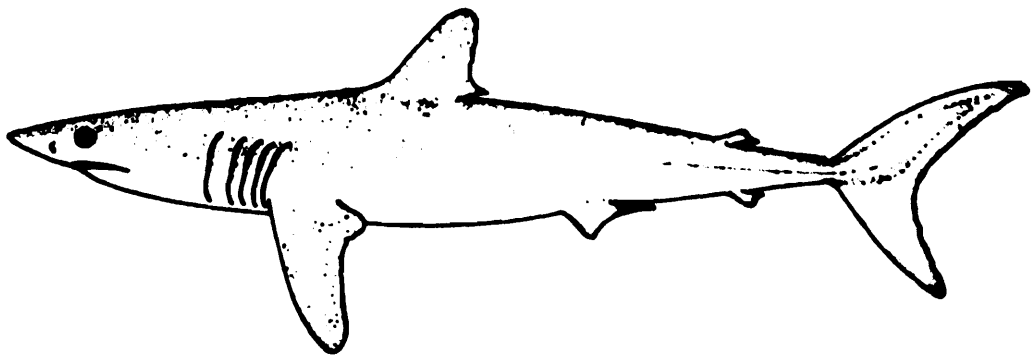
Isurus oxyrinchus Rafinesque, 1810, *Caratt. animal. plante Sicilia* : 12, pl. 13 (type-locality : Sicily).

Lamna spallanzanii (Rafinesque) : Day, 1878, *Fishes of India* : 722, pl. 186, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 26, fig. 7.

Lamna guntheri Murray : Day, 1888, *Fishes of India Suppl.* : 810 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 26.

Isurus glauca (Muller & Henle) : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 27, fig. 7.

Isurus guntheri : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 28.



Text-fig. 7. *Isurus oxyrinchus* Rafinesque

Common Names :

Shortfin mako	...	English
Ganumu-sorrah	..	Tamil
Vorimasmiyaru	...	Lakshadweep Is.

Distinguishing Characters :

Torpedo-shaped, stoutly built, with a long and acutely pointed snout. Spiracles minute, often invisible. Mouth broadly rounded in front and notably long. Teeth strong and relatively few in number, alike in both jaws, backward-pointing, smooth-edged, with a single cusp. Two strongly unequal dorsal fins. Pectoral fins moderately long (shorter than head) and falcate. Caudal fin lunate

Colour : back dark metallic blue, belly white

Geographical Distribution : Worldwide, throughout all tropical and warm temperate seas.

Primarily oceanic species, usually in surface waters (in deeper waters during summer) approaching the coast in search of food.

Fishery Information : Of minor fishery importance in our area; usually taken offshore. Grows to a large size (21 oms).

SUBORDER : SCYLIORHINOIDEI

FAMILY : SCYLIORHINIDAE

[Catsharks]

Small sharks, maximum length about 1 5 m. Head with five gill-slits, the 5th, or 4th and 5th over the pectoral-fin base. Mouth moderately to strongly arched; nasal apertures separate from or connected to mouth by channels (nasoral grooves) crossing a depressed segmant of upper lip (in latter case, no barbels extending from nasal flaps) ; labial folds on both or lower jaw only. Teeth small, numerous, usually multicuspid, with several series functional in each jaw. A fold of skin below eye (secondary lower eyelid). Usually two dorsal fins, without spines; posterior end of first dorsal-fin posterior to a vertical through the origin of pelvic-fin base. Anal fin present.

Seventeen genera recognised, 5 in our area

KEY TO GENERA

1 (a) Supraorbital crest of the chondrocranium present	...	2
(b) Supraorbital crest absent	...	4
2 (a) No labial furrows (or rather rudimentary) along either jaw	...	**Cephaloscyllium***
(b) Labial furrows present, at least along lower jaw	...	3
3 (a) Both upper and lower labial furrows present; labial furrows continuous around each mouth corner, no upper lip tabs	...	**Atelomycterus**
(b) No upper labial furrows present; upper lip with a small projecting tab which overlaps lower lip at each mouth corner	...	**Scyliorhinus***
4 (a) Anal and lower caudal fins close together (almost coincident) ; anal fin particularly long; colour usually uniform	...	**Apristurus***

(b) Anal fin and lower caudal fin wide apart, separated by a considerable distance ; colour usually not uniform ... **Halaelurus***

Genus **Atelomycterus** Garman

Atelomycterus Garman, 1913, *Mem. Mus. Comp Zool. Harv.*, **36** : 100 (type-species : *Scyllium marmoratum* Bennett) ; Springer, 1979, *NOAA Tech. Rep. NMFS Circ.* (422) : 32 (Review).

Body slender, almost eel-like form tapering from the posterior end of jaws. A slight constriction in the area of the first gill-slit gives *Atelomycterus* a somewhat reptilian appearance. Two dorsal fins, nearly equal in area, the first originating over middle of pelvic-fin base or over posterior end of pelvic-fin base. Well developed supraorbital crest (on the chondrocranium) projecting as a narrow shelf above the orbits. Nasal flaps large and very long, their posterior tips reaching past edge of upper lip ; upper lip with broad depressed areas forming broad channels (nasoral grooves) between nasal cavities and mouth. Prominent and long labial furrows continuous around mouth corners, extending along upper jaw for a distance slightly less than length of orbit and along lower jaw for a somewhat greater distance.

Two species, one in our area.

Atelomycterus marmoratum (Bennett)

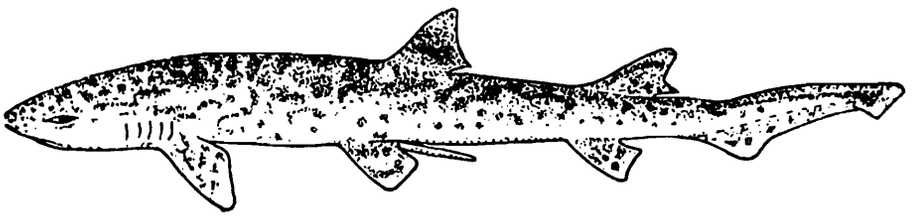
[Text-fig. 8]

Scyllium marmoratum Bennett, 1830, *Life of Raffles* : 693 (type-locality : Sumatra) ; Day, 1878, *Fishes of India* : 724, pl. 190, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 31, fig. 11.

Atelomycterus marmoratum : Misra, 1959, *Fauna of India*, Pisces (2nd ed.), **1** : 40, fig. 12.

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* The fishes of the genus *Cephaloscyllium* Gill represented by *C. silasi* (Talwar), the genus *Scyliorhinus* Blainville by *S. capense* (Smith), the genus *Apristurus* Garman by *A. investigatoris* (Misra), and the genus *Halaelurus* represented by 3 species, are of no fishery value is our region ; *Scyliorhinus natalensis* (Regan) reported by Rama Rao (1975, *J. Bombay nat. Hist. Soc.*, **72** : 218) from our area is a misidentification, his specimens constitute the type material of *Cephaloscyllium silasi* (Talwar).



Text-fig. 8. *Atelomycterus marmoratum* (Bennett)

Common Names :

Marbled catshark	...	English
Kurangan-sura, Udambansura	...	Tamil
Bolad, Wagli	...	Marathi

Distinguishing Characters :

Body elongate and subcylindrical. Head moderately flattened. Mouth fairly arched; nasal flaps large and long, entirely covering posterior openings of nasal apertures and extending past upper lip. Teeth small, numerous, usually tridentate. Two dorsal fins; first fin over middle of pelvic-fin base. Anal-fin base equal to second dorsal-fin base, the rear end of its base under midpoint of latter.

Colour : variable, light brownish becoming whitish below; young with 12 transverse brown bands, separated by pairs of white spots; adults irregularly blotched with brown.

Geographical Disribution : India, Sri Lanka, through the East Indies, to China and the Philippines.

Fishery Information : Reported in the literature of fishery importance in our area, but I have suprisingly not observed this shark in the catches.

FAMILY : CARCHARHINIDAE
[Requiem Sharks]

Small to large-sized sharks. Head with 5 gill-slits, the last over or behind pectoral-fin origin. Eyes with a well developed nictitating membrane within lower lid. Nostrils separate from or connected to mouth by grooves; no nasal barbels. Two dorsal fins, the base of

first wholly anterior to origin of pelvic fins. Anal fin present. Caudal fin much less than half of total length, strongly asymmetrical, with a well marked subterminal notch and a short, but well defined lower lobe. Caudal peduncle not strongly depressed dorso-ventrally or widely expanded laterally, without longitudinal ridges anterior to anal fin; precaudal pits well developed.

The Carcharhinidae are one of the largest families of sharks. Many carcharhinids are of economic interest as food and for the preparation of various subproducts especially oil and Vitamin A from the liver, leather and sandpaper from the skin, fishmeal, gelatine etc. The following key was kindly drawn up by Dr. L. J. V. Compagno.

KEY TO GENERA

1 (a) Precaudal pits absent; dorsal margin of caudal fin not rippled or undulated; a supraorbital crest on the cranium	...	2
(b) Precaudal pits present; dorsal margin of caudal fin rippled or undulated (sometimes irregular in *Scoliodon* and *Triaenodon*); no supraorbital crest on cranium	...	4
2 (a) Origin of first dorsal-fin over pectoral bases; eyes lateral on head; teeth blade-like	....	**Iago***
(b) Origin of first dorsal-fin behind pectoral bases; eyes dorsolateral on head; teeth cuspidate or molariform	...	3
3 (a) Teeth strongly cuspidate; second dorsal fin as large as first; anal-fin base below second dorsal-fin base; caudal fin narrow and very elongated, ribbon-like	...	**Eridacnis***
(b) Teeth blunt, flat, and molariform; second dorsal fin distinctly smaller than first; anal-fin base partly behind second dorsal base; caudal fin broad and not greatly elongated, not ribbon-like	...	**Mustelus**
4 (a) Origin of second dorsal fin far posterior to that of anal fin, virtually on or just anterior to anal insertion	...	5

(b) Origin of second dorsal fin usually slightly in front, above, or slightly behind anal-fin origin, always in front of anal midbase ... 7

5 (a) Head flat and towel-shaped; free rear tip of first dorsal about over mid-base of pelvic fins ... **Scoliodon**

(b) Head moderately depressed; free rear tip of first dorsal fin over pelvic-fin origin or in front of them ... 6

6 (a) Distinct notch on posterior edge of eyes; first dorsal base 2 to 3 times in distance from pectoral to pelvic-fin bases ... **Loxodon**

(b) Orbit smooth, with no notch on its posterior edge; first dorsal base usually less than 2 times in distance from pectoral to pelvic-fin bases ... **Rhizoprionodon**

7 (a) Upper labial furrows very long, extending in front of eyes; teeth with characteristic cocks-comb shaped in both jaws; a dermal keel on caudal peduncle ... **Galeocerdo**

(b) Upper labial furrows shorter, not extending in front of eyes; teeth not cocks-comb shaped; no keel on caudal peduncle ... 8

8 (a) Labial furrows relatively long, extending well on to upper and lower jaws; spiraales always present ... 9

(b) Labial furrows reduced, confined to mouth corners; spiracles usually absent (present or occasional in *Triaenodon* and *Negaprion* specimens) ... 12

9(a) Lower teeth at front of mouth with short, straight, or weakly hooked cusps, concealed or barely protruding when mouth is closed; gill-openings short, less than twice eye length ... 10

(b) Lower teeth at front of mouth with long, strongly hooked cusps that prominently protrude from mouth when it is closed; gill openings over twice eye length ... 11

10 (a) Lower teeth near symphysis with arched tooth, giving them an inverted Y-shape; mouth very short and broadly arched; dorsal, pelvic and caudal fins falcate	...	**Hemigaleus***
(b) Lower teeth near symphysis with flat tooth, giving them an inverted T-shape; mouth longer and narrowly arched; dorsal, pelvic and caudal fins not falcate	...	**Paragaleus***
11 (a) Snout wedge-shaped in dorsoventral view; fins not strongly falcate, with posterior margins of pelvic and pectoral fins straight or slightly concave	...	**Chaenogaleus**
(b) Snout bluntly rounded in dorsoventral view; fins strongly falcate, posterior margins of pectoral and pelvic fins deeply concave	...	**Hemipristis**
12 (a) Upper and lower teeth with high accessory cusps or cusplets on each side of cusp; nostrils with tubular anterior and medial rostral flaps	...	**Triaenodon**
(b) Cusplets usually absent on lower teeth, low or absent on upper teeth; nostrils not tubular	...	13
13 (a) Second dorsal fin much smaller than first dorsal fin	...	**Carcharhinus**
(b) Second dorsal fin about as large as first dorsal fin	...	14
14 (a) Snout short, preoral length much less than mouth width; upper and lower teeth similar, with narrow, smooth-edged cusps	...	**Negaprion**
(b) Snout longer, preoral length about equal to mouth width; upper teeth with broad, high serrated, triangular cusps, lower teeth with narrow and smooth cusps	...	**Lamiopsis**

* The genus *Iago* Compagno & Springer represented by its type-species, *I. omanensis* (Norman) and an undescribed species (being described by L. J. V. Compagno), and the genus *Eridacnis* Smith represented by its type-species, *E. radcliffei* Smith (=*Proscyllium alcocki* Misra), are deep-water species of no fishery value in our area; the genus *Hemigaleus* Bleeker represented by its type-species, *H. microstoma* Bleeker, and the genus *Paragaleus* Budker represented by an undescribed species (being described by L. J. V. Compagno) occasionally show up in the fisheries of south-west India according to Dr. Compagno.

Genus **Carcharhinus** Blainville

Carcharhinus Blainville, 1816, *Bull. Soc. phillom. Paris* : 121 (type-species : *Carcharias melanopterus* Quoy & Gaimard) ; Garrick, 1983, *NOAA Tech. Rep., NMF Circ.*, (445) : (in press) (Revision)

Body elongate and fusiform. Eyes moderate, with internal nictitating lower eyelids. Nasoral grooves and cirri absent. Labial grooves very short or rudimentary, confined to mouth corners. Teeth blade-like with single cusps, cusps of upper teeth always (sometimes minutely) serrated, the lower with smooth or serrated cusps; a series of teeth functional in upper jaw, 1 to 3 in lower jaw. No spiracles. Head with 5 pairs of gill-openings. Two dorsal fins, without spines; first dorsal-fin base closer to pectoral fin than to pelvic fin; second dorsal fin considerably smaller than first; origin of second dorsal-fin in front of anal mid-base; anal-fin base less than twice as long as second dorsal-fin base. Upper and lower precaudal pits present; caudal fin with a definite lobe; no keel on caudal peduncle.

The genus *Carcharhinus* includes a much larger number of species (30) than any other genus of sharks. Many species are important commercially. The following key was kindly drawn up by Dr L. J. V. Compagno based on his recent studies.

KEY TO SPECIES

1 (a) First dorsal and pectoral fins with broad distally rounded tips; free rear tip of anal fin nearly reaches lower caudal-fin origin	...	*C. longimanus*
(b) First dorsal and pectoral fins with narrow distally pointed or rounded tips; free tip of anal fin falls very well in front of lower caudal-fin origin	...	2
2 (a) Upper anterior teeth with broadly triangular cusps, not well delimited from tooth-bases	...	3
(b) Upper anterior teeth with narrow cusps, well delimited from bases	...	6
3 (a) Snout long, about equal to mouth width; a ridge on back between dorsal fins	...	*C. altimus**
(b) Snout very short, much less than mouth width; no inter-dorsal ridge	...	4

4 (a) Second dorsal fin low, with nearly straight posterior margin ; first dorsal-fin height 3.2 × second dorsal-fin height or more (postnatal specimens)	...	*C. amboinensis*•
(b) Second dorsal fin relatively high, with concave posterior margin ; first dorsal-fin height less than 3.2 times height of second dorsal fin	...	5
5 (a) Second dorsal fin about half height of first dorsal fin ; upper anterior teeth with very high crowns relative to width ; at least 15 rows of teeth on each side of upper jaw ; precaudal pit in the form of a longitudinal depression	...	*C. gangeticus*•
(b) Second dorsal fin less than half height of first dorsal fin ; upper anterior teeth relatively low ; usually 13 rows of teeth on each side of upper jaw, but varying from 11 to exceptionally 14 rows ; precaudal pit in the form of a transversely crescentric notch	...	*C. leucas*•
6 (a) Second dorsal fin with a conspicuous black tip but other fins without markings	...	7
(b) Second dorsal fin either plain, dusky or black tipped, but other fins also with conspicuous black markings if black-tipped	...	8
7 (a) First dorsal and pectoral fins falcate ; usually 12 teeth-rows on either side of small medial or alternate teeth at symphysis	...	*C. sealei*•
(b) First dorsal fin and pectoral fins triangular, not falcate ; usually 13 or 14 tooth-rows on either side of small medial or alternate teeth at symphysis	...	*C. dussumieri*
8 (a) Second dorsal fin very low, with greatly enlarged inner margin 2 to 3 times fin height	...	9
(b) Second dorsal fin higher, inner margin less than 2 times fin height	...	10

9 (a)	Snout very long and narrow; cusps of upper teeth smooth; no interdorsal ridge; inner margin of first dorsal fin greatly elongated; no black tips on fins	...	*C. macloti*
(b)	Snout short and moderately broad; cusps of upper teeth serrated; an interdorsal ridge present; inner margin of first dorsal fin moderately elongated; conspicuous black tips on pectoral, second dorsal, and lower caudal lobe	...	*C. sorrah*
10 (a)	Cusps of upper outer lateral teeth smooth-edged or weakly serrated; an interdorsal ridge present	...	*C. hemiodon*
(b)	Cusps of upper outer lateral teeth strongly serrated (except young of *C. brevipinna*); no interdorsal ridge	...	11
11 (a)	Snout very short and bluntly rounded; 11 to 13 rows of upper teeth on each side, antero-lateral with oblique cusps; gill-openings shorter; all fins black or dusky tipped	...	*C. melanopterus*
(b)	Snout longer and wedge-shaped, parabolic, or pointed; 14 to 16 rows of upper teeth on each side, antero-lateral with erect cusps; gill openings longer (especially in *C. brevipinna*); at least some fins black tipped (at some stage in shark growth)	...	12
12 (a)	Snout rather short, wedge-shaped; internarial space 1.0 to 1.2 times in preoral length	...	*C. amblyrhynchoides**
(b)	Snout long; internarial distance 1.4 to 1.6 times in preoral snout length	...	13

* *Carcharhinus altimus* (Springer) and *C. leucas* (Valenciennes) were recently observed by Dr. L. J. V. Compagno in our region; *C. gangeticus* (Muller & Henle) is a very rare species; *C. sealei* (Pietschmann) is most likely present in our area according to Dr. Compagno and considers that "*C. menisorrah*" in Indian waters may include *C. sealei*; *C. amblyrhynchoides* (Whitley) has been reported once (as *C. pleurotaenia*) in our area; *C. amboinensis* (Muller & Henle) most likely occurs in our area according to Dr. Compagno.

13 (a) First dorsal fin lower, its height over 2.2 times space between dorsal-fin bases; upper labial furrows rather long and conspicuous; first dorsal-fin origin over or just behind free rear tips of pectoral fins; lower teeth with smooth or weakly serrated cusps ... *C. brevipinna*

(b) First dorsal fin higher, its height less than 2.2 times in space between dorsal-fin bases; upper labial furrows short and inconspicuous; first dorsal-fin origin over or just behind pectoral insertions; lower teeth with regularly serrated cusps ... *C. limbatus*

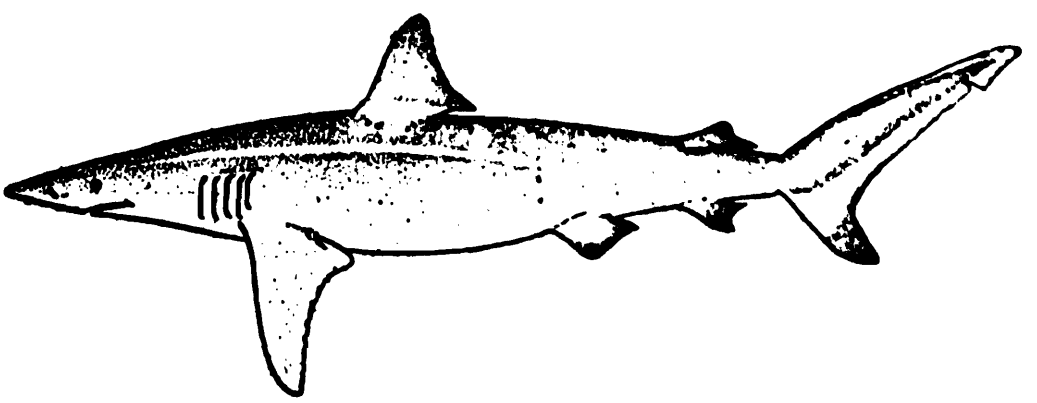
Carcharhinus brevipinna (Muller & Henle)

[Text-fig. 9]

Carcharias (*Aprion*) *brevipinna* Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 31, pl. 9 (type-locality : Java).

Carcharias dussumieri : Day (*nec* Muller & Henle), 1878, *Fishes of India* : 714, pl. 187, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 1 : 13.

Carcharhinus dussumieri : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 60, fig. 17.



Text-fig. 9. *Carcharhinus brevipinna* (Muller & Henle)

Common Names :

Spinner-shark	...	English
Shivra	...	Kannada
Chotimushi, Mushi	...	Marathi

Distinguishing Characters :

Body slender. Snout rather pointed and long, its length equal to or greater than width of mouth and greater than internarial distance; labial folds short but uppers rather long and conspicuous; anterior

nasal flaps rudimentary, very low. Upper and lower teeth nearly symmetrical and very similar, with mostly erect, very narrow cusps; uppers with entirely or partly serrated edges, lower with smooth or weakly serrated cusps. Gill openings relatively long. First dorsal fin with a narrowly rounded apex, its height over 2.2 times space between dorsal-fin bases, its origin over or just behind free rear tips of pectoral fins; origin of second dorsal fin about over anal-fin origin; second dorsal fin high, its inner margin less than twice the height of fin. Pectoral fins falcate and with pointed tips. No dermal ridge between dorsal fins.

Colour : grey on back, white below, with a conspicuous white band on sides. Second dorsal, anal, undersides of pectorals and lower caudal-fin lobe black or dark grey tipped in subadults and adults, but unmarked or nearly so in small individuals (below 1 m.).

Geographical Distribution : A wide-ranging, nearly circumtropical species found in the Atlantic, Mediterranean, Indian Ocean and Western Pacific.

Fishery Information : The species is fairly common in the catches of our area. Attains 60 cm. in length.

Carcharhinus dussumieri (Muller & Henle)

Carcharias (*Prionodon*) *dussumieri* Muller and Henle, 1841, *Syst. Beschr. Plagoist.* : 47, pl. 19, fig. 8 (type-locality : Bombay and Pondicherry; China).

Carcharias menisorrah (*nec* Muller & Henle) Day, 1878, *Fishes of India* : 716, pl. 184, fig. 1 ; Day, 1889, *Fauna Br. India, Fishes*, 1 : 16.

Carcharhinus menisorrah : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 67, fig. 20.

Common Names :

White-cheeked shark	...	English
Karimuthu-sorrah, Suga-sorrah	...	Telugu
Kondian-sorrah	...	Tamil
Tharvat	...	Kannada
Ghari-mushi, Balda	...	Marathi
Moosi	...	Gujarati

Distinguishing Characters :

Body elongate and slender. Snout narrowly rounded, moderately long, equal to mouth-width ; labial folds very short ; anterior nasal flaps very low and rudimentary. Teeth with usually 13 or 14 rows on either side of small medial or alternate teeth at symphysis ; upper anterior teeth with large serrated cusps, well delimited from bases ; teeth in lower jaw erect, their edges only slightly serrated. First dorsal fin broadly triangular, not falcate, its origin behind the free rear tips of pectoral fins ; second dorsal fin very low. Pectoral fins long and triangular, falcate. No dermal ridge between dorsal fins.

Colour : back dark grey, belly greyish or white ; second dorsal fin with a conspicuous black tip.

Geographical Distribution : Indo-west Pacific.

Fishery Information : One of the sharks most commonly seen in the catches of the west coast of India, especially the Kerala coast. The liver oil is rich in vitamin A. Reported to be dangerous to man.

Carcharhinus hemiodon (Valenciennes)

Carcharias (Hypoprion) hemiodon Valenciennes, 1841, *Syst. Beschr. Plagiost* : 35, pl. 19, fig. 2 (type-locality : Pondicherry).

Carcharias hemiodon : Day, 1878, *Fishes of India* : 714 ; Day, 1889, *Fauna Br. India, Fishes*, **1** : 12.

Hypoprion hemiodon : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 53

Common Names :

Longnosed shark	...	English
Pal-sorrah	...	Tamil

Distinguishing Characters :

Body slender and fusiform. Snout short and broadly rounded ; labial folds rudimentary or absent. Teeth in numerous rows, upper teeth triangular, slightly oblique, cusps of upper lateral teeth smooth-edged or weakly serrated, upper anterior teeth with narrow cusps and well delimited from bases ; teeth in lower jaw with erect and narrow cusps, either smooth-edged or weakly serrated on outer basal portion. First dorsal fin with narrow distally pointed or rounded tips, its origin over pectoral insertions ; second dorsal fin high, its inner margin less than

twice the fin-height; pectoral fins falcate. A dermal ridge present between dorsal fins.

Colour : back dark grey, belly white.

Geographical Distribution : Indian Ocean.

Fishery Information : This species contributes a good fishery on the east coast of India, particularly on the Tamil Nadu coast. Attains 60 cm. in length.

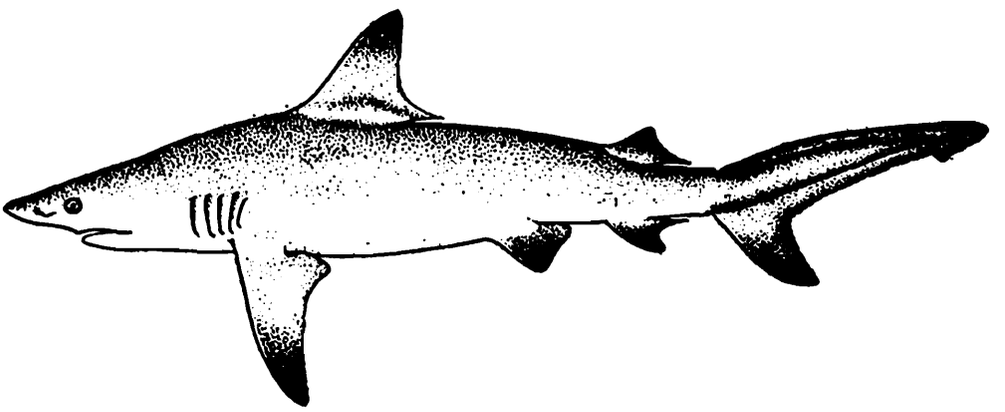
Carcharhinus limbatus (Valenciennes)

[Text-fig. 10]

Carcharias (*Prionodon*) *limbatus* Valenciennes, 1841, *Syst. Beschr. Plagiost.* : 49, pl. 19, fig. 9 (type-locality : not given).

Carcharias limbatus : Day, 1878, *Fishes of India* : 716, pl. 184, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 17.

Carcharhinus limbatus : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 65.



Text-fig. 10. *Carcharhinus limbatus* (Valenciennes)

Common Names :

Blacktip-shark	...	English
Sorra	...	Telugu
Kundan-sura	...	Tamil
Pettiyan-sravu, Paduvala-sorrah	...	Malayalam
Khaksi	...	Kannada
Walu, Mushi, Balda	...	Marathi
Moosi, Magara	...	Gujarati
Miyaru	...	Lakshadweep Is

Distinguishing Characters :

Body fusiform and moderately slender. Snout long, about equal to or slightly less than mouth-width, greater than distance between nostrils, its tip narrowly rounded to pointed; labial folds short, the upper inconspicuous. Teeth in 14 to 16 rows, the upper and lower teeth nearly symmetrical and similar, with erect, narrow cusps and serrated edges. Gill openings moderately long. First dorsal fin with a pointed or very narrowly rounded apex, its height less than 2.2. times in space between dorsal-fin bases, its origin above, or just behind pectoral insertions; second dorsal fin high, its inner margin less than 2 times fin-height, its origin over or slightly in front of anal-fin origin. Pectoral fins falcate. No dermal ridge between dorsal fins.

Colour : back dark grey, ashy blue or dusky bronze; belly white or yellowish white. Tips of pelvic fins with a persistent black spot; tips of dorsals, anal, pectorals and lower lobe of caudal fin usually dusky in juveniles, but these markings fade with growth.

Geographical Distribution : Widespread in the tropical Atlantic, Pacific and Indian Oceans.

Inhabits coastal as well as offshore waters.

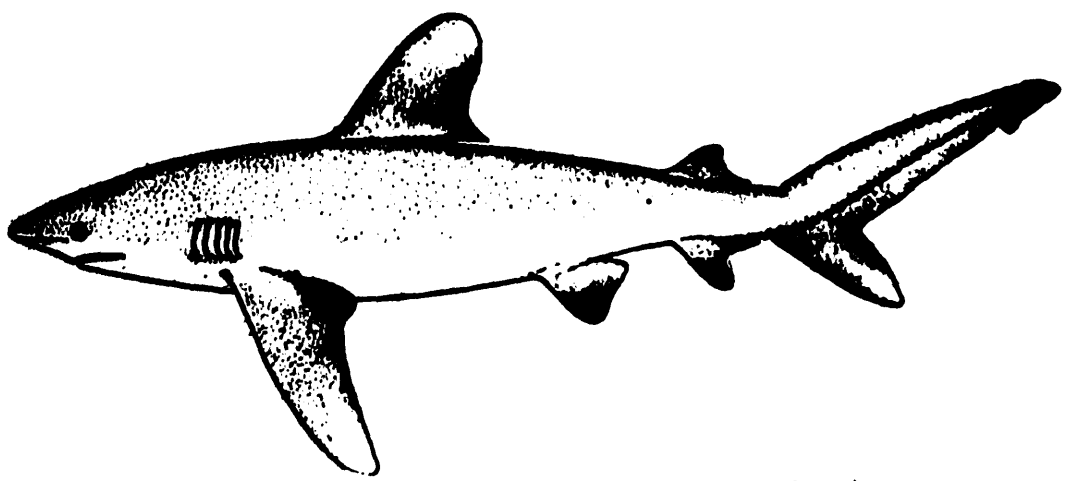
Fishery Information : This shark grows to about 240 cm. The liver oil is reported to be of high potency. One of the sharks most commonly seen in the catches of our region and forms a regular fishery on the Tamil Nadu coast

Carcharhinus longimanus (Poey)

[Text-fig. 11]

Squalus longimanus Poey, 1861, *Mem. hist. nat. Cuba*, **2** : 338, pl. 19, figs. 9-10 (type-locality; Cuba).

Carcharhinus commersonii Misra (*nec* Blainville), 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 59.



Text-fig. 11. *Carcharhinus longimanus* (Poey)

Common Name :

Oceanic whitetip-shark ... English

Distinguishing Characters :

Body moderately stout. Snout short and broadly rounded, its length equal to, or somewhat less than, mouth-width, and greater than distance between nostrils; labial folds very short; anterior nasal flaps very low, rudimentary. Teeth in numerous rows, with serrated edges, those in upper jaw broadly triangular with broad, heavy, mostly erect cusps nearly symmetrical anteriorly, but becoming increasingly oblique at sides; teeth in lower jaw with erect heavy cusps and serrated edges. First dorsal fin noticeably large, with a very broadly rounded apex, its origin slightly behind insertion of pectoral fins; origin of second dorsal fin over, or slightly in front of anal-fin origin; second dorsal fin high, its inner margin less than twice the fin-height; free rear tips of anal fin nearly reaches caudal-fin base. Pectoral fins very long, with broadly rounded wide tips. A dermal ridge present between dorsal fins.

Colour : dark grey with a slight bronze on the dorsal surface, belly whitish. In specimens over 130 mm. the tips of first dorsal, pectorals, pelvics and caudal fins are a mottled white colour; anal fin with a distinct black tip, tips of second dorsal fin may be dusky.

Geographical Distribution : Cosmopolitan, in all warm oceans.

Fishery Information : This is one of the most abundant sharks in oceanic waters and occasionally enters coastal waters in our area. In view of its abundance it is considered to be a potential resource, especially for the production of liver oil. Reported to be dangerous to man.

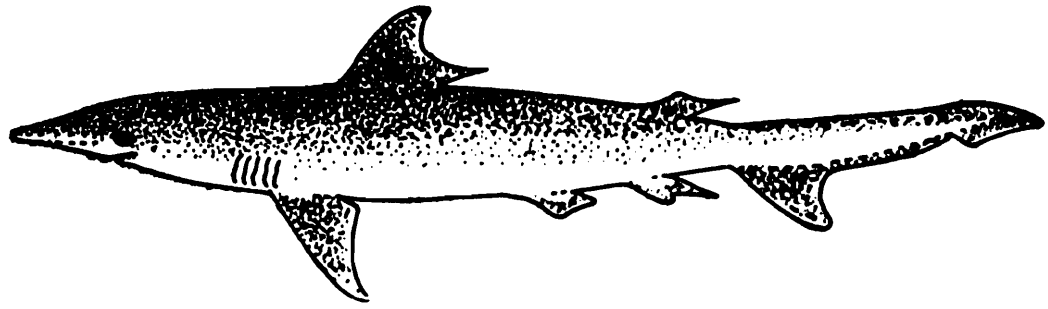
Carcharhinus macloti (Muller & Henle)

[Text-fig. 12]

Carcharias (*Hypoprion*) *macloti* Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 34, pl. 10 (type-locality : New Guinea).

Carcharias macloti : Day, 1878, *Fishes of India* : 713, pl. 188, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 12.

Hypoprion macloti : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 54, fig. 16.



Text-fig. 12. *Carcharhinus macloti* (Muller & Henle)

Common Names :

Maclot's shark	...	English
Pala-sorrah, Sorrah-kowah	...	Telugu
Toki-mushi	...	Marathi

Distinguishing Characters :

Body slender and fusiform. Snout very long and narrow, its length greater than width of mouth, and narrowly rounded and pointed; labial folds short. Teeth in numerous rows, with smooth-edged cusps, upper anterior teeth with narrow cusps and well delimited from bases. First dorsal fin with a pointed or narrowly rounded apex, its inner margin greatly elongated, its origin over insertion of pectoral-fin bases; second dorsal fin very low, with greatly enlarged inner margin 2 to 3 times fin-height; pectoral fins falcate. No dermal ridge between dorsal fins.

Colour : back greyish, belly whitish; outer half of first dorsal fin rather dark, caudal fin dark in its posterior half.

Geographical Distribution : Pakistan, India, Sri Lanka, the East Indies and Melanesia.

Fishery Information : This species is fairly common in the catches of the Kerala coast. Attains 60 cm. in length.

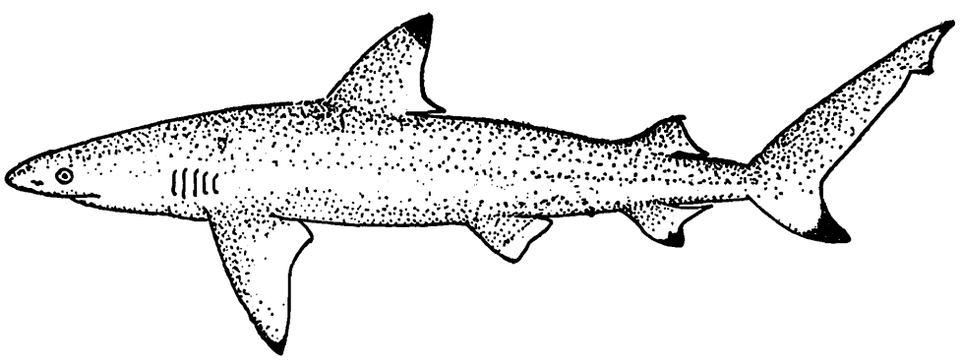
Carcharhinus melanopterus (Quoy & Gaimard)

[Text-fig. 13]

Squalus melanopterus Quoy and Gaimard, 1824, *Voy. Uranie et Physic., Zool.* (pts. 5-6) : 194, pl. 43, figs. 1 & 2 (type-locality : Waigiu, New Guinea).

Carcharias melanopterus : Day, 1878, *Fishes of India* : 715, pl. 185, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 1 : 14.

Carcharhinus spallanzani Misra (*nec* LeSueur)), 1969. *Fauna of India*, Pisces (2nd ed.), 1 : 72, fig. 23.



Text-fig. 13. *Carcharhinus melanopterus* (Quoy & Gaimard)

Common Names :

Blackfin reef-shark	...	English
Caval-sorrah, Raman-sorrah, Mukhan-sorrah, Bokka-sorrah, Ran-sorrah	...	Telugu
Koppulisura, Katta-sura, Kalakumattai-sura, Thalan-sorrah	...	Tamil
Mookan-sravu	...	Malayalam
Neikaplethantee	...	Kannada
Balda, Khada-mushi	...	Marathi
Magara	...	Gujarati

Distinguishing Characters :

Body slender. Snout very short and bluntly rounded, its length about two-thirds of width of mouth; labial folds short. Teeth in upper jaw in 11 to 13 rows; anterolateral teeth with oblique cusps, cusps of upper outer lateral teeth strongly serrated, upper anterior teeth with narrow cusps and well delimited from bases; lower teeth finely serrated. Gill openings relatively short. First dorsal fin with narrow distally pointed tips, its origin above or slightly behind pectoral insertions; second dorsal fin high, its inner margin less than twice height of fin. No dermal ridge between dorsal fins.

Colour : dorsal surface of body is a distinctive lemon-brown contrasting with the white ventral surface. Prominent black tip on first dorsal fin; caudal fin with distinct wide black margin along its entire trailing edge.

Geographical Distribution : Widespread in the Indo-west Pacific, and has been reported recently from the Mediterranean.

Fihery Information : This shark grows to about 240 cm. The liver weighs up to about 20% of total weight of fish; females possess larger livers and yield large quantities of oil. This shark is caught on bottom-lines from April to July on the east coast of India; common off Visakhapatnam, Nagapattinam and Periathalai.

Carcharhinus sorrah (Muller & Henle)

Carcharias (*Prionodon*) *sorrah* Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 45, pl. 16 (type-locality : Madagascar; Pondicherry; Java).

Carcharias sorrah : Day, 1878, *Fishes of India* : 714, pl. 185, fig. 1; Day, 1889, *Fauna Br. India, Fishes*, 1 : 12.

Carcharias sorrah : Day, 1878, *Fishes of India*, : 714, pl. 185, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 1 : 15.

Carcharhinus sorrah : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 70, fig. 22.

Carcharhinus bleekeri : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 58, pl. 6.

Common Names :

Sorrah-shark	...	English
Katta-sorrah	...	Tamil
Shirat	...	Kannada
Balda, Pisori	...	Marathi

Distinguishing Characters :

Body relatively slender. Snout short and moderately broad, its length equal to mouth-width; labial folds rudimentary. Upper and lower teeth nearly symmetrical and very similar, with oblique and narrow cusps, well delimated from bases; cusps of upper and lower teeth serrated. First dorsal fin with a narrowly rounded or pointed apex, its origin over pectoral insertions, inner margin of first dorsal fin moderately elongated; second dorsal fin very low, with greatly enlarged inner margin, 2 to 3 times fin-height; pectoral fins falcate. A huge dermal ridge present between dorsal fins.

Colour : dark grey-black on back, belly whitish; conspicuous black tips on pectorals, second dorsal and lower caudal lobe.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : One of the sharks most commonly seen in the commercial catches of the Tamil Nadu and Kerala coasts; contributes a regular fishery at Portonovo (Tamil Nadu).

Genus **Chaenogaleus** Gill

Chaenogaleus Gill, 1862, *Ann Lyceum Nat. Hist.*, **7** : 411 (type-species : *Hemigaleus macrostoma* Bleeker).

Body elongate; snout wedge-shaped in dorso-ventral view. Gill openings over twice eye length. Spiracles distinct. Labial grooves extending well on to upper and lower jaws, the upper furrow not extending in front of eyes, the lowers somewhat shorter. Lower teeth at front of mouth with long, strongly hooked cusps that prominently protrude from mouth when it is closed. Origin of second dorsal fin slightly in front of anal-fin; posterior margins of pectoral and pelvic fins straight or slightly concave. Caudal peduncle without lateral ridges; precaudal pits marked.

Monotypic.

Chaenogaleus macrostoma (Bleeker)

Hemigaleus macrostoma Bleeker, 1852, *Verh. Batav. Genootsch.* (Plagiost.), **24** : 46, pl. 2, fig. 10 (type-locality : Batavia and Samarang).

Hemigaleus balfouri Day, 1878, *Fishes of India* : 717, pl. 185, fig. 4 (type-locality : Waltair) ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 18, fig. 2.

Chaenogaleus balfouri : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 76, fig. 25.

Common Names :

Balfour's shark	...	English
Pal-sorrah	...	Tamil
Chichundri	...	Marathi
Miyaru	...	Lakshadweep Is.

Distinguishing Characters :

Body slender and elongate. Spiracles minute. Last two gill-slits above pectoral-fin base. First dorsal fin larger than second dorsal fin, its origin midway between pectoral and pelvic fins.

Colour : body dark greyish brown ; fins grey, second dorsal fin dusky distally.

Geographical Distribution : Persian Gulf, Pakistan, Laccadive Sea, India, Sri Lanka and the East Indies.

Fishery Information : Of minor fishery value in our area ; a regular item in the fishery at Cochin, Trivandrum and Tuticorin. Maximum size 60 cm.

Genus Galeocerdo Muller & Henle

Galeocerdo Muller and Henle, 1837, *Sitzb. Akad. Wiss. Berlin* : 397 (type-species : *Squalus arcticus* Faber=*Squalus cuvieri* Le Sueu).

Body fusiform. Upper labial furrows very long, extending in front of eyes. Teeth single cusped, heavily serrated, cockscomb-shaped. Spiracles present. Second fin considerably smaller than first dorsal fin, its origin in front of anal fin ; interdorsal ridge present. Caudal peduncle with lateral keel on each side ; precaudal pits present.

Monotypic.

Galeocerdo cuvieri (Le Sueur)

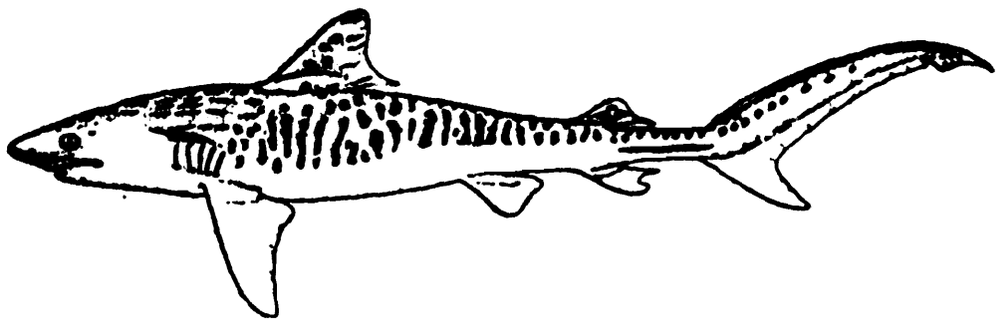
[Text-fig. 14]

Squalus cuvieri Le Sueur, 1822, *J. Acad. Sli. Philad.*, 2 : 351 (type-locality : Australia).

Galeocerdo tigrinus Muller and Henle : Day, 1878, *Fishes of India* : 718 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 21.

Galeocerdo rayneri MacDonald and Barrow : Day, 1878, *Fishes of India* : 718, pl. 187, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 20, fig. 3.

Galeocerdo cuvier : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 80, fig. 27.



Text-fig. 14. *Galeocerdo cuvieri* (Le Sueur)

Common Names :

Tiger-shark	...	English
Kethalam-sorrah	...	Telugu
Vulluvan-sorrah, Kurangu-sorrah	...	Tamil
Kalvari, Kalla-sravu	...	Malayalam
Pullia	...	Kannada
Waghbeer	...	Marathi
Bhoovar	...	Gujarati
Vorimiyaru, Valiyasurav	...	Lakshadweep Is.

Distinguishing Characters :

Body fusiform. Snout short and broadly rounded, its length much less than width of mouth. Origin of first dorsal fin over pectoral-fin axil or its inner edge.

Colour : Slaty grey, paler below, with numerous dark or brown variegated spots or vertical bars on body, and pectoral, dorsal and caudal fins, but fading with growth.

The common name of "tiger shark" comes from the striped markings visible on juveniles but fading in adult.

Geographical Distribution : All tropical Oceans

Inhabits coastal as well as offshore waters, near the surface.

Fishery Information : The large size, shallow-water habit and all embracing appetite make *G. cuvieri* one of the most dengerous species of sharks as far as man is concerned. It is reported to attain a length of 550 cm. and a weight of about 1016 kgms; it yields good liver oil having a fairly high potency of vitamin A. A good fishery of the species exists on the east coast of India from June to March.

Genus **Hemipristis** Agassiz

Hemipristis Agassiz, 1833, *Poiss. Fossiles*, **1** : 8 (type-species : *Hemipristis serra* Agassiz = *Dirrhizodon elongatus* Klunzinger)

Body slender and fusiform. Snout rounded in dorso-ventral view. Labial furrows relatively long, extending well onto upper and lower jaws, upper furrow shorter, not extending in front of eyes. Lower

teeth at front of mouth with long, strongly hooked cusps that prominently protrude from mouth when it is closed. Spiracles distinct; nasoral grooves and cirri absent. Gill openings over twice eye length. Second dorsal fin about half height of first dorsal fin, its origin in front of anal fin. Fins strongly falcate, its posterior margins deeply concave. Caudal peduncle smooth, without lateral keels; precaudal pits present.

Monotypic.

Hemipristis elongatus (Klunzinger)

[Text-fig. 15]

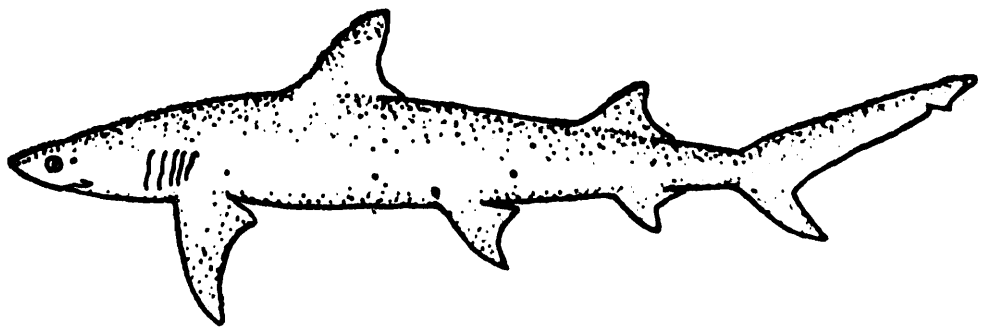
Dirrhizodon elongatus Klunzinger, 1871, *Verh. zool. bot. Ges. Wien.*, **21** : 665 (type-locality : Red Sea).

Carcharias ellioti Day, 1878, *Fishes of India* : 716, pl. 189, fig. 1 (labelled *Aprionodon acutidens*) (type-locality : Karachi, Pakistan) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 15.

Hemipristis pingali Setna and Sarangdhar, 1946, *Proc. nat. Inst. Sci. India*, **12**(5) : 253 (type-locality : Bombay).

Carcharhinus ellioti : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 62 (*nec* fig. 18).

Hemipristis elongatus : Misra, 1969, *Fauna of India*, Pisces (2nd ed), **1** : 78, fig. 26.



Text-fig. 15. *Hemipristis elongatus* (Klunzinger)

Common Names :

Fossil-shark	...	English
Pal-sorrah	...	Telugu
Peducan, Adugupal-sorrah	...	Tamil
Pingal, Datri	...	Marathi

Distinguishing Characters :

Body slender and fusiform. Head moderately depressed, with a rounded snout. Mouth with definite labial furrows in both jaws. Spiracles very small, 1/5 of eye-diameter. Fins strongly falcate; pelvic fins notably long.

Colour : body light ashy-brown above, dull white on sides and belly.

Geographical Distribution : The Red Sea, east coast of Africa, Pakistan, India, Sri Lanka, Gulf of Thailand and Vietnam.

Fishery Information : Of minor fishery value in our region; prized at Tuticorin (Tamil Nadu).

Genus **Lamiopsis** Gill

Lamiopsis Gill, 1862, *Ann. Lyceum Nat. Hist.*, **7** : 401 (type-species; *Carcharias* (*Prionodon*) *temminckii* Muller & Henle).

Body fusiform; snout fairly long, the preoral length about equal to width of mouth. Labial furrows reduced, confined to mouth corners. Spiracles absent. Upper teeth with broad, high serrated, triangular cusps; lower teeth narrow with smooth cusps. Second dorsal fin about as large as first dorsal fin, its origin slightly before anal fin. Caudal peduncle with lateral keels; precaudal pits present.

Monotypic.

Lamiopsis temminckii (Muller & Henle)

Carcharias (*Prionodon*) *temminckii* Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 48, pl. 18 (type-locality : Pondicherry).

Carcharias temminckii : Day, 1878, *Fishes of India* : 717; Day, 1889, *Fauna Br. India,* Fishes, **1** : 17.

Carcharhinus temminckii : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 74, fig. 24.

Common Names :

Fawn-shark	...	English
Noeti-sura	...	Telugu
Korasura	...	Tamil
Thekkan-sravu	...	Malayalam
Nedunth	...	Kannada
Kirwa, Mushi	...	Marathi

Distinguishing Characters :

Body moderately slender and fusiform. Snout long; about equal to width of mouth. Origin of first dorsal fin behind inner angle of depressed pectoral fin; second dorsal fin distinctly larger than anal fin.

Colour : back fawn, belly white; fins largely grey terminally.

Geographical Distribution : India, Burma and the East Indies.

Fishery Information : This shark grows to about 240 cm. The liver oil of this species is reported to be of high potency. One of the sharks most commonly seen in the commercial catches of th east of India.

Genus **Loxodon** Muller & Henle

Loxodon Muller and Henle, 1838, *Mag. Nat. Hist.*, new ser., **2** : 36 (name & diagnosis) ; Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 61 (type-species : *Loxodon macrorhinus* Muller & Henle) ; Springer, 1964, *Proc. U.S. nam. Mus.*, **115** (3493) : 583 (Revision).

Sharks of moderate size, with moderately depressed head. Posterior rim of orbit with a slight notch at midlevel (though it may not always be obvious to the untrained observer unless compared with the smooth orbital rims of other species). Labial furrow in upper jaw poorly developed, usually shorter than lower furrow. Spiracles minute or indiscernible Tip of posterior margin of first dorsal fin over pelvic-fin origin or in front of them; second dorsal fin posterior to anal fin, virtually on or just anterior to anal-fin insertion. Precaudal pits present.

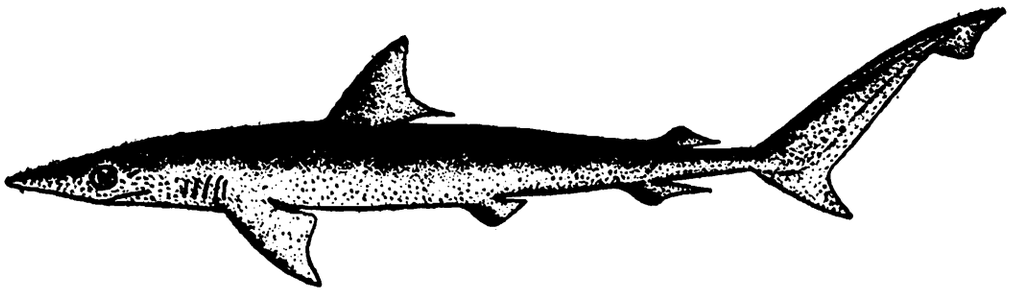
Monotypic.

Loxodon macrorhinus Muller & Henle

[Text-fig. 16]

Loxodon macrorhinus Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 61, pl. 25 (type-locality : not known) ; Nair, Appukuttan and Rajapandian, 1974, *Indian J. Fish.*, **21**(1) : 225, fig. 2 A-G.

Scoliodon ceylonensis Setna and Sarangdhar, 1946, *Proc. nat. Inst. Sci. India*, **12**(5) : 252 (type-locality : Bombay).



Text-fig. 16. *Loxodon macrorhinus* Muller & Henle

Common Names :

Sliteye-shark	...	English
Cosorrah	...	Tamil
Mushi	...	Marathi

Distinguishing Characters :

Body slender, the head long and rather pointed. Teeth in rows ; cusps of teeth smooth and obliquely directed rearward. Head with 5 gill slits, the 3rd or 4th over pectoral-fin origin.

Colour : body greyish dorsally, fading ventrally towards sides to become whitish ventrally ; posterior margin of upper caudal-fin lobe blackish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This shark contributes a good fishery along the south-east coast of India, usually between 30 and 70 m. depth on sandy and muddy bottoms.

Genus **Mustelus** Linck

Mustelus Linck, 1790, *Mag. Physik Naturg. Gotha*, **6**(2) : 31 (type-species : *Squalus mustelus* Linnaeus).

Small to medium-sized sharks. A supraorbital crest on head. Eyes dorsolateral on head. Distinct spiracles present. Teeth blunt, flat and molariform, in several functional series along jaws, forming a mosaic pattern. Two dorsal fins ; origin of first dorsal fin behind pectoral-fin bases ; second dorsal fin notably smaller than first, its origin well ahead of anal fin. Caudal fin broad and not greatly elongated ; caudal peduncle without precaudal pits or longitudinal keel.

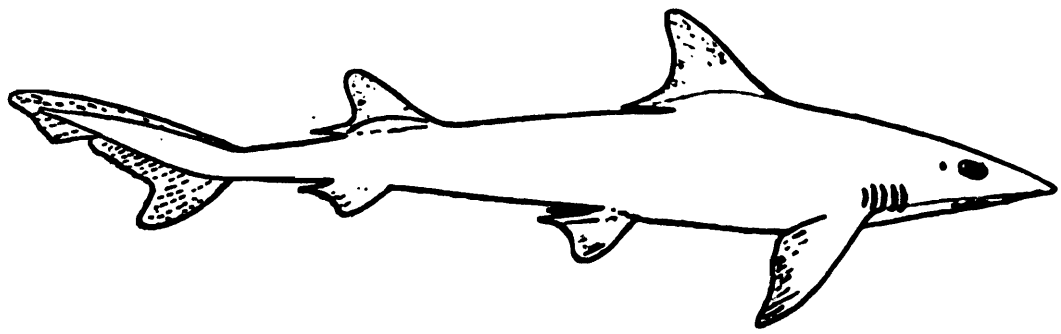
Several species, one in our area. Dr. P. C. Heemstra has recently revised the genus.

Mustelus mosis (Ehrenberg)

[Text-fig. 17]

Squalus mosis Ehrenberg, 1815, *Trans. Lit. Phil. Soc. N.Y.*, **1** : 486 (type-locality : not given).

Mustelus manazo Bleeker : Day, 1878, *Fishes of India* : 720, pl. 186, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1** : 24, fig. 5; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 83, fig. 28.



Text-fig. 17. *Mustelus mosis* (Ehrenberg)

Common Names :

Gummy Smooth-hound		English
Pal-sorrah	...	Telugu
Kajari-mager	...	Marathi

Distinguishing Characters :

A small shark, with an elongate and slender body; snout markedly pointed and long. Mouth triangular, with well developed labial folds Skin fairly smooth.

Colour : body reddish-grey above, dull white ventrally.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery importance in our region

Genus **Negaprion** Whitley

Negaprion Whitley, 1940, *Fishes of Australia*, (pt. 1) : 111 (type-species : *Aprionodon acutidens queenslandicus* Whitley).

Snout short, the preoral length much less than mouth-width. Teeth similar in both jaws, with narrow smooth-edged cusps; cusplets absent on lower teeth, low or absent on upper. Minute upper labial furrow present, but no lower lip grooves. Second dorsal fin as large as first dorsal fin; no interdorsal ridge. Caudal peduncle without lateral ridges; definite precaudal pits present.

The characteristic pale brown colour gives rise to the common name of 'Lemon shark' Three species in the Indian Ocean, two in our area.

KEY TO SPECIES

1 (a) Bases of teeth, as well as cusps, smooth-edged; teeth in numerous rows in jaws	...	*N. odontaspis**
(b) Edges of bases of teeth with one strong denticle on outer side; teeth in a single row in jaws	...	*N. acutidens*

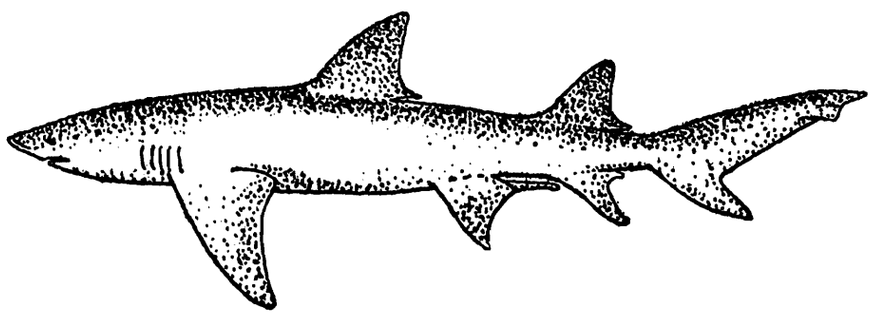
Negaprion acutidens (Ruppell)

[Text-fig. 18]

Carcharias acutidens Ruppell, 1835, *Neue Wirbelth., Fische* : 65, pl. 18, fig. 3 (type-locality : Djedda, Red Sea) ; Day, 1878, *Fishes of India* : 713; Day, 1889, *Fauna Br. India*, Fishes, **1** : 11.

Carcharias ellioti Day (*nec* Day, 1878, p. 716), 1878, *Fishes of India* : pl. 189, fig. 2.

Aprionodon acutidens : Misra, 1969, *Fauna of India,* Pisces (2nd ed), **1** : 51 (*nec* fig. 15).



Text-fig. 18. *Negaprion acutidens* (Ruppell)

Common Names :

Indian Lemon-shark	...	English
Pilal	...	Tamil

Distinguishing Characters :

Body stout. Snout short and broad, shorter than width of mouth; labial folds minute at mouth corners. Spiracles absent. Teeth in a single row, narrow, their cusps smooth-edged and erect. Origin of first

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* *Negaprion odontaspis* (Fowler) has recently been recorded in our area based on a juvenile specimen from the Laccadive Sea.

dorsal fin behind free rear tips of pectoral-fin bases; second dorsal fin nearly as large as first. Pectoral fins broad and slightly falcate.

Colour : body olive grey or yellowish brown, but often darker; belly yellowish or whitish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Fairly common in the catches of our area and is especially prized for its fins; the liver is used in the production of oil and fins for gelatine.

Genus **Rhizoprionodon** Whitley

Rhizoprionodon Whitley, 1929, *Austral. Zool.*, **5** : 354 (type-species : *Carcharias* (*Scoliodon*) *crenidens* Klunzinger) ; Springer, 1964, *Proc. U.S. natn. Mus.*, **115** (3493) : 590 (Revision).

Sharks of small to moderate size, with moderately depressed head. Orbit small, with no notch in its posterior edge; spiracles absent. Mouth width 6·2 to 7.8% and its length 4.1 to 5.3% of total length; labial folds usually well-developed (except in most specimens of *R. oligolinx*.). First dorsal-fin base usually less than two times in distance from pectoral to pelvic-fin bases; free rear tip of first dorsal fin over pelvic-fin origin or in front of them. Origin of second dorsal fin ranges from middle of anal-fin base (rarely) to anal-fin axil. Precaudal pits present; no keels on caudal peduncle.

Seven species, two in our area.

KEY TO SUBGENERA/SPECIES

1 (a) Upper labial furrow short or virtually absent, 0 to 1.3% of total length (rarely more than 1%), usually shorter than lower labial furrow (subgenus *Protozygaena* Whitley) ... *R. oligolinx*

(b) Upper labial furrow longer, always present, more than 1.1% of total length (usually more than 1.3%), rarely shorter than lower labial furrow (subgenus *Rhizoprionodon* Whitley) ... *R. acutus*

Rhizoprionodon acutus (Ruppell)

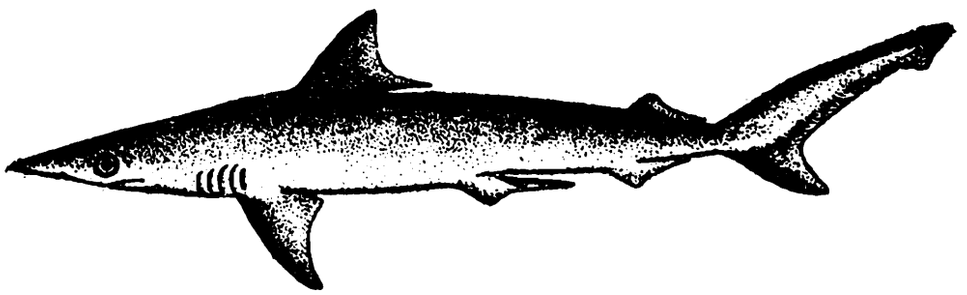
[Text-fig. 19]

Carcharias acutus Ruppell, 1837, *Fische des rothen Meeres* : 65, pl. 18, fig. 4 (type-locality : Red Sea).

Carcharias walbeehmii Bleeker : Day, 1878, *Fishes of India* : 712, pl. 185, fig. 2.

Carcharias walbeehmi : Day, 1889, *Fauna Br. India,* Fishes, **1** : 10.

Scoliodon walbeehmi : Misra, 1969, *Fauna of India,* Pisces (2nd *ed.*), **1** : 49.



Text-fig. 19. *Rhizoprionodon acutus* (Ruppell)

Common Names :

Milk Dog-shark	...	English
Co-sorrah	...	Tamil
Mushi, Mori	...	Marathi
Mooshi	...	Gujarati
Eidah	...	Andaman Is.

Distinguishing Characters :

Body slender and fusiform. Snout long and pointed; labial folds well developed, the lower shorter than upper, equal to width of first gill-slit. Origin of first dorsal fin usually slightly in advance of inner corner of pectoral fin; origin of second dorsal fin over posterior third of anal-fin base to over anal-fin axil.

Colour : back slimy grey, belly white; fins dark, with light margin; upper caudal fin black.

Geographical Distribution : Widespread from Madeira in the eastern Atlantic, to to the East African coast, Madagacar, the Red Sea, India, through the East Indies, to Australia and Japan.

Fishery Information : A good fishery exists along the Tamil Nadu coast and also at Cochin (Kerala). Inhabits shallow coastal waters, usually between 30 and 75 m. depth, on sand and muddy bottoms. Attains 45 cm. in length.

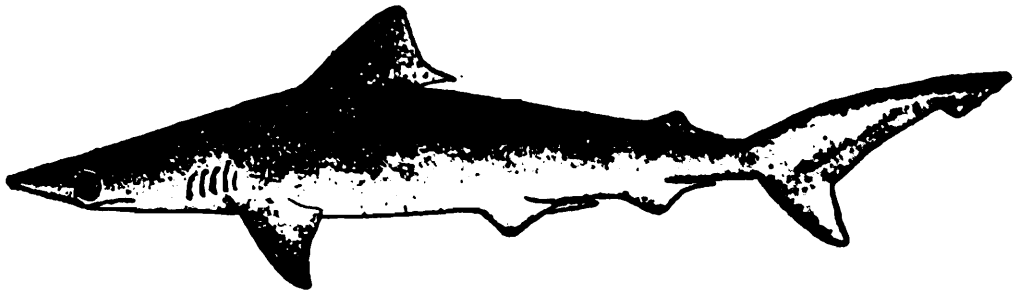
Rhizoprionodon oligolinx Springer

[Text-fig. 20]

Carcharias acutus (*nec* Ruppell) Day, 1878, *Fishes of India* : 712, pl. 184, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 10.

Rhizoprionodon (*Protozygaena*) *oligolinx* Springer, 1964, *Proc. U.S. natn. Mus.*, **115** (3493) : 621, figs. 12, 13 (type-locality : Gulf of Thailand).

Scoliodon palasorrah (*nec* Cuvier) Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 45, fig. 13.



Text-fig. 20. *Rhizoprionodon oligolinx* Springer

Common Names :

Grey Dog-shark	...	English
Sem-sorrah	...	Telugu
Purrooway-sorrah, Pal-sorrah	...	Tamil
Parl-sorrah	...	Malayalam

Distinguishing Characters :

Body slender and fusiform. Snout long and pointed ; upper labial folds very short (poorly developed), shorter than lower labial furrow, lower confined to corners of mouth. Origin of first dorsal fin over inner corner of pectoral fin ; origin of second dorsal fin slightly in front of end of anal-fin base.

Colour : back dorsally grey, gradually fading towards the ventral side, belly whitish ; fins yellowish, upper caudal fin dusky.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Contributes a commercial fishery along the Orissa coast and in the Gulf of Mannar. Attains 53 cm in length.

Genus **Scoliodon** Muller & Henle

Scoliodon Muller and Henle, 1837, *Sitzb. Akad. Wiss. Berlin* : 114 (name only) ; Muller and Henle, 1841, *Syst. Beschr. Plagiost.* : 27 (type-species : *Carcharias* (*Scoliodon*) *laticaudus* Muller & Henle) ; Springer, 1964, *Proc. U.S. natn. Mus.*, **115** (3493) : 573 (Revision).

Small sharks with a flat and towel-shaped head. Spiracles absent. Free rear tip of first dorsal fin about over midbase of pelvic fins ; origin of second dorsal fin usually over posterior fifth of anal-fin base. Origin

of pectoral fin below or slightly in advance of 5th gill-slit; distal tip of appressed pectoral fin over, usually anterior to its inner corner, both tip and inner corner well in advance of level of first dorsal fin. Dorsal margin of caudal fin irregular or rippled; precaudal pits present.

Monotypic.

Scoliodon laticaudus (Muller & Henle)

[Text-fig. 21]

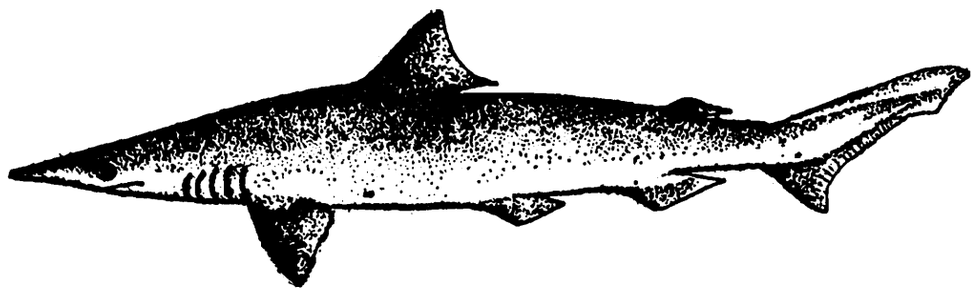
Carcharias (*Scoliodon*) *laticaudus* Muller and *Henle,* 1841, *Syst. Beschr. Plagiost.* : 28, pl. 8 (type-locality : India).

Carcharias laticaudus : Day, 1878, *Fishes of India* : 712, pl. 188, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 9, fig. 1.

Carcharias mulleri Valenciennes : Day, 1878, *Fishes of India* : 713; Day, 1889, *Fauna Br. India,* Fishes, **1** : 11.

Physodon mulleri (Valenciennes) : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 43.

Scoliodon sorrakowah (Cuvier) : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 47, fig. 14.



Text-fig. 21. *Scoliodon laticaudus* (Muller & Henle)

Common Names :

Indian Dog-shark	...	English
Palah-sorrah, Nullian-sorrah	...	Telugu
Pillai-sorrah	...	Tamil
Mori	...	Kannada
Mushi, Son-mushi	...	Marathi
Moosi, Sandha	...	Gujarati

Distinguishing Characters :

Body slender and fusiform. Snout long and depressed. Upper labial furrow poorly developed, as a short crease directed at right angle from lower furrow, visible when mouth is closed. No interdorsal ridge. Lower precaudal pit indistinct.

Colour : body pale greyish-brown above, dull white at sides; fins darker than body.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Small sharks ranging from 330 to 590 mm. in total length, constitute a good fishery along the west and the south-

east of India, particularly in the nearshore waters. Better taken on hook and line. Known to move in shoals composed of one sex.

Remarks: Thillayampalam (1929, *Indian Zool. Mem.*, (2) : 1-116) has given a detailed anatomical description of *Scoliodon laticaudus* (as *S. sorrakowa*). Some portions of this work are based on other species (*Rhizoprionodon*), but the study is an important one.

Genus **Triaenodon** Muller & Henle

Triaenodon Muller and Henle, 1837, *Sitzb. Akad. Wiss. Berlin* : 117 (type-species : *Carcharias obesus* Ruppell) ; Taniuchi, 1975, *Jap. Jour. Ichth.*, 22(3) : 167 (Review).

Body elongate; snout very short and blunt. Nostrils with tubular anterior and medial rostral flaps. Spiracles occasional. Teeth in rows rather than a mosaic arrangement, in 2 or 3 functional series, upper and lower teeth with high accessory cusps or cusplets or on each side of cusp. Minute lip grooves barely extending around mouth corners. Two dorsal fins; second dorsal fin and anal fin about equal in size, each about half size of first dorsal fin; no interdorsal ridge. Caudal peduncle with no lateral keels; precaudal pits present, the lower indistinct. Caudal fin with a definite lower lobe; dorsal margin of caudal fin irregular.

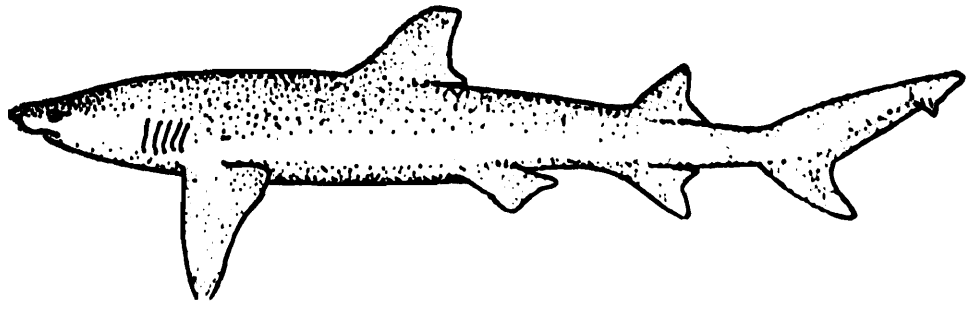
Monotypic; *Triaenodon obtusus* Day, 1878, is most likely a synonym of *Carcharhinus amboinensis* (Muller & Henle) according to Dr. L. J. V Compagno.

Triaenodon obesus (Ruppell)

[Text-fig. 22]

Carcharias obesus Ruppell, 1837, *Neue Wirbelth., Fische* : 64, pl. 18, fig. 2 (type-locality : Djedda, Red Sea).

Triaenodon obesus : Misra (*partim*), 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 85 (*nec* fig. 29) ; Randall, 1977, 1977, *Pacif. Sci.*, 31(2) : 143.



Text-fig. 22. *Triaenodon obesus* (Ruppell)

Common Name :

Whitetip Reef-shark ... English

Distinguishing Characters :

Body elongate; head flat and depressed, the snout blunt. Mouth wide, with hardly any labial folds. Two dorsal fins, origin of first fin about midway between pectoral-fin axil and pelvic-fin base. Second dorsal fin large, almost equal in height to first dorsal fin.

Colour : body greyish-brown, darker on head region, and creamy ventrally. First dorsal and upper caudal fins white-tipped; second dorsal fin and lower caudal-fin lobe often white-tipped; a small whitish blotch often present near apex on lower side of pectoral fin.

Geographical Distribution : From the Red Sea and east coast of Africa, eastward to Panama.

Fishery Information : Of minor fishery value in our region.

Family : Sphyrnidae
[Hammerhead-sharks]

Medium to large-sized sharks. Body elongate and moderately slender, anterior portion of head much flattened dorso-ventrally and very widely expanded laterally in "hammer" or "shovel" form, with the eyes at its outer edges. Two dorsal fins, the first high and pointed, its base wholly anterior to pelvic fins. Caudal fin strongly asymmetrical, with a well marked subterminal notch and a small but well defined lobe; distinct precaudal pits present. Colour : back predominantly grey or brassy, belly white.

Only one genus recognised.

Genus **Sphyrna** Rafinesque

Sphyrna Rafinesque, 1810, *Indice d'ittiologia Siciliana* : 46, 60 (type-species : *Squalus zygaena* Linnaeus) ; Gilbert, 1967, *Proc. U.S. natn. Mus.*, **119**(3539) : 10 (Revision).

Distinguished primarily by the shape of head which is expanded laterally, thus eyes moved outward. Nostrils distinct from one another and from mouth. Mouth crescentric, inferior; no spiracles. First dorsal fin large; second dorsal and anal fins small; no interdorsal ridge. Caudal fin with a definite upper precaudal pit.

Nine species, 4 in our area.

KEY TO SUBGENERA/SPECIES

1 (a) Head with long lateral extension from each side, 2 or 3 times long as wide; eyes and nostrils widely separated; outer narial groove present (subgenus *Eusphyrna* Gill) ... *S. blochii*

(b) Head with moderate extension from each side, greatest width of head not more than 32% of total length; eyes and nostrils close together (subgenus *Sphyrna*) ... 2

2 (a) Prenarial grooves absent or hardly developed; teeth strongly serrated; second dorsal fin very high, with a short inner margin and deeply concave posterior margin; pelvic fins high and falcate ... *S. mokarran*

(b) Prenarial grooves strongly developed; teeth smooth-edged in young, weakly serrated in large individuals; second dorsal fin low, with a long inner margin and a straight or shallowly concave posterior margin; pelvic fins low and not falcate ... 3

3 (a) Front margin of head with a distinct median indentation or "scallop"; anal-fin base noticeably larger than second dorsal-fin base ... *S. lewini*

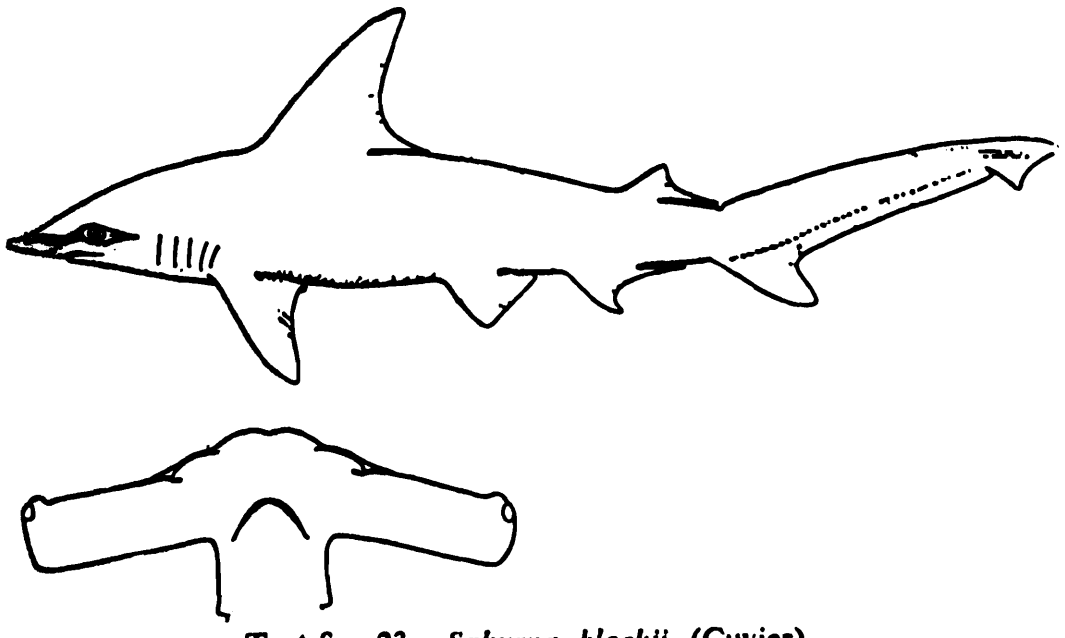
(b) Median indentation lacking on anterior margin of snout; anal-fin base as large as second dorsal-fin base ... *S. zygaena*

Sphyrna blochii (Cuvier)

[Text-fig. 23]

Zygaena blochii Cuvier, 1817, *Regne Animal*, (ed. 1), **2** : 127 (type-locality : Mediterranean) ; Day, 1878, *Fishes of India* : 719, pl. 184, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 22, fig. 4.

Sphyrna blochii : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 87, fig. 30.



Text-fig. 23. *Sphyrna blochii* (Cuvier)

Common Names :

Arrow-headed hammerhead	...	English
Sappa-sorrah	...	Telugu
Komban-sorrah	...	Tamil
Kahnankodi	...	Malayalam
Khan-mushi, Kebichatte	...	Kannada
Zori, Kanar	...	Marathi
Kannar	...	Gujarati

Distinguishing Characters :

Body elongate and laterally compressed. Head hammer-shaped, extremely wide, its greatest width 42 to 50% of total body-length. Eyes and nostrils (nares) widely separated, situated more than half distance away from eye to anterior median notch; outer narial groove present. Upper precaudal pit merely a narrow longitudinal groove.

Colour : body uniform grey or grey-brown, shading to white below; no markings on fins.

Geographical Distribution : Widespread in the Indo-West Pacific.

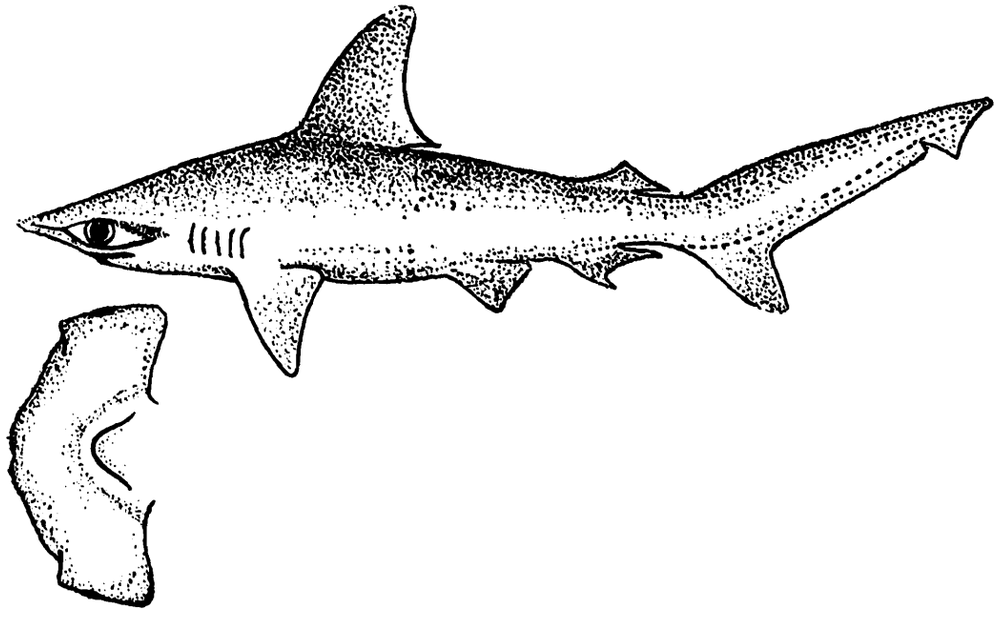
Fishery Information : Contributes a good fishery on the Bengal-Orissa coast, in the Gulf of Mannar and the Kerala coast. It attains about 150 cm, and fish about 1.5 m. are frequently caught in the commercial catches. Good liver-oil of high vitamin A potency is obtained from this species.

Sphyrna lewini (Cuvier, Griffith & Smith)

[Text-fig 24]

Zygaena lewini Cuvier, Griffith and Smith, 1834, *Animal Kingdom*, **10** : 640, pl. 50 (type-locality : south coast of New Holland).

Zygaena tudes Day (nec Valenciennes), 1878, *Fishes of India* : 720, pl. 188, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 23.



Text-fig. 24. *Sphyrna lewini* (Cuvier, Griffith & Smith)

Common Names :

Scalloped hammerhead	...	English
Koma-sorrah	...	Telugu
Magala, Kanmushi	...	Marathi
Kannar	...	Gujarati

Distinguishing Characters :

Body elongate and laterally compressed. Head "hammer"-shaped, its greatest width 27 to 29% of total body-length ; i's anterior contour slightly convex with a shallow, but distinct indentation at midline ; lateral expansions of head very prominent ; eyes large. Nares near eyes ; outer narial groove absent, prenarial groove extends less than halfway of distance from narial opening to snout tip. Teeth triangular, usually with smooth-edged cusps (sometimes slightly serrated in large individuals). First dorsal fin high, falcate ; second dorsal fin small, its base noticeably smaller than anal-fin base. Pelvic fins low, with a nearly straight hind margin.

Colour : body uniform grey, greyish brown or olivaceous above, shading to white below ; pectoral fins tipped grey or black ventrally.

Geographical Distribution : Circumtropical in distribution ; fairly common in the Atlantic and the Pacific Oceans ; in the Indian Ocean it occurs in the Gulf of Aden, India, Sri Lanka, Burma, Celebes and Java.

Fishery Information : Constitutes an important component in the drift gill-net catches of the Orissa coast, and the species is also caught at Kilakarai (Gulf of Mannar). Good liver-oil of high vitamin A potency is obtained from this species. Very common off Cochin and perhaps the most abundant shark during certain months.

Sphyrna mokarran (Ruppell)

Zygaena mokarran Ruppell, 1835, *Neue Wirbelth. Fische* : 66, pl. 17, fig. 3 (type-locality : Red Sea) ; Day, 1888, *Fishes of India Suppl.* : 809 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 23.

Zygaena dissimilis Murray, 1887, *J. Bombay nat. Hist. Soc.*, **2** : 103, pl. (type locality : Karachi, Pakistan).

Sphyrna mokarran : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 89.

Common Name :

Great hammerhead	...	English

Distinguishing Characters :

Body elongate and laterally compressed. Head "hammer"-shaped, its width from 23 to 31% total body-length, its anterior contour with

a deep median indentation. Eyes and nostrils close together; narial grooves absent or hardly developed. Teeth strongly serrated at all sizes. Second dorsal fin very high, its height slightly greater than height of anal fin. Pelvic fins high and deeply falcate. A shallow upper precaudal pit, with an acutely pointed posterior ridge.

Colour : body grey or greyish-brown dorsally, becoming pale below; no markings on fins.

Geographical Distribution : Warm tropical waters throughout the world.

Fishery Information : Not taken in large quantities along the Indian coast except at Portonovo (Tamil Nadu) where it forms a regular fishery. Maximum size 500 cm total length.

Sphyrna zygaena (Linnaeus)

Squalus zygaena Linnaeus, 1758, *Systema Naturae*, (ed. 10), **1** : 234 (type-locality : Europe; America).

Zygaena malleus Valenciennes : Day, 1878, *Fishes of India* : 719, pl. 186, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 22.

Sphyrna zygaena : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 92; Devadoss and Natarajan, 1977, *Curr. Sci.*, **46**(5) : 166.

Common Names :

Round-headed hammerhead	...	English
Komban-sorrah	...	Tamil
Variocha	...	Kannada
Boot	...	Marathi
Kombansurav	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and laterally compressed. Head "hammer"-shaped, its greatest width 26 to 29% of total body-length, its anterior contour not indented at midline. Nares present near eyes; outer narial groove absent, prenarial groove strongly developed. Teeth smooth-edged, weakly serrated in large individuals. Second dorsal fin low, with a long inner margin and a shallowly concave posterior margin. Anal-fin base about as large as second dorsal-fin base. Pelvic fins low, with a nearly straight hind margin.

Colour : deep olive to brownish-grey dorsally, shading to white ventrally; tip of ventral surface of pectoral fin sometimes faintly grey-black.

Geographical Distribution : Circumtropical.

Fishery Information : At Portonovo (Tamil Nadu) it forms a regular fishery and perhaps also at Kilakarai (Tamil Nadu).

ORDER : SQUALIFORMES
SUBORDER : SQUALOIDEI
FAMILY : SQUALIDAE
[Dogfish Sharks]

Small to medium-sized sharks. Body usually elongate. Head with 5 lateral gill-openings, all anterior to pectoral fins. Eyes lateral, without nictitating fold or membrane. Spiracles present. Two dorsal fins, each preceded by a long or short spine, with tip exposed or concealed. No anal fin. Caudal fin strongly asymmetrical to nearly symmetrical, the lower lobe weak to strong, well defined.

Eight genera, four in our area.

KEY TO GENERA

1 (a) Dorsal-fin spines not grooved; no subterminal notch on caudal fin	...	**Squalus**
(b) Dorsal-fin spines with lateral grooves; subterminal notch present on caudal fin	...	2
2 (a) Upper teeth with several cusps	...	**Centroscyllium***
(b) Upper teeth with single cusps	...	3
3 (a) Upper teeth relatively broad, lowers low and wide; dorsal-fin spines prominent and strong; first dorsal-fin origin far forward, close behind pectoral-fin bases; free rear tips of pectoral fins elongated and acutely pointed	...	**Centrophorus**
(b) Upper teeth very narrow, lowers high and wide; dorsal-fin spines very small; first dorsal-fin behind pectoral fins; free rear tips of pectoral fins short and broadly rounded	...	**Centroscymnus***

Genus **Centrophorus** Muller & Henle

Centrophorus Muller and Henle, 1837, *Arch. Naturg.* : 398 (type-species : *Centrophorus granulosus* Muller & Henle = *Squalus granulosus* Schneider) ; Bigelow and Schroeder, 1957, *Bull. Mus. Comp. Zool.*, 117 : 1 (Review).

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* The genus *Centroscyllium* Muller & Henle represented by *C. ornatum* (Alcock), and the genus *Centroscymnus* Bocage & Capello represented by *C. rossi* (Alcock) in our region, are of practically no commercial interest.

Teeth markedly dissimilar in both jaws, unicuspid; upper teeth relatively broad, lowers lower and wide. A prominent and strong spine with lateral grooves, on anterior margin of each of the dorsal fins; origin of first dorsal fin far forward, close behind pectoral-fin bases and above inner margins of pectorals; free tips of pectoral fins elongated and acutely pointed. No precaudal pits or caudal keels; a well-marked subterminal notch present on upper caudal fin.

Four species known, one in our area.

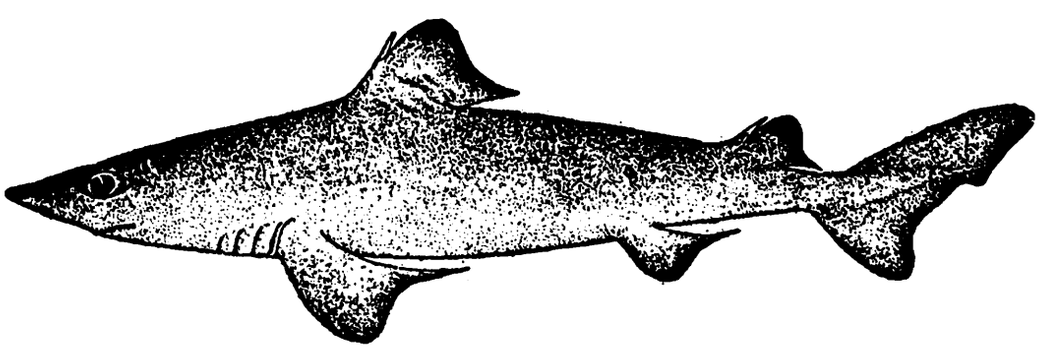
Centrophorus moluccensis Bleeker

[Text-fig. 25]

Centrophorus moluccensis Bleeker, 1860, *Act. Soc. Sci. Indo-Neerland.*, **8** : 3 (type-locality : Amboina).

Atractophorus armatus Gilchrist : Silas, Selvaraj and Regunathan, 1969, *Curr. Sci.*, **38**(5) : 106, fig. 1C.

Centrophorus armatus : Nair and Mohan, 1972, *J. Bombay nat. Hist. Soc.*, **69**(1) : 195, fig. 1A.



Text-fig. 25. *Centrophorus moluccensis* Bleeker

Common Name :

Arrowspine dogfish ... English

Distinguishing Characters :

Body elongate and fusiform; snout pointed. Teeth markedly unlike in both jaws, small and with a single cusp, lower teeth much larger than uppers. Two dorsal fins; origin of first dorsal fin close behind pectoral-fin bases; each dorsal fin with a spine on its anterior margin. Caudal fin with a subterminal notch. Skin with close-set, sessile, thorn-like denticles.

Colour : body grey-brown above, paler below; fins slightly darker than back; area about and above gill-slits darkened, as is a patch above eye and extending back to surround spiracle.

Geographical Distribution : Southern Africa, India, Japan, Taiwan and south-east Australia; bathypelagic, 100 to 150 m.

Fishery Information : Of minor commercial significance, being very rarely caught.

Genus **Squalus** Linnaeus

Squalus Linnaeus, 1758, *Systema Naturae*, (ed. 10), **1** : 233 (type-species : *Squalus acanthias* Linnaeus) ; Garrick, 1960, *Trans. R. Soc. N.Z.*, **88** : 519 (Review).

Body elongate and fusiform. Teeth nearly alike in both jaws, those in lower jaw not greatly enlarged ; both jaws with strongly oblique, small teeth with a single cusp. Two dorsal fins, each fin with a well developed spine without lateral grooves on its anterior margin. Caudal peduncle strongly flattened below, with a strong keel on each side ; no subterminal notch on caudal fin.

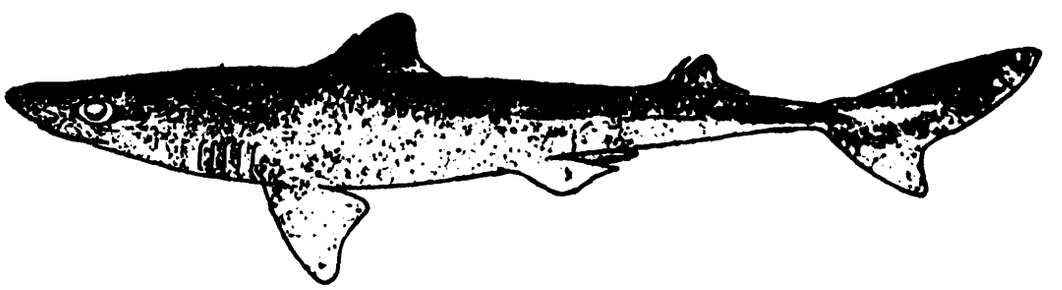
Several species known, one in our region.

Squalus blainvillei (Risso)

[Text-fig. 26]

Acanthias blainvillei Risso, 1826, *Hist. Nat. Europe Merid.*, **3** : 133, pl. 3 (type-locality : ? Mediterranean).

Squalus fernandinus Silas and Prasad (*nec* Molina), 1969, *Curr. Sci.*, **38**(20) : 484, fig. 1.



Text-fig. 26. *Squalus blainvillei* (Risso)

Common Name :

Bigeye dogfish ... English

Distinguishing Characters :

Body elongate and fusiform. Head depressed, the snout bluntly pointed ; mouth very slightly arched ; teeth alike in both jaws, small, compressed, with a single cusp and strongly oblique. Spiracles rather small. Distance from tip of snout to inner corner of nostril greater than that from inner corner of nostril to upper labial furrow. Two dorsal fins ; dorsal-fin spines fairly prominent, the first spine in front of or over free rear tips of pectoral fins ; second dorsal fin markedly smaller than first. Posterior margin of pectoral fin weakly concave, their free tips rounded. Denticles broad and tricuspidate on sides of body.

Colour : uniform dark grey; inner side of claspers and skin around vent pale white.

Geographical Distribution : Circumpolar in both the northern and southern hemispheres, in tropical and subtropical waters as well as in the temperate regions.

Fishery Information : Presently there is only a single record of this species in our waters but species of *Squalus* are of considerable economic importance in adjacent regions constituting sizable fishery.

FAMILY : ECHINORHINIDAE
[Bramble Sharks]

Body rather fusiform, longer than tail. Head moderately depressed, but not greatly flattened. Mouth short and arcuate; prominent labial furrows; teeth alike in both jaws, multicuspid (unicuspid in juveniles). Gill-openings five, moderate, before pectoral fins. Spiracles minute. Two dorsal fins; no fin spines. No anal fin. Precaudal pits present; scattered spine-like tubercles on body.

Single genus only.

Genus **Echinorhinus** Blainville

Echinorhinus Blainville, 1816, *Bull. Soc. Philomath. Paris*, **8** : 121 (type-species : *Squalus spinosus* Gmelin = *Squalus brucus* Bonnaterre).

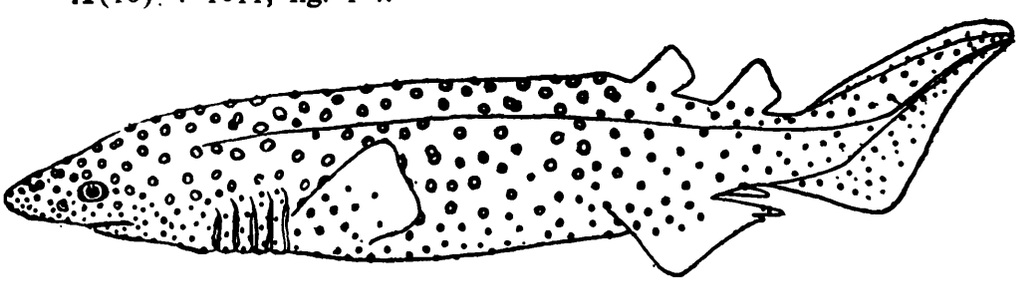
For characters of the genus, see those of family.

Two species known, *E. brucus* from most oceans and the rare *E. cooki* Pietschmann from the Pacific.

Echinorhinus brucus (Bonnaterre)
[Text-fig. 27]

Squalus brucus Bonnaterre, 1788, *Tabl. Encyc. Meth. Ichthyol.* : 11 (type-locality : North Atlantic).

Echinorhinus brucus : Silas, Selvaraj and Regunathan, 1969, *Curr. Sci.*, **38**(5) : 105, fig. 1b; Nair and Mohan, 1971, *Indian J. Anim. Sci.*, **41**(10) : 1011, fig. 1-4.



Text-fig. 27. *Echinorhinus brucus* (Bonnaterre)

Common Name :

Bramble-shark ... English

Distinguishing Characters :

A robust shark with rough spiny skin, the tubercles of radiating bony structure, the dermal denticles sparse and irregularly distributed with entire margined bases and finely ridged spines. Head moderately depressed, snout short. Mouth arcuate; teeth alike in both jaws, each tooth with a pointed median cusp flanked by two small cusps on each side; lower jaw with 3 rows and upper jaw with 2 rows of teeth. Two dorsal fins, no spines in fins. Anal fin absent.

Colour : dark purplish-grey, slightly paler beneath.

Geographical Distribution : Fairly common in the eastern Atlantic and western Indian Oceans, and has been reported only in recent years from our waters; bathypelagic.

Fishery Information : In India as people are not familiar with the deep-sea sharks, it does not command much value in the markets. The oil from the liver of this shark has a reputation as a medicament in South Africa; the oil content of the liver is very high and has lower vitamin A, high iodine value and non-saponifiable matter when compared with other commercially important sharks. Reaches upwards of 308 cms.

Order : Rajiformes
[Skates and Rays : Batoid fishes]

Body typically disc-like, wide and flat, the edges of disc usually formed by expanded pectorals Eyes superior. Mouth inferior, more or less protractile. Gill openings 5, inferior, slit-like. Spiracles present. Dorsal fins, when present, placed on tail; no anal fin.

The group termed 'batoid fishes' comprise a variety of forms commonly known as rays, skates, saw-fishes and guitar-fishes.

Family : Pristidae
[Sawfishes]

Rays of very large size (total length commonly about 5 m.) and of shark-like appearance, with the snout formed into an elongate tooth bearing saw. Pectoral fins small; head, trunk and pectoral fins hardly forming a disc. Gill slits on ventral surface. Eyes and spiracles on top of head. Mouth transverse and straight; numerous teeth in pavement pattern forming bands along jaws; nasal apertures inferior, well in front of and completely separated from mouth. Tail extremely stout, not marked off from trunk Two large and widely seperated dorsal fins; caudal fin well developed. Body, fins and rostrum covered

with small, closely-set dermal denticles in adults but young of *Anoxypristis* are completely naked.

Two genera, both in our area. Dr. Compagno has provided the following key :

KEY TO GENERA

1 (a) Rostral teeth depresed, broad and blade-like, in shallow, broad sockets on the rostrum ; posteriormost rostral teeth ending well anterior to base of rostrum ; nostrils very narrow, with small nasal flaps ; caudal fin with a prominent subterminal notch and a long ventral lobe ... **Anoxypristis**

(b) Rostral teeth narrow, not greatly depressed, and spike-like, in deep, narrow sockets on the rostrum ; posteriormost rostral teeth ending just anterior to base of rostrum ; nostrils broad, with large nasal flaps ; caudal fin without a subterminal notch, with a short ventral lobe or none ... **Pristis**

Genus **Anoxypristis** White & May-Thomas

Anoxypristis White and May-Thomas, 1941, *Ann. Mag. nat. Hist.*, **7**(11) : 395 (type-species : *Pristis cuspidatus* Latham).

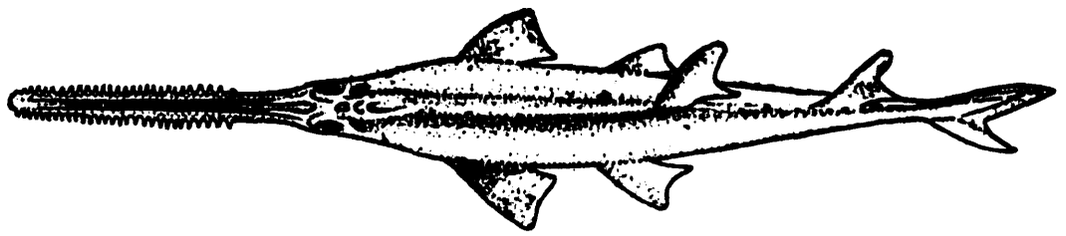
Body elongate, robust, flattened below. Snout prolonged as a flat, narrow and firm blade (saw), each of its edges armed with a single series of transverse, depressed, broad and blade-like teeth, in shallow broad sockets on the rostrum, the posteriormost rostral teeth ending well anterior to base of rostrum. Nostrils very narrow, with small nasal flaps. Caudal fin with a prominent subterminal notch and a long ventral lobe.

Monotypic.

Anoxypristis cuspidatus (Latham)

[Text-fig. 28]

Pristis cuspidatus Latham, 1794, *Trans. Linn. Soc. Lond.*, **2** : 279, pl. 26, fig. 3 (type-locality : not given) ; Day, 1878, *Fishes of India* : 728, pl. 191, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 37, fig. 15 ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 120, fig. 41.



Text-fig. 28. *Anoxypristis cuspidus* (Latham)

Common Names :

Pointed sawfish	...	English
Yahla	...	Telugu
Velameen, Vezha	...	Tamil
Nali	...	Marathi

Distinguishing Characters :

Saw long and narrow, tapers gradually towards its tip, with 24 or 25 pairs of rostral teeth. Trunk broad, deep and robust. First dorsal fin distinctly behind pelvic fins; second dorsal fin slightly smaller than first dorsal fin. Subcaudal lobe well developed, pointed.

Colour : dark drab or neutral-grey above, whitish below; margins of fins and lateral fold of tail whitish; rostral teeth white.

Geographical Distribution : Indo-West Pacific.

Ascends rivers; euryhaline.

Fishery Information : This species reaches a length of about 6 m. The flesh is much esteemed and its liver yields considerable oil. Abundant on the east coast of India, especially on the Tamil Nadu coast.

Genus **Pristis** Linck

Pristis Linck, 1790, *Mag. Neuestes Phys. Naturges. Gotha*, (3) **6** : 31 (type-species : *Squalus pristis* Linnaeus).

Body elongate, robust, moderately depressed, flattened below. Snout prolonged as a flat, narrow and firm blade (saw), each of its edges armed with a single series of transverse, narrow and spike-like teeth, in deep and narrow sockets, the posterior rostral teeth ending just anterior to base of rostrum. Nostrils broad, with large nasal flaps. Caudal fin without a subterminal notch, with a short ventral lobe or none.

Five species, 3 in our area.

KEY TO SPECIES

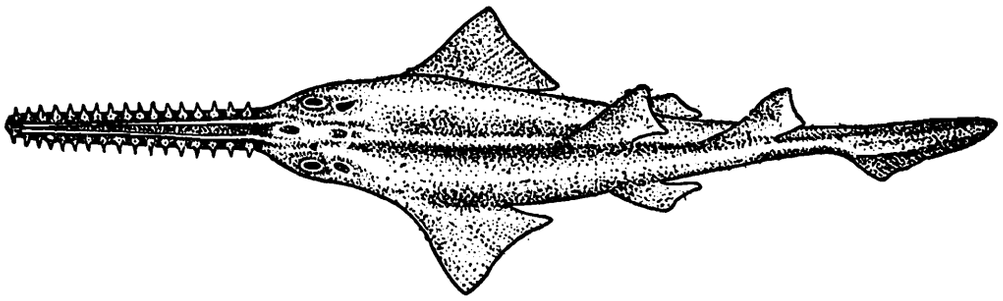
1 (a) First dorsal fin almost entirely in advance of pelvic fins; 17 to 22 pairs of rostral teeth	...	*P. microdon*
(b) First dorsal fin above or distinctly behind pelvic fins; 24 to 35 pairs of rostral teeth	...	2
2 (a) First dorsal fin above pelvic-fin origin	...	*P. pectinata*
(b) First dorsal fin distinctly behind pelvic-fin origin	...	*P. zijsron*

Pristis microdon Latham

[Text-fig. 29]

Pristis microdon Latham, 1794, *Trans. Linn. Soc. Lond*,, **2** : 280, pl. 26, fig. 4 (type-locality : not given) ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 123, fig. 42.

Pristis perrotteti (*nec* Muller and Henle) : Day, 1878, *Fishes of India* : 729, pl. 191, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 38.



Text-fig. 29. *Pristis microdon* Latham

Common Names :

Smalltoothed sawfish	...	English
Kundah	...	Oriya
Valameen	...	Tamil
Kumben-sorah	...	Malayalam
Shinshi, Khandere	...	Marathi

Distinguishing Characters :

Saw long and narrow, narrowing evenly towards its tip, with 17 to 22 pairs of rostral teeth ; in adults the length of saw about 5.0 times width of its base. Trunk broad, deep and robust. First dorsal fin large and erect, almost entirely in advance of pelvic fins ; second dorsal fin subequal with first dorsal fin.

Colour : uniform olive-green above, dirty cream below.

Geographical Distribution : East coast of Southern Africa, the Mediterranean, Madagascar, India, the East Indies and the south-west Pacific.

Shallow water and estuaries, and frequently in freshwater.

Fishery Information : *Pristis microdon* reaches a length of 6 m. Its liver yields considerable oil. Abundant in the southern region of the east coast of India but good grounds are indicated in the northern region also.

Pristis pectinata Latham

Pristis pectinatus Latham, 1794, *Trans. zool. Soc. Lond.*, **2** : 278, pl. 28, fig. 2 (type-locality : In the Ocean) ; Day, 1888, *Fishes of India* Suppl. : 811 Day, 1889, *Fauna Br. India*, Fishes, **1** : 39 ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 125, fig. 43.

Pristis annandalei Chaudhuri, 1908, *Rec. Indian Mus.*, **2** : 391, fig. (type-locality : near Elephant Point, Burma) ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 120, fig. 40.

Common Names :

Smalltooth sawfish	...	English
Khonda-magur	...	Oriya

Distinguishing Characters :

Saw long and narrow, narrowing evenly towards its tip, with 24 to 34 pairs of rostral teeth ; in adults length of saw about 8.0 to 9.0 times its length. Trunk broad, deep and robust First dorsal fin large and erect, its origin above pelvic-fin origin ; second dorsal fin slightly taller than first dorsal fin.

Colour : uniform olive-green above, dirty cream below ; disc edges, pectoral and ventral edges buff, caudal lobe and hind body keels white.

Geographical Distribution : East coast of Africa, the Red Sea, Arabia, India, Bangladesh and the Philippines ; it also occurs in tropical to subtropical latitudes on both sides of the Atlantic and in the eastern Mediterranean.

Shallow coastal waters, estuaries and lagoons, and often penetrates into freshwater in the larger rivers.

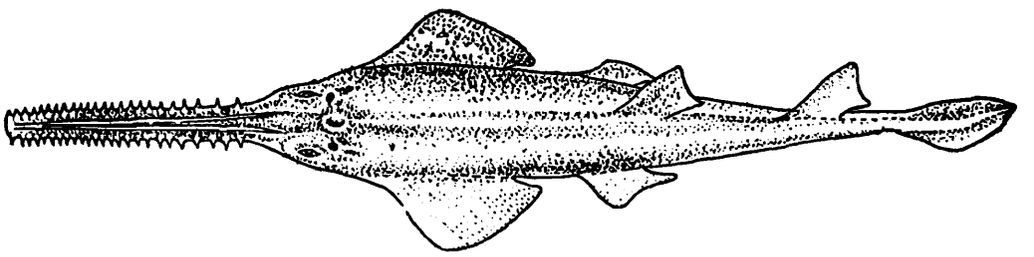
Fishery Information : It grows to a length of 7.5 m. and is the largest of the sawfish. The flesh is good eating Taken commercially only occasionally in our region.

Pristis zijsron Bleeker

[Text-fig. 30]

Pristis zijsron Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **2** : 417) 442 (type-locality : Sandjermassing, Borneo, in rivers).

Pristis zysron : Day, 1878, *Fishes of India* : 729, pl. 191, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 38 ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 126, fig. 44.



Text-fig. 30. *Pristis zijsron* Bleeker

Common Names :

Green sawfish	...	English
Vella-sorrah, Vezha	...	Tamil

Distinguishing Characters :

Saw long and narrow, tapering evenly towards its tip, with 25 to 32 pairs of rostral teeth. Trunk broad, deep and robust. First dorsal fin large and erect, distinctly behind pelvic fins ; second dorsal fin subequal with first dorsal fin.

Colour : sandy-brown, whitish below.

Geographical Distribution : Arabia, Pakistan, India, Sri Lanka, the East Indies and Queensland (Australia).

Fishery Information : Taken rather infrequently both along the east and west coast of India. It reaches a length about 5 m.

Family : Rhinobatidae
[Guitarfishes]

Rays of rather large size (total length up to 180 cm.). Shape of head and of anterior part of trunk varying from moderately flattened with a wedge-like (but never saw-like) snout to strongly flattened with a disc-like, rounded snout ; tail stout and shark-like, but not definitely marked off from body. Pectoral fins moderately enlarged, extending forward either to tip of snout or to about level of nostrils only, extending rearward to level of origin of pelvic fins or further. Eyes and spiracles on top of head. Mouth transverse and nearly straight ; teeth numerous and small, in pavement-like bands along both jaws. Two distinct dorsal fins and a caudal fin. Body and fins covered with small, closely-set dermal denticles, which form a row on midline of back.

Guitarfishes are sluggish, bottom-living animals occurring over sandy or muddy bottoms in shallow coastal areas, including brackish waters, in all tropical, subtropical and warm-temperate latitudes. There is no special fishery for these fishes in our region at the present time. The flesh and especially the fins, are sold dried and salted.

KEY TO SUBFAMILIES/GENERA

1 (a)	Caudal fin conspicuously bilobed; origin of first dorsal fin above pelvic-fin bases; posterior margins of pectoral fins considerably anterior to origin of pelvic fins (Subfamily Rhynchobatinae)	... 2
(b)	Caudal fin not bilobed; origin of first dorsal fin considerably posterior to hind tip of pelvic fins; posterior margins of pectoral fins extend rearward as far or further than origin of pelvic fins (Subfamily Rhinobatinae)	.. 3
2 (a)	Snout elongate; posterior margin of spiracles with two cutaneous folds; mouth slightly undulated, with median projection of lower jaw fitting a corresponding depression in upper jaw	... **Rhynchobatus**
(b)	Snout broad and rounded; no spiracular folds; mouth deeply undulated, with three forward projections of lower jaw corresponding with three indentations of upper jaw	... **Rhina**
3 (a)	Pectoral fins extending to tip of snout; disc broad and rounded	... **Zanobatus***
(b)	Pectoral fins not extending to tip of snout, well separated anteriorly; disc narrow and elongated	... **Rhinobatos**

SUBFAMILY : RHINOBATINAE

Genus **Rhinobatos** Linck

Rhinobatos Linck, 1790, *Mag. Phys. Naturg. Gotha*, (3) **6** : 32 (type-species : *Raja rhinobatos* Linnaeus) (Also spelt *Rhinobatus*, *Rhinobates* by authors).

Body depressed, shark-like; disc passing gradually into tail; tail depressed, robust anteriorly. Disc longer than wide, to as wide as long, usually tapering to a pointed snout. Orbit with fold below eye and projecting shield above pupil. First dorsal-fin origin well behind

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* The genus *Zanobatus* Garman represented by *Z. schoenleinii* (Muller & Henle) in our region, is of no fishery importance.

ventrals. Pectoral fins extend forward beyond level of mouth, well separated anteriorly. No distinct subcaudal. No anal fin.

KEY TO SPECIES

1 (a) Anterior nasal valve extending only as far as level of inner (anterior) margin of nostril	...	2
(b) Anterior nasal valve extending across inner margin of nostril, sometimes meeting that of opposite side	...	4
2 (a) First dorsal-fin base 2.2 to 2.4 times of interspace of dorsal fins; a row of tubercles in median line of back	...	*R. annandalei*
(b) First dorsal-fin base 2.7 to 2.9 times of interspace of dorsal fins; rows of minute tubercles in median line of back	...	3
3 (a) Eye-diameter about 4.9 times in snout length; pectoral and pelvic fins with blue variegated markings	...	*R. variegatus*
(b) Eye-diameter about 3.4 times in snout length; pectoral and pelvic fins uniform brownish grey	...	*R. lionotus*
4 (a) Nostril length 2 to 3 times width of mouth, about equal to internarial distance	...	5
(b) Nostril length less than twice width of mouth, greater than distance between them	...	6
5 (a) Snout very long and narrow, the rostral ridges close together throughout their length; width of mouth 2.6 to 3.25 times in snout length	...	*R. granulatus*
(b) Snout short and narrow, the rostral ridges separated by a considerable distance throughout their length; width of mouth about 1.9 times in snout length	...	*R. obtusus*
6 (a) Snout expanded at tip; nostril length about 1.3 times in width of mouth, and about twice internarial distance	...	*R. thouiniana*
(b) Snout not expanded terminally; nostril length nearly equal to mouth width, 2.3 to 2.4 times in internarial distance	...	*R. typus*

Rhinobatos annandalei Norman

Rhinobatus columnae (*nec* Bonaparte) Day, 1888, *Fishes of India* Suppl. : 811; Day, 1889, *Fauna Br. India*, Fishes, **1** : 44.

Rhinobatus annandalei Norman, 1926, *Proc. zool. Soc. Lond.* : 960, fig. 13 (type-locality : Hooghly estuary).

Rhinobatos annandalei : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 102.

Common Name :

Annandale's shovelnose ray ... English

Distinguishing Characters :

Snout moderate and bluntly pointed, its margin slightly concave; rostral ridges separated by a considerable interspace throughout their lengths. Eye about 3.7 times in snout length, equal to interorbital width. Width of mouth about 2 times in preoral length, more than 2 times longer than internarial distance. Nostrils moderate; anterior nasal flap extending only as far as level of inner end of nostril. Spiracles close behind eyes, equal to eye-diameter. Two dorsal fins; first dorsal-fin base 2.2 to 2.4 times of interspace between dorsal fins. Back finely granular, with a median row of small tubercles.

Colour : body greyish-brown, with indistinct marblings of darker shade and with numerous obscure, round, whitish spots; white ventrally.

Geographical Distribution : India and Sri Lanka.

Fishery Information : It forms a fair proportion of the skate catch off the mouth of the river Hooghly in the Bay of Bengal.

Rhinobatos granulatus Cuvier

Rhinobatus granulatus Cuvier, 1829, *Regne Animal.*, (ed. 2), 2 : 396 (type-locality : ? Pondicherry) ; Day (*partim*), 1878, *Fishes of India* : 732, pl. 192, fig. 2; Day (*partim*), 1889, *Fauna Br. India*, Fishes, 1 : 42, fig. 17.

Rhinobatos granulatus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 103, fig. 34.

Common Names :

Granulated shovelnose-ray	...	English
Suttiwarah	...	Telugu
Purrungun, Padangan	...	Tamil
Kalpoonthi	...	Malayalam
Fodka	...	Kannada
Lanj	...	Marathi

Distinguishing Characters :

Snout triangularly pointed, very long and narrow; rostral ridges close together for greater part of length. Eye-diameter about 6 5 times in snout length, 1.7 in interorbital width. Width of mouth about 2.8 times in preoral distance, 2.6 to 3.2 in snout length, longer

than internarial distance. Nostrils wide, oblique, about half width of mouth, and equal to internarial distance; anterior nasal flap extending across inner (anterior) margin of nostril. Spiracles slightly smaller than eye. Back rather coarsely tuberculated, rough to touch.

Colour : body brownish above, each side of rostral cartilage on snout buff brown; under surface whitish. Dorsal and caudal fins greyish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Specimens of this species of about a metre in length, are frequently caught in the Palk Bay and Gulf of Mannar.

Rhinobatos lionotus Norman

Rhinobatus lionotus Norman, 1926, *Proc. zool. Soc. Lond.* : 961, fig. 14 (type-locality : Mouth of Hughli R.).

Rhinobatos lionotus : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 106.

Common Name :

Norman's shovelnose ray ... English

Distinguishing Characters :

Snout moderate and bluntly pointed, its margins scarcely concave; rostral ridges separated by considerable distance throughout their length. Eye about 3.4 times in snout length, and equal to interorbital width. Width of mouth 2.2 in preoral distance, about 2 times internarial distance. Nostrils moderate, oblique, 2 times in width of mouth; anterior nasal flap extending as far as level of inner end of nostril. Spiracles smaller than eyes. Two dorsal fins; first dorsal-fin base about 2.8 times of interspace between bases of dorsal fins. Back with minute denticles, smooth to touch; a series of minute tubercles in median line of back.

Colour : body uniform brownish-grey or olive-green above, whitish below.

Geographical Distribution : Bay of Bengal.

Fishery Information : It forms a fair proportion of the skate catch in the northern Bay of Bengal.

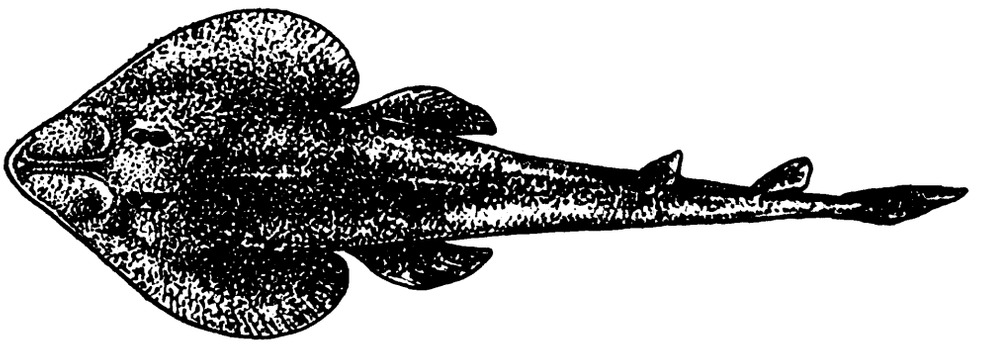
Rhinobatos obtusus Müller & Henle

[Text-fig. 31]

Rhinobatus (*Rhinobatus*) *obtusus* Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 122, pl. 37, fig. 2 (type- locality : Pondicherry & Malabar).

Rhinobatus halavi Day (*nec Forsskal*), 1878, *Fishes of India* : 731, pl. 193, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 43.

Rhinobatos obtusus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 107, fig. 35.



Text-fig. 31. *Rhinobatos obtusus* Müller & Henle

Common Names :

Grey guitarfish	...	English
Suttuwarah	...	Telugu
Pare(young), Padangan (adult)	...	Tamil
Lanj	...	Marathi

Distinguishing Characters :

Snout short and narrow, obtusely pointed, margins scarcely concave ; rostral ridges separated by a considerable interspace for most of their length, slightly expanded towards tip. Eye about 7.0 times in snout length, 2.5 in interorbital width. Width of mouth 1.8 in preoral length, more than internarial distance, about 1.9 in snout length. Nostrils wide, oblique, about half width of mouth, equal to internarial distance ; anterior nasal flap extending beyond level of inner end of nostril. Spiracle with only one skinny projection from hind margin. Back with small tubercles, some spiniform.

Colour : body grey to brownish above, white below ; large specimens have occasionally black blotches on back.

Geographical Distribution : India and the East Indies.

Fishery Information : Taken by fishermen in our country rather infrequently. This species attains about 180 cm in length.

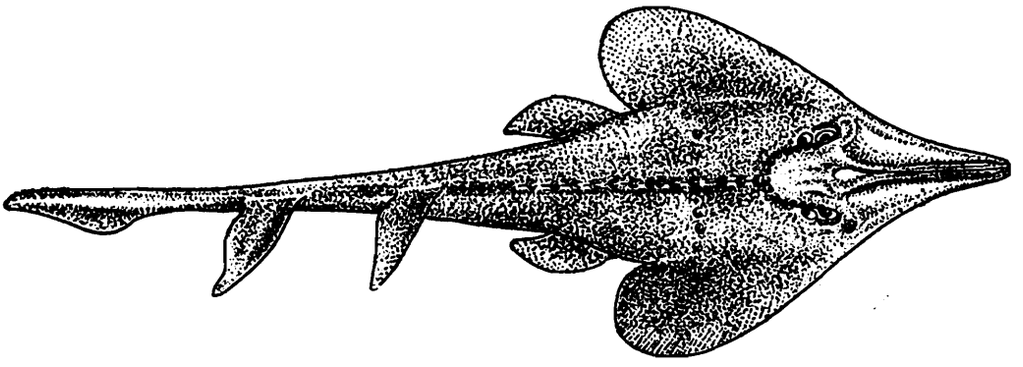
Rhinobatos thouiniana (Shaw)

[Text-fig. 32]

Raja thouiniana Shaw, 1804, *General Zoology*, **5** : 318, pl. 147, fig. 2 (type-locality : unknown).

Rhinobatus thouini (Lacepede) : Day, 1878, *Fishes of India* : 732, pl. 190, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 44.

Rhinobatos thouin (Anonymous) : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 109, fig. 36.



Text-fig. 32. *Rhinobatos thouiniana* (Shaw)

Common Names :

Shaw's shovelnose guitarfish	...	English
Lanj	...	Marathi

Distinguishing Characters :

Snout rather long, expanded at tip, its margins distinctly concave; rostral ridges narrow, expanded anteriorly, ridges close together anteriorly. Eye 5.5 to 8.7 times in snout length. Mouth nearly straight, its width 2.7 times in preoral distance, 2.1 times in internarial distance. Nostrils wide, oblique, their length about 1.3 times in width of mouth, 2.0 in internarial distance; anterior nasal flap extending beyond level of inner end of nostril. Spiracles nearly equal to eyes; skinny folds on posterior margin feebly developed. Back with somewhat enlarged tubercles, also on scapular region and top of head; a row of strong spines in median line of back.

Colour : body grey above, whitish below.

Geographical Distribution : India and the East Indies.

Fishery Information : Taken by fishermen infrequently in India though considered one of the best of the skates. Length nearly 70 cm.

Rhinobatos typus Bennett

Rhinobatus typus Bennett, 1830, *Life of Raffles* : 694 (type-locality : Sumatra).

Rhinobatus granulatus Day (*nec* Cuvier) (*partim*), 1878, *Fishes of India* : 732; Day (*partim*), 1889, *Fauna Br. India*, Fishes, **1** 42, fig. 17.

Rhinobatos typus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 111, fig. 37.

Common Name :

Bennett's shovelnose guitarfish ... English

Distinguishing Characters :

Snout moderate and bluntly pointed, its margin scarcely concave; rostral ridges close together for greater part of their length, separated slightly posteriorly. Eye about 6.5 times in snout length, 2.0 times in interorbital width. Width of mouth 2.8 in preoral length, much longer than internarial distance. Nostrils wide, oblique, slightly less than width of mouth; nostril length 2.3 to 2.4 times internarial distance; anterior nasal fold extending beyond level of inner margin of nostril. Spiracle equal to eye-diameter, close behind it; spiracular folds feebly developed. Two subequal dorsal fins. Tubercles somewhat enlarged on back, scapular region and top of head; a series of strong, compressed spines in median line of back.

Colour : body greyish-red above, dirty white below.

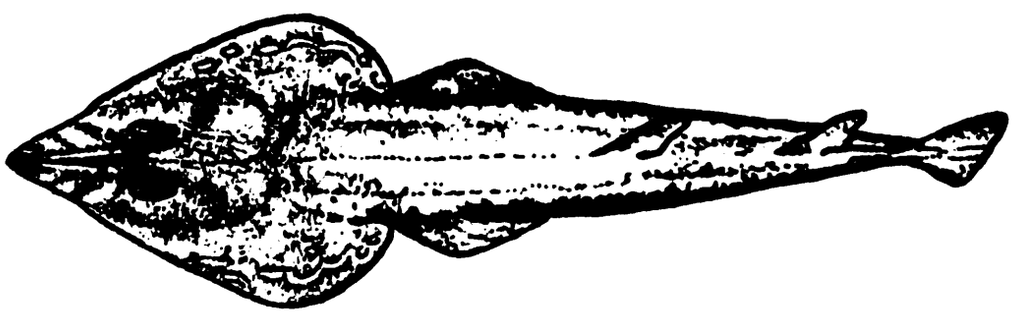
Geographical Distribution : India, the East Indies, Australia and Melanesia.

Fishery Information : Of minor fishery significance in our region.

Rhinobatos variegatus Nair & Mohan

[Text-fig. 33]

Rhinobatos variegatus Nair and Mohan, 1973, *Senck. biol.*, **54**(1/3) : 77, fig. 4 (type-locality : Off Mandapam, Gulf of Mannar, 200 fms.).



Text-fig. 33. *Rhinobatos variegatus* Nair & Mohan

Common Name :

Variegated shovelnose guitarfish ... English

Distinguishing Characters :

Disc wedge-shaped, snout subacutely pointed, its posterior margins evenly concave; rostral ridges separated by a considerable interspace

throughout its length except its tip where it is expanded. Interorbital width about 3.9, eye-diameter 4.9 times, both in snout length. Nostrils oblique, the anterior margin with inner and outer flaps, the former reaches about level of inner corner of nostril ; length of nostril about 2 times in width of mouth. Spiracles close to eyes, about 2/5ths in eye-diameter. Two dorsal fins, about equal in height ; first dorsal-fin base 2.7 to 2.8 times of interspace between dorsal fins. Back with closely-set denticles, with median row of minute denticles ; tip of snout smooth.

Colour : body grey dorsally, ventrally pale ; snout with three brown broad lateral bands on dorsal side and one medially ; tip of snout pigmented ventrally. Pectoral and pelvic fins with variegated markings.

Geographical Distribution : Gulf of Mannar.

Fishery Information : Presently known only from its type-specimen from the Gulf of Mannar and it is likely that the trawl catches from deeper waters of the Gulf of Mannar contains this species.

Subfamily : RHYNCHOBATINAE

Genus **Rhina** Schneider

Rhina Schneider, 1801, *Syst. Ichth. Bloch* : 352 (type-species : *Rhina ancylostomus* Schneider).

Head depressed, broad ; snout broad, rounded. Tail depressed, nearly equal to trunk. Nostrils oblique and large, their length less than internarial width. Spiracles large ; no spiracular folds. Mouth deeply undulated, with three forward projections of lower jaw corresponding with three indentations of upper. First dorsal-fin origin above pelvic fins which are placed well behind pectorals ; pectoral fins not extending forward beyond level of mouth. Subcaudal fin well developed.

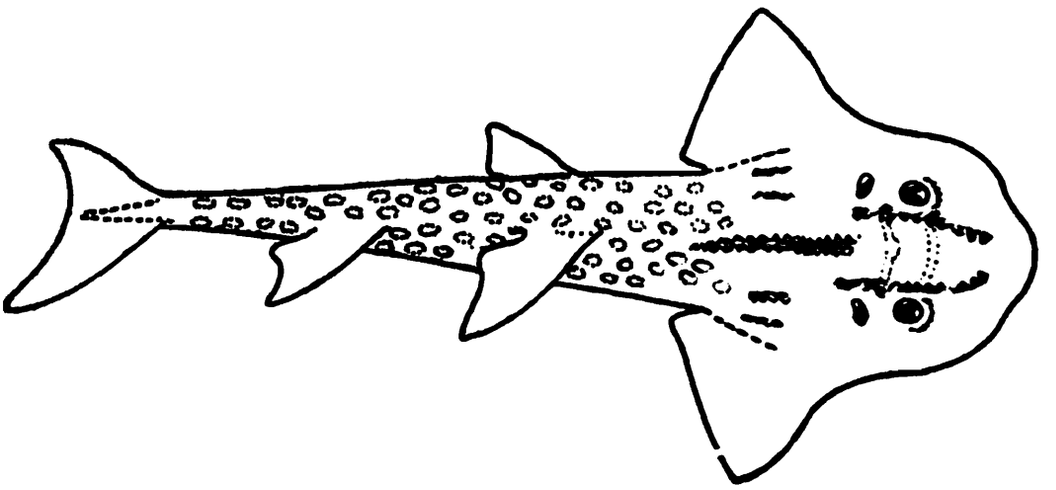
Monotypic

Rhina ancylostoma Schneider

[Text-fig. 34]

Rhina ancylostomus Schneider, 1801, *Syst. Ichth. Bloch* : 352, pl. 72 (type-locality : Coromandel ; Indian Sea).

Rhynchobatus ancylostomus : Day, 1878, *Fishes of India* : 730, pl. 193, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 1 : 41 ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 113, fig. 38.



Text-fig. 34. *Rhina ancylostoma* Schneider

Common Names :

Bowmouthed guitarfish	...	English
Nella-dindi, Pottila-sora	...	Telugu
Mun-ultava (mud-skate)	...	Tamil
Sakshi, Lanj	...	Marathi

Distinguishing Characters :

Head depressed and broad; snout broad, rounded. First dorsal fin triangular, its origin anterior to base of pelvic fins; second dorsal fin similar in shape but slightly smaller. Pelvic fins posterior to hind margin of pectoral fins. Upper and lower caudal fin lobes well developed, the upper longer and narrower than lower. Eyes slightly smaller and entirely separated from spiracles. Mouth strongly undulated. Teeth in about 40 rows in each jaw, smooth, rhomboidal. Row of small tubercles along each supraorbital edge, interrupted by a division of spiracle; median row of small vertebral tubercles down back, also short series on each shoulder.

Colour : body brown dorsally, undersurface uniform grey white; body and sometimes fins with whitish dots, occasionally some tortuous black lines.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially in small quantities along the coast of India, especially at Bombay. Length upwards of 213 cms.

Genus **Rhynchobatus** Müller & Henle

Rhynchobatus Müller and Henle, 1837, *Sitz. Ber. Akad. Wiss. Berlin* : 116 (type-species : *Rhinobatus laevis* Schneider).

Disc longer than wide; snout elongate and tapering; rostral cartilages strong, separated for less than halfway to tip of snout. Anterior margin of disc weakly undulated, its outer angle sharply rounded and slightly greater than 90° Nostrils oblique, the anteror nasal flap not extending across inner margin of nostril. Spiracle with two cutaneous folds. Mouth slightly undulated, with the median projection of lower jaw fitting a corresponding depression in upper. Teeth in pavement of numerous, closely-set diagonal rows. Origin of first dorsal fin above bases of pelvic fins. Subcaudal lobe well developed.

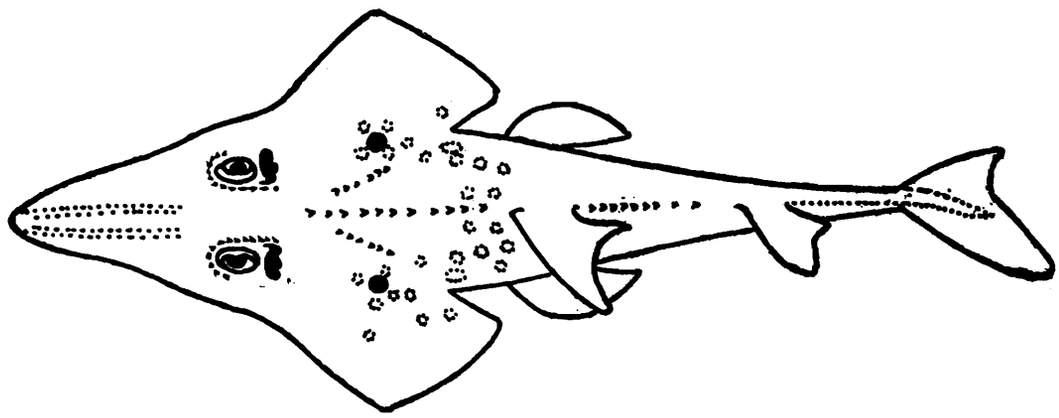
Three species known, one in our region.

Rhynchobatus djeddensis (Forsskal)

[Text-fig. 35]

Raja djeddensis Forsskal, 1775, *Descript. Animal.* : 18 (type-locality : Red Sea).

Rhynchobatus djeddensis : Day, 1878, *Fishes of India* : 730, pl. 192, fig. 1; Day, 1889, *Fauna Br. India,* Fishes, **1** : 40, fig. 16; Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 116, fig. 39.



Text-fig. 35. *Rhynchobatus djeddensis* (Forsskal)

Common Names :

Whitespotted shovelnose guitarfish	...	English
Walawah-tenkee, Nululavi, Tipiulavi	...	Telugu
Padanagan, Palunga, Kachuuluvai	...	Tamil
Varithlai		Malayalam

Etti-baliar	...	Kannada
Ranja, Pok, Lanj	...	Marathi
Kasaj	...	Gujarati

Distinguishing Characters :

Snout long and pointed. Anterior margin of disc weakly undulated, its outer angle sharply rounded and slightly greater than 90° First dorsal fin triangular, above base of pelvic fins; second dorsal fin similar in shape, but slightly smaller. Eyes larger than and immediately anterior to spiracles; spiracles with two cutaneous folds on its hind margin. Row of small tubercles along anterior and inner margins of each orbit and on inner margins of spiracles; median row of small tubercles anterior to first dorsal fin and similar row on interdorsal space; an inner and outer series of tubercles on each shoulder, broken midway in its length.

Colour : upper surface fairly dark olive-green, with numerous scattered white spots on posterior margin of disc and body as far back as second fin; a black ocellar spot on each shoulder; lower surface grey white, with darker margins to pectoral and pelvic fins. Embryos and juveniles have a conspicuous black blotch on tip of snout.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This large Indo-Pacific guitarfish, which can attain a weight of up to 240 kg, is most common on the Tamil Nadu coast. The flesh is considered nourishing when eaten salted or fresh, and the oil from the liver is much esteemed. Large specimens are salted and consumed, smaller ones are eaten fresh. The peak of this fishery on the Tamil Nadu coast is reached in March.

Family : DASYATIDAE

[Stingrays]

A flat, rather lozenge-shaped disc, outer anterior margin of pectorals continuous along side of head, no separate cephalc or subrostral fins. A long tail, distinct from disc, with one or more long poisonous spines (said to cause excruciating pain to humans). No distinct dorsal fin. Gill openings narrow. Spiracles large, close behind eyes. Pelvic fins small, below pectorals. Teeth small, in pavement. Skin smooth or rough, with spines or tubercles, or both. Development ovoviviparous.

KEY TO SUBFAMILIES

1 (a) Caudal fin well developed; tail broad and thick at base	...	**Urolophinae***
(b) Caudal fin absent; tail very slender and often whiplash towards its tip	...	**2**
2 (a) Disc extremely broad, more than 1.5 times as broad as long; tail distinctly shorter than disc width; no papillae on floor of mouth	...	Gymnurinae
(b) Disc at most 1.3 times as broad as long; tail (if complete) much longer than disc width; floor of mouth with several fleshy papillae	...	Dasyatinae

Subfamily : DASYATINAE

[Stingrays or Whiprays]

Stingrays of varying size, disc width from about 30 cm. to more than 2 m. Disc not more than 1.3 times as broad as long, rhomboic, ovate, or nearly circular. Tail very slender, tapering, much longer than disc, and with one or more saw-edged, long, poisonous spines on its base. Floor of mouth with several fleshy papillae. Small teeth in many series forming bands along jaws. Nasal curtains deeply fringed. No dorsal fins; no caudal fin. Some species with longitudinal tail folds on upper and/or lower surface.

Usually inhabit shallow coastal waters, but a few species may occur in deeper waters (beyond 100 m).

Five genera known, 3 in our region.

KEY TO GENERA

1 (a) Tail without serrated spine; upper surface of disc profusely covered with tubercles	...	**Urogymnus**
(b) Tail with serrated spine; upper surface of disc sparsely covered with tubercles	...	**2**
2 (a) Disc oval or rounded; lower surface of tail posterior to origin of spine with a longitudinal membranous fold	...	**Taeniura**
(b) Disc quadrangular; ventral cutaneous fold of tail either absent or terminating far short of tail tip	...	**Dasyatis**

* The subfamily Urolophinae represented by *Urotrygon davesi* Wallace in our region, has been reported only recently from our waters and is presently of no commercial value.

Genus **Dasyatis** Rafinesque

Dasyatis Rafinesque, 1810, *Caratt. animal. piante Sicilia* : 16 (type-species : *Dasyatis ujo* Rafinesque).

Body, head and pectoral fins depressed, forming a wide quadrangular disc. Tail whip-likt, with one or more serrate-edged spines at its base. Upper surface of disc covered with small tubercles.

Numerous species known, 15 in our area.

KEY TO SUBGENERA/SPECIES

1 (a) Tail with longitudinal cutaneous folds (which do not extend to its tip) posterior to origin of spine	...	2
(b) No membranous fold along tail posterior to spine (subgenus *Himantura* Müller & Henle)	...	7
2 (a) Longitudinal cutaneous fold on tail either on its upper or lower surface	...	3
(b) Longitudinal cutaneous fold on tail on both its upper and lower surfaces (subgenus *Amphotistius* Garman)	...	5
3 (a) Longitudinal cutaneous fold on tail only on its upper surface (subgenus *Dasyatis*)	...	*D. pastinacus*
(b) Longitudinal cutaneous fold on tail only on its ventral surface (subgenus *Pastinachus* Rüppell)	...	4
4 (a) Cutaneous fold on tail well-developed, broad, 2 to 3 times as deep as tail, extends more than halfway to its tip	...	*D. sephen*
(b) Cutaneous fold on tail narrow, extends one-sixth of tail length	...	*D. bennetti**
5 (a) No buccal processes (papillae) on floor of mouth		*D. zugei*
(b) Two buccal processes (papillae) on floor of mouth	...	6
6 (a) Tail short, about as long as length of disc	...	*D. imbricata*
(b) Tail long, exceeding length of disc	...	*D. kuhlii*
7 (a) Two buccal processes (papillae) on floor of mouth	...	8
(b) Four or five buccal processes on floor of mouth	...	11

8 (a)	Tail length (its length from posterior angles of pectorals) more than 3 times length of disc	... *D. bleekeri*
(b)	Tail length less than 2.5 times length of disc	... 9
9 (a)	Disc broader than long; tail length 2.3 times length of disc	... *D. marginatus*
(b)	Disc longer than broad, or as long as broad	... 10
10 (a)	Tail length 1.8 times length of disc; eye 6.0 in interorbital width	... *D. favus**
(b)	Tail length less than 1.5 times disc length; eye 3.3 in interorbital width	... *D. walga*
11 (a)	Tail short, nearly as long as length of disc	... *D. microps*
(b)	Tail long, exceeding length of disc	... 12
12 (a)	Upper surface of disc brown, with bright spotted or marbled pattern	... *D. uarnak*
(b)	Upper surface of disc brown or grey, without any bright markings, at most with obscure pale spots	... 13
13 (a)	Snout forming widely obtuse angle	... *D. gerrardi**
(b)	Snout pointed	... 14
14 (a)	Eye about 4.6 times interorbital width; snout length 4.2 times in disc length	... *D. alcockii**
(b)	Eye about 2.1 times in interorbital width; snout length 5.8 times in disc length	... *D. jenkinsii*

Dasyatis bleekeri (Blyth)

[Text-fig. 36]

Trygon bleekeri Blyth, 1861, *J. Asiat. Soc. Bengal*, **29** : 41 (type-locality : Bengal) ; Day, 1878, *Fishes of India* : 738, pl. 195, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 54.

Dasyatis (*Pastinachus*) *sephen* : Misra, 1969, *Fauna of India. Pisces* (2nd ed.), **1** : 157, fig. 51.

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* *Dasyatis bennetti* (Müller & Henle), *D. favus* (Annandale), *D. gerrardi* (Gray) and *D. alcockii* (Annandale) do not contribute to any fishery in our region.

Common Names :

Whiptail stingray	...	English
Seman-tirike	...	Tamil
Pakat, Chamli	...	Marathi



Text-fig. 36. *Dasyatis bleekeri* (Blyth)

Distinguishing Characters :

Disc subrhomboidal, longer than broad. Mouth strongly waved, with two long buccal processes nearer to one another than to mouth angle. Spiracles considerably larger than eyes Tail whip-like, more than 3 times length of disc, without upper and lower cutaneous folds, with one serrated spine. Large round tubercle in middle of back, and usually 3 smaller ones before and 3 more behind; others along upper surface of tail to caudal spine.

Colour : uniform dark-brown above, ventral surface white.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Of common occurrence at several localities on the east coast of India. Speciments of 105 cm disc width and 21 kg weight, are often caught in the Palk Bay and the Gulf of Mannar from within about 25 m. depth.

Dasyatis imbricata (Schneider)

Raja imbricata Schneider, 1801, *Syst. Ichth.* Bloch : 366 (type-locality : Coromandel coast of India).

Trygon imbricata : Day, 1878, *Fishes of India* : 739; Day, 1889, *Fauna Br. India,* Fishes, **1** : 52.

Dasyatis (*Amphotistius*) *imbricata* : Misra, 1969, *Fauna of India,* Pisces (2nd. ed.), **1** : 148.

Common Names :

Schneider's scaly-stingray	...	English
Pakat	...	Marathi

Distinguishing Characters :

Disc as broad as long ; snout produced, pointed. Mouth undulated, with two buccal processes on floor of mouth. Spiracles as large as eyes, close behind. Tail whiplike, short, about as long as length of disc, with one caudal spine ; with low longitudinal cutaneous folds on its upper and lower surfaces. Small tubercles on nape and back, with a row of conical spines on shoulder and back.

Colour : reddish-brown and yellow spotted dorsally, whitish ventrally.

Geographical Distribution : India, Sri Lanka, the East Indies and the Philippines.

Fishery Information : Taken commercially in small quantities along the entire coast of India.

Dasyatis jenkinsii (Annandale)

Trygon jenkinsii Annandale, 1909, *Mem. Indian Mus.*, **2** : 28, figs. 4, 4a (type-locality : Off Ganjam coast, India).

Dasyatis (*Himantura*) *microps* : Misra, 1969, *Fauna of India,* Pisces (2nd ed), **1** : 161, fig. 54.

Common Names :

Sharpnose stingray	...	English
Senthirukkai	...	Tamil

Distinguishing Characters :

Disc broader than long; snout with a sharp point, 5.8 times disc length. Eye 2.4 times in interorbital distance. Spiracles close to eyes. Mouth feebly undulated, with four cutaneous processes on floor of mouth, a long one opposite each projection in lower jaw and a minute process near each corner of mouth. Nasal curtain very finely fringed. Tail 1.9 to 2.4 times longer than disc (when not mutilated), whip-like, without dorsal or ventral cutaneous folds, and with one or two serrated spines. Skin rough; a distinct band of closely-spaced tubercles, about width of interspiracular distance, extends from in front of eyes to base of tail; remainder of disc and pelvic fins naked; 2 or 3 enlarged tubercles medially above shoulder region, more distinct in small specimens.

Colour : uniformly light brown above, creamy-white below; tail in embryos and juveniles with alternating light and dark bands.

Geographical Distribution : East coast of Africa and Orissa coast of India; littoral.

Fisery Information : Of minor commercial significance; taken occasionally by fishermen on the Orissa coast of India.

Dasyatis kuhlii (Müller & Henle)

[Text-fig. 37]

Trygon kuhlii Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 164, pl. 51, fig. 2 (type-locality : Vanicoro, New Guinea; India) ; Day, 1878, *Fishes of India;* 739, pl. 193, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 52.

Dasyatis (*Amphotistius*) *kuhlii* : Misra, 1969, *Fauna of India,* Pisces (2nd ed), **1** : 150, fig. 48.



Text-fig. 37. *Dasyatis kuhlii* (Müller & Henle)

Common Names :

Bluespotted stingray	...	English
Shemen-tenkee	...	Telugu
Kunnoo-tirike, Pulli-thirukhai	...	Tamil
Palwa, Pakat	...	Marathi

Distinguishing Characters :

Disc kite-shaped, much broader than long. Spiracles greatly larger than eyes. Mouth undulated, with two buccal papillae on floor of mouth. Tail long, whip-like, exceeding length of disc, with upper and lower cutaneous folds, with 2 or 3 serrated spines. Skin smooth in young; in adult back and head with small denticles.

Colour : above dull-brown, with numerous small black spots and blue black-edged ocelli. Tip of tail black, preceded by two obscure cross-bands.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : One of the most important of the rays in India, being frequently seen in the commercial catches.

Dasyatis marginatus (Blyth)

Trygon marginatus Blyth, 1861, *J. Asiat. Soc. Bengal*, **29** : 38 (type-locality : Lower Bengal) ; Day, 1878, *Fishes of India* : 738 ; Day, 1889, *Fauna Br. India*, Fishes. **1** : 54.

Dasyatis (*Himantura*) *marginatus* : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 163, fig. 55.

Common Name :

Blackedged stingray	...	English

Distinguishing Characters :

Disc quadrangular, much broader than long. Spiracle large, nearly twice eye. Mouth small, with two buccal processes on floor of mouth. Tail whip-like, about 2.3 times length of disc, without upper and lower cutaneous folds, and one large serrated caudal spine. Skin rather soft ; head and centre of back with closely-set rounded denticles, in large-sized fishes extending on to edge of disc ; tail with similar denticles intermixed with stellate spines.

Colour : grey above, buffy-white below. Males with blue marks around disc except in front margin ; tail blackish.

Geographical Distribution : India, Sri Lanka and Burma.

Fishery Information : Of minor commercial significance; taken occasionally in the Hooghly estuary at Calcutta.

Dasyatis microps (Annandale)

Trygon microps Annandale, 1908, *Rec. Indian Mus.*, **2** : 393, pl. 27 (type-locally : Off Chittagong, Bangladesh).

Dasyatis (*Himantura*) *jenkinsii* : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 164, pl. 11, fig. 3 & text-fig. 56.

Common Name :

Annandale's stingray	...	English

Distinguishing Characters :

Disc rhomboid, about 1.2 times wider than long; snout convexly rounded, slightly projecting, 2.1 times in interorbital distance. Eyes very small, dark in colour, about 10 times in snout length and 5.5 times in interorbital distance. Mouth large, with five buccal processes on floor of mouth. Tail short, nearly as long as length of disc, with a large spine; tail without dorsal and ventral longitudinal cutaneous folds. Skin soft, delicate, without enlarged tubercles on disc, bearing numerous minute spiny denticles.

Colour : whitish, dorsal surface of disc suffused with rose pink, without definite markings. Tail grey above, darker terminally.

Geographical Distribution : East coast of India and Bangladesh.

Fishery Information : Of minor fishery value on the West Bengal coast.

Dasyatis pastinacus (Linnaeus)

Raja pastinaca Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 232 (type-locality : Europe).

Dasyatis (*Himantura*) *pastinaca* : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 154.

Common Names :

Blue stingray	...	English
Thirukay	...	Malayalam

Distinguishing Characters :

Disc 1.2 times broader than long; snout obtusely pointed. Eyes protrude well above level of disc; spiracles larger than eyes and more widely spaced. Mouth small, with 5 fleshy papillae in a transverse

series on floor of mouth. Tail short, with a low dorsal cutaneous fold, 1.5 times longer than disc, depressed dorso-ventrally anterior to tail-spine thereafter cylindrical and whiplike. Upper surface of disc smooth, devoid of any tubercles, ventral surface mainly smooth but sometimes a few small widely spaced dermal denticles occur near anterior margin of disc.

Colour : variable, grey to sea-blue on upper surface, mottled with golden-brown spots which coalese towards perimeter of disc; ventral surface creamy white.

Geographical Distribution : Eastern Atlantic, the North Sea, the western Baltic, the Mediterranean, Natal coast, Madagascar and India.

Fishery Information : *D. pastinacus* does not grow as large as many of the dasyatids. Specimens measuring 410 mm wide (disc-width) have been caught in our waters and taken by fishermen rather infrequently.

Dasyatis sephen (Forsskal)

Raja sephen Forsskal, 1775. *Descript. Animal.* : 17 (type-locality; Lohaja, Red Sea).

Trygon sephen : Day, 1878, *Fishes of India* : 740, pl. 195, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 50, figs. 21, 22.

Dasyatis (*Pastinachus*) *sephen* : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 173, fig. 60.

Common Names :

Drab stingray	...	English
Velugiri-tenkee, Wolga-tenkee	...	Telugu
Adavalan-tiriki, Adal-thirikkai	...	Tamil
Padaiyan-therandee	...	Malayalam
Goval-pakat	...	Marathi
Madi, Olavalen-thirandi	...	Lakshadweep Is.

Distinguishing Characters :

Disc subquadrangular, 1.2 to 1.3 times wider than long; snout blunt, 4.6 times in length of disc. Mouth strongly undulated, with 4 fleshy papillae on floor of mouth. Tail slightly depressed anterior to serrated spines (1 or 2), posteriorly compressed; with extremely broad lower cutaneous fold which is 2 to 3 times as deep as tail and extends more than halfway to its tip. Middle area of disc finely

roughened with denticles in young specimens, but its entire upper surface roughened in adults.

Colour : upper surface yellowish-brown becoming darker towards the tail; caudal fold and filamentous part of tail blackish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This species is common in shallow waters with sandy or muddy bottom and are often caught in the Palk Bay and Gulf of Mannar. This ray is known for its ferociousness, lashing its tail in defence, inflicting severe wounds. The liveroil is also of high vitamin A potency. From the skin of its back some of the 'shagreen' of commerce are prepared.

Dasyatis uarnak (Forsskal)

Raja uarnak Forsskal, 1775, *Descript. Animal.* : 18 (type-locality : Arabia).

Trygon uarnak : Day, 1878, *Fishes of India* : 737 (*nec* pl. 194, fig. 1) ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 53.

Dasyatis (*Himantura*) *uarnak* : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 166, fig. 57.

Common Names :

Honeycombed stingray	...	English
Sankush, Shankar	...	Oriya
Puli-tenke	...	Telugu
Sona-kah-tirike, Pulli-thirukkai	...	Tamil
Belya	...	Kannada
Bhatya, Waghya-pakat	...	Marathi
Madi, Thirandi	...	Lakshadweep Is.

Distinguishing Characters :

Disc wider than long, rhomboidal; snout angular, with a sharp point. Mouth long, undulated, with a transverse series of four fleshy papillae on floor of mouth, outer two smaller than two inner ones. Nasal curtain very finely fringed. Tail (when not mutilated) 2 6 to 3.0 times longer than disc, without dorsal or ventral cutaneous folds; tail cylindrical and whip-like posterior to serrated spines, which number 1 to 3 and which originate about 1·3 times interspiracular distance posterior to hind angles of disc. Skin largely smooth; few fine asperites on occiput; large median white tubercle in centre of disc, surrounded by many smaller close-set flattened ones in form of romb, finally with age extending more or less over head, body and tail.

Colour : background colour of upper surface ranges from brown to black, upon which is superimposed a variable matrix of lines which vary in colour from cream to yellow; in embryos and juveniles there are alternating dark and light bands on the tail; ventral surface of disc whitish, often spotted with black.

Geographical Distribution : Tropical Indo-west Pacific.

Fishery Information : Of common occurrence on the east coast of India. Specimens of 140 cm disc-width and 72 kg in weight, are often caught in the Palk Bay and Gulf of Mannar from within 25 m. depth.

Dasyatis walga (Müller & Henle)

Trygon walga Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 159, pl. 51, fig. 1 (type-locality : India; Red Sea) ; Day, 1878, *Fishes of India* : 738, pl. 194, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 55.

Dasyatis (*Himantura*) *walga* : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 169, fig. 58.

Common Names :

Scaly stingray	...	English
Isacurrah-tenkee, Tenkee shindraki, Thirachi	...	Telugu

Distinguishing Characters :

Disc subcircular, slightly longer than broad, or as broad as long. Spiracles nearly equal to eyes, close behind it; eye-diameter about 3.3 times in interorbital width. Mouth undulated, with two buccal processes on floor of mouth. Tail whip-like, slightly longer than disc length, without upper and lower cutaneous folds, with 1 or 2 large serrated spines. Uniform small tubercles on interorbital, interspiracle and mid-dorsal surface of disc; a series of small spines between root of tail and caudal spine.

Colour : dull grey or brown above, whitish below.

Geographical Distribution : The Red Sea, India, Sri Lanka, through the East Indies, to China.

Fishery Information : Taken commercially in small quantities, mostly on the Kerala coast.

Dasyatis zugei (Müller & Henle)

Trygon zugei Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 165, pl. 54 (type-locality : Japan; China; Pondicherry, India) ; Day, 1878, *Fishes of*

India : 739, pl. 190, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, 1 : 52.

Dasyatis (*Amphotistius*) *zugei* : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), 1 : 152, pl. 11, fig. 2.

Common Names :

Pale-edged stingray	...	English
Chumbara-kah	...	Tamil
Wagli, Pakat	...	Marathi

Distinguishing Characters :

Disc subquadrangular, as long as wide. Spiracles much larger than eyes. Mouth undulated; no buccal papillae on floor of mouth. Tail whip-like, with upper and lower cutaneous folds and one serrated spine. Skin smooth in young; in adults an incomplete median series of tubercles, in very large specimens a complete median series of tubercles; tail roughened with tubercles.

Colour : yellowish to reddish brown, rather pale marginally on disc; cutaneous folds of tail dusky brown.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Forms a fishery of local importance at places on the east coast of India, especially Palk Bay region. Average size is about 18 cm disc-width in the commercial catches; caught almost throughout the year along the east coast of India.

Genus **Taeniura** Müller & Henle

Taeniura Müller and Henle, 1837, *Sitz. Ber. Acad. Wiss. Berlin* : 117 (type-species : *Trygon ornatum* Gray).

Disc rounded, the head not distinct from it. Tail long, compressed and ribbon-like, with 1 or 2 serrated spines above in front of middle of its length; lower cutaneous fold extends to tip of tail; distance from cloaca to tail-tip much more than width of disc. Mouth small, with buccal processes on floor of mouth. Teeth small, in pavement. No dorsal or anal fins; no caudal fin.

Few Indo-Pacific species, 2 in our area.

KEY TO SPECIES

1 (a) Mouth straight, with 5 buccal processes; disc circular ... *T meyeni**

* *Taeniura meyeni* Müller & Henle has been reported from Sri Lanka and is likely to occur in our region also.

(b) Mouth curved, with 2 or 3 buccal processes	...	2
2 (a) Disc oval, longer than wide; back variegated, with round dark edged bluish spots	...	*T lymma*
(b) Disc circular, about as wide as long; back with black spots	...	*T. melanospila*

Taeniura lymma (Forsskal)

Raja lymma Forsskal, 1775, *Descript. Animal.* : 17 (type-locality : Lohaja, Red Sea).

Taeniura lymma : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 141, pl. 10, fig. 2.

Common Name :

Ribbontail-ray ... English

Distinguishing Characters :

Disc oval, about 0.8 times as wide as long. Eyes prominent, its diameter equal to interorbital width. Spiracles dorso-laterally situated, about as long as eyes. Mouth small and curved, with 2 buccal processes. Tail longer than disc, with 1 or 2 serrated spines at its midpoint; a ventral cutaneous fold extends from below origin of anterior spine to tip of tail. Dorsal surface of disc smooth in young, rough in adults with some fine asperities near middle of disc.

Colour : dorsal surface brownish-yellow, with bright blue spots which are smaller and more numerous towards the perimeter of disc, spots absent on tail; two broad bright blue lines extend along dorsal surface of tail as far black as first serrated spine; under surface of disc whitish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : It attains at least a disc length of 24 cm. Taken commercially only occasionally in our area.

Taeniura melanospila Bleeker

Taeniura melanospilos Bleeker, 1853, *Nat. Tijds. Ned.-Indie*, **4** : 513 (type-locality : Batavia).

Taeniura melanospilos : Day, 1878, *Fishes of India* : 740; Day, 1889, *Fauna Br. India*, Fishes, **1** : 56; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 142, pl. 10, fig. 3.

Common Names :

Fantail ray ... English

Giluga-tirike ... Telugu

Distinguishing Characters :

Disc almost circular, 1.1 times wider than long. Eyes prominent but small, 2 times in interorbital distance. Spiracles dorsolaterally situated, larger than eyes. Mouth curved, with 2 or 3 buccal processes Tail stout, slightly longer than disc, with 1 or 2 serrated spines inserted near its midpoint; a ventral cutaneous fold extends from below anterior end of serrated spine to tip of tail. Dorsal surface of disc rough.

Colour : upper surface of disc bluish-grey mottled with black spots and blotches of irregular size which often coalese with one another; lower surface of disc creamy white; ventral fold of tail black.

Geographical Distribution : East coast of Africa, the Red Sea, Madagascar, the east coast of India, Sri Lanka and the East Indies; littoral.

Fishery Information : It attains a disc-length of 147 cm. and a width of 17 cm. Taken commercially only occasionally in our region.

Genus **Urogymnus** Müller & Henle

Urogymnus Müller and Henle, 1837, *Sitz. Ber. preuss. Akad. Wiss. Berlin* : 434 (type-species : *Raja asperrima* Schneider).

Disc circular; body profusely covered with tubercles, also on tail. Tail feeble, about as long as disc length, without spine. No dorsal fin. Teeth in flattened pavement.

Urogymnus africanus (Schneider)

[Text-fig. 38]

Raja africana Schneider, 1801, *Syst. Ichth. Bloch* : 367 (type-locality : Guinea).
Urogymnus asperrimus (Schneider) : Day, 1878, *Fishes of India* : 736, pl. 195, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 1 : 48, fig. 20.
Urogymnus africana : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 176, pl. 12 & 13.

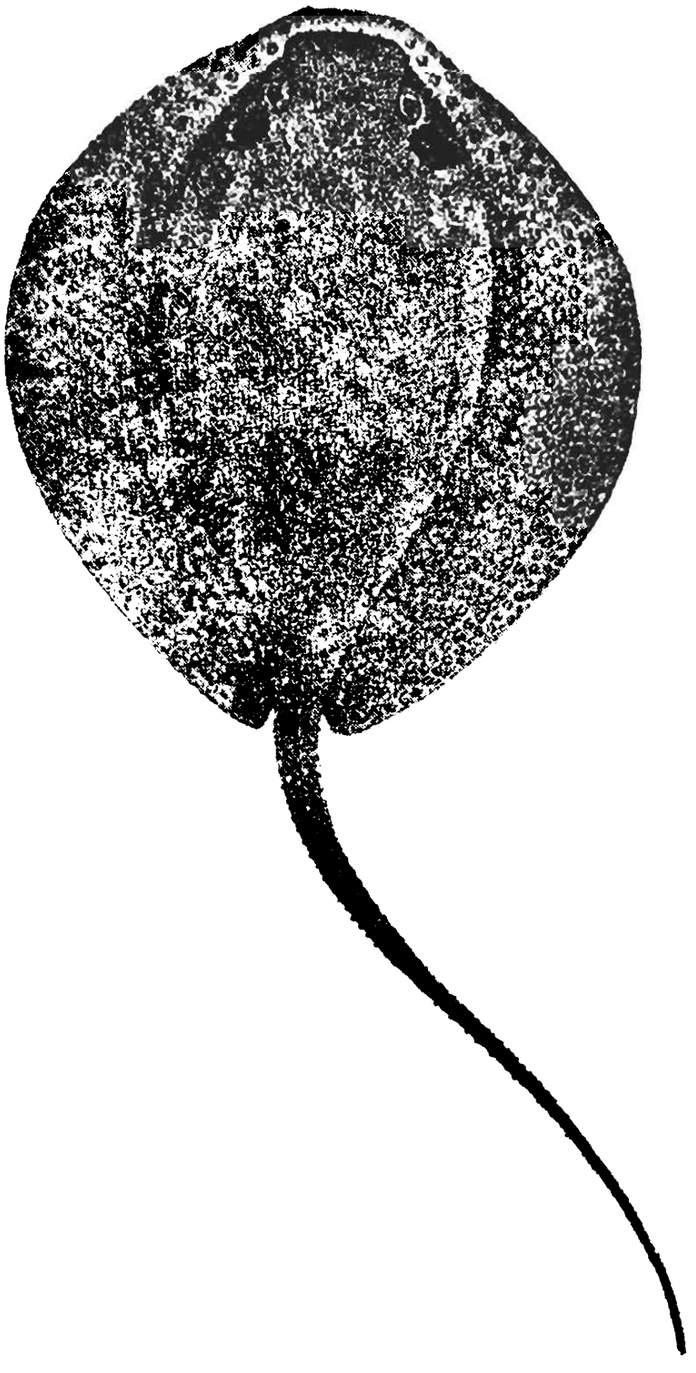
Common Names :

Thorny-ray	...	English
Moolan-tiriki	...	Tamil
Karimadi	...	Lakshadweep Is.

Distinguishing Characters :

Disc circular; body covered with tubercles, also on tail. Tail

long, tapering, with or without narrow fold below according to age; no spine on tail.



Text-fig. 38. *Urogymnus africanus* (Schneider)

Colour : body dark brownish, the tubercles whitish or yellowish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in our region. Length upwards of 120 cm.

Subfamily : GYMNURINAE

[Butterfly rays]

Large-sized stingrays (maximum disc width 2 m.), with a rhomboic disc atleast 1.5 times broader than long, and a distinctly marked-off tail. No buccal papillae on floor of mouth ; many small teeth in bands along jaws ; nasal curtains smooth-edged (with rare exceptions). Caudal fin absent. Some species have spiracular tentacles and one or more long, saw-edged tail spines. Tail rather slender, shorter than disc, with longitudinal folds on upper and/or lower surfaces.

Butterfly rays are cosmopolitan in tropical and warm-temperate waters, usually inhabiting sandy and muddy bottoms in shallow coastal waters.

Genus **Gymnura** Kuhl

Gymnura Kuhl, 1823, *Alg. Konst. Letterbode* : 316 (type-species : ***Raja micrura*** Schneider).

For characters of genus, see those of subfamily.

KEY TO SUBGENERA/SPECIES

1 (a) No dorsal fin ; no cutaneous fold on tail (subgenus *Gymnura*)	...	2
(b) Small but distinct dorsal fin near midlength of tail ; a small longitudinal cutaneous fold present on tail (subgenus *Aetoplatea* Müller & Henle)	...	4
2 (a) Tail armed with a small, weak, serrate spine at its first third	...	*G. japonica*
(b) Tail without serrate spine	...	3
3 (a) Tail nearly as long as length of disc	...	*G. poecilura*
(b) Tail less than half length of disc	...	*G. micrura**
4 (a) Small tentacle present in posterior angle of spiracle	...	*G. tentaculata*
(b) Spiracular tentacles absent	...	*G. zonurus*

* The occurrence of *Gymnura micrura* (Schneider) in our region is most uncertain, the earlier records are without positive evidence of specific identity.

Gymnura japonica (Schlegel)

[Text-fig. 39]

Pteroplatea japonica Schlegel, 1850, *Fauna Japonica,* Pisces, **4**(15) : 309, pl. 141 (type-locality : Nagasaki Bay, Japan).

Pteroplatea micrura (*nec* Schneider) Day, 1878, *Fishes of India* : 741, pl. 194, fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 56, fig. 23.

Gymnura (*Gymnura*) *micrura* : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 181.

Gymnura (*Gymnura*) *japonica* : Talwar and Das, 1974, *Proc. zool. Soc., Calcutta,* **27** : 19.



Text-fig. 39. *Gymnura japonica* (Schneider)

Common Names :

Japanese butterfly ray	...	English
Mazhmi-thirukkai	...	Tamil

Distinguishing Characters :

Disc broad, its length 2.0 to 2.2 times in width. Snout broadly obtuse, with a slight projection in front. Spiracles open upwards, larger than and close behind eyes ; no spiracular tentacles. Tail slender, 1.3 to 1.4 times in length of disc, armed with a small weak serrated spine

at its first third, with no upper and lower cutaneous folds. No dorsal, anal and caudal fins. Mouth moderate, slightly arched, with no buccal processes on floor of mouth. Teeth minute, in each jaw, unicuspidate. Skin smooth.

Colour : dorsal surface of disc slate-colour or brownish grey; tail annulate with 8 dark rings, about as broad as interspaces; ventral surface of disc whitish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Common in the commercial catches of the Orissa coast.

Gymnura poecilura (Shaw)

Raja poecilura Shaw, 1804, *Gen. Zool.*, **5** : 291 (on 'Tenkee-Kunsal' of Russell, 1803, *Fishes of Coromandel*, **1** : 4, pl. 6) (type-locality : Vizagapatnam).

Gymnura (*Gymnura*) *poecilura* : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 182, pl. 14, fig. 2 and text-fig. 63.

Common Names :

Longtailed butterfly-ray	...	English
Tappu-cooti, Tenkee-kunsul	...	Telugu
Advani-tiriki	...	Tamil
Perum-thirandi	...	Malayalam
Randgi, Shevta	...	Marathi

Distinguishing Characters :

Disc broad, its length 1.9 times in width. Snout broadly obtuse, with a little projection in front. Spiracles open upwards, larger than and close behind eyes; no tentacle on spiracle. Tail whip-like, 1.2 to 1.6 times in length of disc, without upper and lower tail folds, no caudal spine. No dorsal, anal and caudal fins. Mouth moderate, without buccal processes on floor of mouth. Teeth minute, in numerous rows in jaws. Skin smooth.

Colour : dorsal surface of disc brown, ventrally whitish; tail whitish with broad blackish rings, much wider than pale interspaces.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Very common in the Palk Bay near Mandapam, in shallow waters at 10 to 30 m. depth; commonly caught

in trawl nets or bottom-set gill nets. It occurs almost round the year, abundant between January and May. Dominant size range 350-700 mm disc-width; breeds almost throughout the year.

Gymnura tentaculata (Valenciennes)

Aetoplatea tentaculata Valenciennes, in Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 175 (type-locality : Malabar, India ; Red Sea).

Gymnura (Aetoplatea) tentaculata : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 179, fig. 62.

Common Name :

Tentacled butterfly-ray . . English

Distinguishing Characters :

Disc about 2 times as wide as long, markedly flattened dorso-ventrally; snout with a small apical projection. Spiracles open upwards, each with a short pointed tentacle in its posterior angle. Tail whip-like, about 2.2 times in length of disc, with faint upper and lower cutaneous folds; a minute serrated caudal spine present. Small dorsal fin at base of tail; base of dorsal fin more than half length of inner edge of pelvic fin. Mouth wide and transverse, without buccal processes on floor of mouth. Teeth small, in numerous diagonal rows; each tooth with a single sharply pointed cusp. Skin smooth.

Colour : greenish-grey dorsally, with irregular round spots of dark brown in young; in adults dark spots and blotches of yellowish green; tail faintly barred; ventral side of disc whitish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Fairly common in the trawl catches off the Bengal-Orissa-Andhra coast in depths ranging from 30 to 60 metres. Width upwards of 76 cms.

Gymnura zonurus (Bleeker)

Aetoplatea zonurus Bleeker, 1852, *Verh Batav. Gen (Plagisot.)*, **24** : 79 (type-locality : Batavia, Java).

Gymnura (Aetoplatea) zonurus : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 180.

Common Name :

Bleeker's butterfly-ray ... English

Distinguishing Characters :

Disc about 2 times as broad as long, markedly flattened dorso-ventrally. Snout with a small apical projection. Spiracles open upwards, no tentacle in its posterior angle. Tail whiplike, 1.8 times in length of disc, without upper cutaneous fold but occasionally with a low cutaneous fold on ventral side; a minute serrated caudal spine usually present Small dorsal fin present at base of tail. Mouth wide and transverse, without buccal processes on floor of mouth. Teeth minute, numerous, in broad bands. Skin smooth.

Colour : dorsal surface of disc olive-green, minutely and closely speckled with dark dots, boldly marked with large round or irregular spots of greenish-yellow and often joined together by irregular lines and blotches of same colour, sometimes ocellate; tail faintly barred.

Geographical Distribution : India and the East Indies.

Fishery Information : Fairly common in the trawl catches of the Orissa coast.

Family : MYLIOBATIDAE

[Eagle and Cownose rays]

Stingrays of rather large size. Head elevated and distinctly marked off from disc; anterior portions of pectoral fins forming a projecting subrostral lobe which may be deeply incised in midline; eyes and spiracles on sides of head; gill-openings about length of eye; tail much longer than disc; venomous spine (s) present in some. A small but distinct dorsal fin present; no caudal fin.

KEY TO SUBFAMILIES

1 (a) Subrostral lobe ('snout') undivided; floor of mouth with several fleshy papillae	...	Myliobatinae
(b) Subrostral lobe deeply incised in midline, thus forming two basally continuous lobes; floor of mouth without papillae	...	Rhinopterine

Subfamily : MYLIOBATINAE

[Eagle rays]

Stingrays of rather large size. Disc rhomboic, much broader than long, its width in fully grown specimens of different species up to more than 2.5 m. Head prominent; eyes prominent,, lateral; anterior subdivisions of pectoral fins form a single subrostral lobe; floor

of mouth with several fleshy papillae; teeth flat and pavement-like, in 1 to 7 series; nasal curtains fringed. Tail long and whiplike, and much longer than disc, a serrated spine (or spines) situated at its base. Skin on dorsal surface usually naked, except on tail.

Eagle rays are usually not abundant enough to become the object of a regular fishery. Four genera, two in our area.

KEY TO GENERA

1 (a) Single series of large teeth only in each jaw; caudal spine (spines) present ... **Aetobatus**

(b) Teeth in three series; no caudal spine ... **Aetomylaeus**

Genus **Aetobatus** Blainville

Aetobatus Blainville, 1816, *Bull. Soc. philom. Paris*, **8** : 122 (type-species : *Raja narinari* Euphrasen).

Disc lozenge-shaped, about twice as broad as long. Tail whiplike, with 1 to 3 serrated basal spines. Head conspicuously marked off from disc; rostral fins forming a unilobed, pointed snout. Teeth in a single transverse series in both jaws. Spiracles large, about twice eye-diameter. Dorsal fin small, situated at basal part of tail.

KEY TO SPECIES

1 (a) Body spotted closely with small dark-edged spots; snout short, tapering, blunt, nearly a broad as or broader than long at base ... *A. oceliatus**

(b) Body uniform or with white spots or rings superimposed upon a blue-black background; snout long, tapering, acute, longer than broad at base ... *A. narinari*

Aetobatus narinari (Euphrasen)

[Text-fig. 40]

Raja narinari Euphrasen, 1790, *Kon. Vet. Acad. Nya Handl. Stockholm*, **11** : 217, pl. 10 (type-locality : St. Bartholomieu, West Indies).

Aetobatis narinari : Day, 1878, *Fishes of India* : 743, pl. 149, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 59, fig. 24.

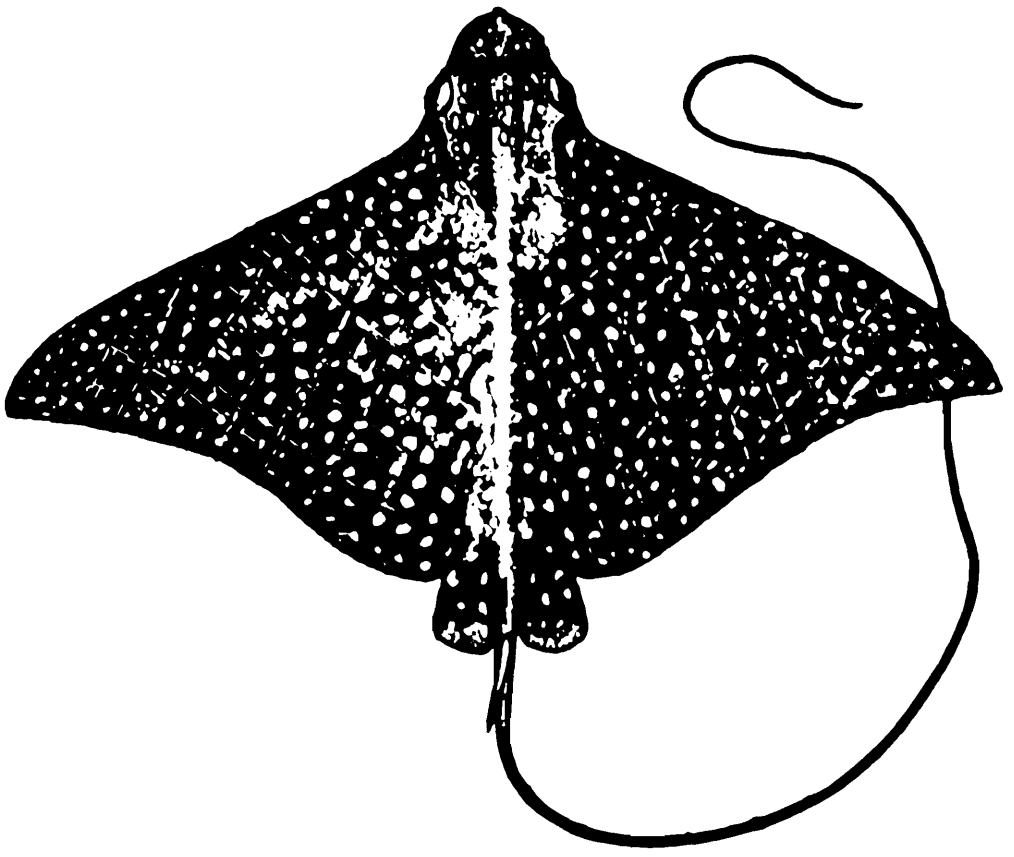
Aetobatus flagellum (Schneider) : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 192, fig. 66.

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* The occurrence of *Aetobatus ocellatus* (Kuhl) in our region is not very definite

Common Names :

Spotted edgle-ray	...	English
Chili	...	Oriya
Eel-tenkee	...	Telugu
Currooway-tiriki, Vaval-thiru	...	Tamil
Pulli-kakka-thirandi	...	Malayalam
Bolad	...	Marathi
Ra-ta-charm-dal	...	Andaman Is.
Madi, Vaval	...	Lakshadweep Is.



Text-fig. 40. *Aetobatus narinari* (Euphrasen)

Distinguishing Characters :

Head prominent, with a fleshy subrostral lobe or "snout" projecting anteriorly from its lower surface. Disc deep dorso-ventrally, about 1.7 times wider than long, with pointed angles and concave posterior margins. Pelvics large and fleshy, extend posteriorly beyond hind tip of dorsal fin. Tail cyclindrical and whiplike, 2 7 times longer than disc (when not mutilated), with a dorsal fin situated posterior to base of pelvic fins, and 1 to 3 serrated spines. Nasal curtain very deeply concave. Teeth in a single transverse series, forming a hard, flat, pavement-like plate in each jaw. Skin smooth.

Colour : If the mucous is intact, the upper surface is blue black with varying number of solid white spots and/or white circular rings dispersed upon the snout, head, disc and pelvic fins ; when the mucous is removed the upper surface is grey-blue ; ventral surface of disc whitish, outer angles of pectorals marginally little brownish.

Geographical Distribution : This cosmopolitan species occurs along the tropical and subtropical shores in the Atlantic, Indian and Pacific Oceans.

Fishery Information : Taken commercially in small quantities in our region. Reaches 335 cams. disc width.

Aetomylaeus Garman

Aetomylaeus Garman. 1908, *Bull. Mus. Comp. Zool. Harvard.* **51** : 252 (type-species : *Myliobatis maculatus* (Gray).

Disc lozenge-shaped, about twice as broad as long. Tail whip-like ; no caudal spine. Head moderately conspicuous ; rostral fins not continuous with pectoral fins at side of head, placed on lower level and united in one lobe. Teeth in 3 rows. Dorsal fin small, placed at basal part of tail.

KEY TO SPECIES

1 (a) Origin of dorsal fin behind ends of pelvic-fin bases ; brown-edged occelli on hind part of disc	...	*A. maculatus*
(b) Origin of dorsal fin opposite esds of pelvic-fin bases	...	2
2 (a) Disc twice wide as long ; about five blue cross-bands on disc (disappearing with age)	...	*A. nichofii*
(b) Disc less than twice wide as long ; green-brown edged ocelli on hind part of disc	...	*A. milvus*

Aetomylaeus maculatus (Gray)

Myliobatis maculata Gray, 1834, *Illustr. Indian Zool.*, Hardwick, **2** : pl. 101 (type-locality : Penang) ; Day, 1878, *Fishes of India* : 742 ; Day. 1889, *Fauna Br. India*, Fishes, **1** : 59.

Aetomylus maculatus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 186.

Common Names :

Mottled eagle-ray	...	English
Bolad, Wagli	...	Marathi

Distinguishing Characters :

Disc lozenge-shaped, its length about 1.8 times in width. Soft subrostral fin (snout) bluntly pointed, unilobed. Eye-diameter 2.5 times in snout length. Mouth straight, without buccal processes on floor of mouth. Spiracles large, not visible from above, 2.2 times in eye-diameter. Single dorsal In at base of tail, placed behind end of pelvic-fin bases. Tail long, whip-like ; no caudal spine. Skin rough, with small tubercles or spines in dorsal area in young.

Colour : brown dorsally with dark edged white spots posteriorly, tail indistinctly banded brown and darker, whitish ventrally.

Geographical Distribution : Mauritius, Arabia, India, Sri Lanka, the East Indies and China.

Fishery Information : Taken commercially in small quantities in our region.

Aetomylaeus milvus (Valenciennes)

Myliobatis milvus Valenciennes in, Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 178 (type-locality : Red Sea).

Aetomylus milvus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 187, fig. 64.

Common Names :

Brown Eagle-ray	...	English
Bolad	...	Marathi

Distinguishing Characters :

Length of disc 1.5 times in its width. Soft subrostral fin ('snout') unilobed, rounded. Eye-diameter 2 times in snout length. Mouth straight, without buccal processes on floor of mouth. Spiracles large, not visible from above, equal to eye-diameter. Single dorsal fin at base of tail, its origin opposite ends of pelvic-fin bases. Tail long, whiplike ; no caudal spine. Skin smooth.

Colour : dorsally uniform dark brown, with green-brown edged ocelli on hind part of disc and pelvic fins ; ventrally pale whitish ; tail brownish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in our region.

Aetomylaeus nichofii (Schneider)

Raja nichofii Schneider, 1801, *Syst. Ichth. Bloch* : 364 (type-locality : East Indies).

Myliobatis nieuhofii : Day, 1878, *Fishes of India* : 742; Day, 1889, *Fauna Br. India,* Fishes, **1** : 58.

Aetomylus nichofii : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 189, 190.

Common Names :

Nieuhof's eagle-ray	...	English
Mookarah tonkee	...	Telugu
Tuppa-kollee	...	Tamil
Kaniyen-thirandi	...	Malayalam
Bolad	...	Marathi
Karaj	...	Gujarati

Distinguishing Characters :

Disc about twice as wide as long. Subrostral fin ('snout') unilobed. Eye-diameter 3.5 times in snout length. Mouth straight, without buccal processes on floor of mouth. Spiracles large, about twice eye-diameter. Single dorsal fin at base of tail, its origin opposite ends of pelvic-fin bases. Tail long, whiplike; no caudal spine. Skin smooth in young, very finely tuberculated in adults.

Colour : dorsally dark brown anteriorly with 3 to 5 blue cross-bands on disc, disappearing with age; posteriorly on disc large close-set, round greyish blotches; tail irregularly blotched or dark brown when young; ventrally whitish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in our region.

Subfamily : RHINOPTERINAE

[Cownosed Rays]

The most striking feature of the Rhinopterinae is the soft bilobed subrostral fin which occurs on the lower surface of the head; anterior margin of head concave. Teeth broad, flat, angular, in pavement. Spiracles large, behind eyes, open laterally. Tail long, slender, whip-

like, with dorsal fin above basal portion and serrated spine further back.

Only one genus.

Genus **Rhinoptera** Cuvier

Rhinoptera Cuvier, 1829, *Regne Animal* (ed. 2), **2** : 401 (type-species : *Myliobatis marginata* St. Hilaire).

Anterior face of cranium concave ; subrostral fin incised (bilobed). Ten species, three in our area.

KEY TO SPECIES

1 (a) Teeth normally in 7 series in each jaw	...	*R. javanica*
(b) Teeth in 9 series in upper jaw	...	2
2 (a) Teeth in 7 series in lower jaw	...	*R. adspersa*
(b) Teeth in 9 series in lower jaw	...	*R. sewelli*

Rhinoptera adspersa Müller & Henle

Rhinoptera adspersa Müller and Henle, 1841, *Syst. Besch. Plagiost.* : 183 (type-locality : India) ; Day, 1878, *Fishes of India* : 744 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 61 ; Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 197.

Common Names :

Rough cowray	...	English
Motta-tiriki, Kurivi-tiriki	...	Tamil

Distinguishing Characters :

Head broad and prominent, its anterior profile deeply concave, with a soft bilobed subrostral fin on its lower surface. Eyes and spiracles laterally situated. Disc falcate, deep dorsoventrally, twice as broad as long. Mouth wide, with numerous papillae covering lower lip ; a wide nasal curtain with strongly fimbriated posterior margin overlaps mouth. Teeth in a dental plate of 9 transverse rows in upper jaw and 7 transverse rows in lower jaw. Tail long, whip-like, with a strong serrated spine. Dorsal fin small, situated at base of tail above inner edge of pelvic fins. Upper surface of disc rough with fine stellate tubercles.

Colour : greenish-brown above, becoming lighter at edges of disc ; lower surface whitish.

Geographical Distribution : Pakistan, India, Sri Lanka and Malaysia ; littoral.

Fishery Information : Of minor commercial significance in our region.

Rhinoptera javanica Müller & Henle

Rhinoptera javanica Müller and Henle, 1841, *Syst. Beschr. Plagiost.* : 182, pl. 58 (type-locality : Java) ; Day, 1878, *Fishes of India* : 744, pl. 195, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 61, fig. 25 ; Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 198.

Common Names :

Javanese cowray	...	English
Valvadi-thirukkai	...	Tamil
Kaka-thirukay	...	Malayalam
Wagla	...	Kannada
Bolad, Wagli	...	Marathi

Distinguishing Characters :

Head broad and prominent, its anterior profile deeply concave in small specimens, slightly concave in adults, with a soft bilobed subrostral fin on its lower surface. Eyes and spiracles laterally situated. Disc falcate, deep dorso-ventrally, about 1.7 times broader than long, with pointed outer angles. Mouth wide, with numerous papillae covering lower lip ; a wide straight-edged nasal curtain with a strongly fimbriated posterior margin overlaps mouth. Teeth in a dental plate of 7 transverse rows in both jaws. Tail long, whip-like, with a serrated spine. Dorsal fin erect, situated at base of tail above inner edge of pelvic fins. Upper and lower surfaces of disc and head smooth, a few minute denticles on tail.

Colour : upper surface brown, lower surface white.

Geographical Distribution : Tropical Indo-west Pacific.

Fishery Information : Occasionally caught along with other rays of commercial importance from our region. On such occasions huge landings are made in routine shore-seine hauls, the shoals without being sighted on surface. Great shoals of this gregarious oyster-eating ray are known to have their chief centre on the Cape Comorin banks, where may come the diastrous raids on the pear banks, clearing millions of maturing oysters between November and February.

Rhinoptera sewelli Misra

Rhinoptera sewelli Misra, 1946, *Rec. Indian Mus.,* **44** : 361, pl. 1 (type-locality : Calicut, Kerala) ; Misra, 1959, *Fauna of India,* Pisces (2nd ed.), **1** : 199, pl. 15, figs. 1, 2 & 3.

Common Name :

Sewell's cowray	...	English

Distinguishing Characters :

Head broad and prominent, its anterior profile slightly concave, with a soft bilobed subrostral fin on its lower surface. Eyes and spiracles laterally situated. Disc falcate, deep dorsoventrally, 1.7 times broader than long, with pointed outer angles. Mouth wide, with numerous papillae covering lower lip; a wide nasal curtain with a strongly fimbriated posterior margin overlaps mouth. Teeth in a dental plate of 9 transverse rows in both jaws. Tail long, whip-like, with 2 serrated spines closely apposed together. Dorsal fin small, situated at base of tail. Upper and lower surface of disc and head smooth.

Colour : upper surface blackish-grey, pinkish white below.

Geographical Distribution : South-west coast of India.

Fishery Information : Of minor commercial significance being taken occasionally on the Kerala coast.

Family : MOBULIDAE

[Devil rays, Mantas]

Stingrays of very large size, with a broad rhomboic disc which may attain a width of over 7 m in some species (*Manta*) ; tail distinctly marked off from body, very long and whiplike. Head distinct from disc; on each side of the snout is a fleshy projection, a cephalic fin or 'horn', separated by the width of the mouth, the latter either terminal or below head. Teeth minute, in many series, forming a band either in one or in both jaws; no papillae in mouth. Eyes and spiracles on sides of head. No caudal fin, but a small dorsal fin at base of tail; a long serrated spine spine (or spines) present on tail in some species, lacking in others. Skin naked or more or less rough with prickles or small tubercles.

Some mantas grow to a width of about 6 m and a weight of more than 1360 kg Three genera, two in our area.

KEY TO GENERA

(a) Mouth on lower surface of head	...	**Mobula**
(b) Mouth terminal, extending across front of head	...	**Manta**

Genus **Manta** Bancroft

Manta Bancroft, 1828, *Zool. Journ.*, 4 : 454 (type-species : *Cephalopterus americana* Bancroft).

Disc rhomboic, about twice wider than long. Head greatly depressed, broad, flat, with two cephalic fins or 'horns' Tail fairly slender and whip-like, with a small dorsal fin at its base, without a spine. Eyes prominent, lateral; spiracles small. Mouth terminal, extending across front of head.

Manta birostris (Donndorff)

[Text-fig. 41]

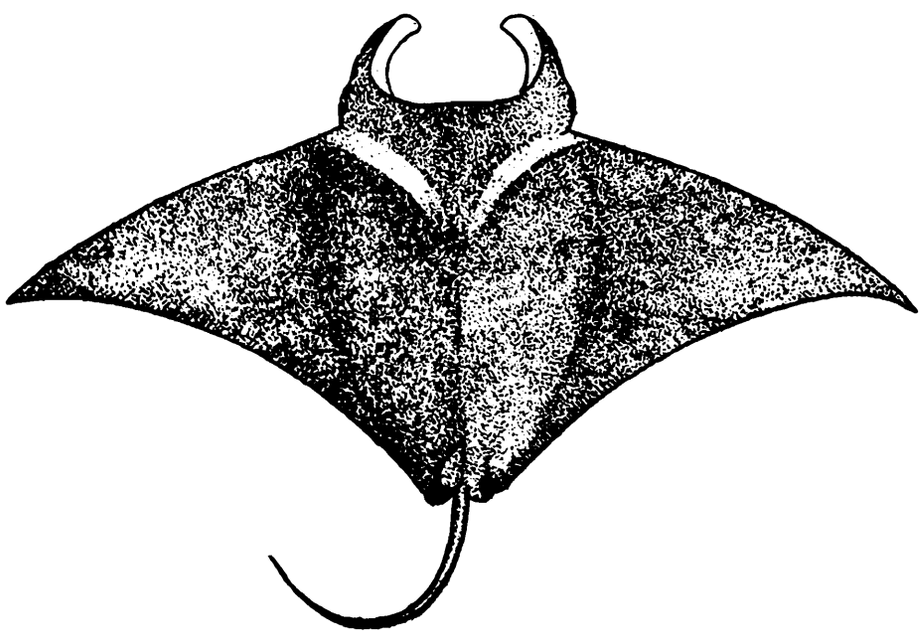
Raja birostris Donndorff, 1792, *Artedi Ichth.* (ed. 2), **3** : 535 (type-locality : not given).

Ceratoptera ehrenbergii Müller and Henle : Day, 1878, *Fishes of India* : **745** (*nec* fig.).

Manta ehrenbergii : Misra, 1969, *Fauna of India,* Pisces (2nd ed.), **1** : 208.

Common Names :

Manta ray	...	English
Kotuwa-tiriki	...	Tamil
Kottar	...	Lakshadweep Is.



Text-fig. 41. *Manta birostris* (Donndorff)

Distinguishing Characters :

Disc rhombic, much wider than long. Head greatly depressed, broad; snout very broad (as seen above) with broadly concave profile, the horns 8.5 times in disc length. Mouth terminal, wide. Teeth numerous, in pavement, present in lower jaw only. Spiracles small, close behind and smaller than eyes. Tail slender, whip-like, without a spine, with a small dorsal fin at its base. Upper surface of disc rather rough, with rough asperities.

Colour : upper surface olivaceous brown to black, below whitish.

Geographical Distribution : Cosmopolitan, the Atlantic Ocean, western Pacific and the Indian Ocean.

Fishery Information : It is one of the largest of fishes and grows to a width of more than 7 m and a weight in excess of 1400 kg. Taken commercially occasionally in our region.

Genus **Mobula** Rafinesque

Mobula Rafinesque, 1810, *Indice Ittiol. Sicil.* : 48, 61 (type-species : *Mobula auriculata* Rafinesque).

Tail slender, whip-like, with a spine occasionally present at its base. Head broad, flat and truncate; mouth on lower surface of head. Small dorsal fin present. Rostral fins moderate, distinct from pectorals, directed forward and obliquely downward.

KEY TO SPECIES

1 (a) Tail with a spine (spines)	...	*M. mobular*
(b) Tail without spine		*M. diabolus*

Mobula diabolus (Shaw)

[Text-fig. 42]

Raja diabola Shaw, 1804, *Gen. Zool.*, **5** : 291 (on *'Eereegoodoo-Tenkee'* of Russell, 1803) (type-locality : Vizagapatnam).

Dicerobatis eregoodoo (Cuvier) : Day, 1878, *Fishes of India* : 744, pl. 193, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 62, fig. 26.

Dicerobatis kuhlii (Müller & Henle) : Day, 1878, *Fishes of India* : 745 ; Day, 1889, *Fauna Br. India, Fishes*, **1** : 63.

Mobula diabolus : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 202, fig. 68.

Mobula kuhlii : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 205.

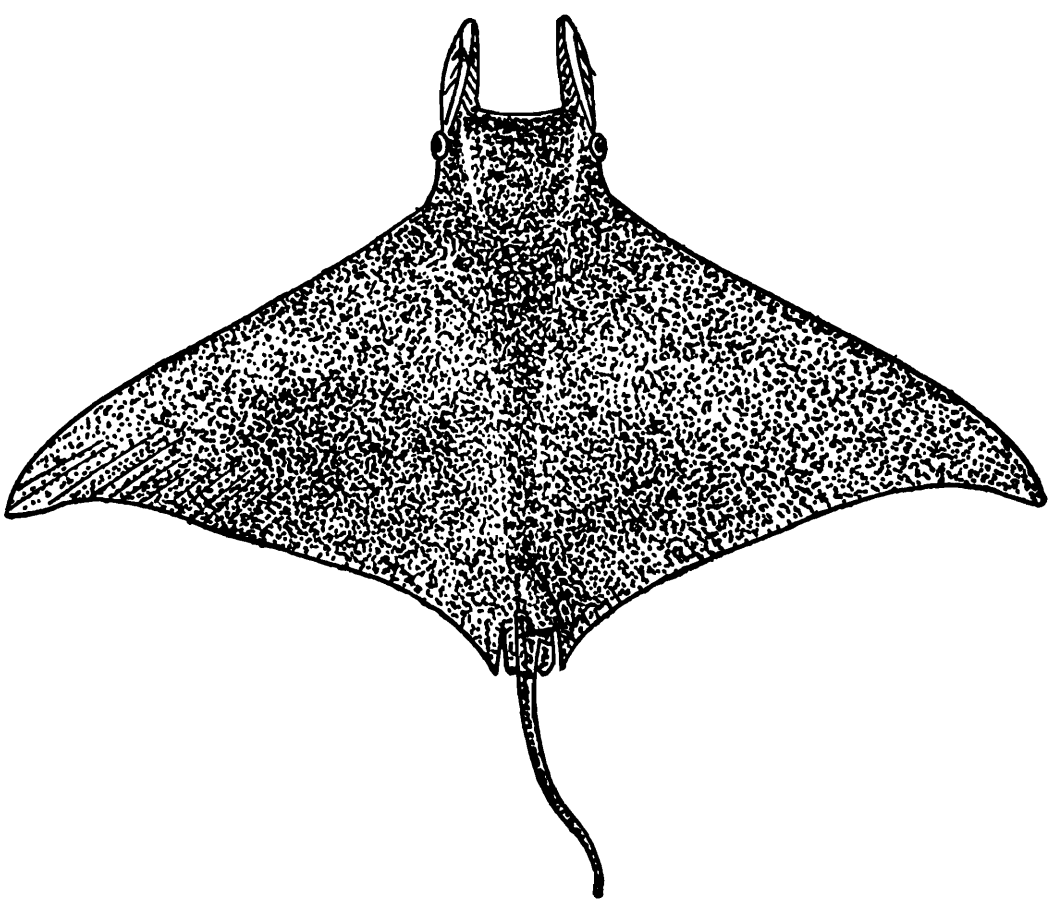
Mobula thurstoni (Lloyd) : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), **1** : 206.

Common Names :

Pigmy devil-ray	...	English
Eregoodoo-tenkee	...	Telugu
Yeliki, Komun-tiriki	...	Tamil
Wagla	...	Kannada
Shing-pakat, Mhorcha	...	Marathi
Kottar	...	Lakshadweep Is.

Distinguishing Characters :

Disc 1.7 to 2.2 times as broad as long; anterior margin of head slightly concave. Pectorals falcate, with sharply pointed lateral and posterior apices and concave posterior margins. Spiracles small, their length about 3 times in horizontal eye-diameter. Mouth ventral, extending entire distance between cephalic fins. Teeth feeble, in numerous rows. Wide straight-edged nasal curtain extends across front of upper jaw. Dorsal fin large, at base of tail, not projecting beyond posterior margin of disc. Tail slender, whip-like, shorter than disc length; no caudal spine. Skin smooth.



Text-fig. 42. *Mobula diabolus* (Shaw)

Colour : grey-brown to blue-black above, creamy-white below.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Occasional catches of large specimens are reported from Gulf of Mannar area in drift nets at 40-60 m depth, usually during the September-October period. Size range of such specimens varies from 572 to 1674 mm. disc-width and a weight of 14 to 44 kg.

Mobula mobular (Bonnaterre)

Raja mobular Bonnaterre, 1788, *Tableau Encyclop. Ichth.* : 5 (type-locality : Mediterranean).

Mobula mobula : Misra, 1969, *Fauna of India*, Pisces (2nd ed.), 1 : 206.

Common Names :

Horny ray	...	English
Shing pakat	...	Marathi

Distinguishing Characters :

Disc subrhomboid, its width twice or more times as long. Snout in form of two curled cephalic horns; eyes prominent. Mouth ventral, well behind head. Spiracles small. Teeth in numerous rows. Single dorsal fin, its origin above pelvic-fin bases. Tail slender, whiplike, more than twice length of disc, without cutaneous folds, with a serrated spine. Skin smooth

Colour : dark brown to bluish-black above, whitish ventrally.

Geographical Distribution : West coast of India and the Mediterranean.

Fishery Information : Taken commercially only occasionally on the Bombay coast.

Class : OSTEICHTHYES

[Bony-fishes]

Skull with well developed system of membrane bones, as opercles, suborbitals etc. Jaws and fins normally fish-like. The individual gill clefts of the sharks and rays have given way to a more advanced single gill-flap or opercle on each side, which effectively covers all of the gill-filaments beneath it. The paired claspers of the elasmobranchs are lacking, and fertilization of the eggs is usually external.

Subclass : ACTINOPTERYGII

[Modern Bony-fishes]

Skeleton bony, firm. Skin normally covered with overlapping scales which in some families may be obsolete, and in others modified by calcification into a hard covering, ossified dermal plates or a complete bony casing. Gills covered by bony operculum and have only one external opening on each side. Caudal fin nearly symmetrical.

Most of the great groups of existing fishes are included in the present arrangement. This is formed largely of various heterogeneous orders, and includes many forms apparently dissimilar. As many are imperfect in definition, the following key is largely provisionally :

KEY TO ORDERS

1 (a) Body not bilaterally symmetrical, highly compressed; dorsal and anal fins long	...	Pleuronectiformes
(b) Body bilaterally symmetrical	...	2
2 (a) Body oddly shaped (broad and depressed), encased in bony rings which are fused	...	Pegasiformes*
(b) Not as above	...	3
3 (a) Gill openings at or behind base of pectoral fin; first ray of spinous dorsal fin (if present) on head and modified into illicium (movable lure)	...	Lophiiformes*
(b) Gill openings before pectoral fins	...	4
4 (a) Semicircular sucking disc present on thorax; head and body scaleless; no swim bladder	...	Gobiesociformes*
(b) No such sucking disc on thorax	...	5
5 (a) Body eel-like, elongate, round in section; gill-openings narrow, on sides of head; no spiny rays in in fins	...	Anguilliformes
(b) Body not eel-like, but if it does have an eel-like form then either the gill-openings not separate from each other (as in true eels) but confluent on ventral side of body near throat, or pelvic fins present, or spiny rays in dorsal and anal fins, or else gill cavity not enlarged	...	6
6 (a) Form of body eel-like	...	7
(b) Form of body not eel-like	...	9
7 (a) One gill-opening on ventral surface, restricted above; pectoral fins absent	...	Synbranchiformes*
(b) Two gill-openings; pectoral fins present	...	8
8 (a) Pelvic fins present, abdominal	...	Notacanthiformes*
(b) Pelvic fins absent	...	Perciformes (Suborder : Mastacembeloidei*)

9	(a)	Sucking disc on head (developed from a transformed spinous dorsal fin)	... Perciformes (Family : Echneidae*)
	(b)	First dorsal fin normal, not transformed into a sucking organ	... 10
10	(a)	Snout markedly elongate, tube-shaped, with the mouth at end of tube ; pelvic fins, when present, abdominal ; gills tufted, lobe-like	... Syngnathiformes*
	(b)	Snout not tubular, but if it resembles a tube then pelvic fins under or not far behind pectoral fins and as a rule with a strong spine	... 11
11	(a)	Pectoral fin with two distinct bases, the upper with rays attached and the lower with several free filamentous rays	... Perciformes (Suborder : Polynemoidei)
	(b)	Pectoral fin with one base, the lower rays occasionally markedly modified as compared with upper rays but there is no considerable interval between the bases of the two group of rays	... 12
12	(a)	Weberian apparatus (a series of small bones connecting the gas-bladder with the internal ear) present ; head scaleless	... 13
	(b)	Weberian apparatus absent ; jaws usually toothed	... 14
13	(a)	Body generally with scales, the head and body never with bony plates ; no teeth in jaws	... Cypriniformes*
	(b)	Body or head either naked or covered with heavy bony plates ; jaws generally with teeth ; several pairs of barbels usually around mouth	... Siluriformes
14	(a)	Mesocoracoid present	... 15
	(b)	Mesocoracoid absent	... 21

15 (a)	Pelvic fins in front of pectoral fins	...	Perciformes (Family : Bathyclupeidae*)
(b)	Pelvic fins, if present, abdominal	...	16
16 (a)	Anal fin very long, with more than 100 rays in anal and caudal fins combined, and confluent with the reduced caudal fin	...	Osteoglossiformes*
(b)	Anal fin of moderate length, not confluent with caudal fin	...	17
17 (a)	Dorsal fin usually inserted in posterior half of body; maxillae included in gape of mouth	...	18
(b)	Dorsal fin median, not far posterior	...	19
18 (a)	Luminescent organs (photophores) present	...	Salmoformes*
(b)	Luminescent organs absent	...	Clupeiformes (Family : Chirocentridae)
19 (a)	Lateral line absent; body compressed in most	...	Clupeiformes
(b)	Lateral line present	...	20
20 (a)	Jaws toothless; branchiostegal rays 3 or 4	...	Gonorynchiformes
(b)	Jaws with teeth; branchiostegal rays 6 to 35	...	Elopiformes
21 (a)	Adipose dorsal fin usually present; premaxillae form the gape of mouth (maxillae excluded); photophores often present	...	Myctophiformes
(b)	Adipose dorsal fin absent	...	22
22 (a)	Caudal fin reduced, confluent with long anal fin; pelvic fins with two rays (which appear as a single filamentous ray)	...	Lampridiformes* (Suborder : Ateleopodoidei)
(b)	Caudal fin, if present, well expressed, but if confluent then to the same extent with the anal and dorsal fins	...	23

23	(a) Pelvic fins present, and inserted normally on belly or not far behind pectoral fins, or, finally, under pectoral fins but more or less markedly behind the vertical of posterior edge of pectoral-fin base	...	24
	(b) Pelvic fins absent, but if present then inserted below base of pectoral fins, or in front of them on throat, or even on chin	...	29
24	(a) Suprabranchial organ (for air breathing) present; dorsal and anal fins long; no fin spines	...	Perciformes (Suborder Channoidei*)
	(b) Suprabranchial organ absent	...	25
25	(a) No spines in fins; opercular and preopercular margins without spines or serrations; suborbital stay absent	...	Atheriniformes
	(b) Spiny rays present if only in one fin**, but if they are weakly expressed, a suborbital stay present	...	26
26	(a) Pair of hyoid barbels present†; dorsal fin continuous	...	Polymixiiformes*
	(b) Hyoid barbels absent	...	27
27	(a) Suborbital stay present (process of suborbital bone which is intergrown with preoperculum; it can be probed with a needle under skin of cheek)	...	Scorpaeniformes
	(b) Suborbital stay absen	...	28
28	(a) Dorsal fins widely separated	...	Perciformes (Suborder : Mugiloidei)
	(b) Dorsal fin continuous, but if (rather rarely) the fins separate, the separation negligible	...	Perciformes (Suborder : Percoidei)

** Spiny rays are absent in adult specimens of family Menidae (Perciformes).
† Fishes of family Mullidae also have barbels, but not hyoid barbels.

29	(a) Pectoral fins tremendously enlarged, with inner rays free; suborbital stay present; head large, blunt and bony; body with scute-like scales	...	Dactylopteriformes*
	(b) Pectoral fins moderate; suborbital stay absent	...	30
30	(a) Orbitosphenoid present	...	31
	(b) Orbitosphenoid absent	...	32
31	(a) No true spines in fins	...	Lampridiformes*
	(b) Spiny rays present in dorsal and anal fins	...	Beryciformes
32	(a) Mouth very small; maxillae usually firmly united or fused with premaxillae; gill openings restricted; scales usually modified as spines, shields or plates	...	Tetraodontiformes
	(b) Mouth not so small; if maxillae fused with premaxillae, or mouth relatively small, then gill openings as a rule normal	...	33
33	(a) Distinct spinous anal fin present, with 1 to 4 spines; body usually thin and deep; simple posttemporal fused to skull	...	Zeiformes*
	(b) Anal fin not forming separate anterior spinous part; posttemporal not fused to skull	...	34
34	(a) Head large, with eyes more dorsal than lateral; body usually scaleless	...	Batrachoidiformes*
	(b) Not as above	...	Gadiformes

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* The fishes of the orders Pegasiformes, Lophiiformes, Gobiesociformes, Notocanthiformes, Syngnathiformes, Perciformes (family Bathyclupeidae), Salmoformes, Lampridiformes, Polymixiiformes, Dactylopteriformes, Zeiformes and Batrachoidiformes are of no fishery importance in our region; the fishes of the orders Synbranchiformes, Perciformes (suborder Mastacembeloidei), Cypriniformes, Osteglossiformes, Salmoformes and Perciformes (suborder Channoidei) are confined to the freshwaters of our area.

Order : CLUPEIFORMES

Suborder : CLUPEOIDEI

Body compressed in most; swimbladder with tube-like connections to inner ear and a pneumatic duct to stomach. Dorsal and anal fins without spines. Branchiostegal rays usually fewer than 15. Abdomen often with keeled scutes along the ventral midline. Jaws not protrusible. Most are plankton feeders, with numerous gill-rakers which serve as efficient straining devices. Almost all marine though some enter estuaries and freshwater.

A complete taxonomic revision of all Indo-Pacific clupeoid fishes (excluding the Chirocentridae and genera confined to temperate waters) has been made by T. Wongratana (Ph.D. thesis, London University, January, 1980). This is the most up-to-data study and supersedes the *Synopsis* of Whitehead (1973). Morphometric and meristic data have been compiled from the above two works.

KEY TO FAMILIES

1 (a) Dorsal fin set well behind midpoint of body; fanglike teeth in jaws	...	Chirocentridae
(b) Dorsal fin more advanced, usually at midpoint of body; teeth small or absent	...	2
2 (a) Articulation of lower jaw under or before eye, the mouth more or less terminal, the snout not 'pig-like'	...	Clupeidae
(b) Articulation of lower jaw behind eye, the mouth underslung (inferior), the snout tapering and 'pig-like'	...	Engraulidae

Family : CLUPEIDAE

[Sardines, Shads]

Small silvery fishes, usually with fusiform, subcylindrical bodies but sometimes quite strongly compressed; abdominal scutes usually present (the Dussumieriinae lack abdominal scutes, except for a single pelvic scute). Lower jaw short but deep, giving typical clupeid mouth shape (except inferior mouth in gizzard-shads and pointed mouth in *Dussumieria*). Teeth small or absent. No spiny rays in fins; dorsal and pelvic fins usually present (both absent in *Raconda*); pectoral fins set low on body; pelvic fins about equidistant between pectoral-fin base and anal-fin origin; anal fin often short (less than 30 rays) but sometimes very long (40 to 60 rays eg. *Ilisha, Opisthop-*

terus) ; caudal fin always deeply forked. Head scaleless ; scales on body cycloid but often shed easily ; no lateral line. Usually 4 to 10 branchiostegal rays (11 to 18 in Dussumieriinae).

A valuable commercial fishery exists for clupeids in many parts of the world. Most species form schools and swim near the surface, usually in coastal waters, feeding on plankton.

KEY TO SUBFAMILIES

1	(a) Branchiostegal rays 11 to 18 : no abdominal scutes (except for W-shaped pelvic scute), belly smooth	...	**Dussumieriinae**
	(b) Branchiostegal rays 4 to 8 ; scutes on belly (except in Spratelloidinae and some Pellonulinae)	...	**2**
2	(a) Anal fin long (more than 30 rays) ; pelvic fins with 6 or 7 rays, or absent ; lower jaw very prominent	...	Pristigasterinae
	(b) Anal fin short (less than 30 rays) ; pelvic fins present, with 7 to 9 rays	...	3
3	(a) Mouth inferior, lower jaw flared outwards at corners ; last dorsal ray often filamentous ; a single (posterior) supra-maxilla only present	...	Dorosomatinae
	(b) Mouth terminal, lower jaw not flared outwards at corners ; last dorsal ray not filamentous	...	4
4	(a) Upper jaw with distinct notch at centre ; two supra-maxillae present	...	Alosinae
	(b) Upper jaw without median notch	...	5
5	(a) Single (posterior) supramaxilla only present	...	Pellonulinae
	(b) Two supramaxillae present	...	6
6	(a) Abdominal scutes present	...	Clupeinae
	(b) Abdominal scutes absent (except for W-shaped pelvic scute)	...	Spratelloidinae

Subfamily : DUSSUMIERIINAE

[Round-herrings]

Clupeoid fishes usually with elongate, fusiform bodies and rounded bellies. Branchiostegal rays 11 to 18. Mouth terminal, lower jaw more or less projecting. Premaxillae rectangular, toothed, teeth not deciduous. Ventral scutes absent except for a modified W-shaped

scute surrounding base of pelvic fins and sometimes a second triangular, plate-like scute immediately behind pelvic fins. Scales cycloid, covering entire body except head, often highly deciduous; elongate axillary scales in angles of pectoral and pelvic fins. Dorsal-fin rays 18 to 23; anal rays 10 to 18; pelvic rays 8.

Two widespread genera recognised, *Dussumieria* and *Etrumeus*, the latter found chiefly in the subtropical seas and not yet recorded from Indian waters.

Genus **Dussumieria** Valenciennes

Dussumieria Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 467 (type-species : *Dussumieria acuta* Valenciennes).

Body elongate, more or less compressed. Snout pointed, jaws equal. Two supra-maxillae, each about half length of maxilla; tip of maxilla rounded, its entire ventral edge almost bearing small conical teeth; premaxillae toothed. Dorsal-fin rays 18 to 23; anal 14 to 18; 18 to 32 gillrakers on lower arm of first gill arch. Branchiostegal rays 12 to 18. Pelvic-fin origin below middle of dorsal fin.

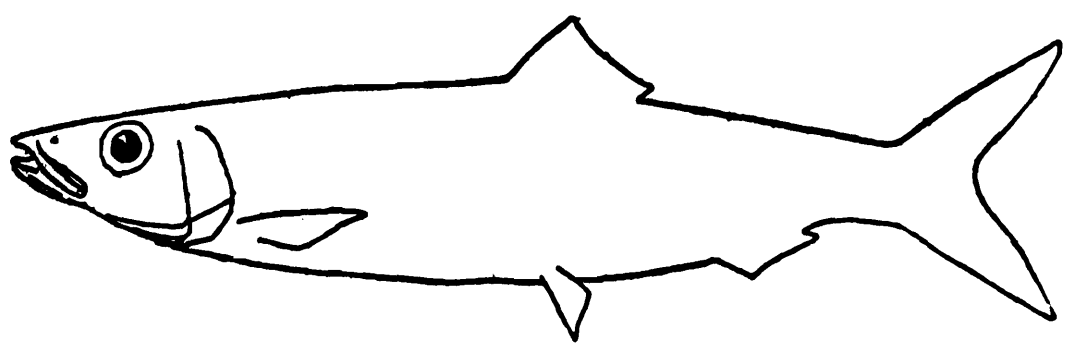
Monotypic according to Whitehead (1973); a second species, *D. elopsoides* Bleeker, 1849, recognised by Wongratana (1980), of which *D. hasseltii* is a synonym. It lacks striae on the exposed part of the scales.

Dussumieria acuta Valenciennes

[Text-fig. 43]

Dussumieria acuta Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 467, pl. 606 (type-locality : Bombay. Coromandel); Day, 1878, *Fishes of India* : 647, pl. 166, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 399, fig. 123; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 170, fig 4; Misra, 1976, *Fauna of India*, Pisces (2nd ed.) **2** : 21, fig. 3.

?*Dussumieria hasseltii* Day (*nec* Bleeker), 1878, *Fishes of India* : 647, pl. 166, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, **1** : 399; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 23, fig. 4.



Text-fig. 43. *Dussumieria acuta* Valenciennes

Common Names :

Rainbow Sardine	...	English
Opul-dah	...	Andaman Is
Marrawa, Morava	...	Telugu
Poonduouringa, Mothakendi, Thondon	...	Tamil
Kola-koyan, Charlay	...	Malayalam
Mannethi	...	Kannada
Sprat-tok	...	Marathi

Distinguishing Characters :

Body elongate, moderately compressed; belly rounded, without scutes (except for plate-like W-shaped pelvic scute). Snout pointed, larger than eye-diameter; maxilla not quite reaching anterior eye border; premaxillae rectangular (not triangular) giving distinctive appearance to mouth. Dorsal fin with 14 to 17 soft rays, placed just behind centre of body. Anal-fin base very short, well behind dorsal-fin base, with 11 to 14 soft rays Scales thin and deciduous.

Colour : body iridescent blue-green on back, flanks beginning gold and fading to silver; fins pale, but first pectoral-fin ray and tip of caudal fin dusky.

Geographical Distribution : Widely distributed throughout the tropical Indo-Pacific.

Fishery Information : The common rainbow-sardine contributes a good fishery on the Andhra and Tamil Nadu coast of India; on the Andhra coast fairly good catches are obtained from November to March and in May. Although these fishes sometimes appear locally in large groups, they do not occur in vast schools as do some of the sardines.

Subfamily : SPRATELLOIDINAE

Body elongate, slightly compressed, rounded ventrally; snout pointed, jaws equal or lower jaw slightly projecting; two supramaxillae. Two well-developed posterior fontanelles broadly or narrowly divided anteriorly. A single, W-shaped pelvic scute; no abdominal scutes. Anal fin with 8 to 12 soft rays. Pelvic-fin origin below mid-dorsal or below second half of dorsal fin.

A single genus in the Indo-Pacific.

Genus **Spratelloides** Bleeker

Spratelloides Bleeker, 1851, *Nat Tijds. Ned.-Indie*, **2** : 214 (type-species : *Clupea argyrotaeniata* Bleeker = *Clupea gracilis* Schlegel; no diagnosis) ; Bleeker, 1852, *Verh. batav. Genoot. Kunst. Wet.*, **24** : 29 (generic diagnosis).

For characters of the genus, see those of family. Two species, both in our region.

KEY TO SPECIES

1 (a) A bright and prominent silvery mid-lateral stripe; scales in lateral series 42 to 48 ... *S. gracilis**

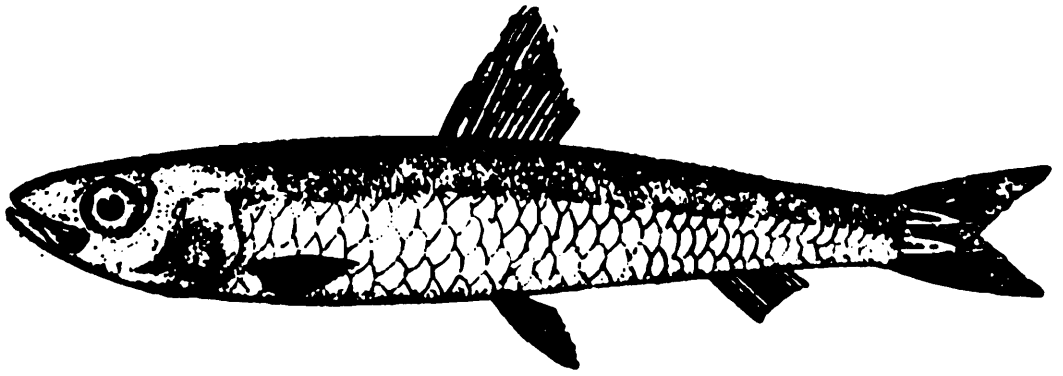
(b) No silvery band, but whole flanks silvery; scales in lateral series 35 to 41 ... *S. delicatulus*

Spratelloides delicatulus (Bennett)

[Text-fig. 44]

Clupea delicatula Bennett, 1831, *Proc. zool. Soc. Lond.*, **1** : 168 (type-locality : Mauritius).

Spratelloides delicatulus : Jones, 1961, *J. mar. biol. Ass. India.* **2**(2) : 267, fig.



Text-fig. 44. *Spratelloides delicatulus* (Bennett)

Common Names :

White bait	...	English
Choorai-chala, Rahi	...	Lakshadweep Is.

Distinguishing Characters :

Body slightly compressed, its depth less than head length. Snout pointed, a little larger than eye-diameter; maxilla extending almost to pupil of eye. Dorsal fin with 9 to 12 soft rays, its origin equidistant

* *Spratelloides gracilis* (Schlegel) has been reported from the Laccadive Sea in our region but is of no fishery importance.

or usually nearer snout-tip than caudal-fin base. Anal fin with 8 or 9 soft rays. Pelvic-fin origin under mid-dorsal or under second half of dorsal fin, slightly nearer to caudal-fin base than to snout-tip. Scales caducous, 35 to 41 in lateral series, 6 or 7 transverse.

Colour : body grey-blue or brown on back, sides and ventral surfaces white or silvery, the two areas meeting at an abrupt line dorso-laterally. Top of head, tip of snout, lower jaw and tongue dark brown, and a small black spot in front of eye. Two black streaks along alar scales on each lobe of caudal fin.

Geographical Distribution : East coast of Africa, India, the East Indies, the Philippines to Australia.

Fishery Information : It is reported that the tuna follow shoals of *Spratelloides delicatulus* in the Laccadive Sea and feed voraciously on them in certain seasons especially during the south-west monsoon. The species enters the lagoons in the island of Minicoy in large numbers when it is caught by the local people for their consumption; it enters the lagoon just before the monsoon period and remains there till the close of the monsoon; its utilization as a bait fish is, therefore, restricted to the flag end of the tuna season.

Subfamily : CLUPEINAE

[Sardines]

Body usually compressed laterally, with scutes on lower edge of belly. Mouth terminal, with feeble or no teeth; two supramaxillae present Anal fin short, with less than 30 rays. Pelvic fin with 7 to 9 rays. Caudal fin forked. Scales thin and deciduous. Branchiostegal rays 4 to 8. All the sardines are noted for their oily flesh.

KEY TO GENERA

1 (a) Gill openings smoothly rounded, with no dermal outgrowths; pelvic-fin rays 7; silvery stripe on flanks	...	**Escualosa**
(b) Gill-openings with two fleshy outgrowths on vertical arm of cleithrum; pelvic-fin rays 8 or 9; flanks silvery	...	2
2 (a) Fronto-parietal striae (on top of head) 3 to 6; lower portion of 2nd supramaxilla longer than upper	...	**Herklotsichthys**
(b) Fronto-parietal striae 7 to 14; lower portion of 2nd supramaxilla equal to upper	...	**Sardinella**

Genus **Escualosa** Whitley

Escualosa Whitley, 1940, *Aust. Zool.*, **9** (4) : 402 (type-species : *Clupea macrolepis* Steindachner = *Kowala thoracata* Valenciennes).

Body oblong, compressed, the abdominal profile more convex than dorsal profile ; belly keeled, abdominal scutes prominent. Upper jaw slightly notched ; two supra-maxillae, the 2nd supra-maxilla large and rectangular. Posterior margin of gill-opening smooth, no dermal outgrowths on vertical arm of cleithrum. Pelvic fin with 7 rays. Silvery lateral stripe along flanks of body.

Monotypic according to Whitehead (1973) ; a second species from Thailand recognished by Wongratana (1980).

Escualosa thoracata (Valenciennes)

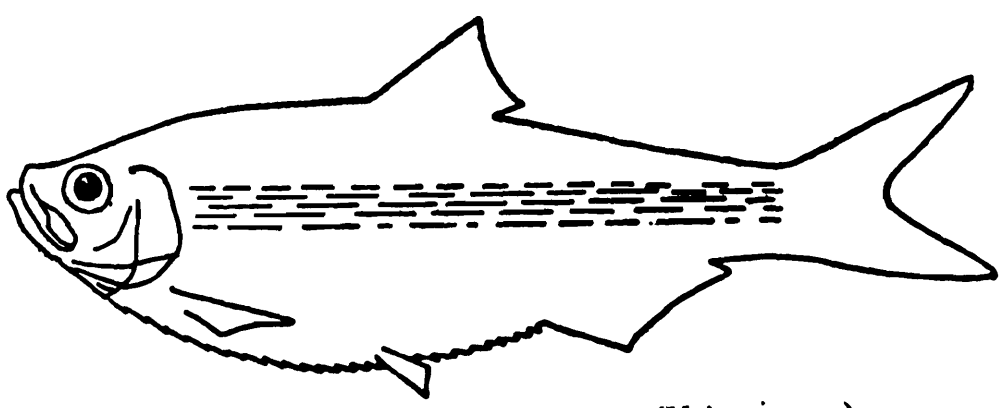
[Text-fig. 45]

Kowala thoracata Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 363 (type-locality ; Pondicherry).

Clupea lile (Valenciennes) : Day, 1878, *Fishes of India* : 638, pl. 162, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 374.

Escualosa thoracata : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 189, fig. 20.

Kowala coval Misra (*nec* Cuvier), 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 65, fig. 17.



Text-fig. 45. *Escualosa thoracata* (Valenciennes)

Common Names :

White sardine	...	English
Kavallu	...	Telugu
Mattileesia, Vellikasu	...	Tamil
Berza, Swadi	...	Kannada
Bhilgee	...	Marathi

Distinguishing Characters :

Body strongly compressed; belly sharply keeled from isthmus to vent, pre-pelvic scutes 17 to 19 and 10 to 12 post-pelvic. Mouth terminal, the upper jaw slightly notched; two supramaxillae, the 2nd large and rectangular. Dorsal fin with 12 to 14 branched rays, its origin at about midpoint of body. Anal fin with 14 to 18 branched rays. Pelvic fin with 7 rays. Gill-rakers 27 to 40 on lower arm of first arch. Scales 35 to 40 in lateral series.

Colour : back dull white, flanks with silvery lateral line; fins hyaline.

Geographical Distribution : Pakistan, India, Sri Lanka, Indo-Malayan Archipelago to Queensland (Australia).

Remarks : The large and rectangular 2nd supra-maxilla in this species is an excellent field character separating this species from superficially similar species of *Hilsa*, *Sardinella* and *Herklotsichthys*. The upper jaw is slightly notched as in the Alosinae, but the low pelvic-fin count of 7 distinguishes this species from *Hilsa* or *Gudusia*.

Fishery Information : This species is caught mainly from the west coast in our country. The fishery season along the east coast is from April to October and along the west coast from September to November, and is caught from dug-out canoes by gill-nets and boat seines.

Genus **Herklotsichthys** Whitley

Herklotsichthys Whitley, 1951, *Proc. R. zool. Soc. N.S.W.*, 1949-50 : 67 (type-species : *Harengula dispilonotus* Bleeker).

Body compressed, belly keeled. Mouth terminal, upper jaw without a distinct median notch; second (posterior) supra-maxilla expanded, the lower part of this bone larger than the upper part. Operculum smooth; frontoparietal striae 3 to 6. Bilobed dermal fold on vertical anterior edge of cleithrum. Dorsal-fin origin before pelvic-fin origin; last dorsal ray normal, not prolonged. Vertical scale striae continuous across scale. Branchiostegal rays 6 or 7.

A single Indian species, *H. quadrimaculatus* is distinguished from the Red Sea *H. punctatus* (Rüppell) by the absence of small black dots along the back. Whitehead (1973) wrongly identified the present species as *H. punctatus* (his Form B).

Herklotsichthys quadrimaculatus (Rüppell)

[Text-fig. 46]

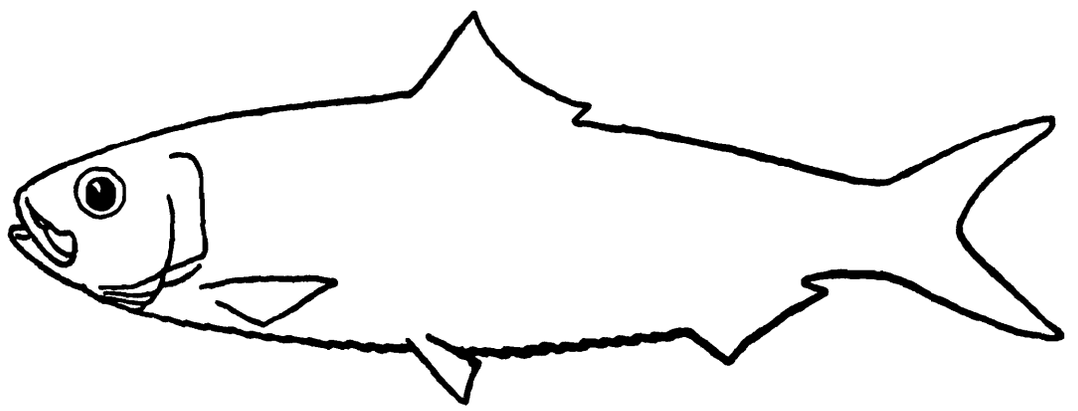
Clupea quadrimaculatus Rüppell, 1837, *Neue Wirbelth., Fische* : 78, pl. 21, fig. 3 (type-locality : Red Sea).

Clupea klunzei (Bleeker) : Day, 1878, *Fishes of India* : 636, pl. 163, fig. 1; Day, 1878, *Fauna Br. India*, Fishes, **1** : 372 (typographical error-*kunzei*).

Herklotsichthys punctatus (*nec* Rüppell) Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 174, fig. 7 (his Form B).

Harengula ovalis Misra (*nec* Bennett), 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 32, fig. 7.

Herklotsichthys quadrimaculatus : Wongratana, 1980, *Ph.D. thesis London, Univ.* : 139.



Text-fig. 46. *Herklotsichthys quadrimaculatus* (Rüppell)

Common Names :

Bluestripe herring	...	English
Kanat	...	Marathi

Distinguishing Characters :

Body moderately compressed, its depth 18 to 30 % in standard length; belly sharp, with keeled scutes, pre-pelvic 16 to 19, post-pelvic 11 to 14. Top of head with 3 to 6 longitudinal frontoparietal striae. Mouth terminal; upper jaw (maxilla) extending slightly beyond anterior border of orbit; two supramaxillae, the 2nd (posterior) supra-maxilla expanded, its lower part longer than upper. Gillrakers 29 to 36 on lower arm of first arch. Dorsal fin with 14 to 16 branched rays. Anal fin with 13 to 18 branched rays. Scales fairly caducous, 38 to 45 in lateral series.

Colour : an electric blue midlateral stripe; dorsal fin grey with at most a yellow tinge.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This is an important clupeoid around Andamans and occurs throughout the year. It also constitutes a minor fishery at Vizhigham (Kerala).

Genus **Sardinella** Valenciennes

Sardinella Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 18 (type-species : *Sardinella aurita* Valenciennes).

Body compressed, belly keeled or rounded. Mouth terminal; upper jaw without a distinct median notch; second supramaxilla paddle-shaped, the lower portion about equal to upper No teeth in jaws. Operculum smooth, without radiating grooves; fronto-parietal striae usually 7 to 14; a bilobed dermal fold on vertical anterior edge of cleithrum. Dorsal-fin origin before pelvic-fin origin; last dorsal ray normal, not prollonged. Anal fin comparatively short, with less than 24 rays; last two anal-rays more extensively branched than anterior ones and somewhat elongated so that the tip of anal fin slightly produced. Vertical scale striae usually interrupted at centre of scale, at least in anterior scales. Gillrakers fine, numerous. Body silvery.

Numerous species in the Indo-Pacific, 11 in our region. Species valued mostly as food fishes and for their oil.

KEY TO SUBGENERA/SPECIES

1 (a) Pelvic fin with 9 rays; pseudobranch long, with distinct ventral ridge; epibranchial gillrakers curled upwards; gillrakers on lower arm of first arch 145 to 258 (in Indo-Pacilc adults) (Subgenus *Sardinella*)	...	*S. longiceps*
(b) Pelvic fin with 8 rays; pseudobranch short, flat; epibranchial gillrakers almost straight; gillrakers in lower arm of first arch not more than 130	...	2
2 (a) Double row of median pre-dorsal scales; abdominal scutes strongly keeled; lower gillrakers 45 to 132 (Subgenus *Clupeonia* Valenciennes)	...	3
(b) Single median pre-dorsal scale row; abdominal scutes barely keeled, belly rounded; lower gillrakers 26 to 43 (Subgenus *Amblygaster* Bleeker)*		6 ...

* Recognised as a distinct genus by Wongratana (1980).

3 (a) Caudal fin tips jet black; lower gillrakers on first arch 38 to 74 (at 75-100 mm standard length); abdominal scutes usually 16 to 17 + 12 to 13	...	*S. melanura*
(b) Caudal fin tips plain, at most caudal margin dusky; lower gillrakers on first arch 43 to 132	...	4
4 (a) Post-pelvic scutes 12 to 14 (rarely 11 or 15)	...	5
(b) Post-pelvic scutes usually 15 (less common 14, rarely 13)	...	8
5 (a) Gillrakers 90 to 132 (at 87-116 mm standard length) on lower arm of first arch	...	*S. dayi*
(b) Gillrakers 43 to 82 on lower arm of first arch	...	6
6 (a) Posterior scales with numerous vertical striae, overlapping at centre of scale; posterior margin of scale much perforated; body depth 28 to 40 % of standard length (at 40-130 mm SL); lower gillrakers on first arch 49 to 65 (at 40-130 mm SL)	...	*S. brachysoma*
(b) Posterior scales with 4 or 5 vertical striae, interrupted at centre of scale	...	7
7 (a) Lower gillrakers on first arch 40 to 67 (at 50-130 mm SL); body depth 24 to 39 % of standard length	...	*S. albella*
(b) Lower gillrakers on first arch 53 to 82 (at 50-130 mm SL); body depth 25 to 35 % of standard length	...	*S. fimbriata*
8 (a) Lower gillrakers on first branchial arch 38 to 65 (at 40-170 mm SL); many perforations on exposed portion of scale	...	*S. gibbosa*
(b) Lower gillrakers on first arch 50 to 77 (at 50-140 mm SL); rather few perforations on exposed portion of scale	...	*S. sindensis**
9 (a) A series of 10 to 20 golden or black-blue spots along flanks; maxilla reaching to vertical from anterior margin of eye; lower gillrakers on first arch 29 to 42	...	*S. sirm*

	(b) No spots on flanks; maxilla not reaching the vertical from anterior margin of eye; lower gillrakers on first arch 26 to 48	...	10
10	(a) Origin of dorsal fin equidistant between snout-tip and caudal-fin base; lower gillrakers 31 to 33 on first branchial arch	...	*S. leiogaster*
	(b) Origin of dorsal fin slightly nearer snout-tip than to caudal-fin base	...	11
11	(a) Lower rakers 26 to 31 on first branchial arch; body moderately heavy, its depth 24 to 27 % in standard length	...	*S. clupeoides*
	(b) Lower gill rakers 37 to 48 on first branchial arch; body slender, its depth 19 to 23% of standard length	...	*S. new species**

Sardinella albella (Valenciennes)

Kowala albella Valencinnes, 1847, *Hist. nat. Poiss.*, **20** : 362 (type-locality : Pondicherry).

Sardinella albella : Whitehead, 1973, *J. mar. biol. Ass. India,* **14** (1) : 183, fig. 13.

Sardinella perforata (Cantor) : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 49.

Common Names :

White sardinella	...	English
Kavalley	...	Telugu
Thatta-kavalai, Choodai	...	Tamil

Distinguishing Characters :

Body fusiform, compressed, its depth 24 to 39 % of standard length; belly sharp, with keeled scutes, pre-pelvic usually 17 or 18, post-pelvic 12 to 14. Pseudobranch short, flat; gillrakers 40 to 67 on lower arm of first arch (at 50-130 mm SL). Dorsal fin with 14 to 16 branched rays, its origin slightly before midpoint of body. Anal fin with 16 to 19 branched rays, lying far behind dorsal fin. Pelvic fin with 8 rays, its origin below anterior part of dorsal-fin base. Scales

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* The status of *Sardinella sindensis* (Day) is rather uncertain and more work is needed before its separation from *S. gibbosa* can be confirmed; the new species of *Sardinella* is being described by Mr S. Lazarus from the Kerala coast.

cycloid, thin, deciduous; anterior scales perforated and fimbriated at posterior margin; posterior scales with 4 or 5 vertical striae, interrupted at centre of scale; pre-dorsal median ridge covered by adjacent sides of two longitudinal rows of scales.

Colour : back blue-black, flanks silvery.

Geographical Distribution : East African coast, the Red Sea, through India, the East Indies to Taiwan; possibly also northern tip of Australia.

Inhabits coastal waters; pelagic.

Fishery Information : This sardine is not abundant anywhere on the west coast of India but at times occurs in small quantities along the south-east coast of India.

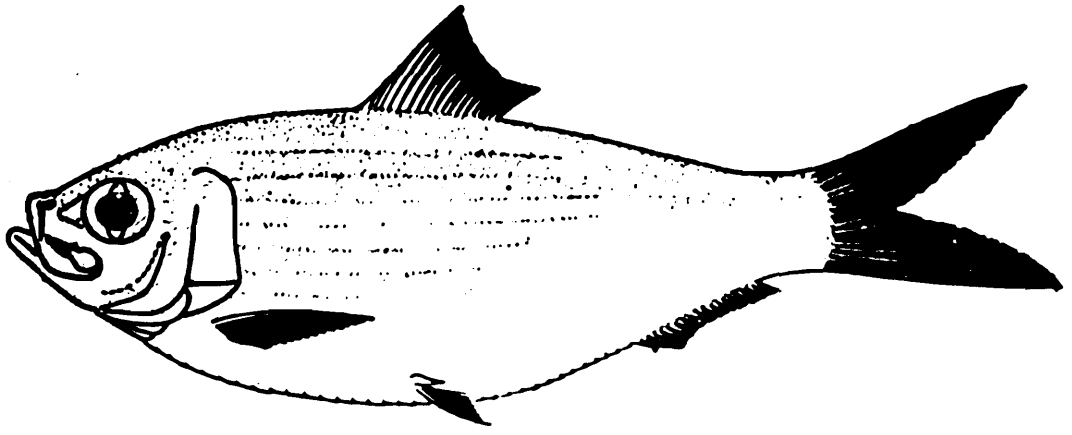
Sardinella brachysoma Bleeker

[Text-fig. 47]

Sardinella brachysoma Bleeker, 1852, *Verh. batav. Genoot. Kunst. Wet.*, **24** : 19 (type-locality : Batavia) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 182, fig. 12.

Clupea brachysoma : Day, 1878, *Fishes of India* : 635, pl. 163, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1** : 371.

Sardinella albella Misra (*nec* Valenciennes), 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 37, pl. 1, fig 3 & text-fig. 8.



Text-fig. 47. *Sardinella brachysoma* Bleeker

Common Names :

Deepbodied sardinella	...	English
Currudden-toaddy	...	Malayalam
Pedi	...	Kannada
Patudda	...	Marathi

Distinguishing Characters :

Body deep and compressed, its depth 28 to 40 % of standard length; belly sharp with keeled scutes, pre-pelvic 17 or 18, post-pelvic 12 to 14. Pseudobranch short, flat; gillrakers on lower arm of first arch 49 to 65 (at 40-130 mm SL). Dorsal fin usually with 14 or 15 branched rays, its origin slightly before midpoint of body. Anal fin usually with 16 to 19 branched rays, lying far behind dorsal fin. Pelvic fin with 8 rays, its origin before anterior part of dorsal-fin base. Scales cycloid, somewhat deciduous; scales strongly fimbriated posteriorly, posterior scales with numerous vertical striae, overlapping at centre of scale, posterior margin of scale much perforated; predorsal median ridge covered by adjacent sides of two longitudinal rows of scales.

Colour : back blue-green, flanks silvery.

Geographical Distribution : Madagascar, east coast of India, Indonesia, Hong Kong and northern coasts of Australia.

Inhabits coastal waters; pelagic.

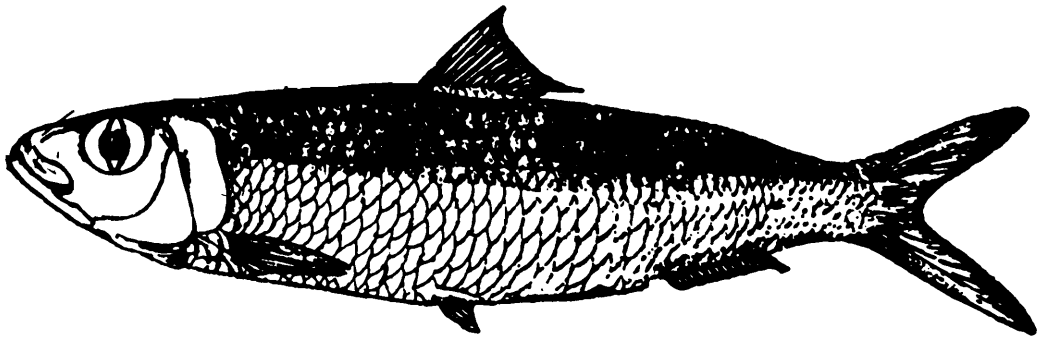
Fishery Information : Taken commercially only occasionally in our region.

Sardinella clupeoides (Bleeker)

[Text-fig. 48]

Amblygaster clupeoides Bleeker, 1849, *J. Ind. Arch.*, **3** : 73 (type-locality : Macassar, Celebes, East Indies).

Sardinella clupeoides : Bennet, 1968, *J. mar. biol. Ass. India*, **7**(1) : 208; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 188, fig. 19; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 39.



Text-fig. 48. *Sardinella clupeoides* (Bleeker)

Common Names :

Sharpnose sardine	...	English
Keerimeen-chalai	...	Tamil
Keerimeen	...	Malayalam
Gumbala, Vapichala	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and subcylindrical, its depth 26 to 27% in standard length; belly rounded and smooth, abdominal scutes feebly keeled, barely exposed. Maxilla not reaching vertical through anterior margin of eye. Pseudobranch short, flat; gill-rakers on lower arm of first arch 26 to 31. Dorsal fin with 14 or 15 branched rays, its origin usually slightly nearer to snout-tip than to caudal-fin base. Anal fin with 14 to 16 branched rays, its origin far behind dorsal fin. Pelvic fin with 8 rays, its origin under anterior half of dorsal-fin base. Scales cycloid, thin, deciduous; predorsal median ridge covered by a single longitudinal series of scales; alar scales on caudal fin present.

Colour : blue-green above and silvery below; without spots on flanks.

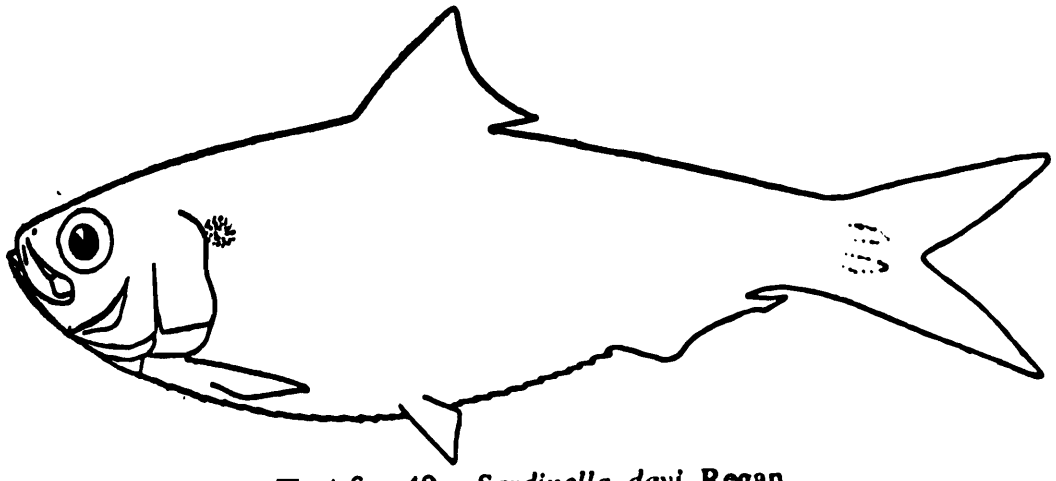
Geographical Distribution : Laccadive Sea, Southern tip of India, Sri Lanka, through the East Indies, to the Philippines.

Fishery Information : This species is of some importance at Vizhingam (Kerala) as a food fish; it occurs at times along with *Sardinella sirm* (Walbaum) and *S. melanura* (Cuvier) constituting the main fishery especially during December. This species is also common in the commercial catches on the Rameswaram Is. (Tamil Nadu).

Sardinella dayi Regan

[Text-fig. 49]

Sardinella dayi Regan, 1917, *Ann. Mag. nat. Hist.*, (8) **19** : 381 (type-locality : Karwar, India) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 181, fig. 10; Anthony-Raja and Lazarus, 1977, *Indian J. Fish.*, **22**(1/2) : 144, fig. 1.



Text-fig. 49. *Sardinella dayi* Regan

Common Names :

Day's sardinella	...	English
?Kavalai, Choodai	...	Tamil
Chalamathi, Parandha-mathi, ?Tholiquanmathi	...	Malayalam
Pedi, Thalchesadi	...	Kannada

Distinguishing Characters :

Fusiform, compressed body, its depth 34 to 38% standard length; belly sharp with keeled scutes, pre-pelvic 18, post-pelvic 13 or 14. Pseudobranch exposed, as long as eye-diameter in larger specimens and up to 1.5 times in eye-diameter in smaller fish; gillrakers on lower arm of first arch increase progressively with age, 28 to 46 at 20 mm standard length, and 80 to 132 at 100-120 mm SL fish. Dorsal fin with 14 or 15 branched rays, its origin slightly nearer to tip of snout than to base of caudal fin. Anal fin with 16 or 17 branched rays. Scales cycloid, thin, deciduous, 40 to 42 in lateral series; scales perforated, fimbriated and eroded posteriorly; predorsal median ridge covered by adjacent sides of two rows of scales; alar scales on caudal fin present.

Colour : back bluish-grey with golden and green reflections, the sides silvery white.

Geographical Distribution : India and Sri Lanka.

Fishery Information : Fairly common in the catches at Tuticorin and Madras (Tamil Nadu), and Vizhigham (Kerala).

Sardinella fimbriata (Valenciennes)

[Text-fig. 50]

Spratella fimbriata Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 359, pl. 601 (type-locality : Malabar).

Clupea fimbriata : Day, 1878, *Fishes of India* : 637, pl. 161, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1** : 373.

Sardinella fimbriata : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 184, fig. 14.

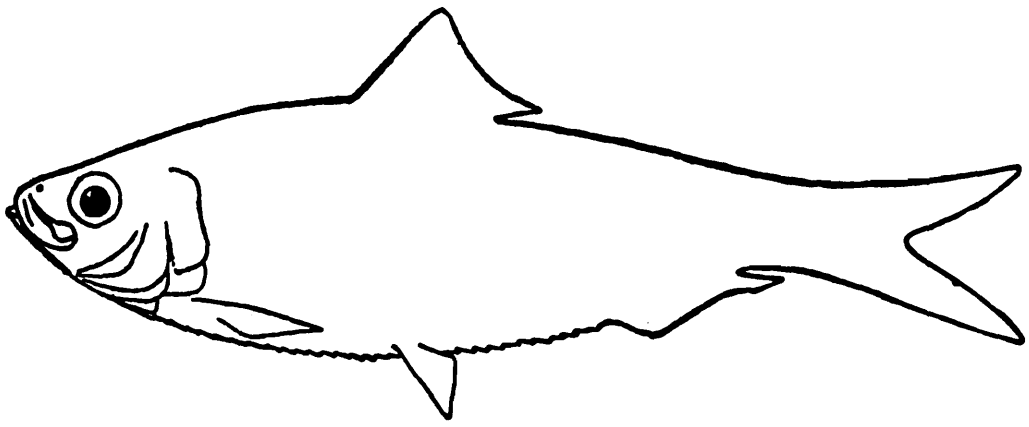
Sardinella jussieu Misra (*nec* Lacepede), 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 43.

Common Names :

Fringescale sardinella	...	English
Kowal	...	Telugu
Choodai	...	Tamil
Karichala	...	Malayalam
Pedwa	...	Marathi

Distinguishing Characters :

Body fusiform, compressed, its depth 25 to 35% of standard length; belly sharp, with keeled scutes, pre-pelvic 17 or 18, post-



Text-fig. 50. *Sardinella fimbriata* (Valenciennes)

pelvic 12 to 14. Pseudobranch short, flat; gillrakers on lower arm of first arch 53 to 82 (at 50-130 mm SL). Dorsal fin with 14 to 16 branched rays, its origin slightly before midpoint of body. Anal fin with 16 to 19 branched rays, lying far behind dorsal fin. Pelvic fin with 8 rays, its origin below anterior part of dorsal fin. Scales cycloid, thin, deciduous; anterior scales perforated and fimbriated at posterior margin; posterior scales with 4 or 5 vertical striae, interrupted at centre of scale; predorsal median ridge covered by adjacent sides of two longitudinal series of scales.

Colour : back blue-green, the flanks silvery.

Geographical Distribution : India, Indo-Malayan Archipelago, to the Philippines, New Guinea and possibly to northern tip of Australia also.

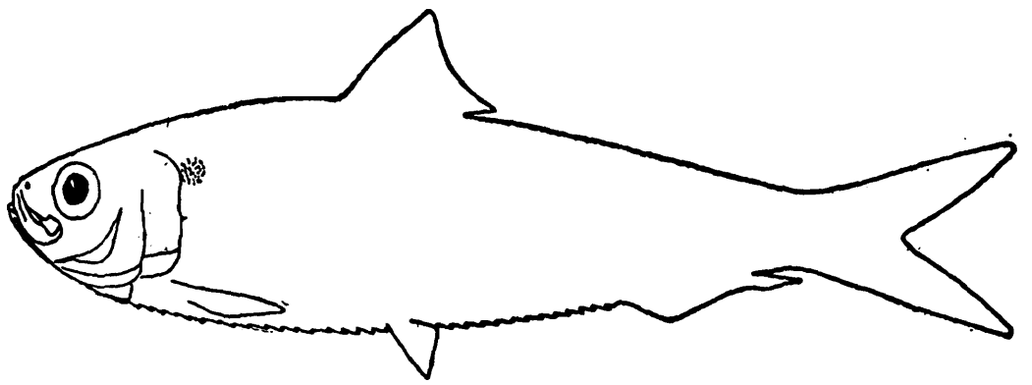
Inhabits coastal waters; pelagic.

Fishery Information : If identifications are correct, then this sardine occurs in commercial quantities along the south Kerala and north Karnataka coasts. It is an intermittant and unpredictable visitor to the south-west coastal waters of India. In some months they are extremely abundant, reaching as much as 23,717 kg in October, 1960 and 42,566 kg in June, 1962 while during other months they are scarce or absent. They are caught entirely by small inshore boats and catamarans with boat-seines and gill-nets; sometimes they occur in shore-seines also.

Sardinella gibbosa (Bleeker)

[Text-fig. 51]

Clupea gibbosa Bleeker, 1849, *J. Ind. Arch.*, **3** : 72 (type-locality : Macassar).
Sardinella gibbosa : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 185, fig. 15.



Text-fig. 51. *Sardinella gibbosa* (Bleeker)

Common Names :

Goldstripe sardinella	...	English
Kavallu	...	Telugu
Neethu-kavalai, Chalai	...	Tamil

Distinguishing Characters :

Body fusiform, slightly compressed, its depth 22 to 31% of standard length; belly sharp with keeled scutes, pre-pelvic 77 to 19, post-pelvic usually 15 (sometimes 14 or 16). Pseudobranch short, flat; gillrakers on lower arm of first arch 38 to 65. Dorsal fin with 13 to 16 branched rays, its origin slightly before midpoint of body. Anal fin with 14 to 18 branched rays, lying far behind dorsal fin. Pelvic fin with 8 rays, its origin below anterior part of dorsal-fin base. Scales cycloid, thin, deciduous; anterior scales with a few perforations and fimbriated at posterior margin, posterior scales with 4 or 5 striae, interrupted at centre of scale; predorsal median ridge covered by adjacent sides of two longitudinal rows of scales.

Colour : blue-green above, silvery on flanks, separated by a narrow yellow horizontal line; black spot at bases of anterior dorsal rays.

Geographical Distribution : East coast of Africa, Madagascar, the Red Sea, through India, the East Indies, to the Philippines, HongKong, and Taiwan, to northern tip of Australia.

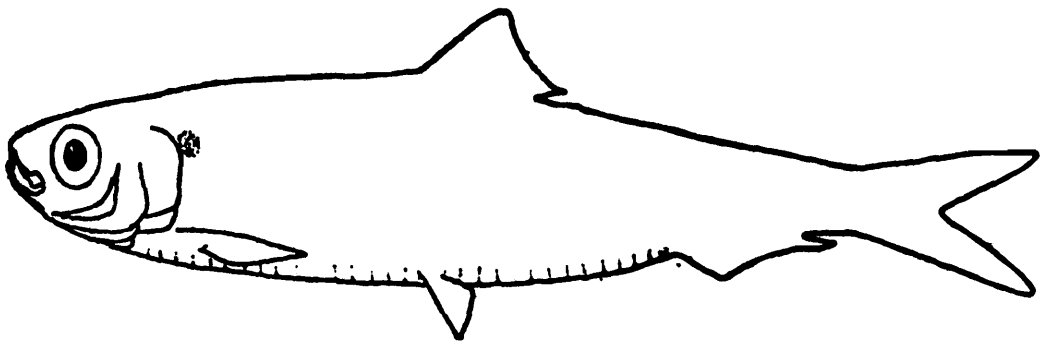
Inhabits coastal waters; pelagic.

Fishery Information : This is a small-sized sardine growing to about 17 cm and is a common species on the east coast of India, forming a major fishery; good catches of this are obtained from November to April.

Sardinella leiogaster Valenciennes

[Text-fig. 52]

Sardinella leiogaster Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 270 (type-locality : Indian Ocean and Trincomalee) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 188, fig. 19; Menon and Talwar, 1974, *J. Bombay nat. Hist. Soc.*, **71**(1) : 42, fig.



Text-fig. 52. *Sardinella leiogaster* Valenciennes

Common Names :

Smoothbelly sardinella	...	English
Keerimeen	...	Malayalam

Distinguishing Characters :

Body elongate, subcylindrical, its depth 22.2 to 24.3% in standard length; belly rounded and smooth, abdominal scutes feebly keeled and barely exposed, 17 or 18 pre-pelvic and 13 to 15 post-pelvic. Upper jaw (maxilla) not extending to vertical from anterior edge of eye. Pseudobranch short, flat. Gillrakers on lower arm of first arch 31 to 33, rather short, slender. Dorsal fin with 15 branched rays, its origin equidistant between snout-tip and caudal-fin base. Anal fin short, with 14 to 17 branched rays, its origin far behind dorsal fin. Pelvic fin with 8 rays, below anterior part of dorsal-fin base. Scales cycloid, thin, deciduous; predorsal median ridge covered by a single longitudinal series of scales; alar scales on caudal fin present.

Colour : body blue-green above and silvery below; without spots on flanks. Dorsal fin black or dusky when fully extended.

Geographical Distribution : Indo-west Pacific.
Inhabits coastal waters ; pelagic.

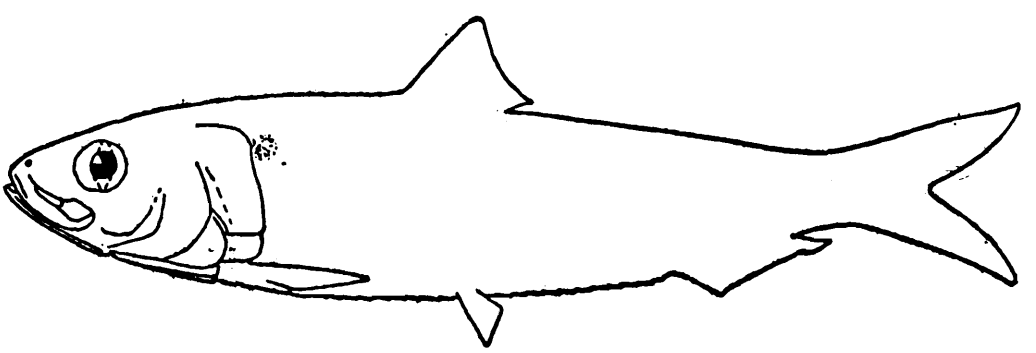
Fishery Information : Of minor fishery significance, being taken rather infrequently in the Andaman Sea and the south Kerala coast.

Sardinella longiceps Valenciennes

[Text-fig. 53]

Sardinella longiceps Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 273 (type-locality : Pondicherry) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 177, fig. 8 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 45, fig. 10.

Clupea longiceps : Day, 1878, *Fishes of India* : 637, pl. 161, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 373.



Text-fig. 53. *Sardinella longiceps* Valenciennes

Common Names :

Indian Oil-sardine	...	English
Noona-kavallu	...	Telugu
Paichalai, Nonalai	...	Tamil
Paycharlay, Charlay, Nalla-mathi	...	Malayalam
Tarli-multhi, Baige	...	Kannada
Haid, Tarli	...	Marathi

Distinguishing Characters :

Body elongate, cylindrical ; belly rounded, with scutes but without prominent keel, usually 18 or 19 pre-pelvic, 14 or 15 post-pelvic. Head very long, 29 to 35% of standard length. Pseudobranch long, with distinct ventral ridge ; gillrakers fine and numerous, 150 to 250 on lower arm of first arch. Dorsal fin with 13 to 15 branched rays, its origin nearer to snout-tip than to caudal-fin base. Anal fin with 12 to 15 branched rays, its origin well behind dorsal fin. Pelvic fin with



Sardinella longiceps Valenciennes

9 rays, placed below middle of dorsal-fin base. Body covered by thin, rather adherent, cycloid scales; predorsal median ridge covered by adjacent sides of two longitudinal rows of scales.

Colour : back blue-green, flanks silvery; a dark spot on hind margin of gill cover.

Geographical Distribution : Coasts of India, North Borneo and the Philippines; and westward to East Africa.

Inhabits coastal waters; pelagic.

Fishery Information : Oil sardine is the most important resource in the neritic pelagic zone off the west coast of India. The coastal areas between Quilon (Kerala) and Ratnagiri (Maharashtra) are the rich and traditional fishing grounds for the Oil-sardine, although in certain years its commercial abundance extends to other sections of the west and east coasts. The annual average catch of oil sardine for 1961-65 was 175, 605 tonnes forming 23.88% of the total marine fish catch of India. The traditional fishery is supported mainly by the fish of length range 10-16 cm comprising mostly O-year and 1-year olds. The fishery starts immediately after the southwest monsoon and lasts from August to March with a peak during September-December period. Large shoals first appear in the southern area and strike the coast gradually in succession in the northern areas and disappear towards the end of the season in the reverse order. The fishery is restricted to a narrow coastal belt. The Oil-sardine ranks as one of the best known commercially important fish of India and is extensively used as food in the fresh and cured conditions. Its bye-products are of great value : the oil is widely used in the jute, leather, soap and other industries, and also for painting the canoes as it has a deterrent effect on ship-worms and other timber boring organisms; the guano is an important fertilizer of the tobacco, coffee, tea and other crops. Oil-sardines are mainly caught with two types of nets -the boat seine "Mathikolli vala" and the gill net "Mathichala vala" along the Kerala coast and the shore seine "Rampani" allong the south Karnataka coast The former two nets constitute efficient gear for the capture of this pelagic shoaling species out in the sea, while the "Rampani" is used only when the shoals enter the shallow inshore waters. The boat seine "Paithu Vala" is also used in the Oil-sardine fishery along the Kerala coast, but with limited efficiency. The average standing stock of the oil sardines in the fishing grounds in our area is estimated to be of the order of 400,000 tonnes. Large scale fluctuations in the fishery are due to fishery independent factors and the variations in the numerical strength of newly recruited year-class to the fishery.

Sardinella melanura (Cuvier)

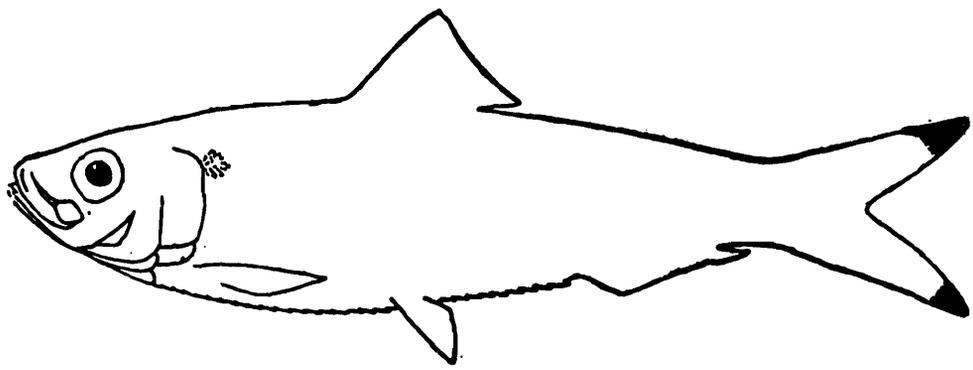
[Text-fig. 54]

Clupea melanura Cuvier, 1829, *Regne Animal* (2nd ed.), **2** : 318 (type-locality : Bombay).

Clupea atricauda Day (*nec* Gunther), 1878, *Fishes of India* : 636, pl. 164, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 372.

Sardinella melanura : Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 180, fig. 9 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 47.

Harengula vittata (Valenciennes) : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 34



Text-fig. 54. *Sardinella melanura* (Cuvier)

Common Names :

Blackstrip sardinella	...	English
Chalai, Salai	...	Tamil
Keeri-charlay	...	Malayalam
Machi, Gumbola, Mathi	...	Lakshadweep Is.

Distinguishing Characters :

Body fusiform, slightly compressed ; body depth 25 to 30% of standard length ; belly strongly keeled, with sharp pointed scutes, 16 or 17 pre-pelvic and 12 or 13 post-pelvic. Pseudobranch short, flat ; gillrakers on lower arm of first arch 38 to 74. Dorsal fin with 12 or 13 branched rays, its origin slightly before midpoint of body. Anal fin with 15 to 17 branched rays. Pelvic fin with 8 rays, its origin below anterior half of dorsal fin. Scales cycloid, thin, deciduous ; predorsal median ridge covered by adjacent sides of two longitudinal rows of scales.

Colour : body blue-green above, flanks silvery. Tips of caudal fin jet black.

Geographical Distribution : Widespread throughout the tropical Indo-west Pacific.

Fishery Information : *Sardinella melanura* is raadily distinguished from all other Indian species of *Sardinella* by having the tips of the caudal fin lobes blackish. It is further characterised by having the lowest number of gillrakers of any species. The species forms a minor fishery during December on the south-west coast of India and also occurs in small quantities in the Andaman Sea at Port Blair.

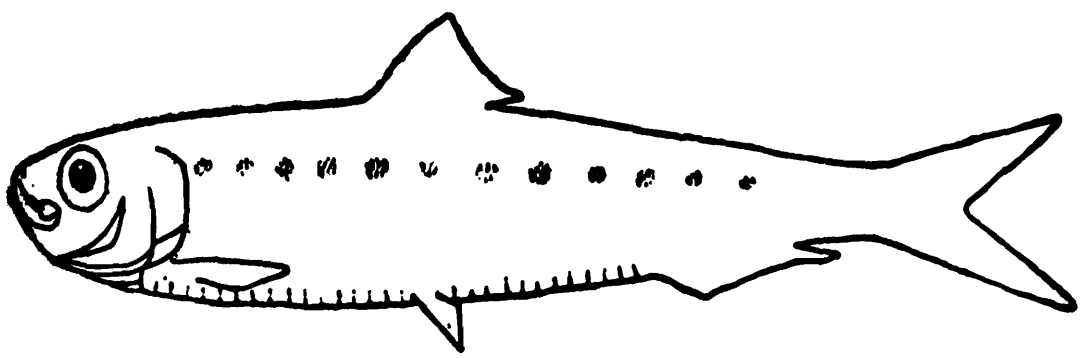
Sardinella sirm (Walbaum)

[Text-fig. 55]

Clupea sirm Walbaum, 1762, *Artedi Pisc.*, 3 : 38 (on Forsskal, 1775, *Descript. Animal.* : 17-*ex.* Arabia).

Clupea leiogaster Day (*nec* Valenciennes), 1878, *Fishes of India* : 636; Day, 1889, *Fauna Br. India,* Fishes, 1 : 372.

Sardinella sirm : Whitehead, 1973, *J. mar. biol. Ass. India,* 14(1) : 187, fig. 17; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), 2 : 52.



Text-fig. 55. *Sardinella sirm* (Walbaum)

Common Names :

Spotted sardinella	...	English
Pulli-kavalai,		
Keerimeen-chalai	...	Tamil

Distinguishing Characters :

Body elongate and subcylindrical, its depth 4.1 to 5.2 times in standard length; belly rounded, abdominal scutes present but with very poorly developed keel so that belly feels smooth, usually 17 pre-pelvic and 13 to 15 post-pelvic scutes. Pseudobranch short, flat; gillrakers 29 to 42 on lower arm of first arch. Maxilla reaching vertical from anterior margin of eye Dorsal fin with 14 or 15 branched

rays, its origin slightly before midpoint of body. Anal fin with 15 to 17 branched rays, its origin far behind dorsal fin. Pelvic fin with 8 rays, its origin below anterior part of dorsal fin. Scales cycloid, thin, deciduous; predorsal median ridge covered by a single longitudinal series of scales.

Colour : blue-green above and silvery on flanks, with 10 to 20 golden spots on flanks, which become blue black or may disappear after death.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters; pelagic.

Fishery Information : This clupeiod contributes a minor fishery at Vizhingam (Kerala) from October-November to February-March of the following year. Drift nets, shore-seines and gill-nets are generally operated to exploit the fishery. This species also contributes a minor fishery along the Tamil Nadu coast.

Subfamily : PRISTIGASTERINAE
[Ilishas, Pellonas]

Body fairly elongate and compressed; abdomen with a sharp median keel of scutes. Mouth moderate, terminal, lower jaw projecting. Teeth in jaws minute. Anal fin long, with more than 30 rays. Pelvic fin with 6 or 7 rays, or entirely absent. Scales thin and easily shed. Branchiostegal rays 4 to 8.

KEY TO GENERA

1 (a) Toothed hypomaxilla present	...	**Pellona**
(b) Toothed hypomaxilla absent, only a ligament present	...	2
2 (a) Pelvic fins present	...	**Ilisha**
(b) Pelvic fins absent	...	3
3 (a) Dorsal fin present	...	**Opisthopterus**
(b) Dorsal fin absent	...	**Raconda**

Genus **Ilisha** Richardson

Hisha Richardson, 1846, *Ichthyol. Seas China Japan* : 306 (type-species : *Ilisha abnormis* Richardson = *Alosa elongata* Bennett) ; Ramaiyan and Whitehead, 1978, *J. mar. biol. Ass. India,* **17**(1) : 187 (Review).

Body elongate, compressed; abdomen with sharp median keel of scutes. Mouth moderate, terminal, the lower jaw projecting; no toothed hypo-maxilla, only a ligament present from premaxillary end to maxillary expansion. Teeth in jaws minute, no canines; bands of teeth on palatines and pterygoids, and an elongate patch on tongue. Dorsal fin with simple and branched rays. Anal fin long, with 35 to 52 rays. Pelvic fin with 7 rays. Branchiostegal rays 6.

KEY TO SPECIES

1 (a) Swimbladder with at most a very small median post-coelomic extension; body depth 32 to 37% of standard length	...	*I. sirishai*
(b) Swimbladder with long tubular post-coelomic extensions	...	2
2 (a) Swimbladder with a single post-coelomic extension on right side of body	...	3
(b) Swimbladder with paired post-coelomic extensions; operculum indented at level of eye	...	5
3 (a) Total scutes 30 to 32	...	*I. megaloptera*
(b) Total scutes 34 to 42	...	4
4 (a) Body depth 31 to 35% of standard length; pectoral fin tip reaching pelvic-fin base	...	*I. filigera*
(b) Body slender, its depth 27 to 31% of standard length; pectoral-fin tip not reaching pelvic-fin base (in adults)	...	*I. elongata*
5 (a) Body deep, its depth 33 to 42% of standard length; pseudobranch completely exposed	...	*I. melastoma*
(b) Body slender, its depth 24 to 32% of standard length; basal part of pseudobranch covered by a thin membrane	...	*I. kampeni*

Illsha elongata (Bennett)

[Text-fig. 56]

Alosa elongata Bennett, 1830, *Mem. Life of Raffles* : 691 (type-locality : Sumatra).

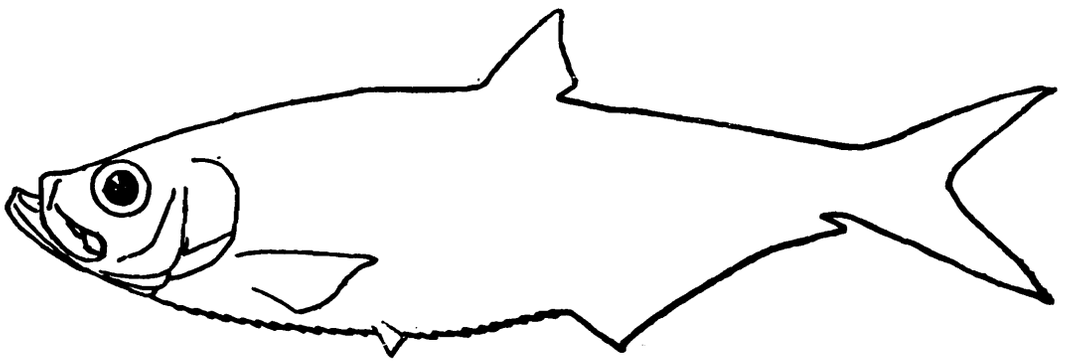
Pellona elongata : Day, 1878, *Fishes of India* : 643, pl. 164, fig. 3 & pl. 165, fig. 1; Day, 1889. *Fauna Br. India*, Fishes, 1 : 380, fig. 117.

Pellona leschenaultii Valenciennes : Day, 1878, *Fishes of India* : 646; Day, 1889, *Fauna Br. India,* Fishes, **1** : 383.

Ilisha leschenaulti : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **1** : 79.

Ilisha elongata : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 72, fig. 19; Seshagiri-Rao, 1976, *Copeia,* (3) : 506, fig. 6.

Ilisha novacula (Valenciennes) : Misra, 1976, *Fauna of India,* Pisces (2nd ed). **2** : 82.



Text-fig. 55. *Ilisha elongata* (Bennett)

Common Names :

Elongate ilisha	...	English
Ditcholl	...	Telugu
Poovali	...	Tamil
Mathi	...	Malayalam

Distinguishing Characters :

Body compressed but fairly slender, its depth 27 to 31% of standard length, deepest a little anterior to dorsal-fin origin; belly strongly keeled, usually with 24 to 26 pre-pelvic, 10 to 15 post-pelvic (total 34 to 42) scutes. Head of moderate size, its length 4 2 to 4.5 times in standard length; lower jaw very prominent. Pseudobranch present, exposed. Gillrakers 19 to 25 on lower arm of first arch. Teeth in a single series in both jaws. Dorsal fin usually with 14 or 15 branched rays, its origin nearer caudal-fin base than snout-tip. Anal fin with 40 to 49 branched rays, its origin below posterior part of dorsal-fin base. Pelvic fins small, no axillary scale. Swim-bladder with a single long post-coelomic extension, present on right side of body.

Colour : back blue-green, flanks silvery. Edge of dorsal fin faintly dark, pectoral fins hyaline but tips slightly dark; margins of anal and caudal fins dusky, remaining part hyaline.

Geographical Distribution : South-east coast of India, Sumatra, China and Japan.

Remarks : In *I. elongata* the body depth is usually measured at the dorsal-fin origin, but the maximum depth is in front of the dorsal-fin origin; if the measurement is taken a little anterior to the dorsal-fin origin the difference in the body depth between this species and *I. filigera* often disappears. However, in *I. filigera* the maximum depth is below the dorsal-fin origin.

Fishery Information : This species is reported to be relatively rare on the coast of India but perhaps the species has not been correctly diagnosed by biologists.

Ilisha filigera (Valenciennes)*

Pellona filigera Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 322 (type-locality : Coromandel coast; Bombay); Day, 1878, *Fishes of India* : 643, pl. 165, fig. 4; Day, 1889, *Fauna Br. India, Fishes*, **1** : 380.

Ilisha filigera : Misra, 1976, *Fauna of India*, Pisces (2nd ed), **2** : 75, fig. 20; Seshagiri-Rao, 1976, *Copeia*, (3) : 503, fig. 5.

Common Names :

Jewelled ilisha	...	English
Kati, Gobar	...	Marathi

Distinguishing Characters :

Body compressed, fairly deep, its depth 31 to 35% of standard length; belly with strongly keeled scutes, 23 to 26 pre-pelvic and 11 to 13 post-pelvic (total 34 to 38). Pseudobranch present, exposed. Gillrakers 19 to 23 on lower arm of first arch. Teeth uniserial in both jaws. Dorsal fin with 14 to 17 branched rays, equidistant between snout-tip and caudal-fin base or slightly nearer former. Anal fin with 43 to 49 branched rays. Pelvic fins very small, slightly before dorsal-fin origin Swimbladder with a single post-coelomic extension, present on right side of body.

Colour : dorsal profile of body dark brown, flanks silvery white. Upper third of dorsal fin dark brown, pectoral and pelvic fins hyaline; margin of anal and caudal fins dark.

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* Ramaiyan and Whitehead (1978) treated this as identical with *Ilisha megaloptera* (Swainson).

Geographical Distribution : India and Borneo.

Fishery Information : Taken commercially in small quantities, mostly on the east coast of India and at Bombay.

Ilisha kampeni (Weber & de Beaufort)

Pellona kampeni Weber and de Beaufort, 1913, *Fishes Indo-Australian archipelago*, **2** : 87 (type-locality : Java, Borneo).

Ilisha whiteheadi Seshagiri-Rao, 1974, *Copeia* : 861 (type-locality : Vizagapatnam).

Ilisha kampeni : Seshagiri-Rao, 1976, *Copeia* : 509, fig. 11.

Common Names :

Weber's ilisha	...	English
Neethu-kuthuva	...	Tamil

Distinguishing Characters :

Body compressed, its depth 24 to 32% of standard length; belly keeled, 17 to 21 pre-pelvic and 7 to 10 post-pelvic scutes (total 25 to 30). Pseudobranch present, basal half covered by a thin membrane (exposed in other species). Gillrakers 20 to 31 on lower arm of first arch. Teeth in a single series in both jaws. Dorsal fin with 13 or 14 branched rays, its origin slightly nearer snout-tip than caudal-fin base. Anal fin with 35 to 42 branched rays, its origin below 8th to 10th dorsal ray. Pelvic fins very short, with no axillary scale Swimbladder with paired post-coelomic extensions.

Colour : dorsal profile of body greenish to dark grey extending to upper third of flanks; rest of flanks silvery white. Dorsal fin hyaline, dark at its tip. Pectoral, pelvic and anal fins hyaline; caudal fin yellowish, margin black.

Geographical Distribution : Bombay, Bay of Bengal, Java and Borneo.

Fishery Information : Taken by fishermen rather infrequently on the Andhra and Tamil Nadu coasts. It occurs in the Vellar estuary (Porto Novo) throughout the year.

Ilisha megaloptera (Swainson)

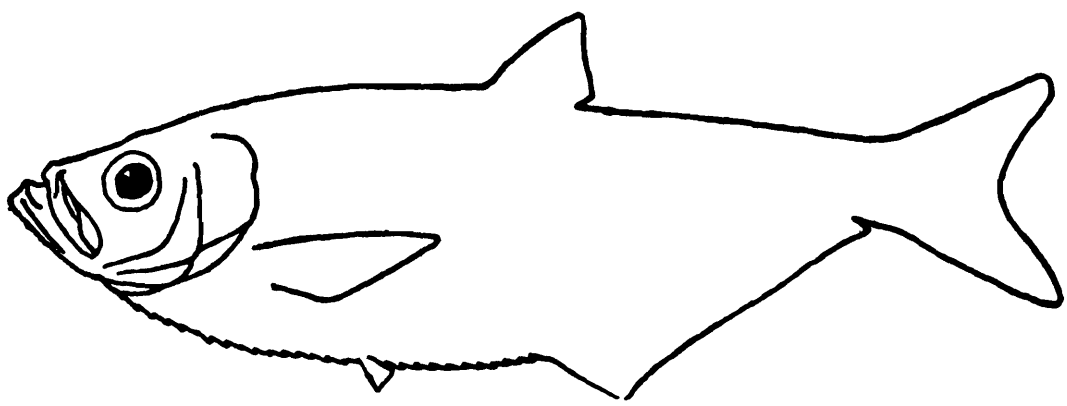
[Text-fig. 57]

Platygaster megalopterus Swainson, 1838, *Natural History of Animals*, **2** : 294 (*on 'Jangarloo'* of Russell, 1803, *Fishes of Coromandel*, **2** : 73, pl. 191-ex. Vizagapatnam).

Pellona megaloptera : Day, 1878, *Fishes of India* : 645, pl. 165, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 1 : 382.

Ilisha kampeni Misra (*nec* Weber & de Beaufort), 1976, *Fauna of India*, Pisces (2nd ed.), 2 78.

Ilisha megaloptera : Seshagiri-Rao, 1976, *Copeia*, (3) : 508, fig. 9.



Text-fig. 57. *Ilisha megaloptera* (Swainson)

Common Names :

Bigeye ilisha	...	English
Jangarloo	...	Telugu
Kuthuva, Poovaali	...	Tamil

Distinguishing Characters :

Body much compressed, fairly deep, its depth 28 to 39% of standard length; belly strongly keeled, with 19 to 23 pre-pelvic and 8 to 12 post-pelvic scutes (total 30 to 32). Pseudobranch present and exposed. Gill-rakers slender, 18 to 23 on lower arm of first arch. Teeth uniserial in both jaws Dorsal fin with 13 to 15 branched rays, its origin about equidistant between snout-tip and caudal-fin base. Anal fin with 35 to 49 branched rays. Pelvic fins small, no axillary scale. Swimbladder with a single tabular post-coelomic extension on right side of body.

Colour : back dark grey, flanks silvery, a faint dark spot on dermosphenotic. Margin of anal fin black, caudal fin dusted with dark pigment; pectoral fins black tipped.

Geographical Distribution : Pakistan, India, Sri Lanka to Indonesia.

Fishery Information : Taken commercially in small quantities, mostly on the East coast of India. It is mainly caught by gillnets and boat seines; it is even caught with trawls at depths of 30-40 m.

Ilisha melastoma (Schneider)

[Text-fig. 58]

Clupea melastoma Schneider, 1801, *Syst. Ichth. Bloch.* : (type-locality : Indian Ocean near Coromandel).

Pellona motius (Hamilton-Buchanan) : Day, 1878, *Fishes of India* : 643, pl. 165, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 381.

Pellona indica (Swainson) : Day, 1878, *Fishes of India* : 644, pl. 164, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 381.

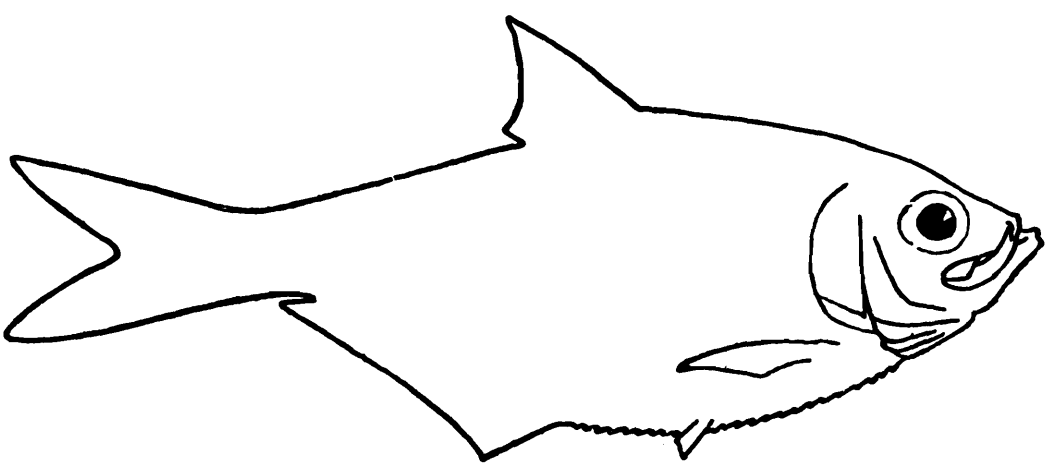
Pellona brachysoma Bleeker : Day, 1878, *Fishes of India* : 645, pl. 164, fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 382.

Ilisha brachysoma : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 71.

Ilisha motius : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 81.

Ilisha indica : Misra, 1976, *Fauna of India,* Pisces (2nd ed.) **2** : 76.

Ilisha melastoma : Whitehead, 1973, *J. mar. biol. Ass. India,* **14** (1) : 212, fig. 37 ; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 80.



Text-fig. 58. *Ilisha melastoma* (Schneider)

Common Names :

Indian ilisha	...	English
Ditchoe	...	Telugu
Thattakuthuva	...	Tamil
Gobar	...	Marathi

Distinguishing Characters :

Body strongly compressed, its depth 32 to 40% of standard length ; belly with strongly keeled scutes, 17 to 21 pre-pelvic, 6 to 10 post-pelvic (total 24 to 33). Lower jaw prominent. Pseudobranch present and completely exposed. Gillrakers 21 to 25 on lower arm of first arch. Teeth minute, in a single series in jaws. Dorsal fin with 13 to 15 branched rays, a little nearer to snout-tip than to caudal-fin base. Anal fin with 32 to 44 branched rays. Pelvic fins very small, with no axillary scale. Swimbladder with paired post-coelomic extensions.

Colour : back brown, lower flanks silvery-white. Dorsal fin with dark pigments ; pectoral and anal fins hyaline ; caudal fin margin dark.

Geographical Distribution : Laccadive Sea, Southern coast of India, Sri Lanka, Bay of Bengal, Indonesia to Hong Kong.

Fishery Information : This species is taken commercially on both the south-west and south-east coast of India ; gill nets and boat seines are used at depths of 10-15 m. Common in the estuaries also.

Ilisha sirishai Seshagiri-Rao

Ilisha sirishai Seshagiri Rao, 1975, *Hydrobiologia*, **47**(3/4) : 463 (*type-locality* : Visakhapatnam) ; Seshagiri-Rao, 1976, *Copeia*, (3) : 503.

Common Names :

Rao's ilisha	...	English
Sirisha	..	Telugu

Distinguishing Characters :

Body much compressed, its depth 32 to 37% of standard length ; belly strongly keeled, with 18 to 21 prepelvic and 9 (rarely 8) postpelvic scutes (total 27 to 30). Pseudobranch present, exposed Gillrakers 22 to 26 on lower arm of first arch. Teeth in a single row in jaws. Dorsal fin with 14 or 15 branched rays, its origin nearer to caudal-fin base than to snout-tip. Anal fin with 36 to 40 branched rays. Pelvic fins small, with no axillary scales. Swimbladder without post-coelomic extensions.

Colour : back blue-green, flanks silvery.

Geographical Distribution : India, Malaysia and Sumatra

Fishery Information : Taken by commercial fishermen rather infrequently on both the east and west coasts of India.

Genus **Opisthopterus** Gill

Opisthopterus Gill, 1861, *Proc. Acad. nat. Sci. Philad.* 38 (type-species *Pristigaster tartoor* Valenciennes = *Pristigaster tardoore* Cuvier).

Body elongate and compressed ; abdomen with a sharp median keel of scutes. Mouth moderate, terminal ; maxilla rounded posteriorly, not extending beyond eye-centre. Teeth in jaws minute, no canines ; no toothed hypo-maxilla, only a ligament present. Dorsal-fin behind that of anal fin. Anal fin long, with 51 to 65 rays. Pelvic fins absent.

Two Indo-Pacific species, one in our area.

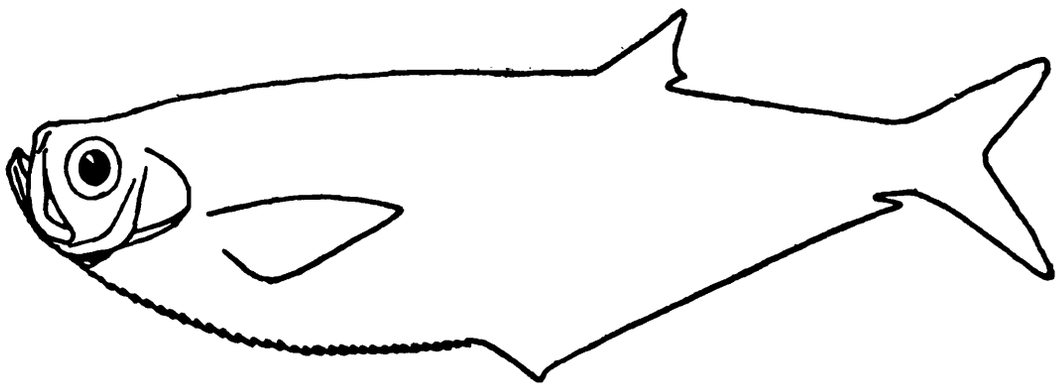
Opisthopterus tardoore (Cuvier)

[Text-fig. 59]

Pristigaster tardoore Cuvier, 1829, *Regne Animal*, (2nd ed.), **2** : 321 (on *'Tartoore'* of Russell, 1803, *Fishes of Coromandel*, **2** : 74, pl. 103—*ex.* Vizagapatnam).

Opisthopterus tartoor (Valenciennes) : Day, 1878, *Fishes of India* : 646, pl. 163, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 384, fig. 118.

Opisthopterus tardoore : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 215, fig. 39 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 88, fig. 23.



Text-fig. 59. *Opisthopterus tardoore* (Cuvier)

Common Names :

Tardoore	...	English
Katti-Chapulu, Tartoore	...	Telugu
Poovalai, Thota, Thalari	...	Tamil
Ambatta	...	Malayalam
Ambattike	...	Kannada
Palfurda	...	Marathi

Distinguishing Characters :

Body elongate and strongly compressed, its depth 26 to 33% of standard length ; belly with 29 to 35 prominent scutes. Dorsal profile of head concave ; mouth directed upwards, lower jaw very prominent. Gillrakers 22 to 28 on lower arm of first arch. Dorsal fin short, with 11 to 14 branched rays, its origin behind midpoint of body. Anal fin very long, with 48 to 60 branched rays. Pelvic fins absent. Pectoral fins longer than head. Scales deciduous.

Colour : back blue-green, flanks silvery.

Geographical Distribution : Western and southern coasts of India, Sri Lanka and Indonesia.

Fishery Information : This species inhabits coastal waters and is taken commercially in small quantities along the western and southern coast of India and also in the Andaman Sea of our region. This is a small sized fish commonly growing to about 170 mm to 180 mm in length. The fishery at Karwar (North Kanara) is restricted to a short period from May to September The most important gear used for the capture of this species is the shore-seine.

Genus **Pellona** Valenciennes

Pellona Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 300 (type-species : *Pellona orbignyana Valenciennes*).

Body elongate and compressed; abdomen with sharp median keel of scutes. Mouth moderate, terminal; lower jaw projecting; toothed hypo-maxilla present. Teeth in jaws minute, no canines; bands of teeth on palatines and pterygoids, elongate patch of teeth on tongue. Anal fin long, with 31 to 38 branched rays. Pelvic fin with 7 rays. Branchiostegal rays 6.

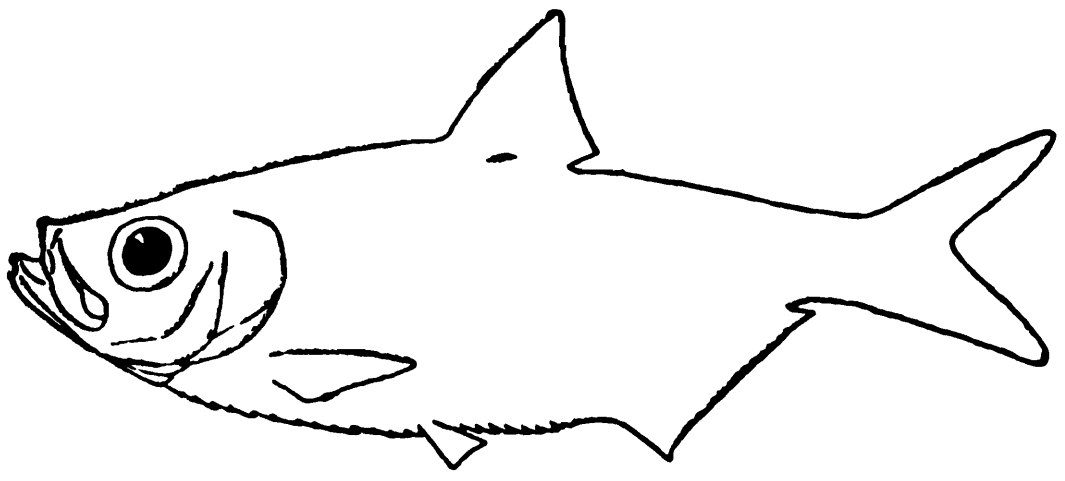
Five species are recognised of which one is recorded in the Indo-Pacific region (Whitehead, 1973); a second species also occuring in Indian waters, will be described by T. Wongratana (1980).

Pellona ditchela Valenciennes

[Text-fig. 60]

Pellona ditchela Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 314 (on 'Ditchelee' of Russell, 1803, *Fishes of Coromandel*, **2** : 72, pl. 88—*ex.* Vizagapatnam) ; Day, 1878 *Fishes of India* : 644, pl. 165, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 381 ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 209, fig. 35 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 85, fig. 22.

Pellona hoevenii Bleeker : Day, 1878, *Fishes of India* : 644, pl. 165, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 382 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 86.



Text-fig. 60. *Pellona ditchela* Valenciennes

Common Names :

Indian pellona	...	English
Ditchelee	...	Telugu
Kuthuva	...	Tamil

Distinguishing Characters :

Body fairly deep and compressed, its depth 25 to 36% of standard length; belly with strongly keeled scutes, pre-pelvic 17 to 20, post-pelvic 8 or 9 (rarely 10), total 25 to 29. Lower jaw very prominent, toothed hypomaxilla present in upper jaw. Eyes large, about 30% of head length. Gillrakers 22 to 27 on lower arm of first arch. Dorsal fin with 13 to 16 branched rays, its origin about midway between snout-tip and caudal-fin base. Pelvic fins slightly in advance of dorsal-fin origin. Anal fin fairly long, with 31 to 38 branched rays, its origin slightly behind dorsal-fin base.

Colour : back blue-brown, flanks silvery. Fins hyaline.

Geographical Distribution : East coast of Africa, India, through the East Indies, to the Philippines and northern tip of Australia.

Inhabits coastal waters; pelagic.

Fishery Information : Taken commercially in small quantities along the entire coast of India and the Andaman Sea in our region. It constitutes minor fisheries along the coasts of Tamil Nadu and Andhra Pradesh.

Genus **Raconda** Gray

Raconda Gray, 1831, *Zool. Miscellany*, **1** : 9 (type-species : *Raconda russeliana* Gray).

Body elongate, strongly compressed, anterior part of ventral profile very convex; abdomen keeled with feebly developed scutes. Mouth moderate, projecting upwards; maxilla tapering posteriorly, extending to operculum or beyond. Teeth minute, in a single series in jaws; teeth on palatines and tongue, none on vomer; no toothed hypo-maxilla, only a ligament present. No dorsal or pelvic fins. Anal fin very long, with 79 to 90 branched rays. Scales moderate, thin, very deciduous.

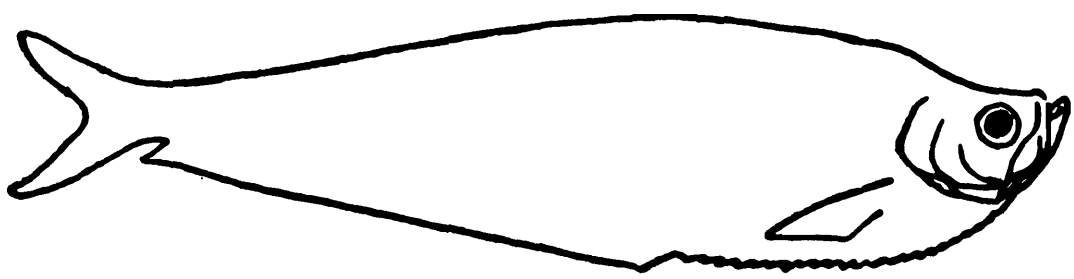
Monotypic.

Raconda russelliana Gray

[Text-fig. 61]

Raconda russeliana Gray, 1831, *Zool. Miscellany*, **1** : 9 (type-locality : Sangar roads, India) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 216, fig. 40.

Raconda russeliana : Day, 1878, *Fishes of India* : 646, pl. 163, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 384 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 90, fig. 24.



Text-fig. 61. *Raconda russeliana* Gray

Common Names :

Russell's smooth-back herring	...	English
Thalari, Thota	...	Tamil
Thada	...	Malayalam
Patulda	...	Kannada
Badasha	...	Marathi

Distinguishing Characters :

Body elongate, strongly compressed, its depth 25 to 28% of standard length. Dorsal profile of head concave ; mouth directed upwards, the lower jaw projecting. No dorsal fin. Pelvic fins absent. Pectoral fins about equal to head. Scales moderate, deciduous.

Colour : back blue-green, flanks silvery ; dark grey patch on shoulder. Caudal fin dusky.

Geographical Distribution : India, Sri Lanka and Indo-Malayan archipelago.

Fishery Information : This is a medium-sized fish and is common in the commercial catches from the mouth and foreshore areas of the Hooghly estuary from November to February. The fish caught are generally sun-dried and consumed by people of the low income group.

Subfamily : ALOSINAE

[Shads, River-Shads]

Indo-Pacific clupeid fishes with a distinct notch in middle of upper jaw; gillrakers of epibranchial of first arch not folding over those of the ceratobranchial; gillrakers present on inner face of epibranchial of third arch. Pseudobranch present. Body compressed, with pre- and post-pelvic scutes. Mouth terminal; two supra-maxillae, the posterior one expanded; no hypomaxilla. Operculum smooth or with a few fine vertical striae. Anal fin moderate, with 14 to 24 branched rays. Pelvic fin with 8 rays, not reduced in size, its origin a little behind dorsal-fin origin; no alar scales on caudal fin.

KEY TO GENERA

1 (a) Scales large, 37 to 47 in lateral series; lower edge of operculum at 20° to horizontal	...	**Hilsa**
(b) Scales small, 77 to 91 in lateral series; lower edge of operculum at about 45° to horizontal	...	**Gudusia***

Genus **Hilsa** Regan

Hillsa Regan, 1917, *Ann. Mag. nat. Hist.*, (8) **19** : 303 (type-species : *Paralosa durbanensis* Regan = *Clupea kelee* Cuvier).

Indo-Pacific alosinid fishes with moderate scales, 37 to 47 in lateral series, 13 to 19 in transverse series; scales adherent. Suboperculum almost rectangular, its junction with operculum, if produced, cutting the dorsal profile in middle of dorsal-fin base or behind. Branchiostegal rays 5 or 6. Gillrakers slender, 60 to 325 on lower arm of first arch. Dorsal fin with 11 to 16 branched rays; anal fin with 14 to 24 branched rays; pelvic fin with 8 rays. Belly with 5 to 18 pre-pelvic and 11 to 16 post-pelvic scutes.

Five species recognised, 3 in our region. According to Wongratana (1980), *Tenualosa* should be recognised as a distinct genus.

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* *Gudusia* Fowler contributes to important fisheries in India but is purely fluviatile; two species of *Gudusia* are recognised, viz. *G. chapra* (Hamilton-Buchasan) and *G. variegata* (Day), from the rivers of India, Pakistan, Bangladesh and Burma.

KEY TO SPECIES

1 (a) Top of head (fronto-parietal region) with numerous exposed striae; no pectoral axillary scale; expanded portion of maxilla with 4 to 6 longigitudinal ridges; cleithral lobe prominent (Subgenus *Hilsa*)	...	*H. kelee*
(b) Fronto-parietal region covered with thick skin, few or no striae visible; pectoral axillary scale present; expanded portion of maxilla smooth or with fine striae (Subgenus *Tenualosa* Fowler)	...	2
2 (a) Caudal fin as long as head; pseudobranch rather attenuated, with ventral ridge and groove below	...	*H. ilisha*
(b) Caudal fin longer than head; pseudobranch not attenuated, without ventral ridge and groove	...	*H. toli*

Hilsa ilisha (Hamilton-Buchanan)

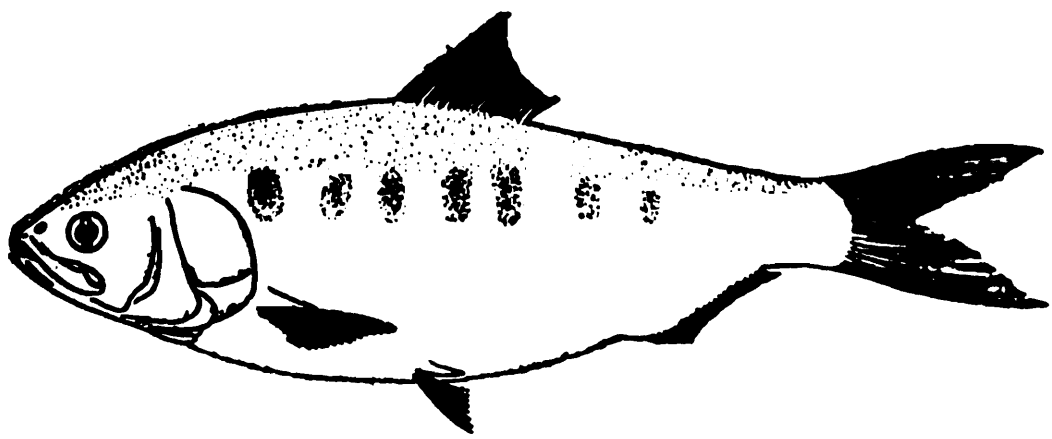
[Text-fig. 62]

Clupanodon ilisha Hamilton-Buchanan, 1822, *Fishes of Ganges* : 243, pl. 19, fig. 73 (type-locality : Ganges estuaries).

Clupea ilisha : Day, 1878, *Fishes of India* : 640, pl. 162, fig. 3; Day, 1889, *Fauna Br. India, Fishes*, **1** : 376, fig. 115.

Hilsa (Tenualosa) ilisha : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 199, fig. 27.

Macrura ilisha : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 54, fig. 12.



Text-fig. 62. *Hilsa ilisha* (Hamilton-Buchanan)

Common Names :

Hilsa shad	...	English
Hilsa	...	Bengali
Ilish, Ilisha	...	Oriya
Palasah	...	Telugu
Ullam, Sevva	...	Tamil
Paluva	...	Malayalam
Paliya, Palasa	...	Kannada
Pala	...	Marathi
Palla, Chaksi	...	Gujarati

Distinguishing Characters :

Body fusiform, its depth a little greater than head length which is 27 to 32% of standard length; belly with fairly sharply keeled scutes, pre-pelvic scutes 16 to 18, post-pelvic 13 to 16. Upper jaw with a distinct median notch when seen from above. Top of head covered with thick skin, no frontoparietal striae. Gillrakers very fine, 120 to 275 on lower part of first arch. Pseudobranch rather attenuated, a groove present below border of pseudobranch. No teeth in jaws. Dorsal fin with 15 or 16 (rarely 14) branched rays, about midpoint of body. Anal fin with 16 to 20 branched rays, lying well behind dorsal-fin base. Pectoral and pelvic fins with axillary scales. Caudal fin as long as head.

Colour : back blue-green, flanks silvery; a series of black blotches along flanks which may disappear in large adults.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters, estuaries and rivers.

Fishery Information : *Hilsa ilisha* has considerable economic importance in Indian waters (especially in the Bay of Bengal), and Pakistan, Bangladesh and Burma. The esteem to which the 'hilsa' is held in Bengal is reflected in the many references to its quality and flavour in Sanskrit anl Bengali literature. This is one of the best known of Indian clupeoids and is a migratory fish ascending all the major river systems, where it is caught in considerable quantities. It occurs in coastal waters in the vicinity of the mouths of the rivers Narmada, Tapti, Cauvery, Pennar, Godavari, Krishna and Mahanadi. In the Hooghly estuary, the species is of particular importance because of the high magnitude of the landings.

Hilsa kelee (Cuvier)

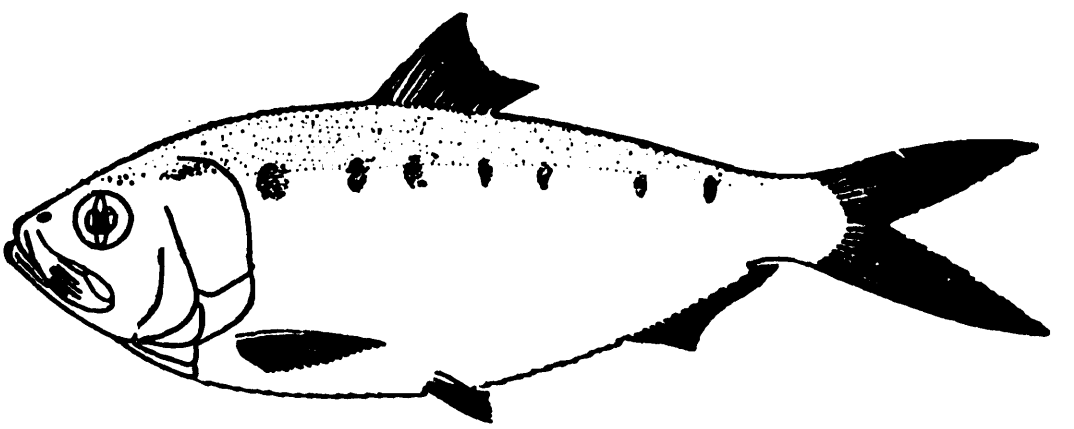
[Text-fig. 63]

Clupea kelee Cuvier, 1829. *Regne Animal*, ed. 2, **2** : 320 (on 'Kelee' of Russell, 1803, *Fishes, of Coromandel*, **2** : 75, pl. 195 upper figure-*ex.* Vizagapatnam).

Clupea kanagurta (Bleeker) : Day, 1878, *Fishes of India* : 640, pl. 162, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 377.

Hilsa (*Hilsa*) *kelee* : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 197, fig. 26.

Macrura kelee : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 57, fig. 13.



Text-fig. 63. *Hilsa kelee* (Cuvier)

Common Names :

Kelee shad	...	English
Keelee, Kolimeen	...	Telugu
Koli-meen, Soodai, Maangai soodai	...	Tamil

Distinguishing Characters :

Body strongly compressed, its depth 30 to 40% of standard length; belly with sharply keeled scutes, 15 to 17 pre-pelvic, 12 to 14 post-pelvic. Fronto-parietal striae on top of head numerous (8 to 14). Adipose eyelid with vertical slit exposing three-quarters of pupil. Upper jaw with distinct median notch when seen from above; no teeth in jaws. Gillrakers very fine, 75 to 180 on lower arm of first arch. Dorsal fin with 13 to 15 branched rays, its origin slightly before midpoint of body. Anal fin with 15 to 19 branched rays, lying well behind dorsal-fin base. Peivic fins below anterior part of dorsal-fin base, with axillary scale. Pectoral fin with no axillary scale.

Colour : back blue-green, flanks silvery, a dark humeral blotch (behind operculum) followed by 3 to 7 similar spots along flanks and occasionally spots along back. Tips of anterior dorsal-fin rays dusky, caudal fin tips faintly dusky.

Geographical Distribution : East African coast, Gulf of Aden, coasts of India, Pakistan, Sri Lanka, Burma and the East Indies.

Fishery Information : Seasonally abundant along the south-east and south west coast of India and no suitable method for their location or capture is being used and hence the magnitude of this resource remains unknown.

Hilsa toli (Valenciennes)

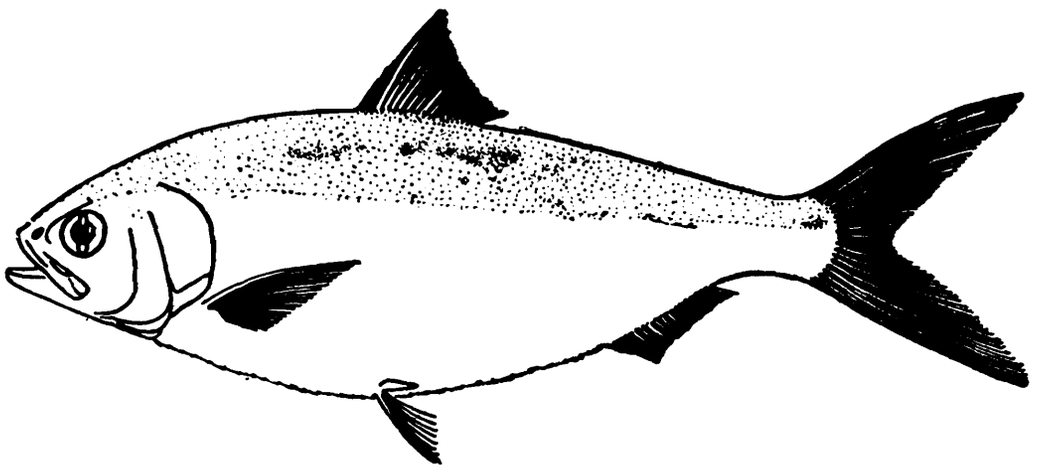
[Text-fig. 64]

Alausa toli Valenciennes, 1847, *Hist. nat. Poiss.*, **20** : 435 (type-locality : Pondicherry, Bombay).

Clupea toli : Day, 1878, *Fishes of India* : 641, pl. 162, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **1** : 377.

Hilsa (*Tenualosa*) *toli* : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 200, fig. 28.

Macrura sinensis Misra (*nec* Linnaeus), 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 59, fig. 14.



Text-fig. 64. *Hilsa toli* (Valenciennes)

Common Names :

Toli shad	...	English
Kajli-Ilish/Chandan-Ilisha	...	Bengali
Oolum	...	Tamil
Bhing	...	Marathi
Palla/Palvi	...	Gujarati

Distinguishing Characters :

Body fusiform, its depth 30 to 35% in standard length; belly with fairly sharply keeled scutes, 17 or 18 pre-pelvic, 11 to 13 post-pelvic. Upper jaw with a distinct median notch when seen from front; top of head covered with thick skin, without striated frontoparietal areas.

Gillrakers fine, 70 to 90 on lower arm of first arch; pseudobranch not attenuated, without ventral groove. No teeth in jaws. Dorsal fin with 14 or 15 branched rays, slightly before midpoint of body. Anal fin with 15 to 18 branched rays, lying well behind dorsal fin. Pectoral and pelvic fins with axillary scales. Caudal fin somewhat longer than head.

Colour : blue-green on back, silvery on flanks.

Geographical Distribution : Coasts of India, Indo-Australian archipelago and northward to Hong Kong, possibly to Taiwan.

Inhabits coastal waters, estuaries and rivers.

Fishery Information : Taken commercially in fair quantities in Gujarat and the Orissa-West Bengal coast in our area.

Subfamily : PELLONULINAE

Body fairly elongate and compressed, with scutes along belly. Mouth terminal, with minute teeth in jaws; a single (posterior) supra-maxilla present Anal fin short, with less than 30 rays. Pelvic fin with 7 to 9 rays, or entirely absent. Scales thin and easily shed. Branchiostegal rays 5 or 6.

KEY TO GENERA

1 (a) Belly keeled, with prominent pre- and post-pelvic scutes	...	**Corica**
(b) Body rounded, with 6 to 9 unkeeled pre-pelvic scutes	...	2
2 (a) Pelvic-fin base well behind vertical from dorsal-fin origin; gill-rakers present on posterior face of 3rd epibranchial	...	**Dayella***
(b) Pelvic-fin base below or before vertical from dorsal-fin origin; gill-rakers absent on posterior face of 3rd epibranchial		**Ehirava***

* The fishes of the monotypic genus *Dayella* Talwar & Whitehead represented by its type-species, *D. malabaricus* (Day), and the monotypic genus *Ehirava* Deraniyagala represented by its type-species, *E. fluviatilis* Deraniyagala, in our region are rare and hence of no fishery importance.

Genus **Corica** Hamilton-Buchanan

Corica Hamilton-Buchanan, 1822, *Fishes of Ganges* : 253 (type-species : *Corica soborna* Hamilton-Buchanan).

Body rather elongate, belly keeled with prominent pre- and post-pelvic scutes. Teeth in jaws minute; palatines and tongue dentate. Lower jaw articulation below eye centre. Dorsal fin with 14 or 15 rays; anal fin with the last two rays detached, forming a separate finlet. Branchiostegal rays 6.

Three species (including *C. lacinata* Fowler, 1935) recognised by T. Wongratana (1980)), two in our area.

KEY TO SPECIES

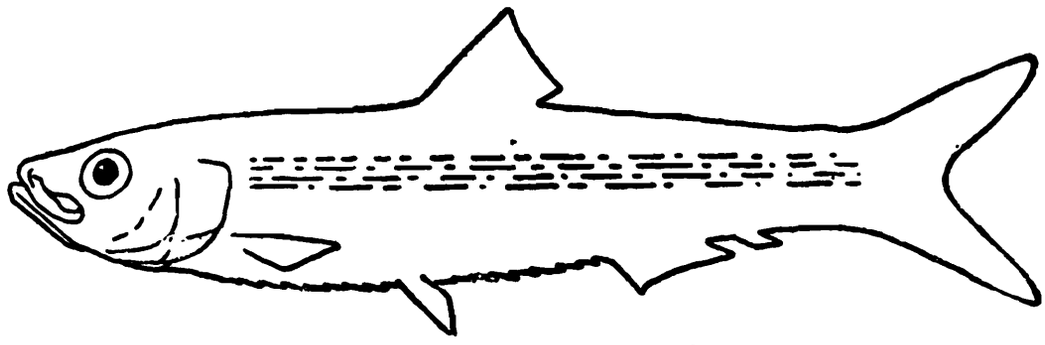
1 (a) Length of head about 4 times in standard length; depth of body about 4.25 times in S. L. ... *C. soborna*

(b) Length of head about 5.5 times in S.L.; depth of body about 5.25 times in S.L. ... *C. biharensis**

Corica soborna Hamilton-Buchanan

[Text-fig. 65]

Corica soborna Hamilton-Buchanan, 1822, *Fishes of Ganges* : 253, 383 (type-locality : Mahanadi R.) ; Day, 1878, *Fishes of India* : 642, pl. 162, fig. 5; Day, 1889 *Fauna Br. India*, Fishes, **1** : 378, fig. 116; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 192, fig. 21.



Text-fig. 65. *Corica soborna* Hamilton-Buchanan

Common Names :

Hamilton's corica	...	English
Cutwaal-alise, Godhae	...	Oriya

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* *Corica biharensis* Kamal & Ahsan, 1979, is a freshwater species but its taxonomic status is doubtful.

Distinguishing Characters :

Body moderately compressed; belly sharply keeled with scutes beginning behind pectoral-fin base, pre-pelvic 10 or 11, post-pelvic 6 or 7. Upper jaw (maxilla) reaching almost to vertical from eye-centre; a single supra-maxilla present. Gillrakers slender. Dorsal fin with 12 or 13 branched rays, its origin considerably nearer to caudal-fin base than to snout-tip. Anal fin with 11 or 12 branched rays, its origin nearer to pelvic-fin base than to caudal-fin base, the last two anal rays separated from rest of fin by a distance equivalent to three intermediate finray bases Pelvic fin with 8 rays.

Colour : body silvery, with light band on sides.

Geographical Distribution : Bay of Bengal.

Fishery Information : Of minor fishery significance in our region. Taken occasionally on the West Bengal-Orissa coast.

Subfamily : DOROSOMATINAE

[Gizzard shads]

Clupeid fishes with jaws and gill arches toothless in adults; mouth inferior, the lower jaw flared outwards at corners; premaxillae triangular; one supra-maxillary. Gill-rakers of first arch not overlapping. Scutes on belly present. Large epibranchial organs present. Pyloric region of gut enlarged and muscular, forming gizzard-like structure. Last ray of dorsal fin of most species extended as a long filament. Pelvic fin with 7 or 8 rays. No bilobed dermal outgrowth from vertical edge of cleithrum.

These fishes derive their name from the peculiar muscular stomach which all of the species in the family possess.

KEY TO GENERA

1 (a) Last dorsal ray filamentous	...	**Nematalosa**
(b) Last dorsal ray not prolonged as a filament	...	2
2 (a) Maxilla slender, with its tip slightly expanded and curved downward; pre-dorsal scales paired and over lapping in midline	...	**Gonialosa***
(b) Maxilla straight, thin, its tip tapering; pre-dorsal scales median	...	**Anodontostoma**

* The genus *Gonialosa* Regan, represented by *G. manmina* (Hamilton-Buchanan) in our region, is a freshwater species.

Genus **Anodontostoma** Bleeker

Anodontostoma Bleeker, 1849, *Verh. batav. Genoot. Kunst. Wet,* **22**(4) : 15 (type-species : *Anodontostoma hasseltii* Bleeker = *Clupanodon chacunda* Hamilton-Burhanan) ; Nelson and Rotham, 1973, *Bull. Am. Mus. nat. Hist.*, **150** : 141 (Review).

Last dorsal ray not prolonged as filament ; level of mouth below level of eye in adults ; third infraorbital moderately expanded, its anterior edge oblique ; maxillary straight, thin, tapering terminally ; one supra-maxillary ; dentary flared outward in front of maxillary ; predorsal scales median, covering midline ; lateral line scales few (usually fewer than 40) ; trunk scales few (usually fewer than 15).

KEY TO SPECIES

1 (a) Gillrakers on first arch about ½ length of gill filaments	...	*A. chacunda*
(b) Gillrakers on first arch as long as gill filaments	...	*A.* new species*

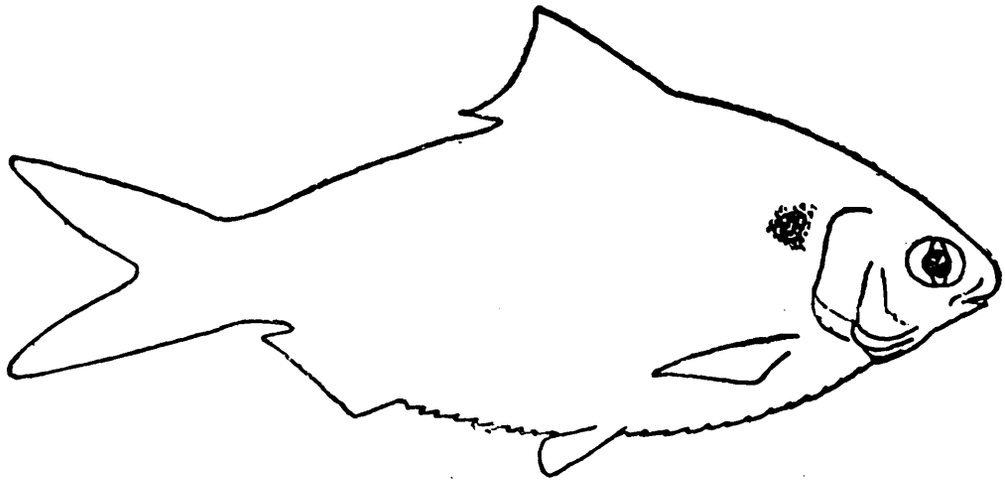
Anodontostoma chacunda (Hamilton-Buchanan)

[Text-fig. 66]

Clupanodon chacunda Hamilton-Buchanan, 1822, *Fishes of Ganges* : 246 (type-locality : Gangetic estuaries).

Chatoessus chacunda : Day, 1878, *Fishes of India* : 632, pl. 160, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 386.

Anodontostoma chacunda : Whitehead, 1973, *J. mar. biol. Ass.* India, **14**(1) : 207, fig. 33 ; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 101, pl. 3, fig. 2 & text-fig. 27.



Text-fig. 66. *Anodontostoma chacunda* (Hamilton-Buchanan)

* The new species of *Anodontostoma* being described by T. Wongratana from Thailand, is also fairly common in the Hooghly estuary.



Anodontostoma chacunda (Hamilton-Buchanan)

Common Names :

Chacunda gizzard-shad	...	English
Balango	...	Oriya
Muddeeru, Kome	...	Telugu
Kulla-poykkendai	...	Tamil
Noonah	...	Malayalam
Gubir, Nir	...	Marathi
Kore-paig-dah	...	Andaman Is.

Distinguishing Characters :

Body deep, almost oval, compressed, its depth 30 to 50% of standard length ; belly a little rounded with scutes, 15 to 18 pre-pelvic and 9 to 12 post-pelvic. Mouth inferior ; maxilla rather deep but thin, straight, tapering terminally. Gillrakers 55 to 95 on first arch, fine, ½ as long as gill filaments. Dorsal fin with 13 to 16 branched rays, the last ray not filamentous Anal fin with 15 to 20 branched rays. Pelvic fin with 7 or 8 rays. A median series of predorsal scales ; lateral scales 38 to 45.

Colour : body silvery, with a dark spot on shoulder.

Geographical Distribution : Pakistan, India, Sri Lanka, Thailand to Indonesia.

Inhabits coastal waters ; pelagic.

Fishery Information : Taken commercially in small quantities in our region. This species is available throughout the year except during the monsoon months. It reaches a length of 20 cm.

Genus **Nematalosa** Regan

Nematalosa Regan, 1917, *Ann. Mag. nat. Hist.*, (8) **19** : 313 (type-species : *Clupea nasus* Bloch) ; Nelson and Rothman, 1973, *Bull. Am. Mus. nat. Hist.*, **150** : 149 (Review).

Last dorsal ray prolonged as a filament ; level of mouth variable ; third infraorbital variably expanded, with a definite anterior edge forming an oblique or vertical margin extending ventrally to preopercle anterior to angle ; posterior end of maxillary expanded and curved downwards ; one supramaxillary ; dentary flared outward in front of maxillary ; predorsal scales paired and overlapping, covering midline ; lateral scales numerous (more than 40) ; trunk scales numerous (more than 15).

Seven species, 2 in our area.

KEY TO SPECIES

1 (a) In skin of top of head, a pair of longitudinal grooves between supra-orbital canals; level of mouth above lower level of eye in adults	...	*N. galatheae**
(b) Supraorbital grooves absent; level of mouth below level of eye in adults	...	*N. nasus*

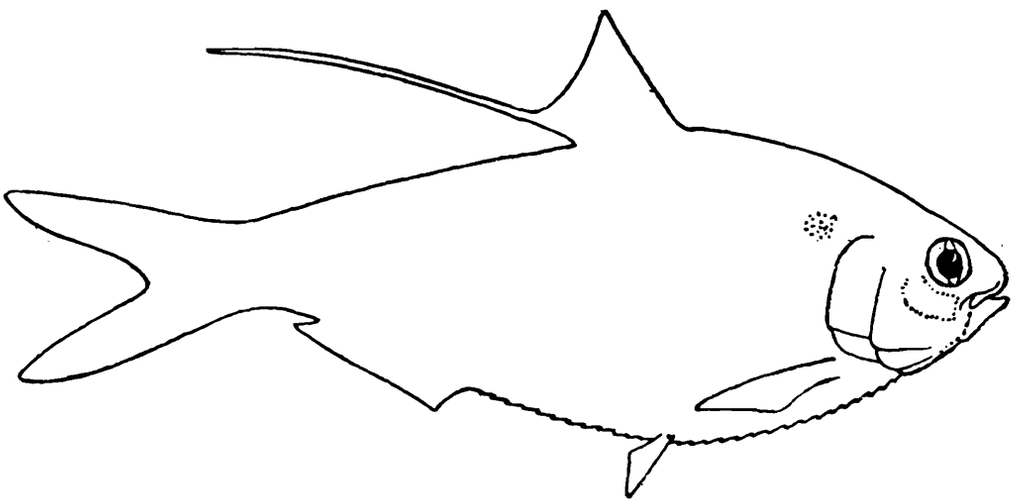
Nematalosa nasus (Bloch)

[Text-fig. 67]

Clupea nasus Bloch, 1795, *Naturges. ausland. Fische,* (9) : 116, pl. 429, fig. 1 (type-locality : Malabar).

Chatoessus nasus : Day, 1878, *Fishes of India* : 634, pl. 160, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **1** : 387, fig. 120.

Nematalosa nasus : Whitehead, 1973, *J. mar. biol. Ass. India,* **14**(1) : 204, fig. 30; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 99, fig. 26.



Text-fig. 67. *Nematalosa nasus* (Bloch)

Common Names :

Bloch's gizzard-shad	...	English
Kome	...	Oriya
Kome	...	Telugu
Muddu-candai Koimeen, Poykkendai	...	Tamil
Noonah, Pananjaulay	...	Malayalam

Distinguishing Characters :

Body oval, deep, its depth 38 to 44% of standard length; belly with scutes, 17 to 19 pre-pelvic and 11 to 13 post-pelvic. Mouth

---

* *Nematalosa galatheae* Nelson & Rothman is known only from the Karnataka coast of India in our region and is a rare species, and is now considered identical with *N. champole* (Hamilton-Buchanan) by Wongratana (1980).

inferior, its level below level of eye in adults; lower jaw flared laterally. Third infraorbital large, its anterior edge rising almost vertically from lower jaw articulation; no supra-orbital grooves on top of head. Gillrakers numerous, more than 200 on lower part of first arch. Dorsal fin with 12 to 14 branched rays, its last ray filamentous. Anal fin with usually 19 to 22 branched rays, lying behind dorsal-fin base. Pelvic fin with 8 rays, its origin below anterior part of dorsal-fin base. Paired pre-dorsal scales, overlapping in midline.

Colour : back black greenish, flanks silvery, with a dark patch on shoulder and dark longitudinal streaks along upper row of scales. Fins yellowish.

Geographical Distribution : Gulf of Aden, the Persian Gulf, India, Sri Lanka, Thailand, China, Japan and the Philippines.

Inhabits coastal waters; pelagic.

Fishery Information : Commercially not taken in large quantities in our region. It is common in the commercial catches along the coasts of Bombay, Karnataka and Kerala, but nowhere in very large numbers. It reaches a length of 15 to 18 cms.

Family : ENGRAULIDAE
[Anchovies]

Body usually fusiform, subcylindrical but sometimes quite strongly compressed; body tapers to very slender tail in rat-tailed anchovies. Snout prominent; mouth far back on underside of head, the lower jaw small and inconspicuous so that the fish appears to be chinless—this characteristic of the head and chin instantly enables one to recognise an anchovy. Body sharp and rounded, with more or less numerous keeled abdominal scutes, either needle-like or strongly keeled. Teeth small and feeble. Gill openings wide; gill-rakers long and slender, 50 or more on lower arm of first arch in most. No spiny rays in fins; dorsal fin usually short and at midpoint of body; pectoral fins set low on body, sometimes with filamentous rays; caudal fin forked (except in *Coilia*). Scales cycloid, thin, rather deciduous; no lateral line. Branchiostegal rays 9 to 20.

Small translucent silvery fishes, occuring often in immense shoals in coastal waters. Valuable marine fish as a source of food and fish meal, also suitable for salting and sun drying as well as canning. The average annual catch of anchovies in India is about 48,000 tonnes of

which 90% is from the west coast of India. In the years when both the sardines and the mackerels are scarce, the anchovies are in plenty in our waters.

KEY TO SUBFAMILIES/GENERA

1 (a)	Body tapering, 'rat-tailed'; caudal and anal fins confluent; no gill-rakers on posterior face of 3rd epibranchial (Subfamily : Coilinae)	**Coilia**
(b)	Body normal; caudal fin bilobed; gillrakers present on posterior face of 3rd epibranchial (Subfamily : Engraulinae)	2
2 (a)	Abdominal scutes present only before pelvic-fin bases; anal fin short. with less than 25 rays ...	**Stolephorus**
(b)	Abdominal scutes present before and behind pelvic-fin bases; anal fin longer, with more than 30 rays ...	3
3 (a)	No abdominal scutes before pectoral fin, or 1 or 2 followed by a gap ...	**Thrissina**
(b)	Pre-pectoral scutes present ...	4
4 (a)	First pectoral ray normal, not filamentous; anterior supra-maxilla small or absent ...	**Thryssa**
(b)	First pectoral ray filamentous; anterior supra-maxilla absent ...	**Setipinna**

Subfamily : COILINAE

The rat-tailed anchovies are quite distinctive. All are placed in a single genus found from India eastwards to Japan

Genus **Coilia** Gray

Coilia Gray, 1831, *Illustr. Ind. Zool., Hardwicke,* **1** : pl. 85, fig. 2 (caption only) ; Gray, 1831, *Zool. Misc.* : 9 (type-species : *Engraulis* (*Coilia*) *hamiltonii Gray* = *Mystus ramcarati* Hamilton-Buchanan).

Body compressed, very elongate, narrowing behind to long slender tail. Mouth oblique; maxilla more or less extended. Teeth small in jaws, palatines and tongue; no canines. Dorsal-fin origin before vertical from anal-fin origin. Pectoral fin with the first 9 to 19 rays filamentous. Anal fin long, with 35 to 116 soft rays, confluent with minute caudal fin.

Twelve species known in the Indo-west Pacific, five in our area. These fishes retain the chinless appearance of the anchovy, but add to it a long, tapering, ratlike tail with a minute caudal fin at tip.

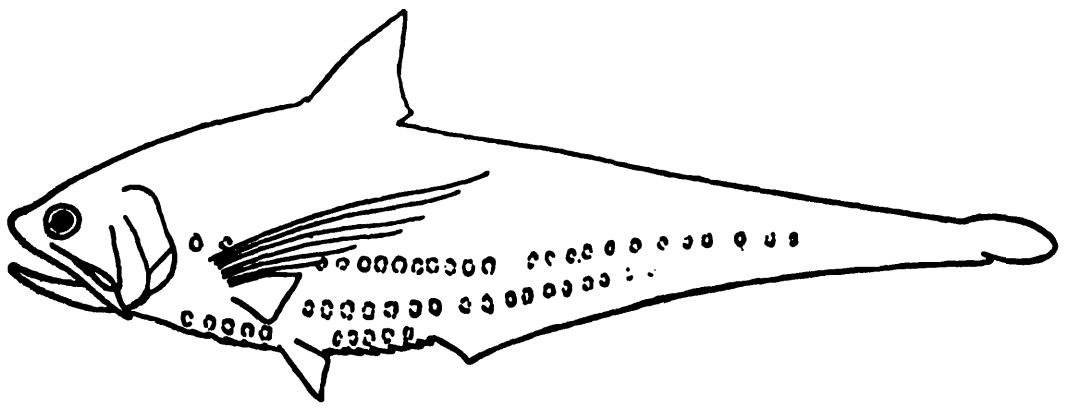
KEY TO SPECIES

1 (a) Longitudinal rows of pearly spots (light organs) on flanks of body; 4 to 6 free pectoral filaments	...	*C. dussumieri*
(b) No pearly spots on flanks of body	...	2
2 (a) Pelvic fin with 9 or 10 rays	...	*C. ramcarati*
(b) Pelvic fin with 7 rays	...	3
3 (a) Maxilla (upper jaw) long, reaching to and beyond gill-opening; 6 or 7 pectoral filaments	...	*C. mystus**
(b) Maxilla short, not extending beyond gill-opening	...	4
4 (a) Pectoral filaments 6	...	*C. neglecta*
(b) Pectoral filaments 10 to 14	...	*C. reynaldi*

Coilia dussumieri Valenciennes

[Text-fig 68]

Coilia dussumieri Valenciennes, 1848, *Hist. nat. Poiss.*, **21** : 81, pl. 610 (type-locality : Bombay) ; Day, 1878, *Fishes of India* : 631, pl. 158, fig. 8; Day, 1889, *Fauna Br. India*, Fishes, **1** : 397, fig. 122; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 244, fig 68; Misra, 1976, *Fauna of India, Pisces* (2nd ed.), **2** : 114, fig. 30.



Text-fig. 68. *Coilia dussumieri* Valenciennes

* *Coilia mystus* (Linnaeus) has been reported only once in our region which according to Wongratana (1980) may be *C. grayii* Richardson.

Common Names :

Gold-spotted grenadier-anchovy	...	English
Oorialli	...	Oriya
Thogai-meen	...	Tamil
Monangu	...	Kannada
Mandeli	...	Marathi
Mandeli	...	Gujarati

Distinguishing Characters :

Body elongate, tapering evenly to very slender tail (unless mutilated and new caudal fin grown) ; belly rather rounded, with 5 or 6 (rarely 4) pre-pelvic and 7 to 9 post-pelvic scutes. Snout strongly projecting, pointed; maxilla (upper jaw) tip pointed, extending to or just beyond gill-opening. A small, sharp spine before dorsal-fin origin ; dorsal-fin origin much nearer to snout-tip than to caudal-fin base. Pectoral fin with the upper 4 to 6 rays filamentous Pelvic fin with 7 rays. Anal fin very long, confluent with caudal fin. Gillrakers 24 to 26 on lower arm of first arch.

Colour : back brown, flanks silvery, with distinctive longitudinal rows of golden or pearly spots on lower flanks.

Geographical Distribution : Coasts of India and Indo-Australian Archipelago.

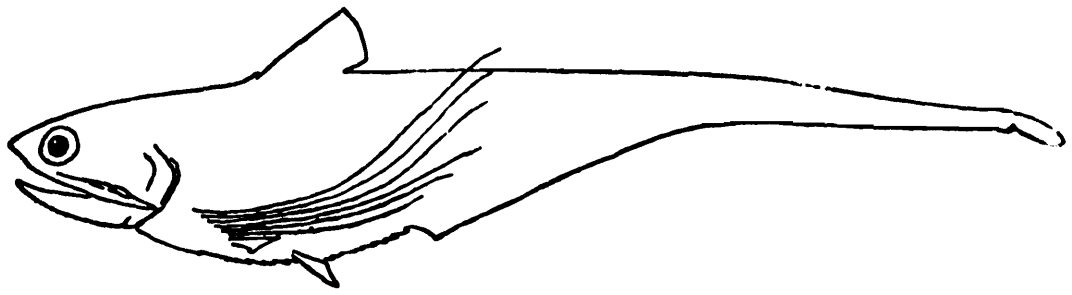
Inhabits coastal waters.

Fishery Information : One of the common food-fishes in Bombay where it is usually taken along with other fishes in the catches of the 'Dol', a specialised bag-net operation. It reaches a maximum size of 20 cm. and is an important item of food of the poor and middle-class people. It is also a common food-fish in Orissa.

Coilia neglecta Whitehead

[Text-fig. 69]

Coilia neglecta Whitehead, 1968, *J. mar. biol. Ass. India*, **9**(1) : 33 (type-locality : Arabian Sea, NW of Bombay, also off Indus, Ganges and Irrawaddy deltas) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 241, fig. 65.



Text-fig. 69. *Coilia neglecta* Whitehead

Common Name :

Whitehead's grenadier anchovy ... English

Distinguishing Characters :

Body compressed, deepest under dorsal-fin origin, then tapering evenly to tail; belly rounded under pectoral-fin base, becoming compressed and keeled towards vent, with 6 to 9 pre-pelvic and 7 to 11 post-pelvic scutes. Snout equal to eye; maxilla reaching just beyond articulation of lower jaw. Dorsal fin preceded by a small scute-like spine. Pectoral fin with 6 free filaments Pelvic fin with 7 rays. Gillrakers on lower arm of first arch 22 to 27, slender.

Colour : body light brown; fins hyaline except black border to anal fin.

Geographical Distribution : Pakistan, India, Singapore and Thailand.

Fishery Information : Commercially not taken in large quantities in our region.

Coilia ramcarati (Hamilton-Buchanan)

[Text-fig. 70]

Mystus ramcarati Hamilton-Buchanan, 1822, *Fishes of Ganges* : 233 (type-locality : Ganges estuaries).

Coilia ramcarati : Day, 1878, *Fishes of India* : 631, pl. 159, fig. 2; Day, 1889, *Fauna Br. India*. Fishes, **1** : 395; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 241, fig. 64; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 117, fig. 31.

Coilia quadragesimalis Valenciennes : Day, 1878, *Fishes of India* : 631; Day, 1889, *Fauna Br. India*, Fishes, **1** : 397; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 116.

Coilia cantoris Bleeker : Day, 1878, *Fishes of India* : 631 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 396 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 113.



Text-fig. 70. *Coilia ramcarati* (Hamilton-Buchanan)

Common Name :

Tapertail anchovy ... English

Distinguishing Characters :

Body compressed, deepest under dorsal-fin base, tapering evenly to caudal fin ; belly rounded under pectoral-fin base, becoming keeled and more compressed behind pelvic-fin base, with 5 pre-pelvic and 10 or 11 post-pelvic scutes. Snout equal to eye ; maxilla tip pointed, extending to articulation of lower jaw. Dorsal fin preceded by a small scute-like spine. Pectoral fin with 6 or 7 rays filamentous. Pelvic fin with 9 or 10 rays, its base a little before vertical from first dorsal-fin ray. Anal fin long, confluent with caudal fin Gillrakers on lower arm of first arch 29 to 30, slender.

Colour : body golden brown, with darkish pigmentation behind gill opening ; fins hyaline.

Geographical Distribution : Mouth of Ganges River and its tributaries.

Fishery Information : Of minor commercial significance, being taken on the West Bengal coast and the Hooghly estuary. This species grows to a length of about 25 cm and is the largest rat-tailed anchovy of the Indian coast.

Coilia reynaldi Valenciennes

[Text-fig. 71]

Coilia reynaldi Valenciennes, 1847, *Hist. nat. Poiss.*, **21** : 81 (type-locality : Rangoon) ; Wongratana, 1980, *Ph.D. thesis London Univ.* : 314.

Coilia korua Dutt and Seshagiri-Rao, 1972, *J. Bombay nat. Hist. Soc.*, **69**(1) : 136, fig. (type-locality : Gollapalem, Andhra Pradesh) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 242, fig. 66.

Coilia whiteheadi Babu-Rao and Jayaswal, *J. Bengal nat. Hist. Soc.* (in press) (type-locality : Hooghly estuary).



Text-fig. 71. *Coilia reynaldi* Valenciennes

Common Names :

Korua grenadier anchovy	...	English
Amadi	...	Bengal
Korua	...	Telugu
Thogai-meen	...	Tamil

Distinguishing Characters :

Body compressed, deepest below dorsal-fin origin, tapering gradually to caudal fin ; belly rounded and keeled from pectoral-fin origin to vent, with 6 to 9 pre-pelvic and 7 to 11 post-pelvic scutes. Snout equal to eye diameter ; maxilla does not extend up to gill-opening. Dorsal fin preceded by a small scute-like spine. Pectoral fin with 10 to 14 free filaments. Pelvic fin with 7 rays Gillrakers 28 to 36 on lower arm of first arch

Colour : upper side of body greenish, flanks golden yellow, abdomen pale yellow. Fins hyaline, unbranched dorsal rays usually dark.

Geographical Distribution : India and Burma.

Fishery Information : Fairly common in the commercial catches of the Andhra coast and in the estuaries of West Bengal.

Subfamlly : ENGRAULINAE

Genus **Setipinna** Swainson

Setipinna Swainson, 1839, *Natural History of Animals*, **2** : 292 (type-species : *Setipinna megalura* Swainson = *Clupea phasa* Hamilton-Buchanan).

Body elongate, compressed; abdomen keeled, abdominal scutes trenchant, extending from gill-openings to vent. Maxilla moderate, its posterior tip projecting well beyond supra-maxilla; first (anterior) supra-maxilla absent. Jaws with a single series of small teeth, reaching to posterior tip of maxilla. Posterior frontal fontanelles triangular, sometimes occluded in adults. Anal fin very long, with 48 to 78 rays, its origin in advance of vertical from dorsal-fin base. Pectoral fin with first unbranched ray filamentous Scales caducous.

Five species are known, 3 in our region.

KEY TO SPECIES

1 (a) Gillrakers on lower arm of first arch 13 or 14; serrae on rakers not forming distinct clumps	...	*S. tenuifilis*
(b) Gillrakers on lower arm of first arch 17 to 21	...	2
2 (a) Anal fin with 48 to 58 rays; prepelvic scutes 20 to 29; gillraker serrae in distinct clumps of longer serrae	...	*S. taty*
(b) Anal fin with 69 to 81 rays; prepelvic scutes 15; gillraker serrae slightly clumped in smaller fishes	...	*S. phasa*

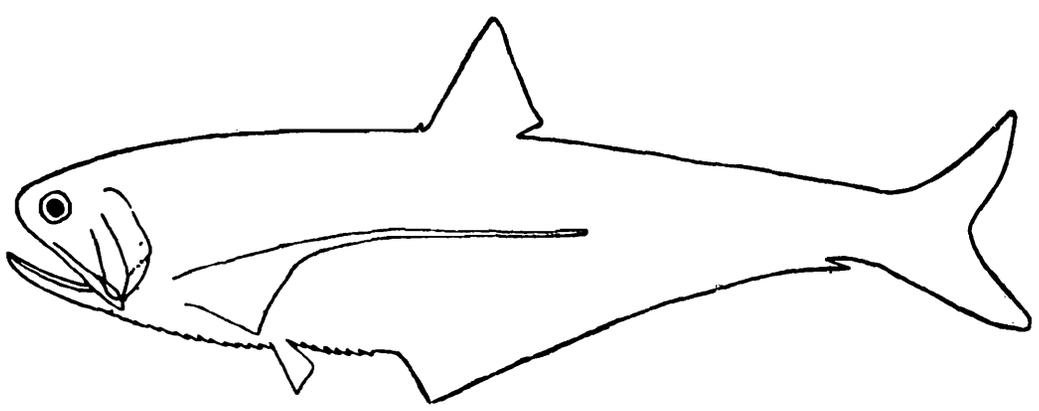
Setipinna phasa (Hamilton-Buchanan)

[Text-fig. 72]

Clupea phasa Hamilton-Buchanan, 1822, *Fishes of Ganges* : 240, 382 (type-locality : brackish rivers of Bengal).

Engraulis telara (Hamilton-Buchanan) : Day, 1878, *Fishes of India* : 627, pl. 158, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 392.

Setipinna phasa : Whitehead, 1973, *J. mar. biol. Ass. India,* **14**(1) : 238, fig. 62; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 107, fig. 28.



Text-fig. 72. *Setipinna phasa* (Hamilton-Buchanan)

Common Names :

Gangetic anchovy	...	English
Phasa	...	Bengali
Tamparia	...	Oriya

Distinguishing Characters :

Body fusiform, strongly compressed; abdomen strongly keeled with 15 pre-pelvic and 6 or 7 post-pelvic scutes. Snout moderately prominent, bluntly pointed; maxilla short, its tip truncate, just extending to gill-opening. Gill-rakers on lower arm of first arch 18 or 19; gillraker serrae slightly clumped in smaller fishes Dorsal-fin origin nearer to snout-tip than to caudal-fin base. Anal fin with 69 to 81 branched rays. First ray of pectoral fin filamentous, usually with 14 branched rays.

Colour : back greenish grey, flanks silvery.

Geographical Distribution : Northern Bay of Bengal and Burma. Coastal waters and ascends rivers.

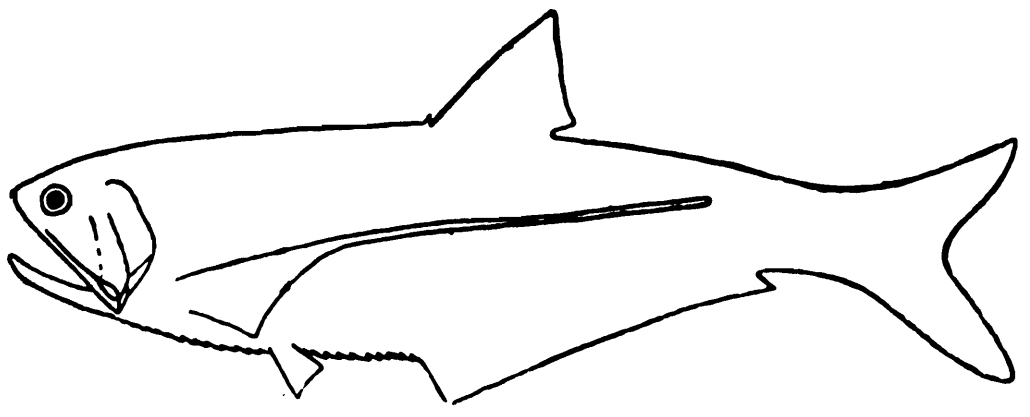
Fishery Information : It is common in the sea, brackish and freshwaters of our region.

Setipinna taty (Valenciennes)

[Text-fig. 73]

Engraulis taty Valenciennes. 1848, *Hist. nat. Poiss.*, **21** : 60 (type-locality : Pondicherry) ; Day., 1878, *Fishes of India* : 628, pl. 158, fig. 5 ; Day, 1889, *Fauna Br. India, Fishes*, **1** : 393.

Setipinna taty : Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 237, fig. 61 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 109, fig. 29.



Text-fig. 73. *Setipinna taty* (Valenciennes)

Common Names :

Hairfin anchovy	...	English
Kella	...	Telugu
Thaadi-poruva, Elapporuvaa	...	Tamil
Paikat	...	Marathi

Distinguishing Characters :

Body fusiform, strongly compressed; abdomen sharply keeled with 20 to 29 pre-pelvic and usually 10 to 13 post-pelvic scutes. Snout moderately prominent, bluntly pointed; maxilla short, its tip truncate and just extending to gill-opening Gillrakers on lower arm of first arch 18 to 21; inner edges of rakers with small serrae forming distinct clumps. Dorsal-fin origin nearer to snout-tip than to caudal-fin base. Anal fin with 48 to 58 branched rays. First ray of pectoral fin filamentous, with 12 to 14 branched rays.

Colour : back brown or bluish, flanks silvery.

Geographical Distribution : East coast of India, Sri Lanka and the East Indies.

Inhabits coastal waters and estuaries.

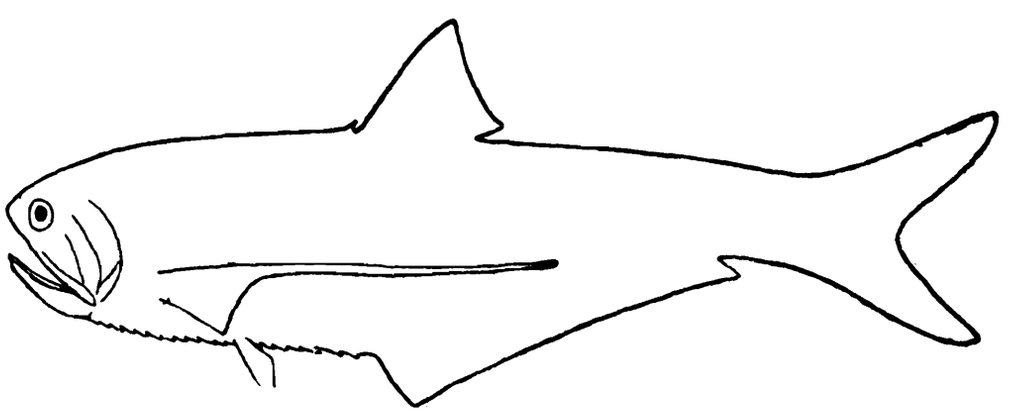
Fishery Information : Taken commercially in small quantities in the sea and estuaries of our region.

Setipinna tenuifilis Valenciennes

[Text-fig 74]

Setipinna tenuifilis Valenciennes, 1848, *Hist. nat. Poiss.*, **21** : 62 (type-locality : Rangoon) ; Wongratana, 1980, *Ph.D. thesis London Univ.* : 299.

Setipinna godavari Babu-Rao, 1961, *Proc. Ist. All-India Congr. Zool.*, [1959] : 364 (type-locality : Godavari estuary) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 239, fig. 63.



Text-fig. 74. *Setipinna tenuifilis* Valenciennes

Common Name :

Godavari anchovy ... English

Distinguishing Characters :

Body fusiform, strongly compressed; abdomen sharply keeled with 17 to 21 pre-pelvic and 6 or 7 post-pelvic scutes. Maxilla short, its tip truncate, not reaching the gill-opening. Gillrakers on lower arm of first arch 13 or 14; serrae on gillrakers not forming distinct clumps. Dorsal-fin origin nearer to snout-tip than to caudal-fin base. Anal fin with 49 to 59 branched rays. Pectoral fin with 11 to 13 branched rays, the first ray filamentous.

Colour : back greenish black, flanks silvery dashed with gold. Dorsal and caudal fin margins dusky.

Geographical Distribution : Bay of Bengal and Northern Borneo.

Fishery Information : Taken commercially in small quantities in the Hooghly and Godavari estuaries and also along the West Bengal coast.

Genus **Stolephorus** Lacepede

[Whitebaits]

Stolephorus Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 381 (type-species : *Stolephorus commersonii* Lacepede).

Body elongate; abdomen rounded, with 1 to 8 needle-like scutes between pectoral and pelvic fins, the scutes with slender ascending arms. Snout usually prominent and rounded; posterior tip of maxilla usually projecting well beyond supra-maxilla; posterior frontal fontanelles triangular, usually retained in adults. Dorsal fin with or without a predorsal spine. Anal fin short, with 14 to 25 rays, its origin usually before last dorsal ray. Pelvic fin with 7 rays. Scales thin, deciduous.

Small translucent marine fishes always with a distinct silvery lateral band. These fishes are the most important among the anchovies with an annual average catch of 34,000 tonnes, accounting for 70% of the total anchovy catch. At present, the catch of whitebaits is obtained almost entirely from Andhra Pradesh, Tamil Nadu and Kerala. White bait stock has been estimated to contribute to about 35% of the total fish biomass along the southwest coast extending up to Ratnagiri (Maharashtra).

KEY TO SPECIES

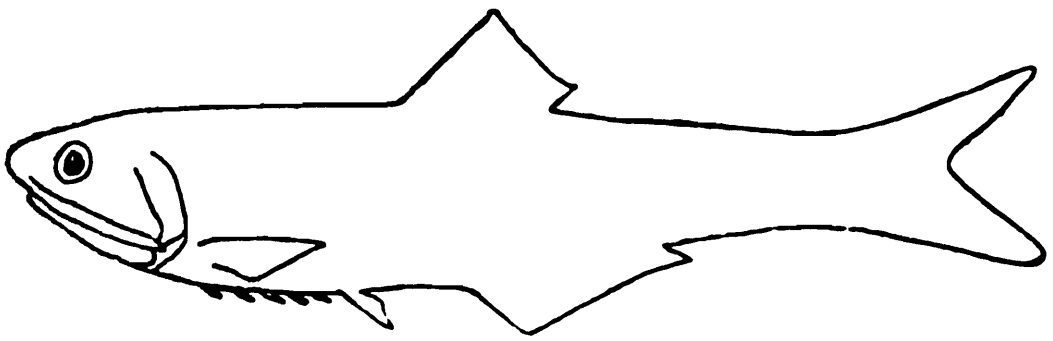
1 (a) Anal-fin origin under or a little behind last dorsal-fin ray; muscular portion of isthmus not reaching to hind border of branchiostegal membrane, leaving a diamond-shaped portion of urohyal exposed	...	2
(b) Anal-fin origin under dorsal-fin base; muscular portion of isthmus extending forward beyond hind margin of branchiostegal membrane	...	4
2 (a) Maxilla truncate posteriorly, not reaching to anterior border of pre-operculum; urohyal plate fleshy; lower gillrakers usually 23 to 26	...	*S. buccaneeri*
(b) Maxilia pointed posteriorly, projecting beyond anterior border of pre-operculum; urohyal plate bony	...	3
3 (a) Gillrakers 23 to 29 on lower arm of first arch; unbranched dorsal and anal rays ii	...	*S. heterolobus*
(b) Gillrakers 21 to 26 on lower arm of first arch; unbranched dorsal and anal rays iii	...	*S. devisi*
4 (a) Hindborder of pre-operculum indented near maxilla tip	...	5
(b) Hind border of pre-operculum evenly rounded near maxilla tip	...	7
5 (a) No double pigment line on back, melanophores irregularly scattered or absent; body slender, its depth less than upper jaw; snout longer, pointed; scutes usually 6 or 7	...	*S. andhraensis*
(b) Double pigment line along back behind dorsal fin; body deep, its depth equal to uppr jaw; snout short and blunt; scales usually 5 to 7	...	6
6 (a) Pre-dorsal spine sometimes present (but no spine on pelvic scute); gillrakers on lower arm of first arch 22 to 28	...	*S. insularis**
(b) No pre-dorsal spine; gillrakers on lower arm of first arch 28 to 30	...	*S.* new species*

7 (a) Predorsal spine present and spine on pelvic scute; gillrakers on lower arm of first arch 20 to 24	...	*S. baganesis*
(b) No pre-dorsal spine, no spine on pelvic scute	...	8
8 (a) Maxilla tip reaching to or only just beyond anterior border of pre-operculum: pelvic-fin tips failing to reach vertical from dorsal-fin origin; 3 to 5 pre-pelvic scutes	...	*S. indicus*
(b) Maxilla tip reaching to or beyond posterior border of pre-operculum	...	9
9 (a) Pelvic-fin tips reaching well past vertical from dorsal-fin origin; a pair of dark predorsal lines on back	...	*S. commersonii*
(b) Pelvic-fin tips not reaching to vertical from dorsal-fin origin; no dark lines on back	...	*S. waitei*

Stolephorus andhraensis Babu-Rao

[Text-fig. 75]

Stolephorus andhraensis Babu-Rao, 1965, *Ann. Mag. nat. Hist.*, (13) **9** : 103 (type-locality : Waltair, Kakinada) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 224, fig. 47.



Text-fig. 75. *Stolephorus andhraensis* Babu-Rao

Common Name :

Andhra anchovy ... English

Distinguishing Characters :

Body fusiform, somewhat compressed, its depth less than upper jaw length; belly rounded with 6 (or rarely 7) needle-like scutes be-

* This new species of *Stolephorus* is to be named by T Wongratana, it has been reported from Bombay in our area but is of no fishery importance.

tween pectoral and pelvic fins, but no spine on pelvic scute. Snout short and pointed; maxilla tip projecting to edge of operculum; hind border of pre-operculum indented near maxilla tip; muscular portion of isthmus extending beyond hind margin of gill membrane. Gillrakers on lower arm of first arch 20 or 21. Dorsal fin with iii 12 to 14 rays, no pre-dorsal spine. Anal fin with iii 16 to 20 rays, its origin below dorsal-fin base.

Colour : body milky white, with bright silvery stripe along flanks.

Geographical Distribution : East coast of India, Singapore, Papua/New Guinea.

Fishery Information : Taken commercially only occasionally on the Andhra coast of our region.

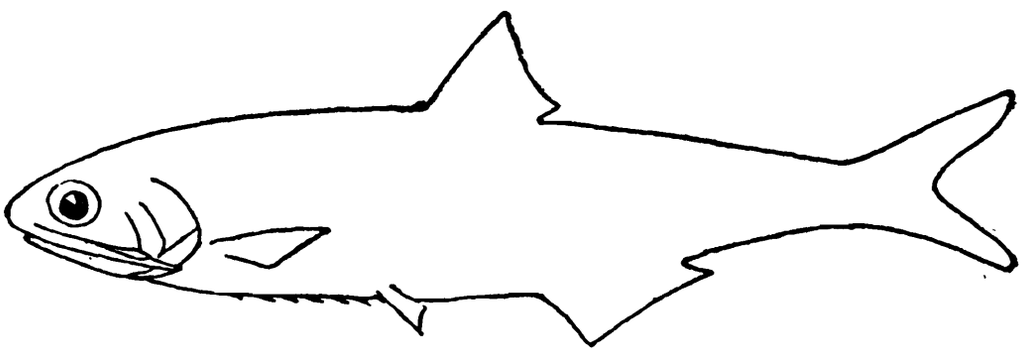
Stolephorus bagenensis Hardenberg

[Text-fig. 76]

Stolephorus bagenensis Hardenberg, 1931, *Treubia,* **13** (1) : 107 (type-locality : Rokan R. mouth) ; Wongratana, 1980a, *Ph.D. thesis London Univ.* : 256.

Stolephorus macrops : Whitehead (*nec* Hardenberg), 1973, *J. mar. biol. Ass. India,* **14** (1) : 223, fig. 45.

Anchoviella tri : Misra (*nec* Bleeker), 1976, *Fauna of India,* Pisces (2nd ed.) **2** : 125.



Text-fig. 76. *Stolephorus bagenensis* Hardenberg

Common Names :

Spined anchovy	...	English
Nethili	...	Tamil
Dindus	...	Marathi

Distinguishing Characters :

Body fusiform, somewhat compressed; belly rounded, with 6 or 7 (rarely 8) needle-like scutes between pectoral and pelvic fins, and a distinctive spine on pelvic scute between fin bases. Snout

projecting, bluntly pointed; maxilla tip pointed, reaching to gill-opening; muscular portion of isthmus reaching to hind border of gill-opening; hind border of pre-operculum evenly rounded near maxilla tip. Gillrakers on lower arm of first arch 18 to 24. Dorsal fin with iii 11 to 13 rays and a small pre-dorsal spine. Anal fin with iii 17 to 20 rays, its origin below dorsal-fin base.

Colour : pale cream when scales lost; bright silvery stripe on flanks; a double line of small pigment spots on back behind dorsal fin.

Geographical Distribution : North-east coast of India, the Indo-Malayan Archipelago but not reported from South China Sea or Australia.

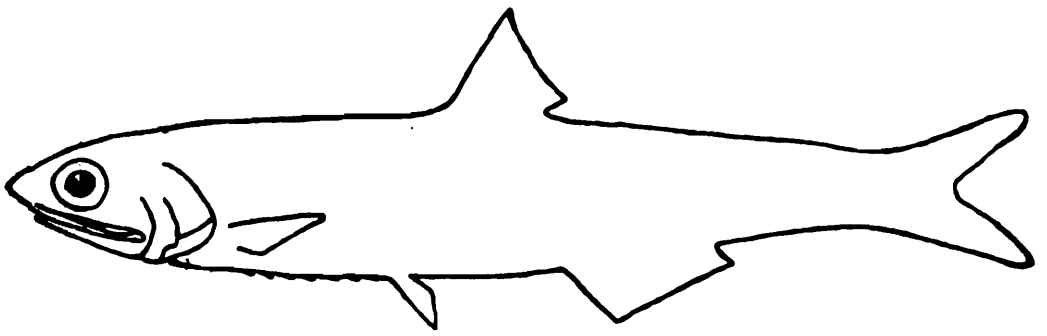
A coastal pelagic species.

Fishery Information : Taken commercially in small quantities in our region.

Stolephorus buccaneeri Strasburg

[Text-fig. 77]

Stolephorus buccaneeri Strasburg, 1960, *Pacific Sci.*, **14** (4) : 396 (type-locality : Hawaii) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 222, fig 44.



Text-fig. 77. *Stolephorus buccaneeri* Strasburg

Common Name :

Buccaneer anchovy ... English

Distinguishing Characters :

Body fusiform, subcylindrical; belly rounded, with 2 to 6 (rarely 7) needle-like scutes between pectoral and pelvic fins. Snout prominent but rounded; maxilla tip truncate (blunt), not reaching to anterior border of pre-operculum; muscular portion of isthmus not reaching to hind border of branchiostegal membrane, leaving exposed

a small (white or silvery) diamond-shaped fleshy plate (easily visible without lens). Gillrakers on lower arm of first arch usually 23 to 26. Dorsal fin with ii 11 to 15 rays. Anal fin with ii 12 to 15 rays, its origin behind last dorsal ray.

Colour : body pale cream when scales lost; bright silvery stripe along flanks.

Geographical Distribution : East coast of Africa, Persian Gulf, India, Indo-Malayan Archipelago, the Philippines, Japan and Hawaii.

Fishery Information : This very widespread species is commercially important on the Kerala coast of India.

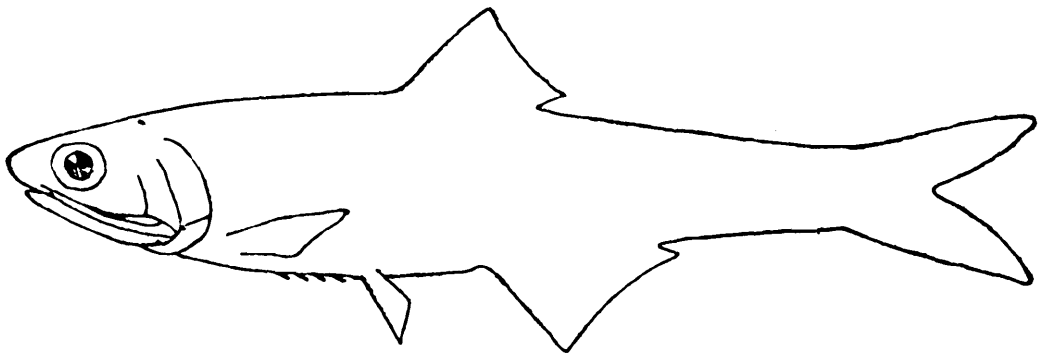
Stolephorus commersonii Lacepede

[Text-fig. 78]

Stolephorus commersonii Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 381, 382, pl. 12, fig. 1 (type-locality : Mauritius) ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 226, fig. 50.

Engraulis commersonianus : Day, 1878, *Fishes of India* : 629, pl. 158, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **1** : 394.

Anchoviella commersonii : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 120, fig. 32 & pl. 3, fig. 3.



Text-fig. 78. *Stolephorus commersonii* Lacepede

Common Names :

Commerson's anchovy	...	English
Chwali-patwa	...	Oriya
Purasa, Kella	...	Telugu
Nethili	...	Tamil
Nethali-netholi	...	Malayalam
Kolla	...	Kannada

Distinguishing Characters :

Body fusiform, nearly cylindrical; belly rounded, with 1 to 4 (rarely 5) needle-like scutes between pectoral and pelvic fins. Snout prominent, rather pointed; maxilla long, its tip pointed and projecting to or beyond posterior border of pre-operculum; posterior border of pre-operculum evenly rounded near maxilla tip; muscular portion of isthmus reaching to hind border of branchiostegal membrane. Posterior frontal fontanelles broad, with sigmoid outer borders. Gill-rakers 21 to 35 (usually more than 23). Dorsal fin with iii 12 to 14 rays; no pre-dorsal spine. Anal fin with iii 17 to 20 rays, its origin below dorsal-fin base.

Colour : pale cream when scales lost; bright silvery stripe along flanks; a double dark line on back before dorsal fin.

Geographical Distribution : East coast of Africa; India, Indo-Malayalam Archipelago and the Philippines to Samoa.

A coastal pelagic species.

Fishery Information : This is one of the large-sized white-baits growing to a size of 13 cms. This species is quite common at Lawson's Bay (Andhra Pradesh) though not caught in very large quantities, and is a food-fish of moderate value.

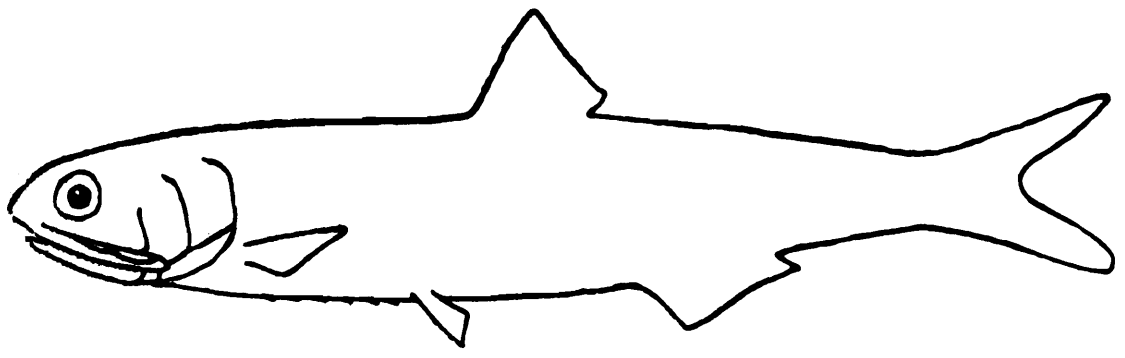
Stolephorus devisi (Whitley)

[Text-fig. 79]

Amentum devisi Whitley, 1940, *Aust. Zool.*, 9 (4) : 404 (type-locality : Cape York).

Stolephorus, Species A, Whitehead, 1973, *J. mar. biol. Ass. India*, 14 (1) : 221, fig. 43.

Stolephorus devisi : Wongratana, 1980, *Ph.D. thesis London Univ.* : 228.



Text-fig. 79 *Stolephorus devisi* (Whitley)

Common Name :

DeVis's anchovy ... English

Distinguishing Characters :

Body fusiform, sub-cylindrical; belly rounded, with 4 to 6 (rarely 3) needle-like scutes between pectoral and pelvic fins. Head length usually less than 4 times in standard length; snout prominent and rounded; maxilla tip pointed posteriorly, projecting beyond anterior border of preoperculum; hind border of preoperculum indented near maxilla tip; muscular portion of isthmus not reaching to hind border of gill-opening, leaving exposed a small (white or silvery) diamond-shaped urohyal bony plate (easily visible without lens). Some teeth of upper jaw enlarged and regularly interspersed amongst the smaller teeth, especially in juveniles. Gill-rakers on lower arm of first arch 20 to 27. Dorsal fin with iii 11 to 13 rays; no pre-dorsal spine. Anal fin with iii 15 to 17 rays, its origin under last dorsal ray.

Colour : body creamy white, with a silvery stripe along flanks.

Geographical Distribution : Gulf of Aden, Persian Gulf, India, Sri Lanka, Indo-Malayan Archipelago, the Philippines, Hong Kong, Taiwan and northern coasts of Australia.

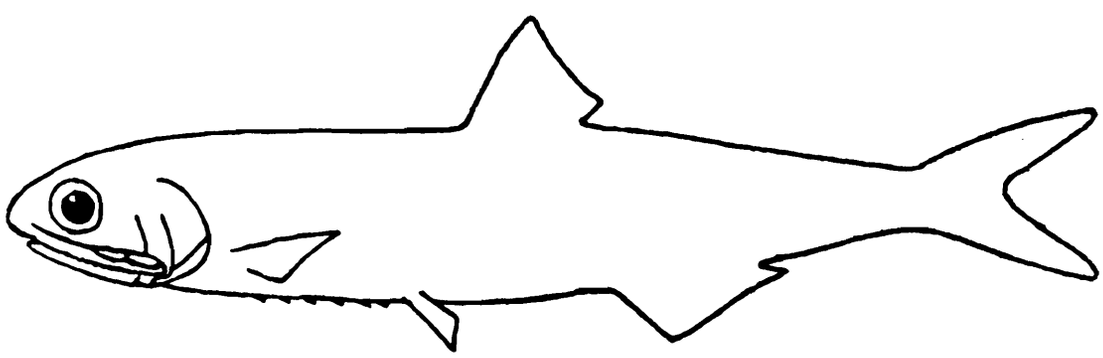
Fishery Information : This species along with *Stolephorus heterolobus* and *S. bataviensis,* form the bulk of the white-bait catch in our country. They occur in the catches either singly or together.

Stolephorus heterolobus (Rüppell)

[Text-fig. 80]

Engraulis heterolobus Rüppell, 1837, *Neue Wirbelth., Fische* : 79, pl. 21, fig. 4 (type-locality : Red Sea).

Stolephorus heterolobus : Whitehead, 1973, *J. mar. biol. Ass. India,* **14** (1) : 220, fig. 42



Text-fig. 80. *Stolephorus heterolobus* (Ruppell)

Common Name :

Shorthead anchovy ... English

Distinguishing Characters :

Body fusiform, sub-cylindrical ; belly rounded, with 4 to 6 needle-like scutes between pectoral and pelvic fins. Head short, usually more than 4 times in standard length ; snout prominent and pointed ; maxilla tip pointed, reaching well beyond anterior border of pre-operculum ; isthmus not reaching to hind border of gill membrane, leaving exposed a small (white or silvery) diamond-shaped urohyal bony plate (easily visible without lens). Gillrakers on lower arm of first arch usually 23 to 29. Teeth on maxilla evenly sized. Dorsal fin with ii 11 to 13 rays. Anal fin with ii 14 to 16 rays, its origin a little behind last dorsal ray.

Colour. : pale bluish-green above ; bright silvery stripe along flanks, the upper border of the stripe deep blue.

Geographical Distribution : East coast of Africa, Red Sea, India, Indo-Malayan archipelago to Japan and Queensland (Australia).

Fishery Information : This widespread species forms the bulk of the anchovy fishery in the Andamans and the east coast of India. The fishing season is from November to April along the Andhra coast, and from May to November along the Tamil Nadu coast.

Stolephorus indicus (van Hasselt)

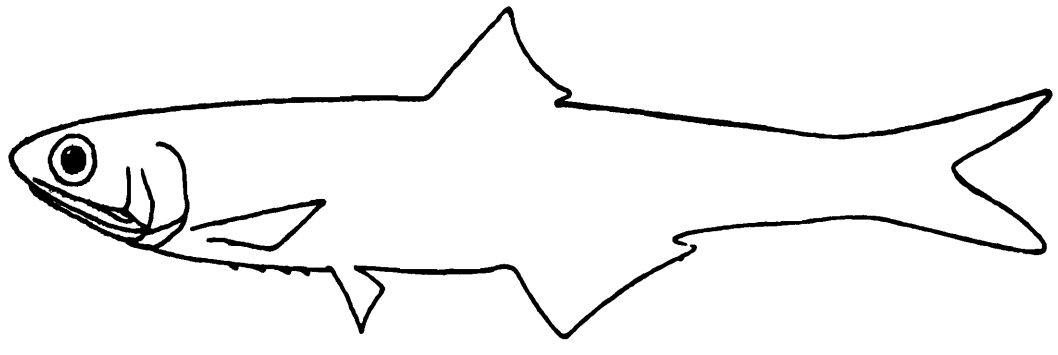
[Text-fig. 81]

Engraulis indica van Hasselt, 1823, *Algemeene Konst-en Letter-bode*, **1** (23) : 329 (type-locality : Java).

Engraulis indicus : Day, 1878, *Fisches of India* : 629, pl. 158, fig. 3 : Day, 1889, *Fauna Br. India*, Fishes, **1** : 394.

Stolephorus indicus : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 225, fig. 49.

Anchoviella indica : Misra, 1976, *Fauna of India*. Pisces (2nd ed.), **2** : 123.



Text-fig. 81. *Stolephorus indicus* (van Hasselt)

Common Names :

Indian anchovy	...	English
Nattoo	...	Telugu
Nethilli	...	Tamil
Conetholi	...	Malayalam
Dindus	...	Marathi
Zooroo-cartdarh	..	Andaman Is

Distinguishing Characters :

Body fusiform, nearly cylindrical; belly rounded, with 3 to 5 (rarely 2 or 6) needle-like scutes between pectoral and pelvic fins. Snout prominent, rather pointed; maxilla tip pointed, not reaching to anterior border of pre-operculum; posterior border of pre-operculum evenly rounded near maxilla tip; muscular portion of isthmus extending forward to hind border of gill membrane. Posterior frontal fontanelles narrow, with straight borders. Gillrakers on lower arm of first arch 21 to 28. Dorsal fin with iii 12 to 14 rays, without pre-dorsal spine. Anal fin usually with iii 17 to 20 rays, its origin below dorsal-fin base.

Colour : pale cream when scales are lost; bright silvery stripe on flanks.

Geographical Distribution : Indo-Pacific, from Zanzibar, through India to Taiwan, Riu Kiu Is., Melanesia, Micronesia and Polynesia.

A coastal pelagic species.

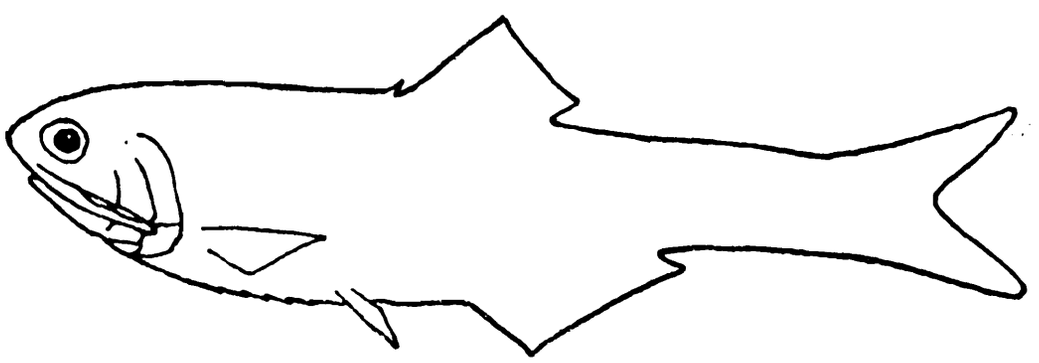
Fishery Information : Taken commercially in small quantities in our region.

Stolephorus insularis Hardenberg

[Text-fig 82]

Stolephorus insularis (*partim*) Hardenberg, 1933, *Natuurk. Tijdschr. Ned-Indie* : **93** (2) : 260 (type-locality : Java, Lingga, Lingga, Bawean, Kangean, Moluccas) (excluding Hardenberg's *S. insularis bataviensis*).

Stolephorus insularis : Wongratana, 1980, *Ph.D. thesis London Univ.* : 250.



Text-fig. 82. *Stolephorus insularis* Hardenberg

Common Name :

Hardenberg's anchovy ... English

Distinguishing Characters :

Body fusiform, somewhat compressed; belly rounded, with 5 to 7 (rarely 4 or 8) needle-like scutes between pectoral and pelvic fins, but no spine on pelvic scute. Snout short and blunt; maxilla tip projecting beyond anterior border of pre-operculum; hind border of pre-operculum indented near maxilla tip; muscular portion of isthmus extending beyond hind margin of gill membrane. Gillrakers on lower arm of first arch 20 to 24. Dorsal fn with iii 11 to 14 rays; pre-dorsal spine sometimes present. Anal fin with iii 16 to 20 rays, its origin under dorsal-fin base.

Colour : pale cream when scales lost; bright silvery stripe along flanks; two thin lines of small pigment spots along back behind dorsal fin. Fins pale yellow.

Geographical Distribution : Gulf of Aden, India, Indo-Malayan Archipelago and Taiwan.

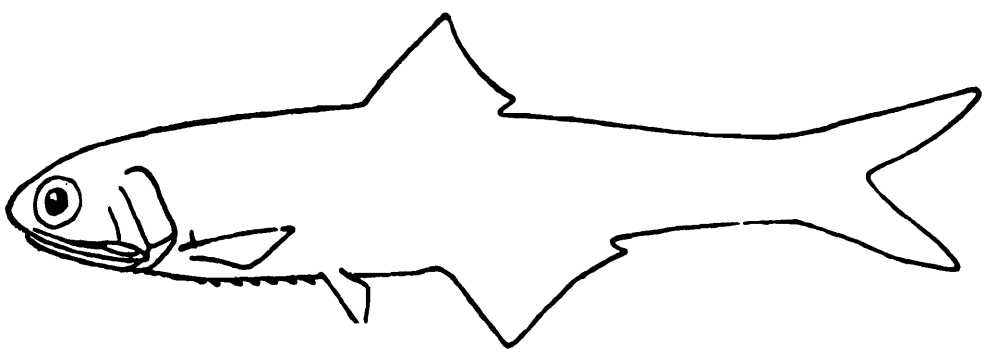
Fishery Information : Taken commercially only occasionally in our region particularly on the Andhra coast.

Stolephorus waitei Jordan & Seale

[Text-fig. 83]

Stolephorus waitei Jordan and Seale, 1926, *Bull. Mus. comp. Zool. Harvard*, **67** (11) : 380 (type-locality : Queensland) ; Wongratana, 1980, *Ph.D. thesis London Univ.* : 242.

Stolephorus insularis bataviensis Hardenberg : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 226, fig. 50.



Text-fig. 83. *Stolephorus waitei* Jordan & Seale

Common Name :

Batavian anchovy ... English

Distinguishing Characters :

Body fusiform, moderately compressed; belly with 5 to 7 (rarely 4) needle-like scutes between pectoral and pelvic fins. Head short, snout rather rounded; maxilla tip pointed, projecting beyond posterior border of pre-operculum; hind border of pre-operculum evenly rounded near maxilla tip; muscular portion of isthmus extending to hind border of branchiostegal membrane. Posterior frontal fontanelles narrow, with outer borders straight. Gillrakers on lower arm of first arch 19 to 25. Dorsal fin with iii 12 to 14 rays; no pre-dorsal spine. Anal fin with iii 17 to 20 rays, its origin below dorsal-fin base.

Colour : pale cream when scales lost; bright silvery stripe along flanks; black dots below eye and on tip of lower jaw.

Geographical Distribution : India, Indo-Malayan Archipelago, the Philippines and Taiwan.

Fishery Information : This species forms an important seasonal element in the anchovy fisheries of our region.

Genus **Thrissina** Jordan & Seale*

Thrissina Jordan and Seale, 1925, *Copeia*, (141) : 30 (type-species : *Clupea baelama* Forsskal).

Body elongate, compressed, with abdominal scutes but lacking scutes in front of pectoral fins (rarely present) but present before and behind pelvic fins; scutes with broad ascending arms. Snout short; two supra-maxillae; posterior tip of maxilla pointed, reaching just beyond lower jaw articulation. Pseudobranch well developed. Teeth in jaws small. Free spine in front of dorsal fin poorly developed and barely apparent. Anal fin with 30 to 36 rays, its origin behind last dorsal ray.

Monotypic.

Thrissina baelama (Forsskal)

[Text-fig. 84]

Clupea baelama Forsskal, 1775, *Descript. Animal.* : 72 (type-locality : Djedda, Red Sea).

Engraulis baelama Day, 1878, *Fishes of India* : 626, pl. 158, fig. 7.

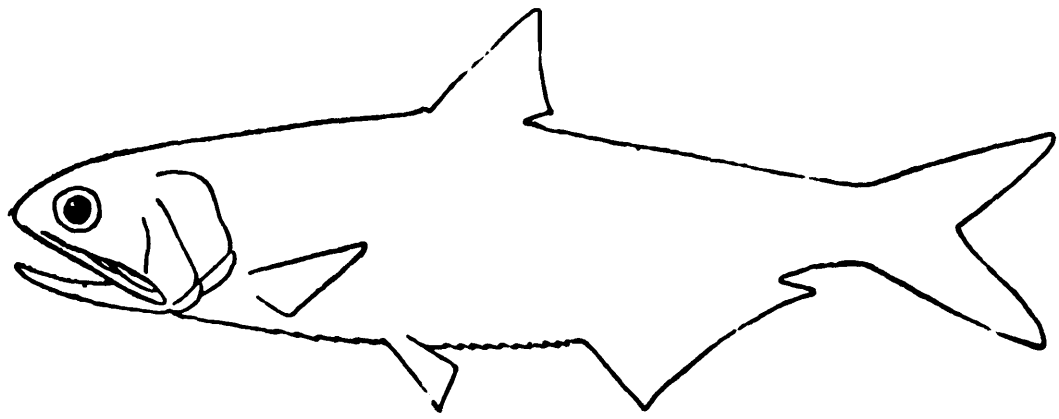
Engraulis baelama : Day, 1889, *Fauna Br. India, Fishes*, **1** : 391.

Thrissina baelama : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 227, fig. 52.

Thrissocles baelama : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 130.

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* Considered a subgenus of *Thyyssa* by Wongratana (1980).



Text-fig. 84. *Thrissina baelama* (Forsskal)

Common Names :

Baelama anchovy	...	English
Poruva, Oruttuporuvaa	...	Tamil

Distinguishing Characters :

Body fusiform, slightly compressed ; belly rounded, with abdominal scutes, 4 to 9 pre-pelvic and 7 to 10 post-pelvic ; occasionally a single plate-like scute at isthmus. Snout prominent, slightly pointed ; maxilla tip pointed and projecting just beyond articulation of lower jaw ; isthmus reaching to hind border of gill membrane. Gill-rakers 19 to 26 on lower arm of first arch, moderately long and slender Dorsal fin with 14 to 16 rays, a small blunt spine before fin. Anal fin with iii 24 to 32 rays, its origin slightly behind last dorsal ray.

Colour : upper surface of body dark blue or brownish, flanks and lower part silvery ; no silvery stripe on flanks

Geographical Distribution : Indo-Pacific region, from Zanzibar, through India, to the Philippines, Melanesia, Micronesia and Polynesia.

A coastal pelagic species.

Fishery Information : This species is taken commercially in the Andaman Sea.

Genus **Thryssa** Cuvier

Thryssa Cuvier, 1829, *Regne Animal* (2nd ed.), **2** : 323 (type-species : *Clupea setirostris* Broussonet).

Body elongate, compressed, with well developed abdominal scutes extending from gill-opening to vent ; all scutes trenchant, with broad ascending arms. Snout short, posterior tip of maxilla usually projecting well beyond supra-maxilla. Teeth minute in jaws, and on palate

and tongue. Posterior frontal fontanelles triangular, usually retained in adults. Anal fin long, with 24 to 46 branched rays, its origin usually before last dorsal ray. Pectoral fins normal, without any filamentous ray.

KEY TO SPECIES

1 (a) Lower jaw with high coronoid process, maxilla (upper jaw) very long, extending to beyond pectoral-fin tip	...	*T setirostris*
(b) Lower jaw slender; maxilla (upper jaw) not extending beyond pectoral-fin tip	...	2
2 (a) Maxilla long, reaching to pectoral-fin base or beyond	...	3
(b) Maxilla short, not reaching to pectoral-fin base	...	6
3 (a) Gillrakers serrae uneven but not clumped; lower gillrakers on first arch 13 to 21	...	4
(b) Gillrakers serrae in distinct clumps; lower gilrakers on first arch 16 to 24	...	5
4 (a) Anal fin with 29 to 37 branched rays; mouth nearly horizontal; pre-pelvic scutes 16 to 20; snout-tip on level of eye centre	...	*T. mystax*
(b) Anal fin with 38 to 44 branched rays; mouth oblique; pre-pelvic scutes 15 to 17; snout-tip above level of eye centre	...	*T. purava*
5 (a) Maxilla reaching 1/2 to 7/8 along pectoral fin; post-pelvic scutes 6 to 9; anterior supra-maxilla absent	...	*T. dussumieri*
(b) Maxilla shorter, reaching to 1/3 along pectoral fin; post-pelvic scutes 8 to 12; anterior supra-maxilla usually present	...	*T vitrirostris*
6 (a) Lower gillrakers on first arch 11 to 15	...	*T. hamiltonii*
(b) Lower gillrakers on first arch 17 to 19	...	7
7 (a) Anal fin with 38 to 43 rays; lower gillrakers on first arch 16 to 20	...	*T malabarica*
(b) Anal fin with 34 rays; lower gillrakers on first arch 27 to 29	...	*T kammalensis*

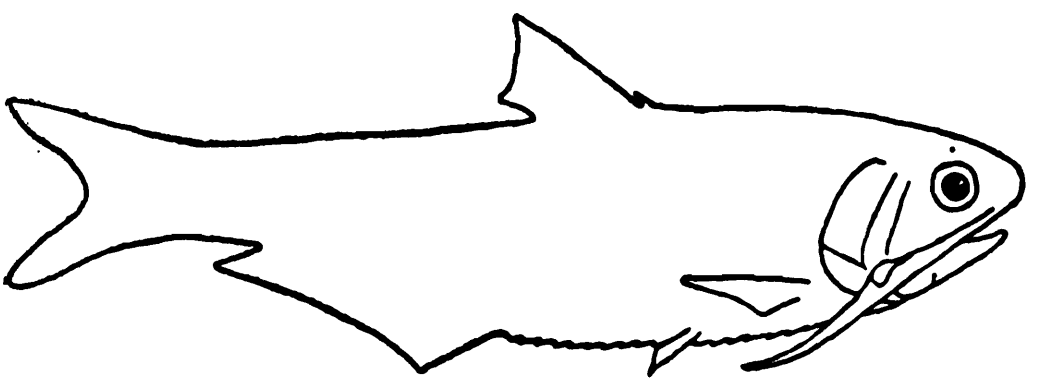
Thryssa dussumieri (Valenciennes)

[Text-fig 85]

Engraulis dussumieri Valenciennes, 1848, *Hist. nat. Poiss.*, **21** : 69 (type-locality : not given) ; Day, 1878, *Fishes of India* : 627, pl. 158, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 391.

Thryssa dussumieri : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 232, fig. 56.

Thrissocles dussumieri : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 131, pl. 3, fig. 1 and text-fig. 33.



Text-fig. 85. *Thryssa dussumieri* (Valenciennes)

Common Names :

Dussumier's thryssa	...	English
Semporuva	...	Tamil
Neela-manangu	...	Kannada
Kati	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 14 to 16 pre-pelvic and 6 to 9 post-pelvic scutes. Snout prominent, bluntly rounded; maxilla long, its tip pointed and reaching to 1/2 to 7/8 along pectoral fin; anterior supra-maxilla absent; mouth not strongly oblique. Gillrakers on lower arm of first arch 16 to 20; gillraker serrae in distinct clumps. Dorsal fin with 9 to 12 branched rays; a small, sharp spine before dorsal-fin origin. Anal fin with 29 to 37 branched rays.

Colour : back brown, flanks silvery; dark venulose area at shoulder. Fins hyaline.

Geographical Distribution : Pakistan, India, Malaysia, East Indies and north to Hong Kong.

Fishery Information : This is a small-sized anchovy and good catches of this fish are obtained on the Andhra coast during February and from June to September. It also constitutes a fishery along the coasts of Kerala and Tamil Nadu from June to September.

Thryssa hamiltonii (Gray)

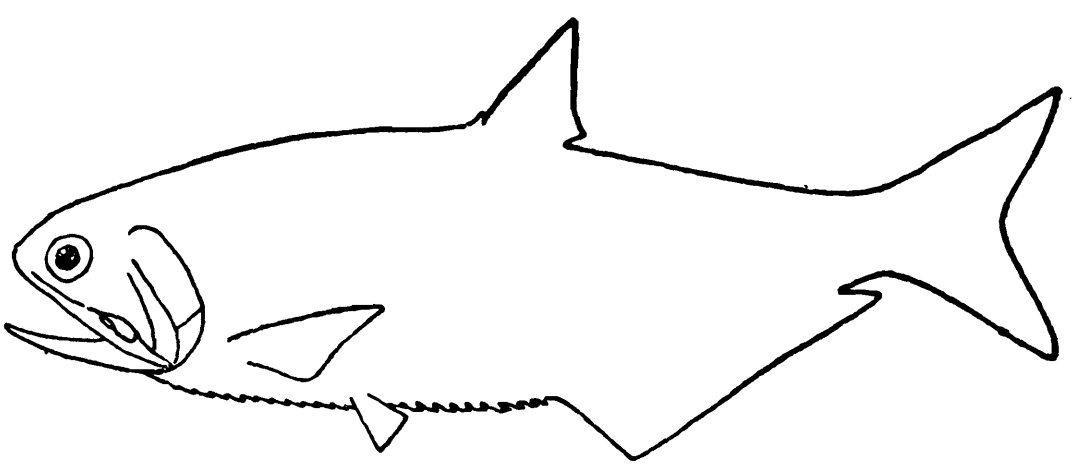
[Text-fig. 86]

Thrissa hamiltonii Gray, 1835, *Illust. Ind. Zool., Hardwicke,* **2** : pl. 92 (type-locality : not given).

Engraulis hamiltonii : Day, 1878, *Fishes of India* : 625, pl. 157, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **1** : 389.

Thryssa hamiltonii : Whitehead, 1973, *J. mar. biol. Ass. India,* **14**(1) : 234, fig. 58.

Thrissocles hamiltonii : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 133.



Text-fig. 86. *Thryssa hamiltonii* (Gray)

Common Names :

Hamilton's thryssa	...	English
Poorawah	...	Telugu
Nedumporuva	...	Tamil
Charlay	...	Malayalam
Badarkati, Khavli	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 15 to 20 pre-pelvic and 9 to 12 post-pelvic scutes. Snout prominent, bluntly rounded; maxilla short, only extending slightly beyond gill-opening, not to pectoral-fin base; mouth not strongiy oblique. Gillrakers on lower arm of first arch 11 to 15 Dorsal fin with 10 to 12

branched rays; a small free spine in front of dorsal fin. Anal fin with 32 to 39 branched rays, its origin just behind last dorsal ray.

Colour : back brown, flanks silvery, dark venulose area on shoulder. Fins hyaline.

Geographical Distribution : Pakistan, India, Sri Lanka, the Andaman Is., through the East Indies, to North Queensland (Australia) and Hong Kong.

A pelagic species, occuring in large shoals.

Fishery Information : A common anchovy on the east coast of India; fairly large, attaining a length of about 21 cms. On the Andhra coast it is landed during February to October, with heavy catches in February and from July to September.

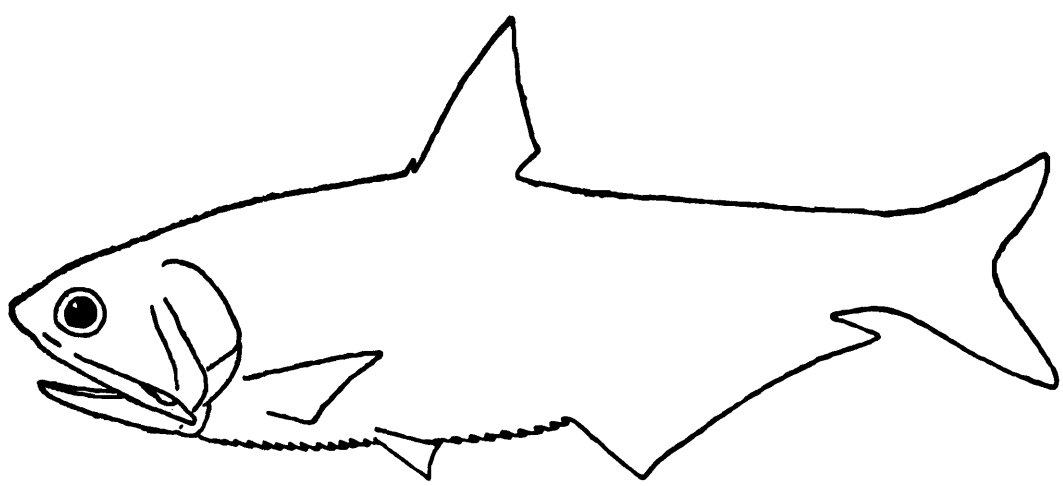
Thryssa kammalensis (Bleeker)*

[Text-fig. 87]

Engraulis kammalensis Bleeker, 1849, *Verh. batav. Genoot. Kunst. Wet.*, **22** : 13 (type-locality : Madura Straits near Kammal and Surabaya) ; Day, 1878, *Fishes of India* : 626, pl. 157, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 390.

Thryssa kammalensis : Whitehead, 1973, *J. mar. biol. Ass. India*, **14**(1) : 236, fig. 60.

Thrissocles kammalensis : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 135, fig. 34.



Text-fig. 87. *Thryssa kammalensis* (Bleeker)

* Wongratana and Sivakumar (in press) have shown that *T kammalensis* does not occur in India and this species is a new species.

Common Name :

Aathuporuva ... Tamil

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled with about 8 pre-pelvic and 5 post-pelvic scutes. Snout fairly prominent, bluntly pointed; maxilla short, reaching only a little beyond gill-opening, not to pectoral-fin base; mouth not strongly oblique. Gillrakers on lower arm of first arch 27 to 29. Dorsal fin with 13 or 14 rays; a small, sharp spine before dorsal fin. Anal fin with about 34 rays.

Colour : back brown, flanks silvery; dark venulose area on shoulder occasionally present.

Geographical Distribution : India and the East Indies.

Fishery Information : Of minor commercial significance on the south-east coast of India.

Thryssa malabarica (Bloch)

[Text-fig. 88]

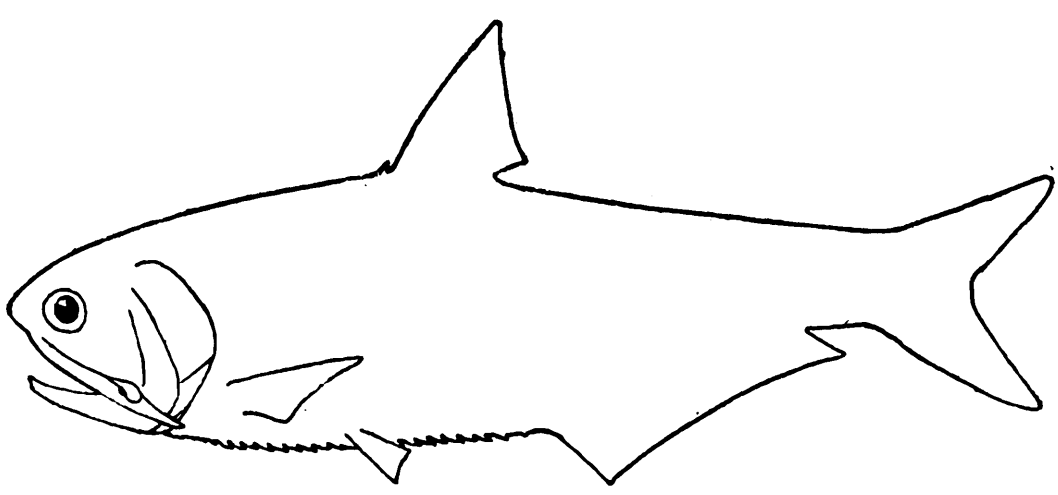
Clupea malabarica Bloch, 1795, *Naturges. ausland. Fische,* **9** : 115, pl. 432 (type-locality : Tranquebar).

Engraulis malabaricus : Day, 1878, *Fishes of India* : 625, pl 157, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, **1** : 389.

Thryssa gautamiensis Babu Rao, 1971, *Copeia,* (3) : 479, fig. 1 (type-locality : Godavari estuary).

Thryssa malabarica : Whitehead, 1973, *J. mar. biol. Ass. India,* **14**(1) : 235, fig. 59.

Thrissocles malabaricus : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 138, pl. 7, fig. 2 and text-fig. 36.



Text-fig. 88. *Thryssa malabarica* (Bloch)

Common Names :

Malabar thryssa	...	English
Poorwa	...	Telugu
Aduppooth-poruva	...	Tamil
Manangoo	...	Malayalam
Kati	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 14 to 17 pre-pelvic and 8 to 10 post-pelvic scutes. Snout fairly prominent, bluntly pointed; maxilla short, extending only a little beyond gill-opening, not to pectoral-fin base; mouth strongly oblique. Gillrakers on lower arm of first arch 17 to 19. Dorsal fin with 10 to 12 branched rays : a small, sharp spine before dorsal-fin origin. Anal fin with 34 to 38 branched rays

Colour : back brown, flanks silvery; dark venulose area on shoulder. Fins hyaline.

Geographical Distribution : Pakistan and Indian coasts.

Inhabits coastal waters and estuaries.

Fishery Information : Taken commercially in small quantities in our region; fairly good fishery along the coast of Kerala.

Thryssa mystax (Schneider)

[Text-fig. 89]

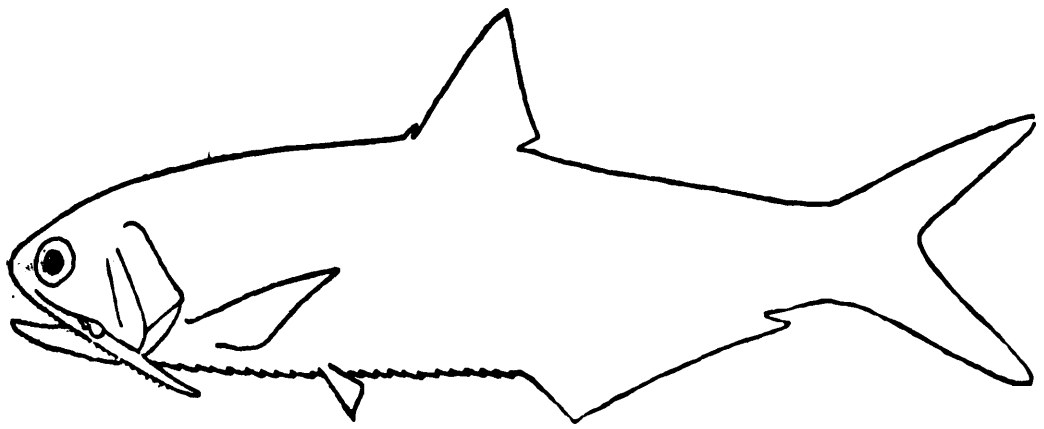
Clupea mystax Schneider, 1801, *Syst. Ichthy. Bloch* : 426, pl. 83 (type-locality : Malabar).

Engraulis mystax : Day, 1878, *Fishes of India* : 625, pl. 157, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1** : 390.

Thryssa mystax : Whitehead, 1973, *J. mar. biol. Ass. India* **14**(1) : 231, fig. 54.

Thrissocles mystax : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 140.

Thrissocles valenciennesi (Bleeker) : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 146.



Text-fig. 89. *Thryssa mystax* (Hamilton-Buchanan)

Common Names :

Moustaced thryssa	...	English
Phasa	...	Bengali
Phasa	...	Oriya
Nedum-poruva	...	Telugu
Poruva	...	Tamil
Manangu	...	Malayalam
Engallu	...	Kannada
Kati, Tolkati, Dandetar	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 16 to 20 pre-pelvic and 8 to 13 post-pelvic scutes. Snout prominent, bluntly rounded; maxilla long, its tip pointed and reaching to or beyond pectoral-fin base; mouth not strongly oblique, nearly horizontal. Gillrakers on lower arm of first arch 13 to 16; inner edges of rakers with small serrae but not forming distinct clumps. Dorsal fin with 10 to 12 branched rays; a small, sharp spine before dorsal-fin origin. Anal fin with 29 to 37 branched rays.

Colour : back brown, flanks silvery; a dark venulose area on shoulder; gill-cavity light orange in life.

Geographical Distribution : India, Sri Lanka and the East Indies.

A coastal pelagic species.

Fishery Information : This species is the most important element of the anchovies which form an important fishery along the Kerala coast. The majority of the catches are obtained with the boatseine and gill-net, locally known as 'paithu vala' and 'chala vala' respectively, which form the two important nets used along this coast for capturing pelagic shoaling fish This species is also a common anchovy at Lawson's Bay (Andhra) and is landed during. the period February to October, with heavy catches in February and from July to September. Along the coast of Bombay the average length of the specimens is 13 cms and along the Andhra coast 21 cms.

Thryssa purava (Hamilton-Buchanan)

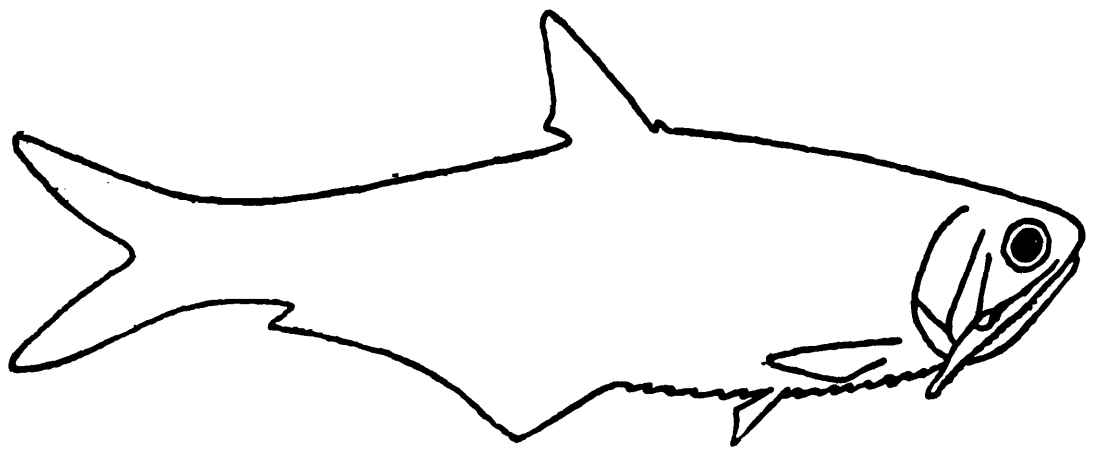
[Text-fig 90]

Clupea purava Hamilton-Buchanan, 1822, *Fishes of Ganges* : 238 (type-locality : Ganges estuaries).

Engraulis purava : Day, 1878, *Fishes of India* : 628, pl. 157, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **1** : 393.

Thryssa purava : Whitehead, 1973. *J. mar. biol. Ass. India*, **14**(1) : 231, fig. 55.

Thrissocles purava : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 142.



Text-fig. 90. *Thryssa purava* (Hamilton-Buchanan)

Common Names :

Gangetic anchovy	...	English
Pussai	...	Oriya
Peddah-poorawah	...	Telugu
Nedum-Poruva	...	Tamil
Kutthavoo	...	Malayalam
Monangu	...	Kannada
Khavli	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 15 to 17 pre-pelvic and 9 to 12 post-pelvic scutes. Snout prominent, bluntly rounded; maxilla long, its tip pointed and extending to or beyond pectoral-fin base; mouth strongly oblique. Gill-rakers on lower arm of first arch 17 to 21 ; serrae uneven but not clumped along the inner edge of each raker. Dorsal fin with 9 to 12 branched rays; a small, sharp spine before dorsal fin. Anal fin with 38 to 44 branched rays.

Colour : back brown, flanks silvery; dark venulose area at shoulder. Fins hyaline.

Geographical Distribution : East coast of India.

Fishery Information : Taken commercially in small quantities in our region; fairly good catches are obtained from the coast of Kerala. It grows up to a length of 30 cms and is reported to breed in estuaries and the tidal reaches of rivers A tender and oily fish which is esteemed as food and is suitable for canning.

Thryssa setirostris (Broussonet)

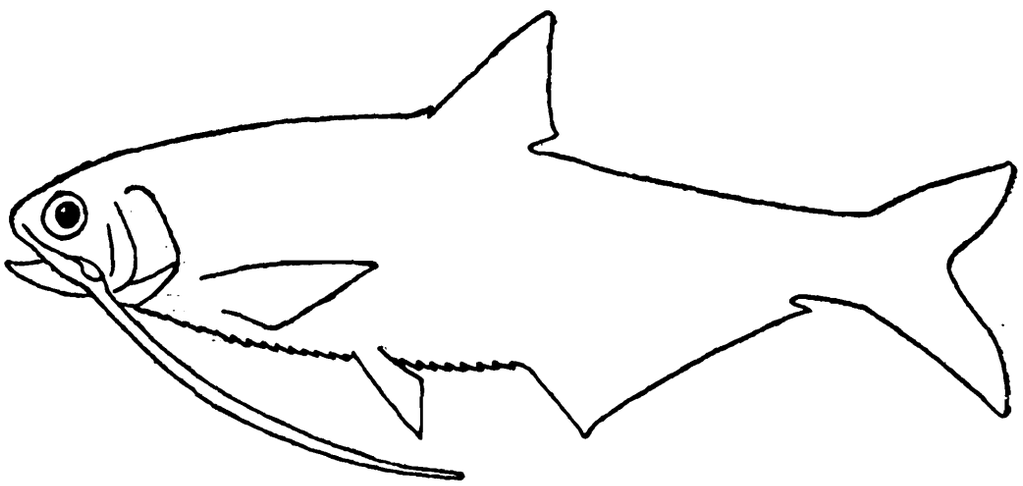
[Text-fig, 91]

Clupea setirostris Brousscnet, 1782, *Ichthyol.* : text and pl 2, no pagination (type-locality : Pacific Ocean near Tanna Is., Society group).

Engraulis setirostris : Day, 1878, *Fishes of India* : 626; Day, 1889. *Fauna Br. India,* Fishes, **1** : 391.

Thryssa setirostris : Whitehead, 1973, *J. mar. biol. Ass.* India, **14**(1) : 230, figs. 53.

Thrissocles setirostris : Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 144.



Text-fig. 91. *Thryssa setirostris* (Broussonet)

Common Names :

Longjaw thryssa	...	English
Yeka-poorawah	...	Telugu
Thaadi-poruva	...	Tamil
Chiru-mangu	...	Malayalam
Dandetar	...	Marathi

Distinguishing Characters :

Body fusiform, fairly strongly compressed; belly keeled, with 16 to 18 pre-pelvic and 9 or 10 post-pelvic scutes. Snout bluntly rounded; maxilla very long, extending beyond pectoral-fin tip, often to anal-fin origin; lower jaw slender but rising steeply in mouth (i.e. with ascending coronoid process). Gillrakers on lower arm of first arch 10 to 12, moderately long. Dorsal fin with 10 to 12 branched rays; a small, sharp spine before dorsal fin. Anal fin with 29 to 36 branched rays.

Colour : back brown, flanks silvery; a faint venulose area at shoulder Fins hyaline.

Geographical Distribution : Indo-Pacific region from east coast of Africa, through India, to Queensland and Polynesia.

A pelagic species.

Remarks : The deep lower jaw, with its high coronoid process, and the very long maxilla make this species unmistakable.

Fishery Information : Taken commercially in small quantities in our region.

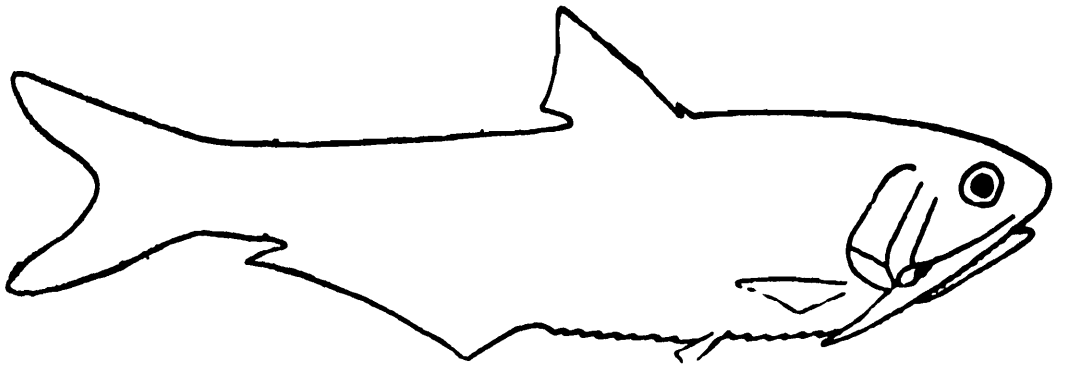
Thryssa vitrirostris (Gilchrist & Thompson)

[Text-fig. 92]

Engraulis vitrirostris Gilchrist and Thompson, 1908, *Ann. S. Afr. Mus.*, **6** : 201 (type-locality : Durban, Natal).

Thrissocles vitrirostris : Dutt, 1961, *Curr. Sci.*, **30** : 104 ; Dutt, 1966, *J. zool. Soc. India*, **15** (1) : 59.

Thryssa vitrirostris : Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 233, fig. 57.



Text-fig. 92. *Thryssa vitrirostris* (Gilchrist & Thomson)

Common Names :

Orangemouth thryssa	...	English
Nedu-poruva	...	Tamil

Distinguishing Characters :

Body fusiform and fairly strongly compressed ; belly keeled, with 16 to 19 pre-pelvic and 8 to 12 post-pelvic scutes. Snout prominent, bluntly rounded ; maxilla long, its tip pointed and reaching to 1/3 along pectoral fin ; anterior supramaxilla usually present ; mouth strongly oblique. Gillrakers on lower arm of first arch 18 to 24 ; inner edges of rakers with small serrae forming distinct clumps. Dorsal fin with 10 to 12 branched rays ; a small free, sharp spine in front of dorsal fin. Anal fin with 31 to 40 branched rays.

Colour : back brown, flanks silvery; dark venulose area at shoulder; gill cavity bright orange. Fins hyaline.

Geographical Distribution : Coasts of India and westward to the East African coast.

A coastal pelagic species.

Fishery Information : Taken commercially only occasionally on the Andhra coast.

Family : CHIROCENTRIDAE
[Wolf-herrings]

Body much elongate, highly compressed, resembling the Clupeidae (sardines) but without abdominal scutes; fanglike teeth in jaws (highly predacious fish). No spiny rays in fins; dorsal fin placed behind midpoint of body. Pectoral fins set low on body; pelvic fins about equidistant between pectoral-fin base and anal-fin origin. Anal-fin origin below vertical from anterior dorsal-fin base. Caudal fin deeply forked. Branchiostegal rays 7. Spiral valve in interstine; no pyloric caeca. Scales small, thin, cycloid, very deciduous; lateral line absent.

A single Indo-Pacific genus, *Chirocentrus* with two species. Wolf-herrings are voracious carnivores, unlike all other clupeoids. Their contribution of about 8000 tonnes to India's annual total marine fish catch forms about 1%.

Genus **Chirocentrus**

Chirocentrus Cuvier, 1816, *Regne Animal.* (1st ed.), **2** : 178 (type-species : *Clupea dorab* Forsskal).

For characters of genus, see family characters.

KEY TO SPECIES

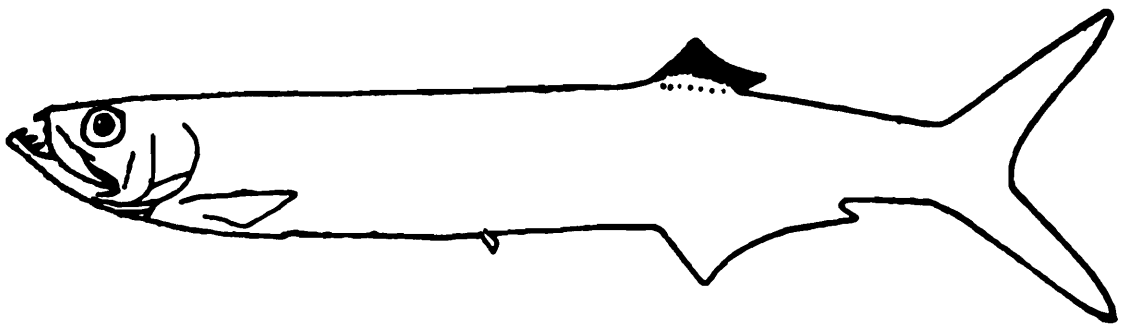
1 (a) Upper part of dorsal fin black; pectoral fin about equal to distance from eye centre to hind border of gill cover ... *C. dorab*

(b) Dorsal fin entirely white or colourless; pectoral fin equal to distance from mid-snout to hind border of gill cover ... *C. nudus*

Chirocentrus dorab (Forsskal)
[Text-fig. 93]

Clupea dorab Forsskal, 1775, *Descript. Animal.* : xiii, 72 (type-locality : **Djedda** and Moccha, Red Sea).

Chirocentrus dorab : Day, 1878, *Fishes of India* : 652, pl. 166, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 368, fig. 114 ; Whitehead, 1973, *J. mar. biol. Ass. India*, **14** (1) : 168, fig. 2 ; Misra, 1976, Fauna of *India*, Pisces (2nd ed.), **2** : 181, fig. 52 and pl. 8, fig. 3.



Text-fig. 93. *Chirocentrus dorab* (Forsskal)

Common Names :

Dorab wolf-herring	...	English
Wahlah	...	Telugu
Kunda	...	Oriya
Mullu-valai, Kiru-vahlah	...	Tamil
Thuppo-vahlay	...	Malayalam
Karli	...	Marathi

Distinguishing Characters :

Body elongate, strongly compressed; belly sharp but without scutes. Mouth large ; canine teeth in both jaws, two canine teeth on premaxillae pointing forward. Depth of head at eye 8 to 11% of standard length. Dorsal fin with 16 to 19 rays. Anal fin with 29 to 26 rays, its origin under dorsal fin ; anal-fin base twice or more than twice length of dorsal-fin base. Pectoral fin length about equal to distance from eye-centre to hind border of gill cover. Pelvic fins very small. Scales very small, easily shed.

Colour : deep blue-green on back, a golden line below, flanks silvery. Upper part of dorsal fin black, as also anterior part of anal fin and the base of pectoral fin ; caudal fin yellow.

Geographical Distribution : Indo-W. Pacific.

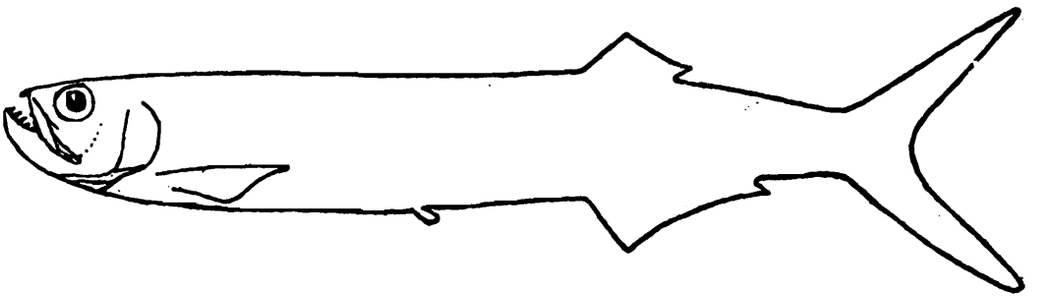
Fishery Information : This species contributes to an important fishery along the east and west coast of India. Although *Chirocentrus dorab* occurs in the fisheries of almost all the maritime states of India, nearly 76% of the total catch comes from the east coast. Tamil Nadu occupies the foremost place in the dorab fishery of the country, next

comes Andhra Pradesh followed by Maharashtra. Good eating but bony; large specimens dangerous.

Chirocentrus nudus Swainson

[Text-fig. 94]

Chirocentrus nudus Swainson, 1839; *Natural History of Animals,* **2** : 294 (on 'Wallah' of Russell, 1803, *Fishes of Coromandel,* **2** : 78, pl. 199 *ex*-Vizagapatnam) ; Luther, 1966, *J. mar. biol. Ass. India,* 8(1) : 195; Whitehead, 1973, *J. mar. biol. Ass. India,* **14** (1) : 168, fig. 3 ; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 183.



Text-fig. 94. *Chirocentrus nudus* Swainson

Common Names :

Whitefin wolf-herring	...	English
Wahlah	...	Telugu

Distinguishing Characters :

Body elongate and strongly compressed, strap-like; belly sharp but without scutes. Mouth large; large canine teeth in both jaws, two canine teeth on pre-maxillae pointing forward. Depth of head at eye 10.3 to 12.3% of standard length. Dorsal fin with 16 to 19 rays. Anal fin with 31 to 37 rays, its origin under that of dorsal fin; anal-fin base twice or more than twice the dorsal-fin base. Pectoral fin about equal to distance from mid-snout to hind border of gill cover. Pelvic fins small. Scales very small, easily shed.

Colour : bluish green on back, flanks silvery; dorsal and anal fins colourless, but base of pectoral fin black.

Geographical Distribution : East coast of Africa, India, Sri Lanka, through the East Indies, to Japan and tropical Australian waters.

Fishery Information : This species is the dominant species in the dorab fishery on the Rameswaram Island and the Orissa coast, and constitutes nearly 80% of the total of the two species by number, annually.

Order : ELOPIFORMES

Body slender, usually compressed. Gill-openings wide. Pelvic fins abdominal; caudal fin deeply forked. Dorsal and anal fins without spines. Scales cycloid, well developed; lateral line present.

KEY TO SUBORDERS/FAMILIES

1 (a) Mouth inferior, the snout projecting beyond tip of lower jaw; bony gular plate (located between arms of lower jaw) small and often overlooked (suborder Albuloidei)	...	Albulidae
(b) Mouth terminal or superior; gular plate clearly present between arms of lower jaw (suborder Elopoidei)	...	2
2 (a) Scales small, about 95 to 120 along lateral line; pseudobranchiae large; last dorsal ray not elongated	...	Elopidae
(b) Scales large, 30 to 40 along lateral line; pseudobranchiae absent; last dorsal ray filamentous	...	Megalopidae

Suborder : ELOPOIDEI

Family : ELOPIDAE

(Ladyfishes, Tenpounders)

Elongate, fusiform fishes with cylindrical bodies, resembling the Clupeidae but possessing a lateral line and lacking scutes along the abdomen. Mouth terminal; a fairly large, bony gular plate located under the mouth, between the arms of the lower jaw. Dorsal fin with 20 to 25 soft unbranched rays, set at about midpoint of body, last ray not elongated; anal-fin origin slightly behind last dorsal-fin ray. Pseudobranchiae large. Scales small and thin, cycloid, 95 to 120 along lateral line.

The family is represented by a single genus, *Elops*. These fishes resemble externally the milkfish; all of them have a long, deeply forked tail and a single dorsal fin of soft rays, placed above the centre of the body and more or less opposite the pelvic fins. However, these do have one distinguishing mark which the others lack—a fairly large, bony gular plate located under the mouth, between the arms of lower jaw. In this character these fishes are allied to Megalopidae in which, however, the last ray of the dorsal fin is elongated as a long filament.

Genus **Elops** Linnaeus

Elops Linnaeus, 1766, *Systema Naturae* (ed. 12), **1** : 518 (type-species : *Elops saurus* Linnaeus) ; Nybelin, 1979, *Acta Regiae Soc. Sci. Litt. Gothob.*, Zool. (12) : 1 (Review).

Characters same as for the family. Three species, one in our area.

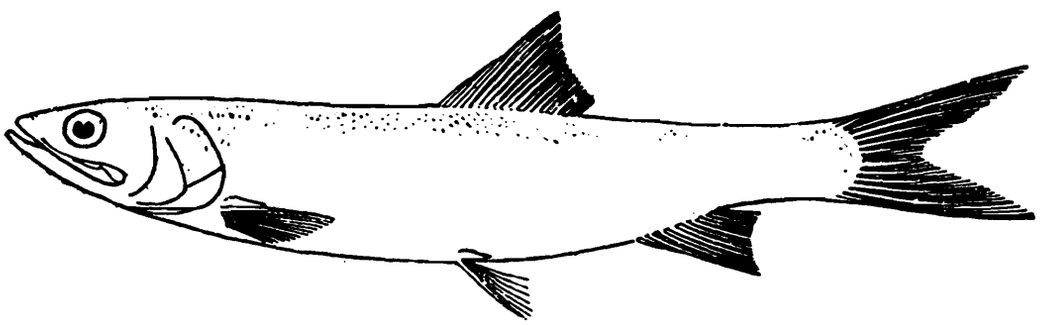
Elops machnata (Forsskal)

[Text-fig. 95]

Argentina machnata Forsskal, 1775, *Descript. Animal.* : xiii, 68 (type-locality : Red Sea).

Elops saurus (*nec* Linnaeus) Day, 1878, *Fishes of India* : 649, pl. 166, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 401, fig. 125 ; Misra, 1976, *Fauna of India,* Pisces (2nd ed.), **2** : 9, fig. 1 and pl. 1.

Elops machnata : Whitehead, 1962, *Ann. Mag. nat. Hist.*, (13) **5** : 321.



Text-fig. 95. *Elops machnata* (Forsskal)

Common Names :

Tenpounder	...	English
Naum	...	Oriya
Jallugu, Jinnagow	...	Telugu
Ullahti, Poomeen, Manna	...	Tamil
Valli-poomeen	...	Malayalam
Shonas, Chirya, Dandeli	...	Marathi

Distinguishing Characters :

Body elongate and fusiform, with smooth unkeeled body. Mouth terminal, with many, sharp, small teeth ; upper jaw long, extending well behind eye ; lower jaw projecting slightly. Dorsal fin with 20 to 25 soft rays, set near midpoint of body. Anal fin with 18 to 20 rays, its origin well behind last dorsal-fin ray. Pelvic-fin base below middle of dorsal-fin base. Scales very small, about 100 along lateral line.

Colour : back of body blue-green, flanks silvery ; fins yellowish.

Geographical Distribution : Indo-W. Pacific.

Inhabits coastal waters ; pelagic.

Fishery Information : Occasionally caught along the east cost of India, especially at Madras. The flesh is disappointing, being insipid and full of bones.

Family : MEGALOPIDAE
[Tarpons]

Body somewhat compressed, moderately deep-bodied ; no scutes along belly. Mouth terminal or superior ; a fairly large, bony gular plate located under mouth, between arms of lower jaw. Dorsal fin with 13 to 21 unbranched soft rays, the last ray elongated and filamentous. Anal fin with 22 to 31 soft rays, its origin slightly behind last dorsal ray. Pelvic fin with 10 or 11 rays. Scales large, 37 to 48 along lateral line.

Although primarily marine, these fishes are known from brackish and even fresh waters. Two genera recognised, one in our area.

Genus **Megalops** Lacepede

Megalops Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 289 (type-species : *Megalops filamentosus* Lacepede = *Clupea cyprinoides* Broussonet).

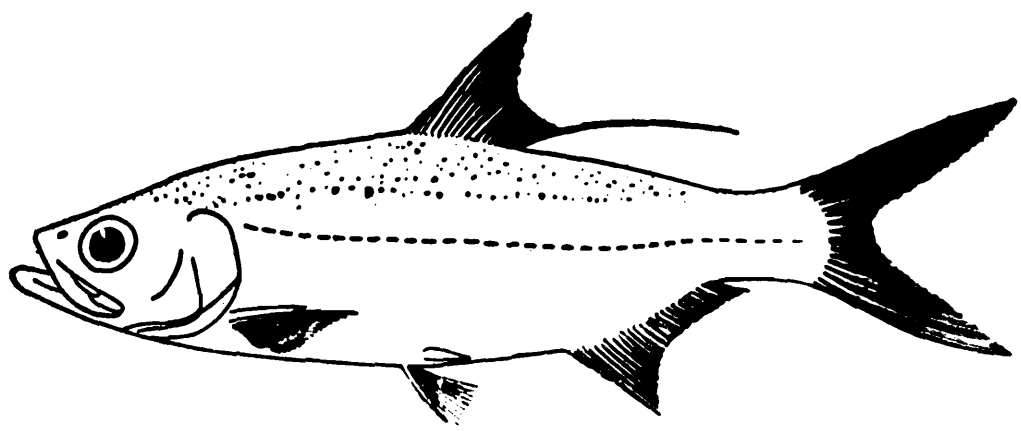
Dorsal fin with 17 to 20 rays. Origin of pelvic fin beneath dorsal-fin origin. Scales large, 37 to 42 along lateral line.

Two species, one in our area.

Megalops cyprinoides (Broussonet)
[Text-fig. 96]

Clupea cyprinoides Broussonet, 1782, *Ichthyol.* : pl. 9 (type-locality : Oceans between the Tropics).

Megalops cyprinoides : Day, 1878, *Fishes of India* : 650, pl. 159, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 402, fig. 126 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 2 : 12, pl. 1, fig. 4.



Text-fig. 96. *Megalops cyprinoides* (Broussonet)

Common Names :

Indo-Pacific tarpon	...	English
Punnikowa, Vorsa	...	Oriya
Kudinga	...	Telugu
Moran-kendai, Morua	...	Tamil
Nanchil, Velathan	...	Malayalam
Chirai, Vadas	...	Marathi

Distinguishing Characters :

Body fusiform and somewhat compressed, with smooth, unkeeled belly. Mouth superior; upper jaw extending almost to hind border of eye, the lower jaw projecting slightly; gular plate present. Dorsal fin with 17 to 20 rays, the last ray elongated and filamentous. Anal fin with 24 to 31 rays. Scales large; 30 to 42 along lateral line.

Colour : back blue-green, flanks silvery; lateral line golden.

Geographical Distribution : Indo-west Pacific.

A coastal pelagic species, ascending rivers.

Fishery Information : Taken commercially along the coasts of Andhra and Kerala. This is a fast growing carnivore but the flesh is poor and bony; reaches a maximum length of a metre.

Suborder ALBULOIDEI
Family : ALBULIDAE
[Bonefishes]

Elongate, fusiform fishes, resembling the Clupeidae but possessing a lateral line and lacking scutes along the belly. Snout conical, projecting beyond tip of lower jaw, mouth inferior; bony gular plate (between arms of lower jaw) small and often overlooked; 6 to 16 branchiostegal rays. Fins lacking spines; a single dorsal fin. Pelvic fin with 10 to 14 rays. Scales small, none on head.

Two genera, one in our area.

Genus **Albula** Scopoli

Albula Scopoli, 1777, *Introd. nat. Hist.* : 453 (type-species : *Esox vulpes* Linnaeus).

Dorsal fin short, with 16 to 21 rays. Branchiostegal rays 10 to 16. Gill-rakers 15 to 17. Snout conical, mouth inferior; maxillae toothless; small gular plate present. Lateral line scales 66 to 84.

Two species, one in our area. Identification is easy because of the thick, transparent cartilage that covers the pointed head and because of the characteristic profile of the head with its receding mouth.

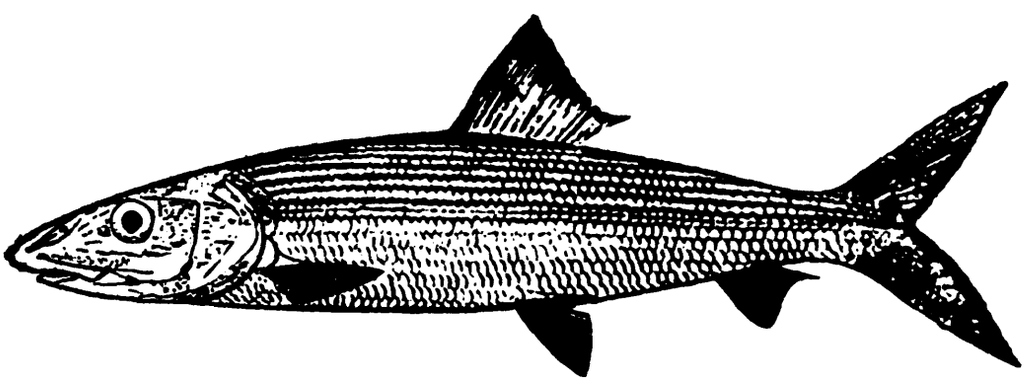
Albula vulpes (Linnaeus)

[Text-fig. 97]

Esox vulpes Linnaeus, 1758, *Systema Naturae* (ed. 10), **1** : 313 (type-locality : Bahamas).

Albula conorhynchus Schneider : Day, 1878, *Fishes of India* : 648 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 401.

Albula vulpes : Misra, 1976, *Fauna of India*. Pisces (2nd ed.). **2** : 16, fig. 2.



Text-fig. 97. *Albula vulpes* (Linnaeus)

Common Names :

Bonefish	...	English
Miemas, Elimeen	...	Lakshadweep Is.

Distinguishing Characters :

Body slender. Snout rather pig-like, projecting beyond tip of lower jaw ; mouth inferior, the upper jaw not reaching to eye. Fins lacking spines ; dorsal fin with 15 to 17 rays ; anal fin with 8 rays. Scales small, 65 to 75 along lateral line.

Colour : back blue/green with narrow dark horizontal lines, fading rapidly after death, sides silvery. Fins yellowish white.

Geographical Distribution : Circumglobal, in most tropical seas.

Found in shallow coastal waters, estuaries and bays, over sand or mud bottoms.

Fishery Information : Taken commercially only occasionally in our region. The flesh is palatable but with numerous fine bones.

Order : ANGUILLIFORMES
[Eels]

Body elongate and cylindrical (snake-like), usually naked, or with at most minute embedded scales. Pectoral fins sometimes absent; no pelvic fins. Dorsal and anal fins usually long and low, the rays often concealed by skin, mostly confluent with caudal fin, sometimes absent; no fin spines. Gill-openings comparatively narrow. Lateral line present, sometimes obsolete.

A great group of soft-rayed fishes, characterised especially by their contour, living in almost all waters of the globe, they recall in superficial appearance many serpents. Large marine eels are dangerous and formidable, and are the most virile of all animals. Some are savage, aggressive and vicious and, when furnished with large fang-like teeth, are capable of inflicting dangerous and frightful wounds. While poison glands are not present, bites from such creatures may turn septic. Many eels, likely almost all, pass through a metamorphosis in which the young or 'Leptocephalus' stage is lived in the ocean, in the fresh water forms. Marine eels occur commonly in the coastal and offshore waters of India and during 1970, 4500 tonnes were landed which formed 0.4% of the country's fishery of that year. During the 1956-65 period, Maharashtra's annual average catch of eel was 4,519 tonnes forming 3.02% of the State's total marine fish catch and this was the highest among the eel catches of all States of the country. Gujarat ranked next with 1,115 tonnes of eels forming 1.14% of the total marine fish catch of that state.

KEY TO FAMILIES

1 (a)	Gill openings ventral, confluent or only slightly separated; body with minute, rudimentary, embedded scales	...	Synaphobranchidae*
(b)	Gill openings mostly lateral, separate	...	2
2 (a)	Upper and lower jaws very elongate; anus near gill-openings or its distance from them less than head length; pectoral fins present	...	3
(a)	Jaws normal, not much produced; distance of anus from gill-openings much more than head length	...	4
3 (a)	Upper and lower jaws extremely long, needle-like (almost filamentous); dorsal fin originating above head or pectoral fins	...	Nemichthyidae*

(b) Jaws very elongate but not needle-like; dorsal fin originating behind anus	...	Serrivomeridae*
4 (a) Body with minute embedded scales; dorsal, anal and caudal fins well developed; pectoral fins present	...	Anguillidae
(b) Body scaless (naked)	...	5
5 (a) Large canine teeth (often fang-like) on vomer (medially on roof of mouth	...	6
(b) No large canine teeth on vomer	...	8
6 (a) Pectoral fins absent; occipital region of head somewhat elevated	...	Muraenidae
(b) Pectoral fins present	...	7
7 (a) Anus well behind pectoral fins and somewhat before midpoint of body: body cylindrical in front, tail only compressed	...	Muraenesocidae
(b) Anus below pectoral fins or close behind; body compressed	...	Dysommidae*
8 (a) Posterior nostrils opening inside mouth, on upper lip or just above mouth; branchiostegal rays overlapping midventrally	...	Ophichthidae
(b) Posterior nostrils not labial, but lateral or superior; branchiostegal rays not overlapping below	...	9
9 (a) Dorsal and anal fins reduced, confined to posterior part of body; lower jaw projecting		Moringuidae*
(b) Dorsal, anal and caudal fins well developed; lower jaw not projecting		10
10 (a) No pectoral fins; snout long; body very elongate	...	Nettastomiatidae*
(b) Pectoral fins typically well developed or minute or absent (in some Heterocongrinae); snout short; body rather robust	...	Congridae

* The fishes of the families Synaphobranchidae, Nemichthyidae, Serrivomeridae, Dysommidae, Moringuidae and Nettastomiatidae, are presently of no commercial importance in our region.

Family : ANGUILLIDAE

Eel-like fishes, cylindrical anteriorly, with minute embedded scales. Anus in the anterior half of body length. Dorsal fin originating at some distance from head; dorsal, anal and caudal fins confluent. Pectoral fins well-developed. Gill-openings vertical slits below origin of pectoral fins. Eyes covered by skin, without free orbital margin. Posterior nostrils in front of eyes, anterior nostrils tubular and near anterior margin of snout. Mouth slightly oblique, extending to below or behind eyes; tongue free. Teeth conical, small, in cardiform bands on jaws and vomer. Lateral line distinct. Usually catadromous.

Only one genus recognised.

Genus **Anguilla** Shaw

Anguilla Shaw, 1803, *General Zoology*, **4** : 15 (type-species : *Anguilla vulgaris* Shaw = Muraena anguilla L.) ; *Ege*, 1939, *Dana Rep.*, **16** : 1 (Revision).

For characters see those of family. Several species known, 2 in our area.

KEY TO SPECIES

1 (a) Dorsal fin originating nearly above anus ; no edentulous grooves in teeth bands ... *A. bicolor bicolor**

(b) Dorsal fin originating about midway between gill-opening and anal-fin origin ; edentulous groove in teeth bands ... *A. bengalensis bengalensis*

Anguilla bengalensis bengalensis (Gray & Hardwicke)

Muraena bengalensis Gray and Hardwicks, 1834, *Illust. Indian Zool.* : pl. 95, fig. 5 (type-locality : Ganges R.).

Anguilla bengalensis : Day, 1878, *Fishes of India* : 659, pl. 168, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 86, fig. 35.

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* *Anguilla bicolor bicolor* McClelland is not common in the commercial marine catches, elver resources of *A. bicolor* and *A. bengalensis* are plentiful in certain estuarine locations in the country and there is a good export market for both live elvers as well as eels.

Common Names :

Long-finned eel	...	English
Malugu	...	Telugu
Vellangoo	...	Tamil
Aarel	...	Malayalam
Ahir	...	Marathi

Distinguishing Characters :

Body snake-like, cylindrical anteriorly. Mouth slightly oblique, extending beyond the eye. Teeth small, conical, in cardiform bands in jaws and vomer; teeth in lower jaw divided by a longitudinal groove. Dorsal-fin origin midway between gill-opening and anal-fin base. Pectoral fins well developed.

Colour : body brownish dorsally mottled with darker brown, belly yellowish. Fins yellowish mottled with brown

Geographical Distribution : Freshwaters and seas of Pakistan, India, Sri Lanka, the Andamans, Burma and the East Indies.

Fishery Information : One of the three most common commercial eels of our region and is fairly abundant on the east coast of India and the Andaman Islands where it attains a length of 120 cms.

Family : MURAENIDAE
[Moray Eels]

Stocky, powerful eels, their body muscular and somewhat compressed. Typically the occipital region of head is somewhat elevated due to the development of strong muscles. Mouth very wide, usually extending to well behind eyes. Teeth usually sharp, mostly raptorial but sometimes molar-like; teeth on vomer (roof of mouth) uniserial or in a median patch. Anterior nostrils tubular at front of snout, posterior nostrils above anterior portion of eye or elongated forward from that point. Gill openings restricted to small roundish lateral openings; fourth branchial arch strengthened and supporting pharyngeal jaws. No spines in fins; dorsal and anal fins in thick skin, rays rarely visible, sometimes reduced to a short rudiment near end of tail, but always confluent with caudal fin, distinct round end of tail. No pectoral fins. Lateral line pores on head but not on body, two branchial pores present. No scales.

KEY TO SUBFAMILIES/GENERA

1 (a)	Dorsal fin originating above anus or more posteriorly (subfamily Uropterygiinae) ...	**2**
(b)	Dorsal fin originating above gill opening or forward on head (subfamily Muraeninae) ...	**3**
2 (a)	No pore adjacent to posterior nostril ...	**Uropterygius**
(b)	A lateral-line pore adjacent to each nostril, the pore and nostril separated by only a septum ...	**Anarchias***
3 (a)	Teeth mostly blunt, molar-like ...	**Echidna**
(b)	Teeth sharp, some of them fang-like or shark-like ...	**4**
4 (a)	Anus to tip of tail 1.5 to 2.0 times times rest of body; anterior nostril simple tube ...	**Thyrsoidea**
(b)	Anus to tip of tail less than 1.5 times body length ...	**5**
5 (a)	Lateral jaw teeth with some serrations on their margins (serrations visible under magnification) ...	**Gymnothorax**
(b)	Lateral jaw teeth without serrations ...	**6**
6 (a)	Anterior nostrill with bilobed flap; posterior nostrils large, before eyes ...	**Enchelynassa***
(b)	Anterior nostril with simple tube; posterior nostrils small ...	**7**
7 (a)	One or more long median depressible fangs in front of upper jaw ...	**Lycodontis**
(b)	No long median depressible fang in upper jaw, at most a single median stout conical tooth in front ...	**Siderea**

Subfamily : MURAENINAE

Genus **Echidna** Forster

Echidna Forster, 1777, *Bibliotheca Banksiae* : 181 (type-species : *Echidna variegata* Forster).

Elongate, rather compressed with a fairly robust body; front profile of head fairly blunt. Anterior nostrils tubular at front of snout.

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* The genus *Anarchias* Jordan & Starks represented by *A. fuscus* Smith and *A. cantanensis* Schultz, and the monotypic genus *Enchelynassa* Kaup represented by its type-species. *E. conina* (Quoy & Gaimard), have been reported only once from the Minicoy Island in our region but are of no fishery importance.

Vent in about middle of body length. Teeth mostly blunt, molar-like. Dorsal and anal fins well developed, confluent with caudal fin; origin of dorsal fin above gill-openings.

Found in all tropical seas, some strikingly marked and coloured. Rather sluggish fishes.

KEY TO SPECIES

1 (a) Body variegated	...	2
(b) Body uniform brown or black	...	5
2 (a) Tail about half length of rest of body; body dark brown, with numerous narrow light cross-bars, yellow in life	...	*E. zebra*
(b) Tail about as long as rest of body (vent about midway)	...	3
3 (a) Body rather dark, with 25 to 30 narrow lighter cross-bars, only on tail with age	...	*E. polyzona**
(b) Body lighter, with dark spots in groups or marbled or mottled with darker	...	4
4 (a) Body with numerous small spots or lines and two series of large, more or less star-like patches	...	*E. nebulosa*
(b) Body light brown or whitish, everywhere marbled or mottled with darker, or dark brown marbled with whitish	...	*E. delicatula**
5 (a) Body uniform dark brownish, with edges of dorsal and anal fins white, sharply contrasting with brown colour	...	*E. leucotaenia**
(b) Body uniform black, no light edge to the fins	...	*E. nigra**

Echidna nebulosa (Ahl)

Muraena nebulosa Ahl., 1789, *Muraena et Ophichtho* : 5, pl. 1, fig. 2 (type-locality : East Indies) ; Day, 1878, *Fishes of India* : 673, pl. 172, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 83, fig. 33.

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* *Echidna leucotaenia* Schultz has been reported only once from our area; *E. nigra* (Day) has not been reported since its original discovery from the Andaman Islands; the occurrence of *Echidna polyzona* (Richardson) in our area is not very certain; and *Echidna delicatula* (Kaup) is rare in our area.

Common Names :

Starry moray	...	English
Saulinga-pam	...	Telugu
Mouveng, Malanhi	...	Lakshadweep Is.

Distinguishing Characters :

Depth of body 15 to 20 times in total length, about 1.6 in head length; head about 3.5 in trunk. Anus in about middle of length. Posterior nostril with very low crenulate margin, front tubules short. Teeth conical in young, blunter with age; young have uniserial blunt teeth on side of each jaw, with age biserial; a group of teeth in front of upper jaw almost united with the two rows of teeth on vomer. Dorsal-fin origin before gill-openings.

Colour : body pale yellowish brown, with 2 or 3 rows of star-shaped blotches enclosing one or more ocelli in centre; interspaces mottled with irregular lines and spots.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This eel is of minor commercial significance in our region.

Echidna zebra (Shaw & Nodder)

Gymmothorax zebra Shaw and Nodder, 1797, *Naturalists' Miscellany*, **9** : pl. 322 (type-locality : Sumatra).

Muraena polyzona Day (*nec* Richardson), 1878. *Fishes of India* : 673, pl. 169, fig. 3 (erroneously marked as *M. schultzei*) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 83.

Muraena zebra : Day, 1878, *Fishes of India* : 673 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 82.

Common Names :

Zebra moray	..	English
Buddide-pam	...	Tamil
Mudiveng, Kadukkamalanhi	...	Lakshadweep Is.

Distinguishing Characters :

Depth of body about 20 in total length, about 2 in head length; head about 5 in trunk. Tail about half length of rest of body. Posterior nostril with low tubular rim. Teeth granular, in 2 or 3 series

on each side of lower jaw, with vomer in almost continuous pavement in upper jaw, those on sides of jaws smaller. Dorsal-fin origin about over gill-opening.

Colour : body black to dark chocolate, with numerous narrow yellow cross-bars that turn white on preservation.

Geographical Distibution : Indo-west Pacific.

Fishery Information : This eel attains a large size; a beautiful creature but vicious. Of minor commercial significance in our region.

Genus **Gymnothorax** Bloch

Gymnothorax Bloch, 1795, *Naturges ausland. Fische*, (9) : 83 (type-species : *Gymnothorax reticularis* Bloch).

Body strong, muscular, moderately compressed. Anteror nostrils tubular, posterior nostrils simple openings with at most low rim. Lateral jaw teeth sharp, with some serrations on their margins, but these serrations are very small. Dorsal fin originating on head. Anus in about midpoint of body.

Marine eels, often very large and beautifully coloured; common in the warmer parts of the Indo-Pacific and Atlantic Oceans.

'KEY' TO SPECIES

1 (a) Head, trunk and tail with distinct dark cross-bands	...	2
(b) Head, trunk and tail with no cross-bars	...	3
2 (a) Body reddish brown, with 28 to 35 irregular cross-bands, partly encycling body, about as broad as interspaces, which are spotted in their dorsal part	...	*G. punctatofasciata**
(b) Body yellowish brown with reticulation, spots and 14 or 15 dark cross-bars, more distinct on tail	...	*G. reticularis*
3 (a) Definite rectangular black blotch extending about one eye-diameter behind eye and forward so as to enclose eye in narrow black line; median fins white edged, broadly so posteriorly	...	*G. monostigmus**
(b) No single black blotch just behind eye	...	4

4 (a) Tail longer than trunk; colour greenish yellow, with silvery spots on lateral line ... *G. sathete**

(b) Tail slightly shorter than trunk; body light brownish, mottled with pale specks on upper half of body and on high dorsal fin ... *G. pseudothyrsoideus**

Gymnothorax reticularis Bloch

Gymnothorax reticularis Bloch, 1795, *Naturges ausland. Fische,* (9) : 85, pl. 815 (type-locality : Tranquebar).

Muraena reticularis : Day, 1878, *Fishes of India* : 669; Day, 1889, *Fauna Br. India,* Fishes. **1** : 78.

Common Name :

Reticulated moray ... English

Distinguishing Characters :

Body strong, muscular, moderately compressed. Anterior nostrils tubular, posterior nostrils simple openings without tubes. Teeth with serrations on their anterior and posterior margins, uniserial; vomerine teeth (on roof of moth) in two rows in front, uniserial behind. Dorsal fin originating on head, before gill-openings. Anus slightly before midpoint of body; tail about equal to trunk.

Colour : yellowish brown with reticulation, spots, and 14 or 15 dark cross-bars, more distinct on tail; dark lines along side of head and throat.

Geographical Distribution : Indo-W. Pacific.

Fishery Information : Of minor fishery value in our region.

Genus **Lycodontis** McClelland

Lycodontis McClelland, 1844, *Calcutta Jour. Nat. Hist.,* **5** : 173 (type-species : *Lycondontis literata* McClelland = *Muraenophis tile* Hamilton Buchanan).

Body strong, muscular, moderately compressed. Anterior nostrils tubular, posterior nostrils simple openings without tubes. Dentition

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* *Gymnothorax punctatofasciata* Bleeker, *G. monostigmus* (Regan) and *G. sathete* (Hamilton-Buchanan) do not contribute to any fishery in our country; *G. pseudothyrsoideus* (Bleeker) is a very common eel in Bombay generally obtained in long-line as well as in bag-net catches, but is not edible.

raptorial, usually powerful teeth (mostly fang-like), with one or more long median depressible fangs in front of upper jaw, teeth without serrations on their anterior and posterior margins. Dorsal fin originating on head; dorsal and anal fins normal and confluent with caudal fin.

Numerous species in all warm seas, a few found in temperate areas, some attaining a large size and amongst the most dangerous, aggressive and feared of all marine creatures.

KEY TO SPECIES

1 (a) Teeth in upper jaw in 2 or 3 series, the inner row of at least 5 teeth, generally more	..	2
(b) Teeth in upper jaw in a single row, or with an anterior inner series of 1 to 4 fang-like ones (which disappear with age)	...	3
2 (a) Cleft of mouth 2 to 3 times in head length; head length 1.7 to 2.9 times in trunk; body dark with numerous fine light spots	...	*L. meleagris*
(b) Cleft of mouth 3.8 to 4.2 times in head length; head length 3 times or somewhat less in trunk; body brownish yellow or greenish, with small white spots (which may be entirely absent in adults)	...	*L. tile**
3 (a) Head and trunk with distinct dark crossbars, usually also on tail	...	4
(b) Not as above	...	5
4 (a) Dark cross-bars never wider than interspaces, usually narrower; first bar through eye, continuous below chin	...	*L. enigmaticus**
(b) Cross-bars wider, usually much wider than interspaces, the first bar through snout	...	*L. petelli**
5 (a) Gill-openings dusky or black (body may be wholly black)	...	6
(b) Gill-openings not dusky or black		7
6 (a) Head length 3 to 3.5 times in trunk; body mottled or dark in front, mottled behind, or wholly dark; margins of fins may be light	...	*L. flavimarginatus**

	(b) Head longer than one-third of trunk; body basally light brown, with numerous contrasted black spots and blotches	...	*L. javanicus**
7	(a) Body uniform brown, without darker markings	...	8
	(b) Body variegated in some way	...	9
8	(a) Dorsal fin high, above vent about equal to depth of body; depth of body 20 to 26 times in total length	...	*L. hepaticus**
	(b) Dorsal fin moderately developed, lower than height above vent; depth of body 19 to 22 times in total length	...	*L. monochrous**
9	(a) Background of body light, the whole head and body with large dark blotches, either as honeycombing or as rounded blotches, dark area greater than light background	...	10
	(b) Not as above		11
10	(a) Dark marks especially on head in honeycomb pattern; depth of body 13 to 15 times in total length, 1.5 to 1.7 times in head length	...	*L. favagineus**
	(b) Dark marks all rounded blotches; depth of body 18 to 22 times in total length; 2.4 to 2.5 times in head length	...	*L. permistus**
11	(a) Background lightish with dense cover of fine black reticulations, may form vague cross-lines on tail; chin notably lighter, often white areas; snout rather short	...	*L. richardsonii**
	(b) Dark with distinct darker spots, may form irregular cross-bars on tail	...	*L. boroensis**
	(c) Background either light with many variable dark spots and irregular bars, or background dark to black with some light markings, reticulations, or spots in front and reticulations and cross-bars on tail; corners of mouth usually dusky; snout pointed		12

12 (a) Colour pattern composed of large brown blotches arranged more or less regularly and separated by narrow pale lines that occur more or less as irregular vertical streaks posteriorly, and in large specimens the pale streaks may have small dark specks; margin of median fins white posteriorly ... *L. undulata**

(b) Colour pattern of narrow black blotches on a pale background; some of black spots are somewhat joined but narrower than pale light brownish interspaces; six small small black spots behind eye to over corner of mouth; spots on body may be roundish, in 2 or 3 irregular rows ... *L. fimbriata**

Lycodontis meleagris (Shaw & Nodder)

Muraena meleagris Shaw and Nodder, 1795, *Naturalist's Miscellany*, **7** : pl. 229 (type-locality : Pacific Ocean); Day, 1878, *Fishes of India* : 668; Day, 1889, *Fauna Br. India*, Fishes, **1** : 76.

Common Names :

Spotted-moray	...	English
Killis	...	Marathi

Distinguishing Characters :

Depth of body 19 (in juveniles) to 12 (in adults) in total length; length of head 2.6 to 2.8 times in trunk, and 7 to 8 times in total length; snout blunt. Cleft of mouth about 2 times in length of head. Anus before mid-point of body; tail 1.3 to 1.4 times as long as rest of body. Anterior nostril a short tube; posterior nostril a low tube with

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* *Lycodontis enigmaticus* (Bleeker), *L. petelli* (Bleeker), *L. flavimarginatus* (Rüppell), *L. javanicus* (Bleeker), *L. hepaticus* (Rüppell), *L. monochrous* (Bleeker), *L. permistus* Smith, *L. richardsonii* (Bleeker) and *L. fimbriata* (Bennett) do not contribute to any fishery in our area; *L. tile* (Hamilton-Buchanan) is reported to be common in the Hooghly estuary of our region; *L. favagineus* (Bloch & Schneider), the tasselated eel, is very frequently observed on the Bombay coast but is, however, considered non-edible and poisonous; *L. undulata* (Lacepede) is very common in the rocky inshore areas of Bombay—it is a good and hard aquarium fish but has no fishery importance: *L. buroensis* (Bleeker) has been reported only recently from the Laccadive Sea.

Thyrsoidea macrura (Bleeker)

Muraena macrurus Bleeker, 1854, *Nat. Tijds. Ned.-Indie,* **7** : 324 (type-locality : Java).

Muraena macrura : Day, 1878, *Fishes of India* : 672, pl. 170, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 81, fig. 32.

Common Names :

Giant moray	...	English
Seram-pambu	...	Tamil

Distinguishing Characters :

Depth of body about 40 times in total length ; 3 to 4 in head length ; head about 3.5 in trunk. Posterior nostril with low rim, anterior nostrils short tubes. Cleft of mouth about 3 in head length. Teeth all slender, fang-like, front larger median depressible fangs ; uniserial small hidden teeth on vomer. Dorsal-fin origin a short distance before gill-openings, which are larger than eye-diameter.

Colour : olive brown above, lighter below ; fins tinged with black.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This is the largest known eel, growing to over 3.5 m. Not usually agressive, but dangerous when cornered. The eel is of less economic value and is used as fish bait or consumed as food by the poor people in the country.

Subfamily : UROPTERYGINAE

Genus **Uropterygius** Rüppell

Uropterygius Rüppell, 1835, *Neue Wirbelth., Fische Rothen Meeres* : 83 (type-species : *Uropterygius concolor* Rüppell).

Fairly elongate, slightly compressed body ; position of vent highly variable. Dorsal and anal fins reduced to rudiments, confined to end of tail, with which confluent. Mouth extends far behind eye. Teeth usually in several series, fang-like, some depressible ; teeth on vomer. Front nostrils with tube ; posterior nostril above front of eye, with low rim, and with a single pore.

Rather sluggish eels, mostly small, found mainly in reefs of the tropical Indo-Pacific. Only few species but widely distributed, 4 in our area.

KEY TO SPECIES

1 (a) Tail (anus to tip of tail) short, about 1.75 to 2.0 times in length of head and trunk combined; body brown, with prominent irregular dark blotches or spots	...	*U. tigrinus**
(b) Tail about equal to rest of fish	...	2
2 (a) Body uniform red-brown, no reticulations or mottlings anywhere	...	*U. concolor**
(b) Colour not plain brown, mottled	...	3
3 (a) Tail equal to or somewhat shorter than head and trunk combined; head 7 to 7.5 times in total length	...	*U. macrocephalus**
(b) Tail longer than head and trunk combined; head 9 to 11 times in total length	...	*U. marmoratus*

Uropteryglus marmoratus (Lacepede)

Gymnomuraena marmorata Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 648 (type-locality : New Britain) ; Day, 1878, *Fishes of India* : 674, pl. 172, fig 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 85. fig. 34.

Common Names :

Marbled moray	...	English
Lafiveng, Melanhi	...	Lakshadweep Is.

Distinguishing Characters :

Body strong, muscular, moderately compressed. Head length about 8 times in distance from snout-tip to vent. Eyes nearer to snout-tip than to corner of mouth. Teeth slender, sharp, fang-like, in 2 rows in jaws, the inner teeth larger and depressible; larger depressible fangs median in front of upper jaw, a single row of moderate teeth along vomer. Anterior nostrils tubular and short, the posterior nostril with feebly crenulate low rim. Fins rudimentary, the median fins distinct round end of tail.

Colour : body dull yellow or brown, marbled and blotched with brown, especially on back; anus dark blue.

Uropterygius tigrinus (Lesson), *U. concolor* Rüppell and *U. macrocephalus* (Bleeker) are of no fishery significance in our area.

Geographical Distribution Widespread in the tropical Indo-west Pacific.

Fishery Information : Of minor fishery importance in the Andaman Islands.

FAMILY : CONGRIDAE

(Conger Eels)

Body very elongate, cylindrical except posteriorly. Eyes well developed; lips well developed; posterior nostrils close to or near eyes. Gill-openings restricted to sides; branchiostegal rays long, but not overlapping ventrally. Mouth usually large, the lower jaw usually not projecting (except in Heterocongrinae); teeth strong, but rarely developed as long canines. Dorsal and anal fins confluent with caudal fin; pectoral fins present (rarely absent); pelvic fins absent. Anus far behind gill openings, in anterior half of body.

The conger eels occur from shallow water to deep sea in various habitats. At the present time conger eels have little economic importance in our region as none is the object of a special fishery. Excellent eating.

KEY TO SUBFAMILIES

1 (a) Pectoral fins minute or absent; body extremely elongate and worm-like	...	Heterocongrinae*
(b) Pectoral fins well-developed; body rather robust or slender, but not worm-like	...	2
2 (a) Nostrils superior or lateral; snout typically longer than eye-diameter; caudal fin narrow and longer than head and trunk combined; dorsal- and anal-fin rays segmented	...	Congrinae
(b) Nostrils labial or nearly so (except *Ariosoma*); snout equal to or shorter than eye-diameter; caudal fin robust and about equal to head and trunk combined; dorsal and analfin rays unsegmented	...	Bathymyrinae*

* The eels of the subfamily Heterocongrinae represented by *Taenioconger hasi nicobarensis* (Klauscwitz & Eibesfeldt), *Xarifania obsura* Klausewitz & Eibesfeldt, and *Gorgasia maculata* Klausewitz & Eibesfeldt; and the subfamily Bathymyrinae represented by two genera *Ariosoma* Swainson and *Bathymyrus* Alcock, in our area, are of no fishery value.

Sub-family : CONGRINAE

Fin-rays segmented; caudal fin well developed, tail appreciably longer than head and trunk combined; pectoral fins present; preorbital bone above upper lip with bony projections from its ventral elge into lip (except in *Conger* and *Congriscus*); vent usually well before middle of body length.

KEY TO GENERA

1 (a) Vent placed in posterior half of body	...	**Coloconger***
(b) Vent placed before middle of body length	...	2
2 (a) Teeth essentially in a single series on each jaw	...	3
(b) Teeth in several series on each jaw	...	4
3 (a) Dorsal-fin origin over branchial aperture; snout shorter than eye; visceral peritoneum wholly black	...	**Congriscus***
(b) Dorsal-fin origin over middle or posterior half of pectoral fins; snout longer than eye; visceral peritoneum light coloured	...	**Conger***
4 (a) Anterior nostrils tubular	...	**Promyllantor***
(b) Anterior nostrils not tubular or weakly so	...	5
5 (a) Teeth rather small, cardiform on jaws and in several rows on vomer	...	6
(b) Teeth large, acute, essentially in two rows on jaws and in a single row or scattered on front of vomer	...	7
6 (a) Lateral line raised above body surface; vomerine teeth acute	...	**Rhynchoconger***
(b) Lateral line barely raised above body surface; vomerine teeth granular	...	**Gnathophis***
7 (a) Sensory pores on head rather small and round; snout moderate, about 1.5 times in eye-diameter	...	**Uroconger**
(b) Sensory pores on head large and slit-like; snout long, about twice length of eye	...	8

8 (a) Teeth on vomer in a small patch	...	**Congrina***
(b) Teeth on vomer in a single row along the anterior fourth of the bone	...	**Bathycongrus***

Genus **Uroconger** Kaup

Uroconger Kaup, 1856, *Arch. Naturgesch.*, **22** (1) : 71 (type-species : *Congrus lepturus* Richardson).

Elongate rather robust body, tapering to a point. Origin of dorsal fin above base or posterior portion of pectoral fin. Tail very long, at least twice as long as head and trunk combined. Caudal fin moderate. Pectoral fins moderate in length. Anterior nostrils not tubular, on anterior lateral surface of snout, posterior nostrils in front of eyes. Upper lip without upturned free flange. Teeth acute, conspicuous, biserial in jaws; vomerine teeth present.

KEY TO SPECIES

1 (a) Vomerine teeth in a single row of 10 to 20 teeth with a few larger teeth anteriorly	...	*U. lepturus*
(b) Vomerine teeth sparse, in a group of 2 or 3 large teeth anteriorly with perhaps a few smaller teeth on each side and behind	...	*U. braueri*†

Uroconger lepturus (Richardson)

Congrus lepturus Richardson, 1845, *Zool. Voy. Sulphur* : 106, pl. 56, figs. 1-6 (type-locality : Canton, China).

Uroconger lepturus : Day, 1878, *Fishes of India* : 661, pl. 170, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 89, fig. 37.

Common Names :

Slender conger-eel	...	English
Tolaka, Vam	...	Marathi

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* The fishes of the genera *Coloconger* Alcock, *Congriscus* Jordan & Hubbs, *Conger* Oken, *Promyllantor* Alcock, *Rhynchoconger* Jordan & Hubbs, *Gnathophis* Kaup, *Congrina* Jordan & Hubbs, and *Bathycongrus* Ogilby are of no fishery value in our area.

† *Uroconger braueri* Weber & de Beaufort is a deep-water speries of no fishery importance in our region.

Distinguishing Characters :

Body elongate and cylindrical, becoming narrower posteriorly on tail which is remarkably tapering to a point. Tail usually longer than twice length of head and trunk combined. Head large and stout; snout strong, broad and blunt, projecting in front of lower jaw. Mouth large, its gape extends to below posterior margin of eye; tongue free. Teeth in 2 rows on sides of jaws, canine-like; premaxillary patch of teeth almost exposed on lower surface of tip of snout when mouth is closed; vomerine teeth in a single row of 10 to 20 teeth, with a few larger teeth anteriorly. Dorsal-fin origin above or slightly before pectoral-fin base. Lateral line conspicuous.

Colour : body dark brownish, lateral line with a row of whitish spots; fins darker.

Geographical Distribution : Widespread in the tropical Indo-W. Pacific.

Fishery Information : This eel is common in the bag-net catches at Sasson Dock and Versova (Bombay) where it is of minor economic value and used as fish bait or consumed as food by the poor people.

Family : MURAENESOCIDAE
(Pike congers)

Eel-like fishes, cylindrical in front, compressed only along tail. Mouth large, its gape extends beyond eye; tongue not free from floor of mouth; no fleshy lip. Snout often markedly elongate; anterior nostrils tubular, posterior nostril a simple opening in front of eye. Gill openings large, separate and placed low on body. Teeth prominent, even raptorial, especially those on vomer. Dorsal and anal fins long with many segmented (soft) rays, confluent with caudal fin; origin of dorsal fin over pectoral-fin bases. Pectoral fins well developed, prominent; pelvic fins absent. Anus well behind pectoral fin and somewhat before midpoint of body. No scales.

Nine genera (5 in our area) in shallow tropical seas or deeper water, sometimes entering rivers. Should be handled with care because of their large, strong sharp teeth. Excellent eating.

KEY TO GENERA

1 (a) No conspicuous sensory pores on head ... 2

(b) Sensory pores on head obvious ... 4

2 (a) Teeth in a single row in jaws, followed by an incomplete inner row in upper jaw	...	**Sauromuraenesox***
(b) Teeth in essentially three rows in jaws	...	3
3 (a) Principal vomerine teeth large, compressed, moderately acute, each with sharp anterior and posterior edges and prominent basal cusps, the teeth in contact or separated; principal teeth on lower jaw of same form, erect or turned slightly inwards	...	**Muraenesox**
(b) Principal vomerine teeth large, round in section, very acute, each with only minute cusps distally, the teeth widely separated; principal teeth on lower jaw of same form, directed almost horizontally outwards	...	**Congresox**
4 (a) Pectoral fins present	...	**Xenomystax***
(b) Pectoral fins absent or vestigial	...	**Gavialiceps***

Genus **Congresox** Gill

Congresox Gill, 1890, *Proc. U. S. natn. Mus.*, **13** : 234 (type-species : *Conger talabon* Cuvier).

Eel-shaped, without scales. Mouth large, its gape well behind eye; tongue not free. Teeth in jaws in essentially three series, principal teeth on lower jaw very acute and directed almost horizontally outwards; principal vomerine teeth large, round in section, very acute, each with only minute cusps distally, the teeth widely separated. Dorsal and anal fins confluent with caudal fin. Pectoral fins well developed.

Two species in the Indo-Pacific, both in our region.

KEY TO SPECIES

1 (a) Dorsal rays before vertical through anus 57 to 68; pectoral-fin length in head length about 4.1; lateral line pores before anus 35 to 40	...	*C. talabonoides*

* The fishes of the genera *Sauromuraenesox* Alcock, *Xenomystax* Gilbert and *Gavialiceps* Wood-Mason, are of no fishery importance in our area.

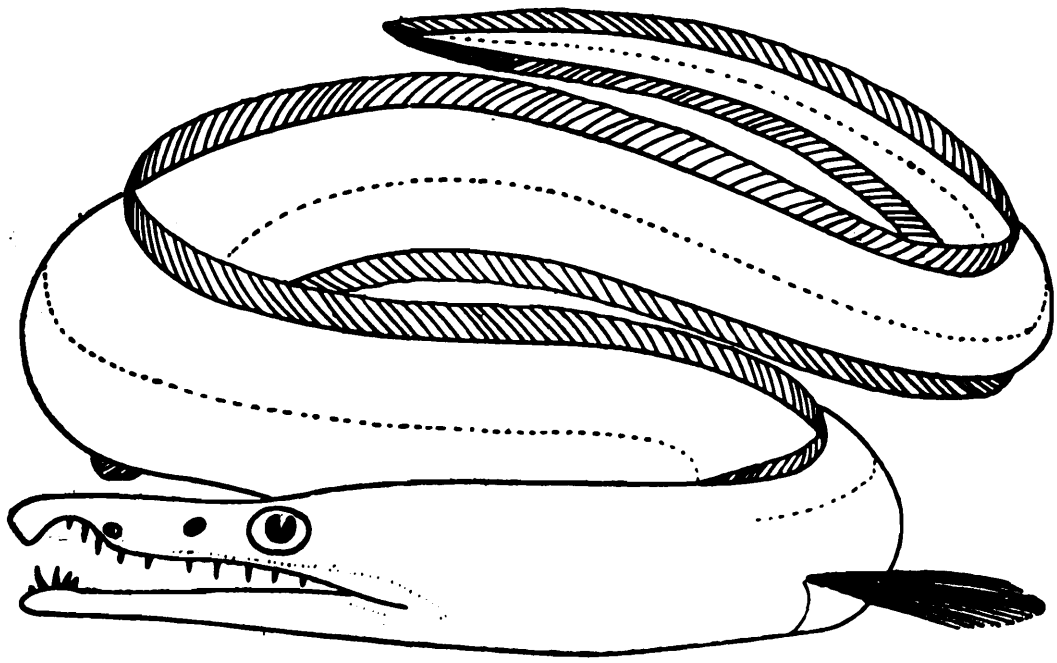
(b) Dorsal rays before vertical through anus 70 to 75; pectoral-fin length in head length about 3.2; lateral line pores before anus 41 to 42 ... *C. talabon*

Congresox talabon (Cuvier)

[Text-fig. 98]

Conger talabon Cuvier, 1829, *Regne Animal.*, 2 (ed. 2) : 350 (on "Talabon" of Russell, 1803, *Fishes of Coromandel*, 1 : 27, pl. 38; type-locality : Vizagapatnam).

Muraenesox talabon : Day, 1878, *Fishes of India* : 661, pl. 168, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, 1 : 90, fig. 38.



Text-fig. 98. *Congresox talabon* (Cuvier)

Common Names :

Yellow pike-conger	...	English
Tala-bon, Culim-poun	...	Telugu
Kotah, Kulivi-pamboo	...	Tamil
Aarel	...	Malayalam
Vam		Marathi

Distinguishing Characters :

Eel-shaped robust fish without scales. Mouth large, the upper jaw extends well behind eye. Teeth in jaws in 3 rows; outer row of teeth in lower jaw directed almost horizontally outwards, fang-like

canine teeth at front of lower jaw and on vomer, median canines of vomer conical (needle-like, not blade-shaped) and without basal lobes (at most with indications). Dorsal-fin origin before gill-openings. Pectoral fin well developed, its length about 3.2 times in head length.

Colour : head and body olive-yellow; vertical fins with dusky border.

Geographical Distribution : India, the Andamans, to Indonesia and southeast Asia.

Lives over soft bottoms down to about 100 m; also in estuaries.

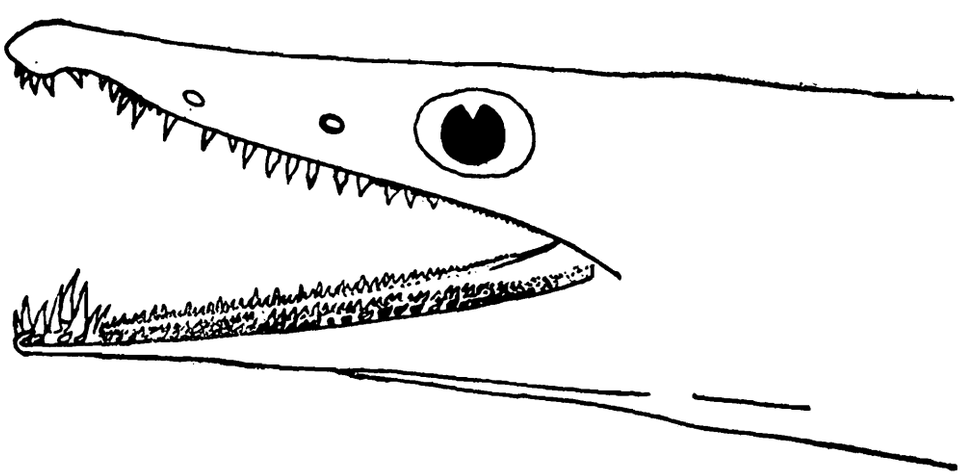
Fishery Information : Of minor fishery importance on the east coast of India; it attains 300 cms (=10 ft) in length.

Congresox talabonoides (Bleeker)

[Text-fig. 99]

Conger talabonoides Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie,* **7** : 324 (type-locality : Celebes).

Muraenesox talabonoides : Day, 1878, *Fishes of India* : 662, pl. 168, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, **1** : 91.



Text-fig. 99. *Congresox talabonoides* (Bleeker)

Common Names :

Indian pike-conger	...	English
Pambumeen	...	Malayalam
Wam, Vam	...	Marathi
Vam	...	Gujarati

Distinguishing Characters :

Eel-shaped fish without scales. Mouth large, its gape extends well beyond eye. Teeth in upper jaw in 3 rows, in lower jaw in 4 rows; outer tooth row in lower jaw leaning almost horizontally outwards; fang-like canine teeth at front of lower jaw and on vomer, median canines on vomer conical (needle-like, not blade-shaped) and without basal lobes. Pectoral fin well developed, its length about 4 times in head length.

Colour : head and body golden yellow; dorsal and anal fins with a dusky border.

Geographical Distribution : Red Sea, coasts of India, to Indonesia, southeast Asia and China.

Inhabits soft bottoms down to about 100 m; also in estuaries.

Fishery Information : This eel supports an important and flourishing fishery along the north-western parts of India. It commands a good market being an important food fish. It is generally captured in the bag-nets ('dol'), long lines and trawl nets. The yield of 'wam' are particularly high in the monsoon months in Bombay and Gujarat waters; there are two depth zones with concentration of eels, one the shallower area of 16-45 m and the other deeper one beyond 51 m.

Genus **Muraenesox** McClelland

Muraenesox McClelland, 1843, *Calcutta Jour. nat. Hist.*, 4(15) 408 (type-species : *Muraenesox tricuspidata* McClelland) ; Castle and Williamson, 1975, *J. L. B. Smith Inst. Ichth. Sp. Publ.*, (15) : 4 (Review).

Eel-shaped fish without scales. Mouth large, its gape extends beyond eye; tongue not free. Teeth in jaws raptorial, in several rows; principal teeth on lower jaw moderately acute, erect or turned slightly inwards; vomerine teeth bladelike, tricuspid, each with sharp anterior and posterior edges, and prominent basal cusps, the teeth in contact or separated. Dorsal and anal fins confluent with caudal fin. Pectoral fins well developed.

These eels are readily recognised by their large size, raptorial teeth and aggressiveness, giving them the common name pike-conger eels. Six species provisionally recognised, two in our area.

KEY TO SPECIES

1 (a) Lateral-line pores before anus 33 to 39; posterior nostrils slightly closer to eye than to anterior nostrils; eye-diameter about 3 times in snout length; grows upto 180 cms. ... *M. bagio*

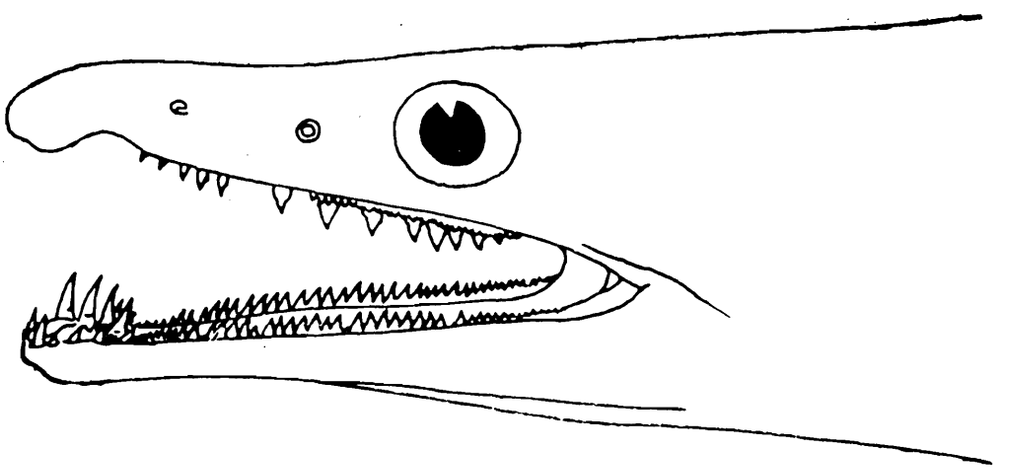
(b) Lateral-line pores before anus 40 to 47; posterior nostrils much nearer to eye than to anterior nostrils; eye-diameter 2 to 2.5 times in snout length; grows upto 80 cms ... *M. cinereus*

Muraenesox bagio (Hamilton-Buchanan)

[Text-fig. 100]

Muraena bagio Hamilton-Buchanan, 1822, *Fishes of Ganges* : 364 (type-locality : Ganges estuary).

Muraenesox cinereus (*nec* Forsskal) Day (*partim*), 1878, *Fishes of India* : 662; Day (*partim*), 1889, *Fauna Br. India,* Fishes, **1** : 91.



Text-fig. 100. *Muraenesox bagio* (Hamilton-Buchanan)

Common Name :

Common pike-conger ... English

Distinguishing Characters :

Eel-shaped robust fish without scales. Snout long; eye-diameter about 3 times in snout length; interorbital width about 10.7 in head length. Posterior nostrils only slightly closer to eye than to anterior nostrils. Mouth large, its upper jaw extending well behind eye. Teeth in jaws in 2 or 3 series; outer teeth on lower jaw pointing straight upward (not bent outwards), fang-like canine teeth at front of lower jaw

and on vomer, median canines on vomer with distinct basal lobes, their bases sometimes in contact. Dorsal-fin origin slightly in front of gill-openings. Pectoral fins well developed. Lateral line from head to above anus, with 33 to 39 pores.

Colour : head and body greyish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits soft bottoms down to about 100 m ; also in estuaries.

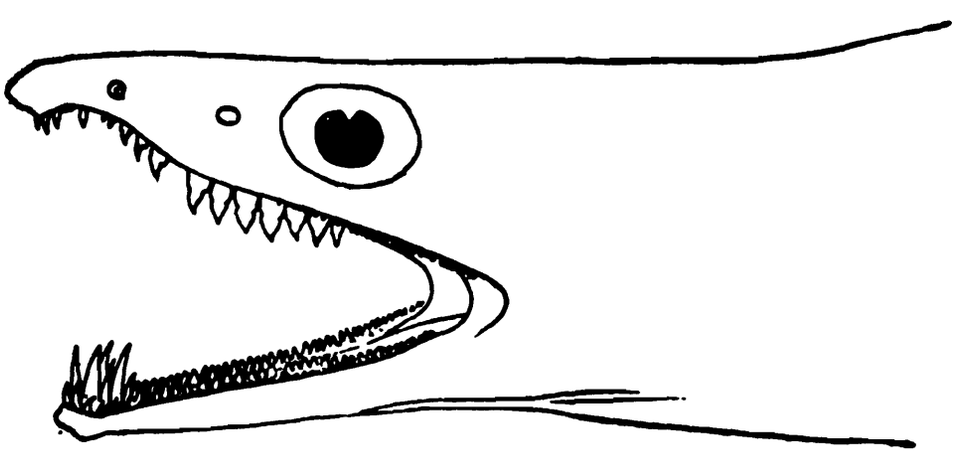
Fishery Information : Of minor fishery importance, being taken quite frequently on the West Bengal coast.

Muraenesox cinereus (Forsskal)

[Text-fig. 101]

Muraena tata cinera Forsskal, 1775, *Descript. Animal.* : 22 (type-locality : Red Sea).

Muraenesox cinereus : Day (*partim*), 1878, *Fishes of India* : 662, pl. 169, fig. 4 ; Day (*partim*), 1889, *Fauna Br. India*, Fishes, 1 : 91.



Text-fig. 101. *Muraenesox cinereus* (Forsskal)

Common Names :

Daggertooth pike-conger	...	English
Kadal-vilangu	...	Tamil
Wam	...	Marathi

Distinguishing Characters :

Eel-shaped robust fish without scales. Snout short ; eye-diameter 2 to 2.5 times in snout length ; interorbital width in head about 8.2. Posterior nostrils much nearer to eyes than to anterior nostrils. Mouth large, its upper jaw extending well beyond eyes ; teeth in jaws in

2 or 3 series; outer row of teeth in lower jaw erect (not bent outwards); fang-like canine teeth at front on lower jaw and vomer, median canines on vomer with distinct basal lobes, their bases more or less in contact. Dorsal-fin origin slightly in front of gill-openings. Pectoral fins well developed. Lateral line from head to above anus, with 40 to 47 pores.

Colour : head and body dull white, becoming fairly dark dorsally; fins broadly edged with black.

Geographical Distribution : Eastern Mediterranean, Red Sea, through the northern Indian Ocean, to Indonesia and northwards to Japan.

Inhabits soft bottoms down to about 100 m; also in estuaries.

Fishery Information : One of the common commercial eels of India and common in the catches at Sasson Dock and Versova (Bombay). It is generally caught with hook and lines, and occasionally in bag-nets as well as in trawl nets. Considered to be a good food fish. Larval forms and elevers of this eel are also obtained in fair numbers from Sasson Dock and Vervosa (Bombay) during April and May; they are found mixed up with shrimp catches landed by the bag-nets from about 20 to 25 m.

Family : OPHICHTHIDAE
(Snake-eels)

Body very long and snake-like, cylindrical anteriorly. Mouth large, its cleft usually beyond eye. Teeth variable, strong and fang-like, or small and pointed or blunt and granular, uniserial to polyserial in jaws. Nostrils widely separated, the posterior inside mouth or somewhat penetrating or opening through a valve in upper lip. Gill openings small, slit-like or round; branchiostegal rays numerous and overlapping along the midventral line (forming a basket-like structure termed a jugostegalia in the ventral wall of the throat). No spines in fins; dorsal and anal fins continuous around the tail externally, or discontinuous, with the caudal-fin rays reduced. Pectoral fins present or absent; pelvic fins absent. No scales.

The Ophichthidae comprise a large family of mostly fossorial eels limited to continental shelf depths of all tropical and subtropical oceans. The resemblance of many ophichthids to snakes has earned them the common name of 'snake-eels', and along with the morays, have evolved many sea-serpant legends among tropical coastal people.

KEY TO SUBFAMILIES/GENERA

1 (a) Tail tip flexible, a fringe of fin present around the tip, the dorsal, caudal and anal fins thus forming one continuous external fin; gill openings mid-lateral, a constricted opening (Subfamily Myrophinae)	...	2
(b) Tip of tail finless; gill-opening mid-lateral to entirely ventral, generally unconstricted (Subfamily Ophichthinae)	...	5
2 (a) Pectoral fins absent	...	**Muraenichthys**
(b) Pectoral fins present	...	3
3 (a) Anterior nostril non-tubular, posterior nostril before eye; dorsal-fin origin slightly before vent	...	**Benthenchelys***
(b) Anterior nostril tubular; dorsal-fin origin before mid-trunk region	...	4
4 (a) Posterior nostril labial, along edge of lip beneath a flap, or opening into mouth	...	**Myrophis***
(b) Posterior nostril lateral, above lip, an elongate slit before lower margin of orbit	...	**Neenchelys**
5 (a) Dorsal-fin beginning on nape, above supraorbital; pectoral fins absent	...	**Callechelys***
(b) Dorsal-fin, if present, originating behind head	...	6
6 (a) Pectoral fins absent; dorsal and anal fins low but distinct	...	7
(b) Pectoral fins present, generally well developed; median fins generally elevated	...	9
7 (a) Gill-openings low-lateral, crescentric	...	**Bascanichthys***
(b) Gill-openings entirely ventral	...	8
8 (a) Body stout, its depth less than 30 times in its length; vomerine teeth enlarged, pointed and recurved	...	**Lamnostoma**
(b) Body moderately elongate, its depth more than 40 times in its length; vomerine teeth conical, not enlarged	...	**Caecula***

9	(a) Teeth pointed; pectoral-fin base restricted, opposite upper half of gill-openings	...	**Ophichthus**
	(b) Teeth molariform or granular; pectoral fin broad-based	...	10
10	(a) Posterior nostril along lip margin, with a flap	...	**Leiuranus***
	(b) Posterior nostril along lower edge of lip or opening into mouth, a plain slit	...	11
11	(a) Dorsal-fin origin above or behind gill-openings	...	**Pisodonophis**
	(b) Dorsal-fin origin well in advance of gill-openings	...	**Myrichthys***

Genus **Lamnostoma** Kaup

Lamnostoma Kaup, 1856, *Arch. Naturges.* : 49 (type-species : *Lamnostoma pictum* Kaup = *Dalophis orientalis* McClelland) ; McCosker, 1977, *Proc. Calif. Acad. Sci.*, (4)**41** (1) : 68 (Revision).

Body stout, cylindrical, pointed at each end; body slightly longer than tail; snout pointed. Eyes small to moderate. Anterior nostril flush along snout, its posterior rim produced; posterior nostril usually associated with a pendulous flap. Teeth in jaws slender, pointed, uniserial or biserial; vomerine teeth enlarged, pointed and recurved. Gill openings inferior. Dorsal-fin origin above or behind gill-opening. Pectoral fins absent.

Four species provisionally recognised, one in our area.

Lamostoma orientalis (McClelland)

Dalophis orientalis McClelland, 1845, *Calcutta Jour. nat. Hist.*, **5** : 213 (type-locality : Madras).

?*Ophichthys orientalis* : Day+, 1878, *Fishes of India* : 665, pl. 171, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 96.

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* The monotypic genus *Benthenchelys* Fowler, the genus *Bascanichthys* Jordan & Davis represented by a freshwater species, *B. longipinnis Kner* (= *B. deraniyagalai* Menon) ; the genus *Myrophis* Lutken represented by *M. lepturus* Kotthaus ; the genus *Callechelys* Kaup represented by *C. nebulosus* Smith and *C. melanotaenia* Bleeker ; the genus *Caecula* Vahl represented by *C. pterygera* Vahl : and the genus *Myrichthys* Girard represented by *M. colubrina* (Boddaert) and *M. maculosa* (Cuvier), do not contribute to any fishery in our area ; the monotypic genus *Leiuranus* Bleeker represented by *L. semicinctus* (Lay & Bennett) has been reported only recently from the Laccadive Sea in our area.

\+ Castle (personal comm.) considers Day's (*nec* McClelland) *orientalis* identical with *Caecula pterygera* Vahl.

Common Names :

Oriental worm-eel	...	English
Manti-bukaro-paumbu	...	Telugu
Kadal-vilangu	...	Malayalam

Distinguishing Characters :

Body stout and cylindrical, its depth about 25 times in total length, about 3 in head, about 3.5 in trunk. Snout sharply pointed, eye nearer rictus than snout-tip. Teeth acute, uniserial on jaws and on vomer. Dorsal and anal fins low but distinct; dorsal-fin origin a little behind gill-openings.

Colour : body olive above, lighter below, sometimes with white spots on side of occiput.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery significance being fairly common in the commercial catches of the Orissa and West Bengal coasts.

Genus **Muraenichthys** Bleeker

Muraenichthys Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie*, **4** : 505 (type-species : *Muraenichthys gymnopterus* Bleeker) ; McCosker, 1977, *Proc. Calif. Acad. Sci.*, (4)**41**(1) : 58 (Revision).

Body short to moderately elongated, the tail generally longer than body and laterally compressed posteriorly. Anterior nostrils tubular; posterior nostril labial, either along edge of lip beneath a flap or opening into mouth. Gill-openings very small, about equal to eye, mid-lateral. Dorsal and anal fins low; dorsal-fin origin either before or behind anus. Pectoral fins absent. Caudal fin present, confluent with dorsal and anal fins, externally visible, tail tip flexible.

19 species recognised, 3 in our area.

KEY TO SUBGENERA/SPECIES

1 (a) Posterior nostril opens into mouth, covered by an exterior valvular flap; two pores between nostrils; jaw teeth uniserial or biserial (subgenus *Scolecenchelys* Ogilby) ... *M. macropteus**

(b) Posterior nostril opens on the outer lip as an elongate slit with an anterior flap; a single pore between the anterior and posterior nostrils; jaw teeth usually in bands (subgenus *Muraenichthys*)		2
2 (a) Dorsal-fin origin slightly behind anus	...	*M. schultzei*
(b) Dorsal-fin origin well in advance of anus	...	*M. gymnopterus**

Muraenichthys schultzei Bleeker

Muraenichthys schultzei Bleeker, 1857, *Nat. Tijds. Ned.-Indie*, **13** : 366 (type-locality : Java) ; Day, 1878, *Fishes of India* : 663, pl. 169, fig. 3 (erroneously shown as *Muraena polyzona*) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 93, fig. 40.

Common Name :

Bleeker's worm-eel ... English

Distinguishing Characters :

Body stout, its depth 20 to 25 times in total length. Snout blunt; gape of mouth to well beyond eye. Teeth in bands in jaws, intermaxillary teeth in a patch. Dorsal fin slightly behind anus.

Colour : body olive green.

Geographical Distribution : Indo-Pacific.

Fishery Information : Of minor fishery significance in the Andaman Sea of our region.

Genus **Neenchelys** Bamber

Neenchelys Bamber, 1915, *J. Linn. Soc. Lond.*, Zoology, **31** : 479 (type-species : *Neenchelys microtretus* Bamber) ; McCosker, 1977, *Proc. Calif. Acad. Sci.*, (4)**41**(1) : 60 (Revision).

Body moderately elongate, compressed posteriorly; body shorter than tail; snout subconical. Gill-openings mid-lateral, a constricted opening. Anterior nostril tubular; posterior nostril lateral, above lip, an elongate slit before lower margin of orbit. Dorsal-fin origin less

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* *Muraenichthys macropterus* Bleeker and *M. gymnopterus* (Bleeker) have been reported only once from our area.

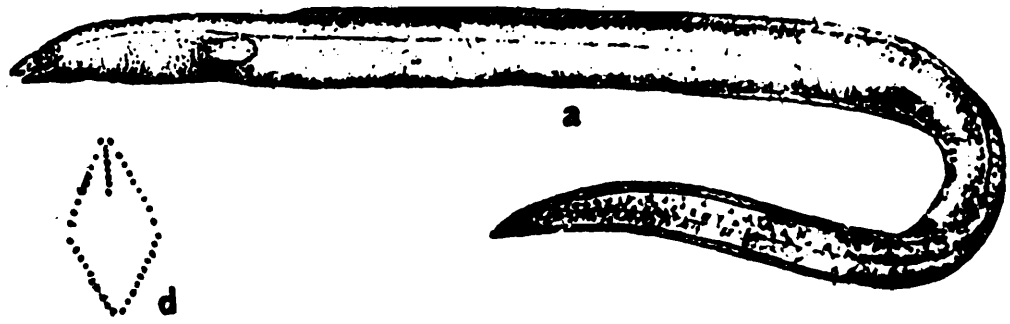
than a head length behind gill-openings. Pectoral fins moderately developed, longer than eye. Caudal fin present, confluent with dorsal and anal fins, externally visible; tail tip flexible.

Two species, one in our area.

Neenchelys buitendijki Weber & de Beaufort

[Text-fig. 102]

Neenchelys buitendijki Weber and de Beaufort, 1916, *Fishes of Indo-Australian Archipelago*, **3** : 268, fig. 117 (type-locality : Java) ; Mohamed, 1958, *J. Bombay nat. Hist. Soc.*, **55** (3) : 513, fig.



Text-fig. 102. *Neenchelys buitendijki* Weber & de Beaufort

Common Name :

Spotted worm-eel ... English

Distinguishing Characters :

Body moderately elongate, compressed posteriorly, its depth 19 to 21 times in total length. Teeth in jaws conical, uniserial. Dorsal and anal fins low ; tip of tail flexible. Pectoral fins moderately developed.

Colour : body yellowish pink, with brown pigment spots on dorsal surface of body ; fins generally whitish in colour but the posterior end of dorsal and anal fins as well the caudal fin blackish.

Geographical Distribution : India and Java.

Fishery Information : Occurs in fair numbers among the shrimp catches at Sasson Dock and Versova—the two fish landing centres of Bombay ; generally caught in 'Dol' nets (bag nets used with the help of stake or buoys) from depths varying from 5 to 20 m. and appears more frequent in the catches from December to May.

Genus **Ophichthus** Ahl

Ophichthus Ahl, 1789, *De Muraena et Ophichthus* : 3 (type-species : *Muraena ophis* Linnaeus) ; McCosker, 1977, *Proc. Calif. Acad.*, Sci., (4)**41**(1) : 79 (Revision).

Body moderately to very elongate, laterally compressed posteriorly; body (head and trunk) shorter than tail ; snout moderately developed, subconical, over-hanging lower jaw. Eyes moderate to large ; anterior nostril tubular, posterior nostril along lower edge of lip or opening into mouth. Dentition variable, from numerous, small and multiserial to few, large and uniserial or biserial, never caniniform. Dorsal-fin origin above or behind gill-openings, but generally before pectoral tips. Pectoral fins well developed. Tip of tail finless. Colouration generally uniform, although banded or spotted species may be included.

A circumtropical genus with about 55 species, 4 in our area.

KEY TO SPECIES

1 (a) Head and trunk combined about equal to tail	...	2
(b) Head and trunk combined 1.5 to more times in tail	...	3
2 (a) Teeth in upper jaw in a single row	...	*O. cephalozona*
(b) Teeth in upper jaw in 2 rows	...	*O. ornatissimus**
3 (a) Dorsal-fin origin above gill-openings	...	*O. altipinnis**
(b) Dorsal-fin origin behind pectoral-fin bases	...	4
4 (a) Teeth in upper jaw in single row on sides of jaws	...	*O. apicalis*
(b) Teeth in upper jaw in 3 rows on sides of jaws	...	*O. microcephalus**

Ophichthus apicalis (Bennett)

Ophisurus apicalis Bennett, 1830, *Cat. Zool. Spec.* in : *Mem. Life of Raffles* : 692 (type-locality : Java).

Ophichthys apicalis : Mohamed, 1957, *J. Bombay nat. Hist. Soc.*, **54**(3) : 739, fig.

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* *Ophichthus ornatassimus* (Kaup), *O. altipinnis* (Kaup) and *O. microcephalus* Day are rather rare in our region.

Common Names :

Pointed-tail snake-eel	...	English
Devar	..	Marathi

Distinguishing Characters :

Depth of body 26 to 33 times in total length, 2.6 to 3.2 in length of head. Head 8.8 to 9.8 times in total length, 2.3 to 2.7 in trunk; head and trunk combined 1.5 to 1.6 times in tail (anus to tip of caudal fin). Snout rather blunt; cleft of mouth extends slightly or not beyond the posterior margin of eye. Teeth small, sharp, in a cluster on tip of upper jaw, uniserial on sides of jaws, irregularly biserial on vomer. Dorsal-fin origin over about pectoral-fin base; dorsal and anal fins expanded near end of tail. Pectoral fin 2.2 to 2.5 times in length of head.

Colour : body light brown with greenish tint, ventrally whitish.

Geographical Distribution : Indo-Pacific.

Fishery Information : This eel is fairly abundant in Sasson Docks and Versova (Bombay), being caught always in the bag-net catches. It is common throughout the year at both these centres and generally occurs along with the small shrimp catches.

Ophichthus cephalozona Bleeker

Ophichthus cephalozona Bleeker, 1864, *Atlas Ichth.*, **4** : 49, pl. 12, fig. 2 (type-locality : not known) ; Mohamed, 1957, *J. Bombay nat. Hist. Soc.*, **54**(3) : 738, fig. 13.

Common Name :

Bleeker's snake-eel	...	English

Distinguishing Characters :

Depth of body 28 to 29 times in total length. Length of head 10 to 11 times in total length, 3.5 to 4.5 in trunk; head and trunk combined about equal to tail. Snout bluntly pointed, much projecting; cleft of mouth extending beyond eye. Teeth rather large, pointed, curved, in a single row in jaws and vomer; in a separate cluster of 4 to 6 stout teeth on tip of upper jaw. Dorsal-fin origin above tip of pectoral fin; end of dorsal and anal fins ending shortly before end of tail.

Colour : body purplish brown, nape with a broad slackish cross-band on nape. Dorsal and anal fins blackish with a white margin.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Fairly common in the bag-net catches at Versova (Bombay) ; seldon occurs in the long-line catches.

Genus **Pisodonophis** Kaup

Pisodonophis Kaup, 1856, *Arch. Naturges.*, **22**(1) : 47 (type-species : *Pisodonophis cancrivorus* Richardson) ; McCosker, 1977, *Proc.* Calif. Acad. *Sci.*, (4)**41**(1) : 82 (Revision) (erroneously spelt *Pisoodonophis* in the literature).

Body moderately elongate, laterally compressed posteriorly. Snout moderately developed, subconical ; lower jaw included. Anterior nostril tubular, posterior before eye. Teeth molariform or granular, multiserial on jaws and vomer, largest at intermaxillary with a short gap separating those of the vomerine block. Dorsal-fin origin above or behind gill-openings. Pectoral fins moderate, broad-based. Tip of tail finless. Colouration generally uniform, spotted in one species.

Rather large robust eels, mostly in sheltered to turbid water, often in estuaries. Widely distributed in the tropical Indo-Pacific, few species, 3 in our region.

KEY TO SPECIES

1 (a) Dorsal-fin origin above middle of pectoral fins	...	*P. cancrivorus**
(b) Dorsal-fin origin behind end of pectoral fins	...	2
2 (a) Head length 3.5 to 4 times in trunk	...	*P. boro*
(b) Head length 5 to 5.5 times in trunk	...	*P. chilkensis**

* *Pisodonophis cancrivorous* (Richardson) is uncommon in the commercial catches and *P. chilkensis* (Chandhuri) is only known from the Chilka Lake (Orissa) where it is rather rare.

Pisodonophis boro (Hamilton-Buchanan)

[Text-fig. 103]

Ophisurus boro Hamilton-Buchanan, 1822, *Fishes of Ganges* : 20, pl. 5, fig. 5 (type-locality : Hooghly estuary near Calcutta).

Ophichthys boro : Day, 1878, *Fishes of India* : 664, pl. 171, fig. 2; Day. 1889, *Fauna Br. India,* Fishes, 1 : 94, fig. 41.



Text-fig. 103. *Pisodonophis boro* (Hamilton-Buchanan)

Common Name :

Bengal's snake-eel ... English

Distinguishing Characters :

Body elongate and cylindrical, its depth 30 to 36 times in total length, and 2.6 to 3.6 times is head length. Length of head 9 to 12 times in total length, and 3.5 to 4 times in trunk. Mouth large, its cleft extends behind eye; lower jaw shorter; teeth granular, in sveral series. Dorsal fin considerably behind tip of pectoral fin; dorsal and anal fins low, end before tip of tail.

Colour : body uniform brownish olive above, pinkish or yellowish on sides and belly.

Geographical Distribution : Indo-W. Pacifii.

Marine bot entering rivers.

Fishery Information : Of minor commercial significance in our region being frequently taken in the Hooghly estuary.

Order : GONORYNCHIFORMES

Suprabranchial (=epibranchial) organ present; mouth small; toothless jaws; first three vertebrae specialized and associated with one or more cephalic ribs; 5 to 7 hypural plates.

Suborder : CHANOIDEI

Family : CHANIDAE

[Milk-fishes]

Body elongate, moderately compressed, without scutes along abdomen. Adipose (fatty) tissue covering eye. Mouth terminal and small, with no teeth; maxilla short, not extending beyond vertical from eye centre; no supramaxillae; lower jaw with symphysial tubercle. No gular plate (small bony plate between arms of lower jaw). Dorsal and anal fins with basal sheath of scales; pelvic fin with 10 or 11 soft rays; large axillary scales at base of pectoral and pelvic fins. Caudal fin deeply forked. Scales small, cycloid; lateral line present. Branchiostegal rays 4. An accessory gill-structure present.

Only one genus.

Genus **Chanos** Lacepede

Chanos Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 395 (type-species : *Chanos arabicus* Lacepede).

For characters of only genus, see family characters.

Monotypic.

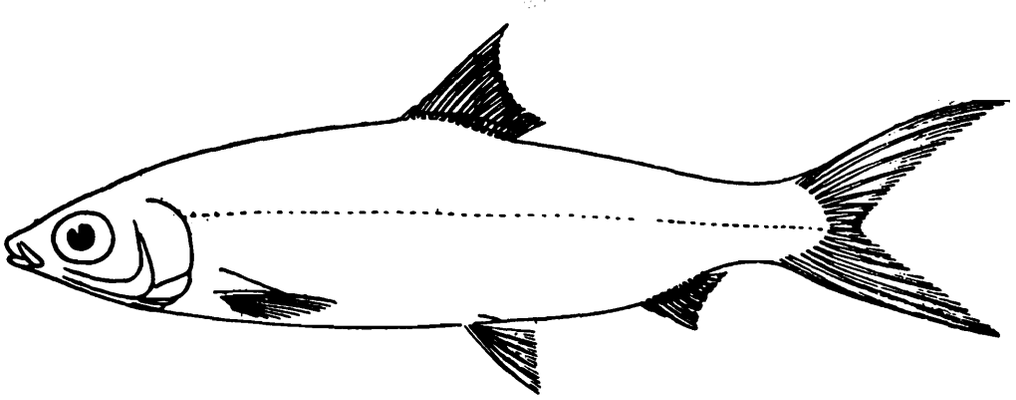
Chanos chanos (Forsskal)

[Text-fig. 104]

Mugil chanos Forsskal, 1775, *Descript. Animal.* : 74 (type-locality : Djedda, Red Sea).

Chanos salmoneus (Schneider) : Day, 1878, *Fishes of India* : 651, pl. 166, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **1** : 403, fig. 127.

Chanos chanos : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 186, fig. 53, and pl. 8, fig. 1.



Text-fig. 104. *Chanos chanos* (Forsskal)

Common Names :

Milk-fish	...	English
Polah-bontah	...	Telugu
Palmeen, Tulu-candul, Pal-kendai	..	Tamil
Poomeen	..	Malayalam
Mekkunu	...	Lakshadweep Is.

Distinguishing Characters :

Body torpedo-shaped; no scutes along belly. Mouth small, without teeth; upper jaw slightly projecting, with no supramaxillae; lower jaw with a small symphysial tubercle at tip, fitting into a notch. Dorsal fin with 13 to 17 rays, its origin midway between front border of eye and caudal-fin base. Anal fin short, with 9 to 11 rays, close to caudal fin. Pectoral and pelvic fins with large axillary scales. Caudal fin deeply forked. Scales small, cycloid; head naked; lateral line present.

Colour : back olive-green, sides silvery. Dorsal, anal and caudal fins with dusky margins; inner sides of pectoral and pelvic fins dusky.

Geographical Distribution : Indo-west Pacific.

Found in coastal waters, entering estuaries, rivers and lakes.

Fishery Information : An important food fish. Common in the commercial catches in the coastal waters in our region especially the Gulf of Mannar and is considered to be suitable for fish culture in India. This species is very much esteemed as a food fish and is suitable for introduction into tanks and ponds especially where the water is slightly saline. The fry is collected from the coasts and later introducted into ponds and tanks. *Chanos* is of considerable commercial importance as a food-fish in Southeast Asia.

Order : SILURIFORMES
[Catfishes]

Fairly elongate body, skin naked or covered with bony plates. Spines often present at the front of the dorsal and pectoral fins, if present only single in each fin; pectoral fins low; adipose fin usually present. Eyes usually small (barbels are important in detecting food). Vomer usually toothed (as is the pterygoid and palatine). Maxillae

usually rudimentary, supporting a barbel on each side. Principal caudal fin rays 18 or fewer (most with 17). Front four vertebrae joined together, with a chain of small bones connecting air-bladder and auditory organ known as Weberian apparatus.

A large group of carnivorous bottom feeders; most species are permanent residents of fresh waters.

KEY TO FAMILIES

1 (a) Caudal fin rounded, extends far forward on dorsal surface; no adipose fin	...	2
(b) Caudal fin does not extend on dorsal surface of body	...	3
2 (a) Body strongly depressed anteriorly, compressed posteriorly; two short anal fins, the second confluent with caudal fin	...	Chacidae*
(b) Body eel-like; single long anal fin, confluent with caudal fin	...	Plotosidae
3 (a) Dorsal-fin base very long, stretching almost the whole back, not preceded by a spine	...	Clariidae*
(b) Dorsal fin short or absent (with less than 25 rays)	...	4
4 (a) Anal-fin base long, with 28 to 93 rays	...	5
(b) Anal-fin base relatively short, with 6 to 20 rays (except the genus *Horabagrus* with 23 to 28 rays)	...	8
5 (a) Adipose dorsal fin present; dorsal fin, if present, preceded by a spine	...	6
(b) Adipose dorsal fin absent; dorsal fin not preceded by a spine	...	7
6 (a) Nasal barbels present; adipose dorsal fin present or absent; dorsal fin sometimes absent	...	Schilbeidae*
(b) Nasal barbels absent; adipose fin present; dorsal fin present	...	Pangasiidae*

7	(a)	Four pairs of barbels (nasal, maxillary, mandibular and mental) ; respiratory apparatus markedly modified—long air sac, serving as lung, extends posteriorly from gill-chamber	... Heteropneustidae*
	(b)	One or two pairs of barbels (maxillary and mandibular) ; respiratory apparatus of ordinary type	... Siluridae*
8	(a)	Gill membranes united to isthmus	... 9
	(b)	Gill membrances united to each other but free from isthmus	... 11
9	(a)	Nostrils well separated, the posterior with a barbel ; body with longitudinal row of tubercles	... Akysidae*
	(b)	Nostrils close together, separated by a barbel or valve	... 10
10	(a)	Four pairs of barbels (distinct nasal barbels) ; mostly small forms occuring in mountain rapids	... Sisoridae*
	(b)	One to three pairs of barbels (no nasal barbels) ; some bony plates on head and near dorsal-fin origin	... Ariidae
11	(a)	Dorsal fin without spine ; four pairs of barbels	... Olyridae*
	(b)	Dorsal fin preceded by a spine	... 12
12	(a)	Dorsal and pectoral spines strong ; teeth on roof of mouth ; nostrils widely separated	... Bagridae*
	(b)	Dorsal and pectoral spines weak ; no teeth on roof of mouth ; nostrils close together	... Amblycipitidae*

Family : ARIIDAE
(Often Tachysuridae in the literature)
[Sea Catfishes]

Medium to large-sized fishes. Fairly elongate body without scales ; caudal fin forked. Head rounded to depressed ; some strong bony

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* The fishes of the families Chacidae, Clariidae, Schilbeidae, Pangasiidae, Heteropneustidae, Siluridae, Akysidae, Sisoridae, Olyridae, Bagridae and Amblycipitidae, are confined to the freshwaters of our region.

plates on head and near dorsal-fin origin which are more or less visible beneath a thin skin (seldom completely obscured by a thick tissue). Three pairs of barbels (no nasal barbels)—paired maxillary and mandibular (or mental) barbels, usually both present but in some cases one or the other type of barbel absent. Teeth in jaws villiform (fine), those on palate conical, granular, or molar-like and in patches, or sometimes absent altogether. A serrated spine in front of first dorsal fin and in each pectoral fin. Adipose dorsal fin present.

These fishes inhabit coastal waters especially the river mouths, often penetrating freshwaters. Dangerous fishes as the serrated spines inflict painful lacerated wounds which have caused deaths. There are no poison glands, but the mucous on the spine is toxic.

The marine catfishes belonging to the two families Ariidae and Plotosidae contributed 44,355 tonnes during 1976, averaging 2.5% of the total annual marine fish landings in India. Their landings are the highest in Kerala ; Maharashtra, Tamil Nadu, Gujarat, Andhra, Karnataka, West Bengal and Orissa follow in the order of decreasing abundance. They are caught in all types of gear, particularly hooks and lines, and are consumed fresh or cured conditions. The air-bladders are used for the manufacture of isinglass.

KEY TO GENERA

1 (a) Mandibulary barbels absent ; a pair of stiff, semi-osseous maxillary barbels present only	...	**Osteogeneiosus**
(b) Mandibulary barbels present ; maxillary barbels soft, not osseous	...	2
2 (a) Two or four barbels present around mouth—a pair of very small mandibulary, the maxillary barbels absent : lower jaw longer than upper	...	**Batrachocephalus**
(b) Six barbels present around mouth—two pairs of mandibulary and one pair of maxillary ; lower jaw equal to or shorter to upper jaw	...	3
3 (a) Palate (roof of mouth) toothed	...	**Arius**
(b) Palate edentulous (with no teeth)	...	4

4 (a) Mouth opening wide, its cleft extending beyond anterior margin of eye; teeth in a single series of closely set incisor-like (cutting edged) in both jaws ... **Ketengus***

(b) Mouth opening narrow, its cleft ending much before anterior border of eye; teeth villiform, but no incisor-like teeth in jaws ... **Hemipimelodus***

Genus **Arius** Valenciennes

Arius Valenciennes, 1840, *Hist. nat. Poiss.*, **15** : 53 (type-species : *Pimelodus arius* Hamilton-Buchanan) ; Wheeler and Baddokwaya, 1981, *J. nat. Hist. Lond.*, **15** : 769 ; Jayaram, 1982, *Rec. zool. Surv. India. Occ. Pap.*, (37) : 1 (Review).

Tachysurus (*nec* Lacepede) Jayaram and Dhanze, 1979, *Matsya*, (4) : 48.

Elongate body and moderately compressed. Mouth moderate, the upper jaw longer ; 3 pairs of barbels around mouth—one pair of maxillary and 2 pairs of mandibular. Teeth in villiform bands in jaws ; teeth on palate (roof of mouth) in 1 to 3 patches on either side. Dorsal fin short, with a strong serrated pungent spine and 6 or 7 soft rays ; adipose fin well developed. Anal fin short, with 14 to 24 soft rays. Pectoral fin with serrated spine, and 9 to 12 soft rays.

Some of the fishes of this genus are found regularly in freshwater in India, but the genus is primarily marine. The number of species is large and most of them are very abundant and economically important. The genus is presently under revision by Dr. K. C. Jayaram and Dr. J. R. Dhanze. *Arius acutirostris* Day and *A. burmanicus* Day known from the rivers of Burma, have been omitted from the key.

KEY TO SPECIES

1 (a) Teeth on roof of mouth in three patches on either side, arranged in a large triangular group, the base of which is formed by two small anterior patches while the hind patch is much larger ... 2

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* The monotypic genus *Ketengus* Bleeker represented by *K. typus* Bleeker, occurs only in the Andaman Sea in our region but is of no fishery importance ; the genus *Hemipimelodus* Bleeker represented by H. *jatius* (Hamilton-Buchanan), is of no fishery importance in our region.

	(b) Teeth on palate in one or two patches on each side	...	3
2	(a) Snout rounded; anterior patches of teeth on either side of palate distinctly separated from each other	...	*A. thalassinus*
	(b) Snout conical or rather pointed, clearly projecting beyond lower jaw; anterior patches of teeth on either side of palate adjacent to each other	...	A. species**
3	(a) Teeth on palate in one patch on each side (no teeth on vomer)	...	4
	(b) Teeth on palate in two distinct patches on each side	...	14
4	(a) Teeth on palate villiform, globular or conical	...	5
	(b) Teeth on roof of mouth granular or molar-like	...	9
5	(a) Median longitudinal groove on top of head reaching to base of supra-occipital process	...	6
	(b) Median fontanelle groove on top of head not reaching to median keel of supraoccipital process	...	7
6	(a) Pelvic fins reaching to anal fin; snout depressed and elongated; dorsal-fin filament elongated in juveniles	...	*A. subrostratus*
	(b) Pelvic fins not extending to anal fin; snout blunt and rounded; no elongated dorsal-fin filament	...	*A. sumatranus**
7	(a) Palatine teeth finely granular, in two elliptic widely separated patches	...	*A. macronotocanthus**
	(b) Palatine teeth villiform (small and fine)	...	8
8	(a) Teeth on palate in two more or less triangular patches; maxillary and outer mandibular barbels of unequal length	...	*A. caelatus*

** This undetermined species is common in the commercial catches of the Kerala coast; its identity is under study by Dr. K. C. Jayaram.

(b) Teeth on palate in two small pear-shaped patches on each side; maxillary and outer mandibular barbels of nearly same length	...	*A. parvipinnis**
9 (a) Median longitudinal groove on top of head reaching to base of supra-occipital process	...	10
(b) Median longitudinal groove on top of head not reaching to median keel of supraoccipital process	...	13
10 (a) Premaxillary tooth-band distinctly divided in middle; palatine patch of teeth placed at deep posterior extremity of roof of mouth	...	*A. tenuispinis*
(b) Premaxillary tooth-band continuous palatine patch of teeth not placed far backwards on roof of mouth	...	11
11 (a) Palatine patch of teeth pyriform-shaped; snout duck-billed shaped	...	*A. platystomus*
(b) Palatine patch of teeth oval, ovoid or elliptical-shaped; snout not duck-billed shaped	...	12
12 (a) Pectoral-fin spine longer than dorsal-fin spine; anal fin with 14 to 16 rays	...	*A. jella*
(b) Pectoral-fin spine equal to dorsal-fin spine; anal fin with 19 rays	...	*A. gagora**
13 (a) Eye large, its diameter 1.6 to 2.5 times in interorbital width	...	*A. arius*
(b) Eye smaller, its diameter 2.6 to 4 times in interorbital width	...	*A. maculatus*
14 (a) The two patches of teeth on roof of mouth arranged in a transverse series (side by side laterally) in one connected group on each side	...	15
(b) The two patches of teeth on palate arranged in longitudinal series, the anterior patch small and posterior patch large	...	16
15 (a) Basal plate before dorsal-fin distinctly large, butterfly-shaped; outer palatine patch oval-shaped	...	*A. sagor*

(b) Basal plate before dorsal-fin narrow, S-shaped; outer palatine patch triangular-shaped ... *A. sona*

16 (a) Posterior patches of teeth on palate elliptical-shaped and diverging posteriorly; a prominent protuberance of the supra-ethmoid bone on either side of eye present ... *A. dussumieri*

(b) Posterior patches of teeth on palate pear-shaped and converging posteriorly; no protuberance of supra-ethmoid bone on either side of eye ... *A. crossocheilus**

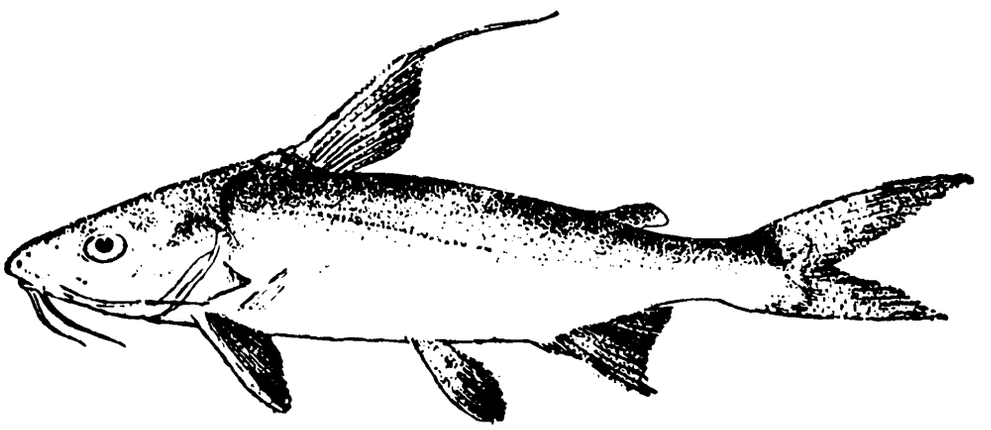
Arius arius (Hamilton-Buchanan)

[Text-fig. 104a]

Pimelodus arius Hamilton-Buchanan, 1822, *Fishes of Ganges* : 170, 376 (type-locality : estuaries of Bengal).

Arius buchanani Day, 1877, *Fishes of India* : 463, pl. 105, fig. 6 (type-locality : Hooghly R. at Calcutta; Burma); Day, 1889, *Fauna Br. India*, Fishes, 1 : 181.

Tachysurus arius : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 3 : 32, fig. 3.



Text-fig. 104a. *Arius arius* (Hamilton—Buchanan)

* *Arius sumatranus* (Bennett) is rare in our region; *A. parvipinnis* Day is known only from the East coast of India in our region and is uncommon in the commercial catches; *A. macronotacanthus* Bleeker is also rare in our region; *A. gagora* (Hamilton-Buchanan) is a freshwater species known only from the Hooghly river in our country; and *A. crossocheilus* Bleeker is a rather rare species in our region.

Common Names :

Hamilton's catfish	...	English
Jella	...	Telugu

Distinguishing Characters :

Body elongate and robust; head depressed, the snout blunt and rounded; eyes fairly large, 1.6 to 2.5 times in interorbital width. Median fontanelle groove on top of head shallow, not reaching base of supra-occipital process; supra-occipital process wider at its base than broad. Mouth subterminal, its gape narrow; three pairs of barbels around mouth; teeth in jaws villiform; premaxillary tooth-band continuous, about 4 times as long as broad; teeth on palate globular, forming two elliptical patches, one patch on each side, with a horn-like conical projection anteriorly. Dorsal and pectoral fins with strong pungent spines; tip of dorsal spine prolonged into a filament; pectoral spine shorter than dorsal spine; adipose dorsal fin small. Anal fin with 20 or 21 rays.

Colour : body silvery steel along back, lighter on sides and below. Dorsal and pectoral fin margins posteriorly dusky; adipose dorsal fin with a well defined black spot.

Geographical Distribution : East coast and south-west coast of India, Bangladesh and Burma.

Fishery Information : This species is an estuarine form and is fairly common on the east coast of India particularly in the Chilka Lake (Orissa).

Arius caelatus Valenciennes

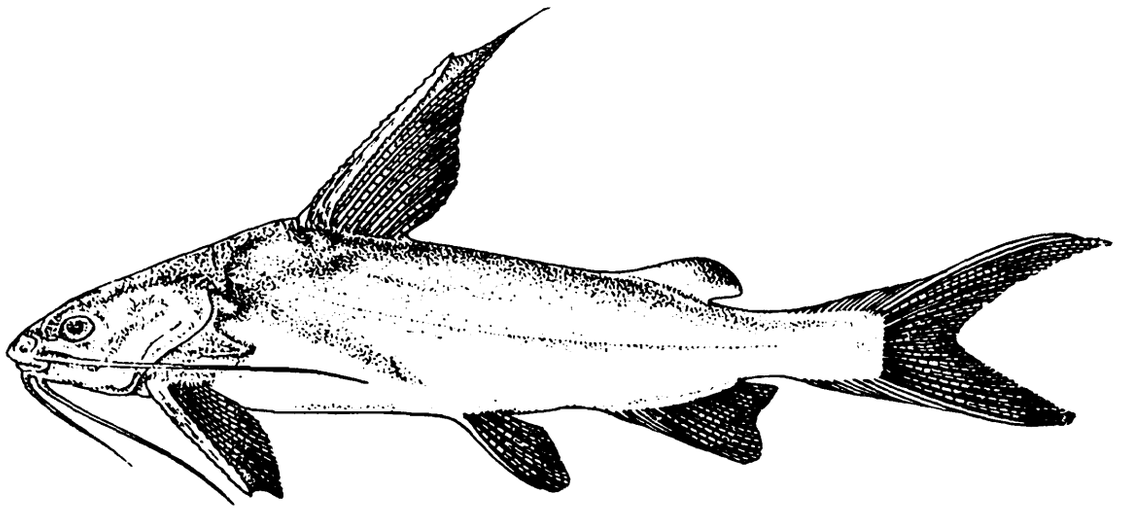
[Text-fig. 105]

Arius caelatus Valenciennes, 1840, *Hist. nat. Poiss.*, **15** : 66 (type-locality : Bombay) ; Day, 1877, *Fishes of India* : 459, pl. 105, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 174.

Arius nenga (*nec* Hamilton-Buchanan) Day, 1877, *Fishes of India* : 458, pl. 104, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 173, fig. 67.

Tachysurus nenga : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 50.

Tachysurus caelatus : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 35, fig. 4.



Text-fig. 105. *Arius caelatus* Valenciennes

Common Names :

Engraved catfish	...	English
Keleru	...	Tamil
Kelithi	...	Malayalam
Galiyi	...	Kannada

Distinguishing Characters :

Body robust and elongate; head profile concave at nape, the supra-occipital process rising thereafter. Mouth subterminal; three pairs of barbels, strong, the maxillary barbels extending to end of pectoral-fin. Median fontanelle groove on top of head broad, not reaching to median keel of supra-occipital process. Head shield strongly rugose and granulated; supra-occipital process short, wider at its base than long; basal plate before dorsal-fin V-shaped. Eye-diameter 5.5 to 7 times in head length, 3 to 4 times in interorbital width. Teeth in jaws small and fine; premaxillary band of teeth 8 to 10 times longer than broad; teeth on palate villiform, in one small patch on each side, each patch roughly triangular-shaped, separated from each other and from jaw-teeth somewhat less than their width. Dorsal-fin spine coarsely granulated; tip of dorsal spine produced into a long filament; adipose-fin rather large. Pectoral-fin spine very strong, thick and coarsely granulated, considerably shorter than dorsal-fin spine.

Colour : body bluish black on top of head and back, whitish below, the whole with a metallic blue lustre. Tip of dorsal fin blackish, its filament black; adipose dorsal fin entirely black or bearing a large black blotch on upper half. Pectoral, pelvic and anal fins dusky; caudal fin paler. Barbels dusky.

Geographical Distribution : Pakistan, India, Sri Lanka to Indo-Australian archipelago, but not the Philippines or Australia.

Fishery Information : This species attains a large size (450 mm) and is one of the commercially important catfishes of our area, especially on the east coast.

Arius dussumieri Valenciennes

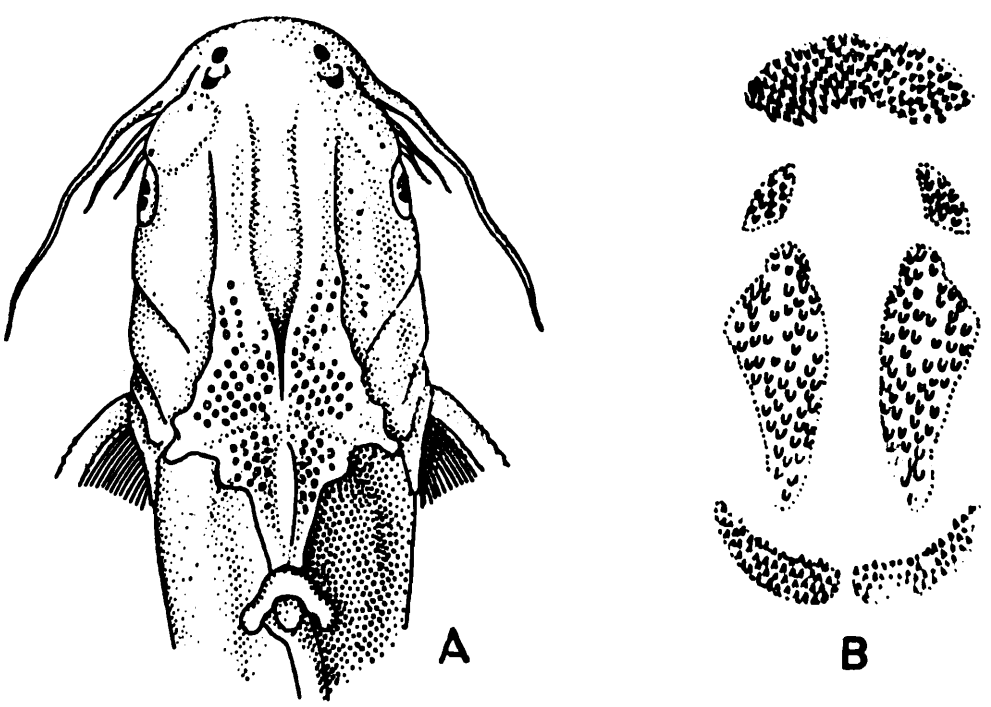
[Text-fig. 105a]

Arius dussumieri Valenciennes, 1840, *Hist. nat. Poiss.*, **15** : 84 (type-locality : Malabar) ; Day, 1877, *Fishes of India* : 467, pl. 107, fig. 7 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 188.

?*Arius nella* (Valenciennes) : Day, 1877, *Fishes of India* : 465 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 184.

Tachysurus dussumieri : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 39.

?*Tachysurus nella* : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 48, fig. 6.



Text-fig. 105a. *Arius dussumieri* Valenciennes

A. Dorsal view of head and anterior portion of body to show the external ethmoid protuberance.

B. Palate dentition.

Common Names :

Dussumier's catfish	...	English
Thogadam, Jeddi-jella, Nellah-jella	...	Telugu
Mandaikaliru, Keluthy	...	Tamil
Kazhu-theydoo, Valiaethah	...	Malayalam
Mungam-shede	...	Kannada
Shingala, Mogarushedde	...	Marathi

Distinguishing Characters :

Body elongate ; head depressed. Barbels 3 pairs around mouth, well developed. Median fontanelle on top of head shallow, reaches to base of supraoccipital process which is as wide at its base as it is long and extends to basal plate ; basal plate before dorsal fin, narrow and S-shaped ; head shield granulated above. A prominent protuberance of the lateral ethmoid above and anterior of eye distinctly seen. Premaxillary band of teeth about 3 times long as broad ; teeth on palate in 2 patches on each side, arranged in a longitudinal series ; anterior (vomerine) patch small, posterior (palatine) large, elliptical-shaped and diverging posteriorly ; teeth molariform. Dorsal-fin spine as long as head minus snout ; pectoral-fin spine shorter than dorsal-fin spine.

Colour : body dirty bluish along the back, becoming lighter on sides ; adipose fin with a black spot.

Geographical Distribution : West Madagascar, Pakistan, India, Bangladesh and Sri Lanka.

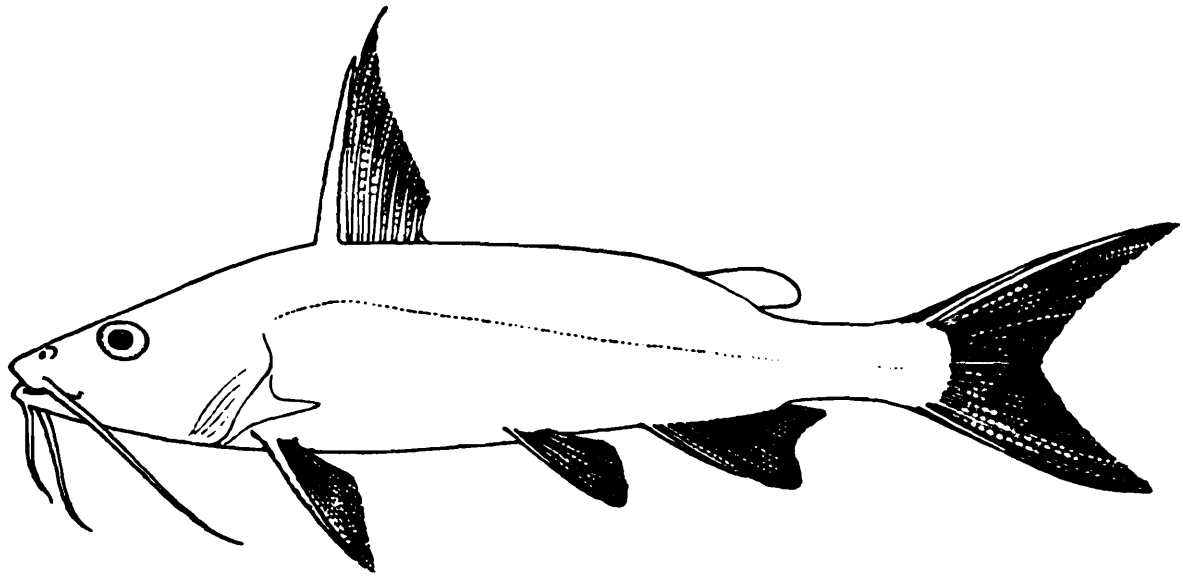
Fishery Information : It is common catfish in our region and forms an important element in the catfish fishery. At Vizhinjam (Kerala) this catfish along with *A. thalassinus*, constitutes the catfish fishery which generally starts in April and lasts till the end of the year. These fishes are caught in boat-seines, and hooks and lines in the inshore area. Though not in high demand in the fresh condition, a flourishing trade exists for the cured product ; cured by filleting, salting and sun-drying.

Arius jella Day

[Text-fig. 106]

Arius jella Day, 1877, *Fishes of India* : 467, pl. 106, fig. 3 (on 'Deddi-jellah' of Russell, 1803, *Fishes of Coromandel*, 2 : 54, pl. 169) (type-locality : Madras) ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 187.

Tachysurus jella : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 3 : 42.



Text-fig 106. *Arius jella* Day

Common Names :

Small-eye catfish	...	English
Gondia	...	Oriya
Deddi-jellah, Thella-jellah	...	Telugu
Vellai-ettah, Keluthy	...	Tamil
Bilishedde	...	Kannada
Shingala	...	Marathi

Distinguishing Characters :

Body elongate ; head depressed. Mouth subterminal ; three pairs of barbels around mouth. Median fontanelle on top of head broad and flat, reaching to base of supra-occipital process ; supra-occipital process slightly keeled. Eye-diameter 6 to 7 times in head length, 2 to 3 times in interorbital width. Teeth in jaws villiform ; premaxillary band of teeth continuous, about 3 times as long as broad ; teeth on palate globular, in one patch on either side, ovoid-shaped. Dorsal and pectoral fin-spines strong, the pectoral spine longer than the dorsal spine. Anal fin with 14 to 16 rays.

Colour : back of body silvery-grey, white on sides and below. Fins grey ; adipose dorsal fin with black blotch.

Geographical Distribution : East coast of India, Burma and Sri Lanka.

Fishery Information : Common in the trawl catches of the West Bengal-Orissa coast and contributes a high percentage in the marine catfishes of this region. They are caught in all types of gears, particularly hook and lines. They are found in small shoals in the coastal waters, estuaries and backwaters of the east coast of India ; common in the Adyar and Ennur backwaters at Madras throughout the year ; during the breeding season i.e. from August to January, they are abundant in the backwaters.

Arius maculatus (Thunberg)

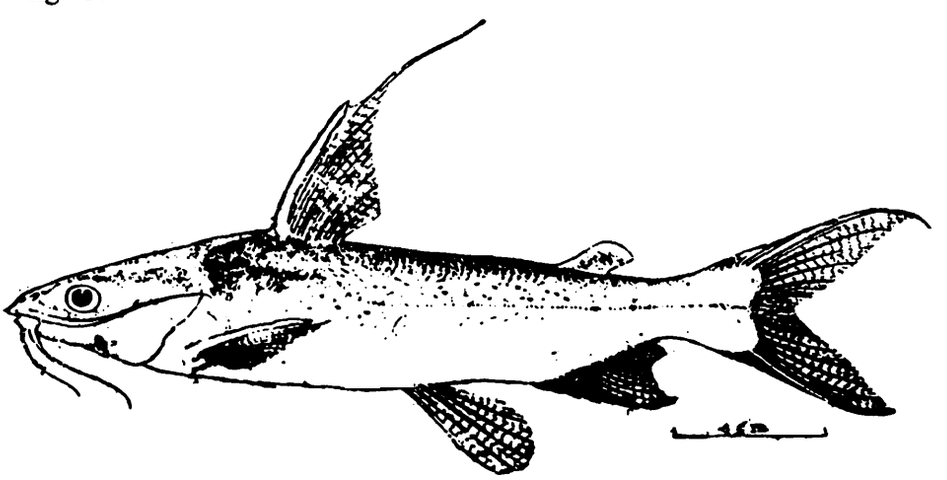
[Text-fig. 107]

Silurus maculatus Thunberg, 1792, *Kongl. Vet. Akad. Nya Handl. Stockholm*, **13** : 31, pl. 1, fig. 2 (type-locality : Japan).

Arius falcarius Richardson : Day, 1877, *Fishes of India* : 463, pl. 106, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 182.

Arius malabaricus Day, 1877, *Fishes of India* : 464, pl. 107, fig. 4 (type-locality : Canara) ; Day, 1877, *Fauna Br. India*, Fishes, **1** : 183 ; Jayaram and Dhanze, 1981, *Bull. zool. Surv. India*, **4**(1) : 121 (Status discussed).

Tachysurus platystomus : Misra, 1976, *Fauna of India*, Pisces (2nd ed), **3** : 54, fig. 5.



Text-fig. 107. *Arius maculatus* (Thunberg)

Common Names :

Spotted catfish	...	English
Venkelotri	...	Tamil
Thedu	...	Malayalam



Arius maculatus (Thunberg)

Distinguishing Characters :

Body elongate; head pointed; eyes fairly small, its diameter 2.6 to 4.0 times in interorbital width. Three pairs of barbels around mouth; maxillary barbels slender, reaching to base of pectoral fin, but much shorter in older fishes. Head shield somewhat rugose; median fontanelle groove on top of head deep and long, running from a short distance behind tip of snout to before median keel of supra-occipital process, which is striated and granulated, and slightly longer than broad. Teeth in jaws villiform; premaxilla tooth-band continuous, about 4 times as long as broad; teeth on palate granular or molar-like, in two large semi-oval patches normally far behind premaxillary tooth-band. Dorsal and pectoral fin-spines strong; pectoral-fin spine shorter than dorsal-fin spine; tip of dorsal fin usually prolonged as a filament; adipose dorsal fin small.

Colour : body brown to bluish brown above, sides grey and belly whitish with dusky spots, the whole with a silvery sheen. All fins black tipped, pectoral and pelvic fins dusky, adipose dorsal fin mainly blackish.

Geographical Distribution : Pakistan, India, Sri Lanka to Indo-Australian archipelago, but not the Philippines and Australia.

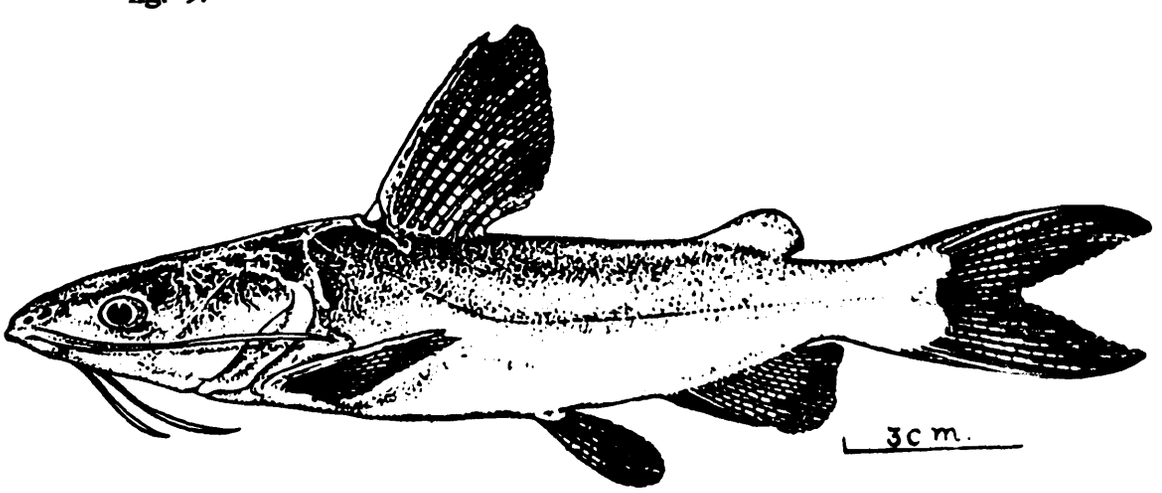
Fishery Information : This catfish is a commercially important species on the west coast of India.

Arius platystomus Day

[Text-fig. 108]

Arius platystomus Day, 1877, *Fishes of India* : 464, pl. 107, fig. 3 (type-locality : Canara) ; Day, 1889, *Fishes Br. India*, Fishes, 1 : 183.

Tachysurus platystomus : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 3 : 54, fig. 9.



Text-fig. 108. *Arius platystomus* Day

Common Names :

Flat-mouthed catfish	...	English
Khadapi-shingala	...	Marathi

Distinguishing Characters :

Body elongate; head depressed, the snout duck-billed shaped. Three pairs of flat and fleshy barbels around mouth. Median fontanelle on top of head short and narrow, not reaching to base of supra- occipital process; supra-occipital process strongly keeled; basal plate before dorsal-fin S-shaped. Teeth in jaws villiform; premaxillary tooth-band continuous, about 6 times as long as broad; teeth on palate in one patch on each side, pyriform-shaped, with granular teeth. Dorsal-fin spine strong; adipose fin small. Pectoral-fin spines strong.

Colour : body bluish on back, lighter on sides and below. Fins with light tinge of grey.

Geographical Distribution : India and ? Sri Lanka.

Fishery Information : This species is one of the main catfishes of commercial importance along the Bombay coast and the Hooghly estuary.

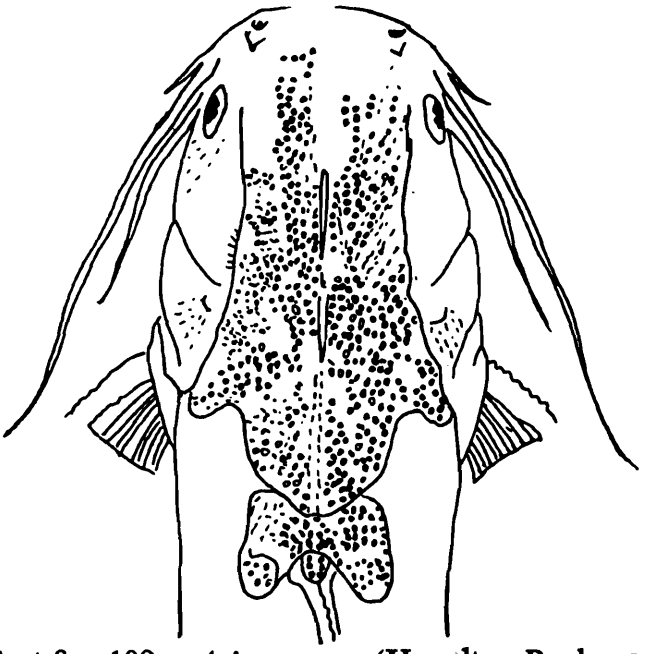
Arius sagor (Hamilton-Buchanan)

[Text-fig. 109]

Pimelodus sagor Hamilton-Buchanan, 1822, *Fishes of Ganges* : 169, 378 (type-locality : estuaries of Bengal).

Arius sagor : Day, 1877, *Fishes of India* : 461, pl. 105, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 178.

Tachysurus sagor : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 56, fig. 10,



Text-fig. 109. *Arius sagor* (Hamilton-Buchanan)
Dorsal view of head and anterior portion of body to show the butterfly—shaped basal bone of dorsal fin.

Common Names :

Sagor catfish	...	English
Billi-shede, Shingara	...	Marathi

Distinguishing Characters :

Body elongate; head broad and much depressed. Three pairs of barbels around mouth, the maxillary barbels reaching to at least middle of pectoral fins. Median fontanelle on top of head broad and flat. Head shield rugose and conspicuously granulated; supra-occipital process large, broader than long; basal plate before dorsal fin distinctly large, butterfly-shaped. Teeth in jaws villiform, premaxillary band about 5 times as broad as long; teeth on palate small and conical, in 2 patches on either side, the patches arranged side by side laterally in one connected group on each side, the outer patches rounded and oval, longer than inner patches; inner patches separated by a very narrow space. Dorsal and pectoral fins each with a spine, the tips of spines with a filamentous prolongation; adipose dorsal fin of moderate size.

Colour : back and sides dark grey blue, belly milky white; usually silvery white or blue-green cross-bands on back and sides. Fins dusky black, only soft part of dorsal fin ligrter. Maxillary barbels wholly blackish, the outer half or tip of other barbels blackish.

Geographical Distribution : Pakistan, India to Indo-Australian archipelago, but not the Philippines or Australia.

Fishery Information : This is a fairly common species in the catches. It grows to a large size fetching a good prize. It usually occurs around estuaries.

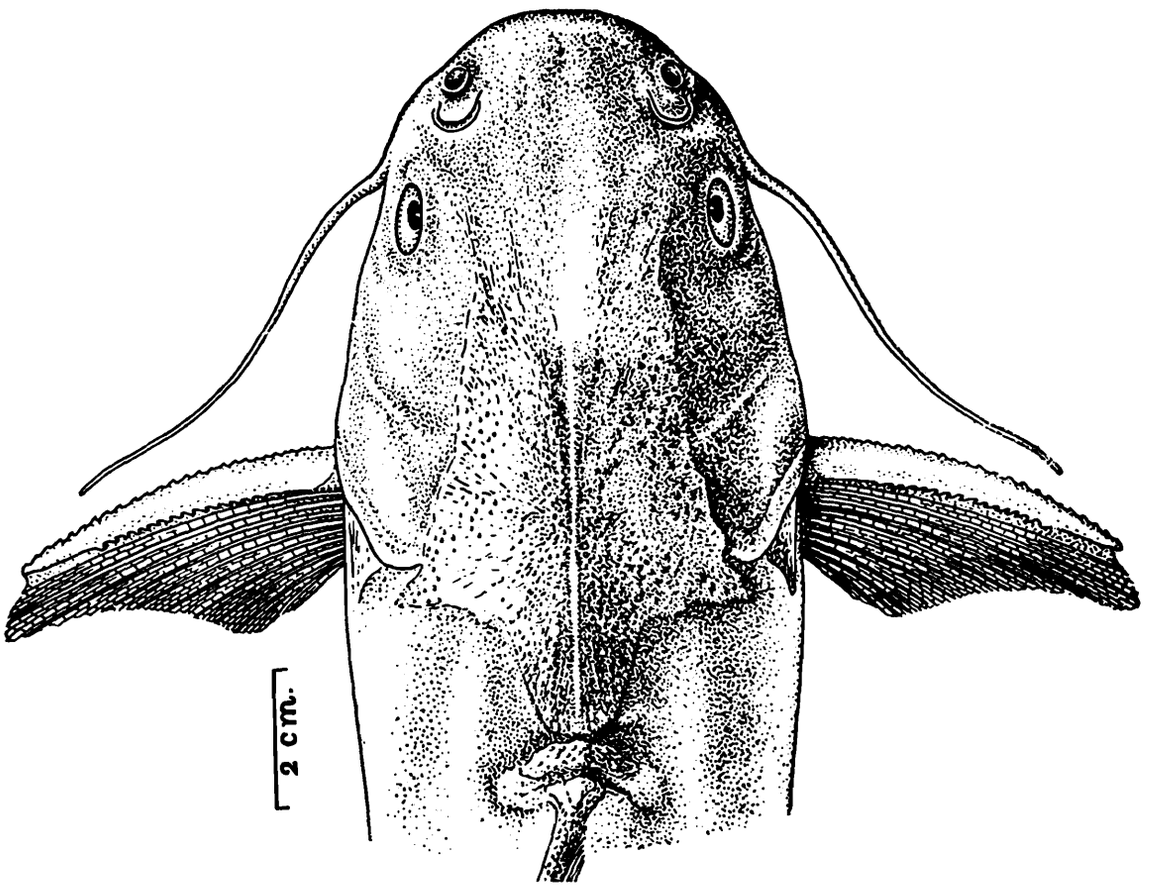
Arius sona (Hamilton-Buchanan)

[Text-fig. 110]

Pimelodus sona Hamilton-Buchanan, 1822, *Fishes of Ganges* : 172, 376 (type-locality : estuaries of Bengal).

Arius sona : Day, 1877, *Fishes of India* : 462, pl. 105, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 1 : 179.

Tachysurus sona : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 3 : 62, fig. 13.



Text-fig. 110. *Arius sona* (Hamilton-Buchanan)
Dorsal view of head and anterior portion of body to show the normal shape of basal bone of dorsal fin.

Common Names :

Dusky catfish	...	English
Jella	...	Telugu
Sona-tengra, Shingal	...	Marathi

Distinguishing Characters :

Body elongate; head broad and depressed. Three pairs of barbels around mouth. Head shield granulated, the granules in radiating series; median fontanelle on top of head rather broad and flat, not extending to base of supra-occipital process; supra-occipital process as wide or wider at its base than long, convex at its posterior extremity; basal plate before dorsal-fin narrow, S-shaped. Premaxillary band of teeth villiform, continuous, about 6 times as broad as long; teeth on palate villiform, in two patches placed side by side laterally in one connected group on either side, anterior patch small, the outer patch large and triangular-shaped. Dorsal and pectoral fin-spines strong.

Colour : body leaden grey, paler below, the sides sometimes bluish with gold. Fins dusky to black terminally.

Geographical Distribution : Pakistan, India, Bangladesh, Sri Lanka and the East Indies.

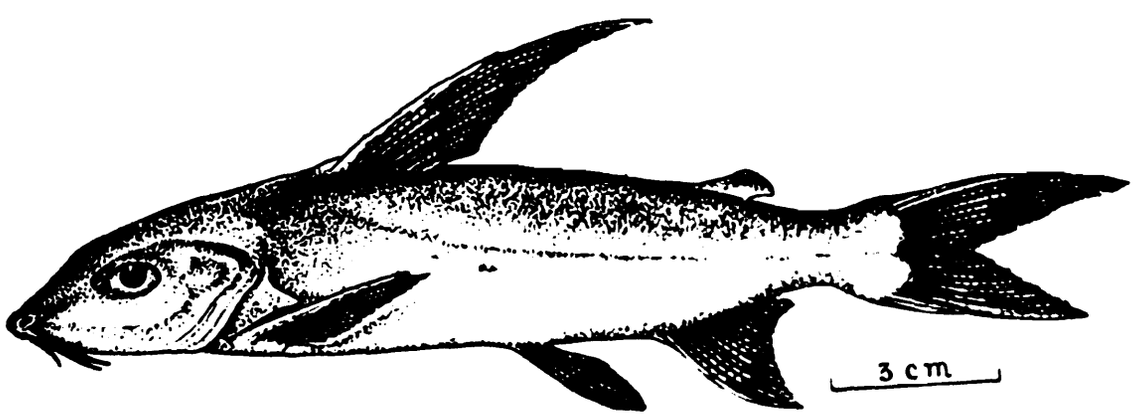
Fishery Information : One of the commercially important marine catfishes of the Bombay coast.

Arius subrostratus Valenciennes

[Text-fig. 110a]

Arius subrostratus Valenciennes, 1840, *Hist. nat. Poiss.*, **15** : 62 (type-locality : Malabar) ; Day, 1877, *Fishes of India* : 441, pl. 106, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 178.

Tachysurus subrostratus : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 65.



Text-fig. 110a. *Arius subrostatus* Valenciennes

Common Name :

Short-nosed catfish	...	English
Theydoo	...	Malayalam

Distinguishing Characters :

Body elongate ; head depressed, the snout elongated. Three pairs of barbels around mouth, all shorter than the head. Median fontanelle groove on top of head narrow, reaching to base of supra-occipital process. Head shield roughly granulated ; basal plate before dorsal fin, V-shaped. Teeth in jaws villiform ; teeth on palate in one small

patch on either side, villiform, each patch oval and equal to eye-diameter. Dorsal-fin spine strong; tip of dorsal fin often produced into a long filament in juveniles; adipose dorsal fin moderate. Pectoral-fin spine as long as dorsal-fin spine. Pelvic fins extending to anal fin.

Colour : body silvery grey on back, lighter below. Fins greyish.

Geographical Distribution : Pakistan, southern coast of India and Sri Lanka.

Sea, estuaries and tidal rivers.

Fishery Information : Common in the commercial catches of the Kerala coast, attaining about 300 mm in length.

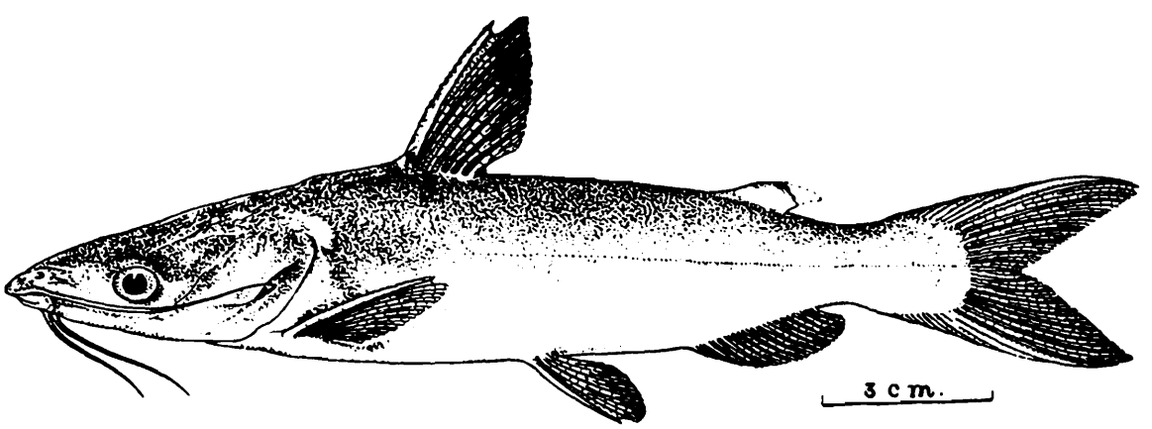
Arius tenuispinis Day

[Text-fig. 110b]

Arius tenuispinis Day, 1877, *Fishes of India* : 466, pl. 107, fig. 5 (type-locality : Bombay) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 187 ; Talwar, 1976, *Rec. zool.* Surv. *India*, **69** : 291.

Arius satparanus Chaudhuri, 1916, *Mem. Indian Mus.*, **4** : 430, figs. 6-8 (type-locality : Chilka Lake, Orissa).

Hemipimelodus tenuispinis : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 18.



Text-fig. 110b. *Arius tenuispinis* Day

Common Names :

Day's catfish	...	English
Shingala	...	Marathi

Distinguishing Characters :

Body robust and elongate. Head depressed, the snout highly depressed and angular; median fontanelle groove on top of head reaching to base of supra-occipital process; supra-occipital process about 4 times as long as broad; basal plate before dorsal-fin small and V-shaped; skin of head on either side of fontanelle and behind eyes with tubercles. Barbels around mouth shorter than the head. Teeth in jaws villiform; premaxillary tooth-band distinctly divided in middle, about 4.5 times as long as broad; teeth on palate in 2 pear-shaped large patches, much convergent behind and placed far back almost at posterior extremity of roof of mouth; palatine teeth globular. Dorsal-fin spine slender; pectoral-fin as long as dorsal-fin spine but slightly stronger.

Colour : body dark grey on dorsal surface, merging to silvery-grey ventrally. Tips of dorsal, pectoral and caudal fins dusky.

Geographical Distribution : East African coast, India and Sri Lanka.

Fishery Information : This species contributes an important fishery along the Maharashtra, Karnataka and Andhra-Orissa coast of India. On the north-east coast of India, the species has three periods of peak abundance in a year falling roughly in February-April, May-July and October December. In this area hooks and lines with catamarans, boat-seines with catamarans, shore-seines with Masula boats, and drift-nets and gill-nets with catamarans, are the important fishing units in the commercial fishery which is presently confined to grounds of less than 50 m.

Arius thalassinus (Rüppell)

[Text-fig. 111]

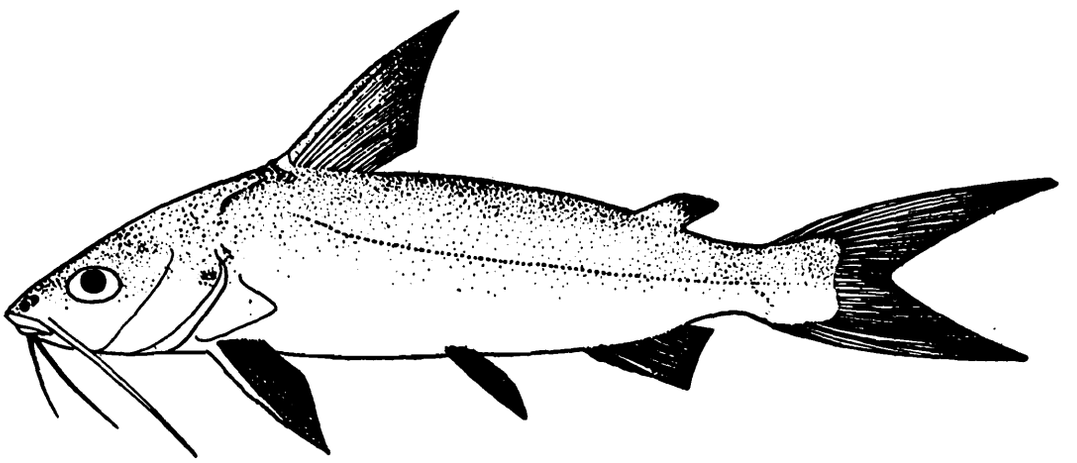
Bagrus thalassinus Ruppell, 1837, *Neue. Wirbelth. Fische Rothen Meeres* : 75, pl. 20, fig. 2 (type-locality : Massaua, Red Sea).

Arius serratus Day, 1877, *Fishes of India* : 462, pl. 105, fig. 3 (type-locality : Sind); Day, 1889, *Fauna Br India*, Fishes, **1** : 180; Jayaram and Dhanze, 1978, *Bull. zool. Surv. India*, **1**(2) : 203 (status discussed).

Arius thalassinus : Day, 1877, *Fishes of India* : 463, pl. 104, fig. 4 and pl. 106. fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **1** : 181.

Tachysurus thalassinus : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : fig. 12.

Tachysurus thalassinus : Misra, 1976 *Fauna of India*, Pisces (2nd ed.), **3** : 68, fig. 14.



Text-fig. 111. *Arius thalassinus* (Ruppell)

Common Names :

Giant marine-catfish	...	English
Thogadam, Jeddi-jellu	...	Telugu
Mandai-kaliru	...	Tamil
Navettah, Valiaettah	...	Malayalam
Kaggishedde, Mogarushedde	...	Kannada
Shingala	...	Marathi

Distinguishing Characters :

Body elongate and robust; snout rather obtuse; dorsal profile before dorsal-fin nearly straight and somewhat steep. Mouth sub-terminal; three pairs of barbels around mouth. Head shield weakly straited and granulated, its surface nearly smooth; supra-occipital process narrow, longer than broad at its base, its side border almost parallel and straight. Teeth in jaws villiform; teeth on palate fine, in 3 patches on either side, closely set and arranged in a large triangular group, the base of which is formed by two small anterior patches while the hind patch is much larger and extending backwards. Dorsal fin with a long pungent spine, prolonged into a fllament; pectoral spine rather strong, as long as dorsal spine; adipose dorsal fin considerably small.

Colour : body rich reddish-brown above, densely pigmented, the whole with a bronze or silvery lustre; with numerous narrow,

parallel, transverse iridescent cross-bands corresponding with lines of papillae. Dorsal, adipose and caudal fins dark terminally, as also upper surface of pectoral and pelvic fins.

Geographical Distribution : Widespread in the Indo-west Pacific region.

Fishery Information : As its name applies, this is a marine species often found in and around estuaries. The species is commercially abundant along both the east and west coast of India while the other species of *Arius* have more restricted commercial abundance. On the Andhra-Orissa-West Bengal coast, the catfish catches are composed of almost exclusively of *A. thalassinus* and *A. tenuispinis*. The commercial fishery is confined to grounds of less than 50 m., the important fishery units being boat-seines with catamarans, and hook and lines with catamarans. The fishery has three peaks in a year, in March, May-June and September-October. At Vizhinjam (Kerala) this species along with *T dussumieri*, constitutes the catfish fishery which generally starts in April and lasts till the end of the year, the peak month of the fishery being August. Grows to 935 mm.

Genus **Batrachocephalus** Bleeker

Batrachocephalus Bleeker, 1846, *Nat. Gen. Arch. Ned.-Indie*, (2)3 : 147, 176 (type-species : *Batrachocephalus ageniosus* Bleeker) ; Jayaram, 1982, *Rec. zool. Surv. India Occ. Pap.*, (37) : 4 (Review).

Body elongate and moderately compressed. Head large, broad and depressed, with head shields exposed. Mouth terminal ; a pair of very small mandibular barbels, with indications of inner (mental) ones ; maxillary barbels absent. Teeth conical in jaws ; palatines with conical teeth ; no teeth on vomer. Dorsal fin with a strong pungent spine and 7 soft rays ; adipose fin short, posteriorly free. Pectoral fin with a strong spine and 7 to 9 soft rays. Pelvic fin with 6 rays. Air-bladder free, not enclosed in bone.

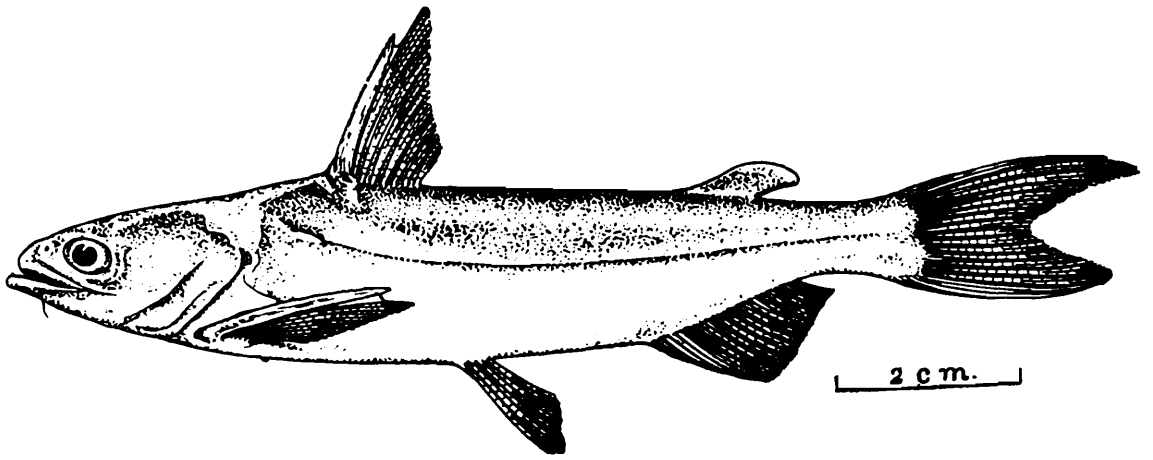
Monotypic.

Batrachocephalus mino (Hamilton- Buchanan)

[Text-fig. 112]

Agenelosus mino Hamilton-Buchhanan, 1822, *Fishes of Ganges* : 159 (type-locality : Ganges river).

Batrachocephalus mino : Day, 1877, *Fishes of India* : 468, pl. 108, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 192, fig. 70 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 3 : 14.



Text-fig. 112. *Batrachocephalus mino* (Hamilton-Buchanan)

Common Name :

Frog-headed catfish .. English

Distinguishing Characters :

Body elongate. Head large and broad; head-shields forming a cross, with the surface corrugated, the occipital process longer than broad at its base. Mouth wide and terminal, with one pair of small barbels (mandibular only), indications of inner mental pair seen but not conspicuous. Dorsal and pectoral fin spines serrated. Caudal fin forked.

Colour : body silvery, dark brown above. Fins yellowish, powdered with dark.

Geographical Distribution : Pakistan, India, Sri Lanka, Bangladesh, Burma and the East Indies.

In sea, estuaries and tidal rivers.

Fishery Information : Taken by fisherman rather infrequently in our region.

Genus **Osteogeneiosus** Bleeker

Osteogeneiosus Bleeker, 1846, *Nat. Gen. Arch. Ned.-Indie*, (2)3 : 146, 173 (type-species : *Osteogeneiosus macrocephalus* Bleeker) ; Jayaram, 1982, *Rec. zool. Surv. India, Occ. Pap.*, (37) 6 (Review).

Body elongate ; head strongly depressed, covered by smooth skin. Mouth moderate, only with a single pair of semiosseous stiff maxillary barbels. Teeth in jaws villiform ; on palate granular, in two widely separated patches. Short dorsal fin with a pungent spine and 7 soft rays ; adipose dorsal fin small. Anal fin with 19 to 22 soft rays.

Pectoral fin each with a strong pungent spine and 10 or 11 soft rays. Airbladder free, not enclosed in bone.

Monotypic.

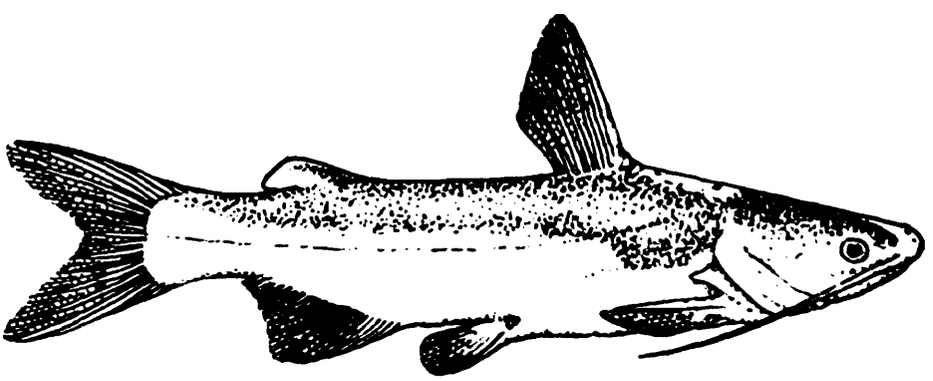
Osteogeneiosus militaris (Linnaeus)

[Text-fig. 113]

Silurus militaris Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 305 (type-locality : Asia).

Osteogeniosus militaris : Day, 1877, *Fishes of India* : 469, pl. 108 fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 190, fig. 69 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 21.

Osteogeniosus sthenocephalus Day, 1877, *Fishes of India* : 469, pl. 108, fig. 3 (type-locality : Moulmein, Burma) ; Day, 1889 *Fauna of Br. India*, Fishes. **1** : 191 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 22.



Text-fig. 113. *Osteogeneiosus militaris* (Linnaeus)

Common Names :

Soldier catfish	...	English
Sunga	...	Oriya
Pirathi-jella	...	Telugu
Pone-keliti	...	Tamil
Vengdi-etta, Ponkelithi	...	Malayalam
Sanget	...	Kannada
Shingala	...	Marathi

Distinguishing Characters :

Body elongate ; head strongly depressed. Mouth moderate, with only one pair of very stiff and bony maxillary barbels, rather longer than head. Head shield rather smooth, without granulations or rugose striae ; median fontanelle of moderate width, not reaching to base of supra-occipital bone ; supraoccipital process narrow, about 2.0 to 2.5 times as long as wide at its base. Teeth villiform, in bands in jaws ; teeth on palate in two longitudinal semioval patches, converging in front. Dorsal and pectoral fin-spines strong and serrated ; adipose dorsal fin medium-sized. Caudal fin forked.

Colour : head and back of body intense dark blue with silvery reflections, belly silvery white, sparingly dotted with black. Fins greyish white, minutely spotted with black; tips of dorsal and adipose dorsal fin dark blue.

Geographical Distribution : Pakistan, India, Sri Lanka, Bangladesh and the East Indies.

Found in turbid waters of the shallower parts of the continental shelf.

Fishery Information : This catfish is one of the commercially important species of our region and occurs in huge shoals on the Tamil Nadu coast south of Madras, from October to May. A coarse isinglass is made from the air bladder.

Family : PLOTOSIDAE
[Catfish-eels]

Elongated catfishes with naked slimy skin, the tail pointed or bluntly rounded. Four pairs of barbels around the mouth. No adipose fin; two dorsal fins, the second elongate and confluent with the caudal fin (as is the long anal fin); a pungent serrated spine in front of short-based first dorsal fin and one in each pectoral fin Pelvic fin with 10 to 12 soft rays. Branchiostegal rays 9 to 13.

This family is represented by about seven genera in the Indo-west Pacific. Majority of the members are marine, some are estuarine while a few species are permanently fluviatile. *Plotosus* is the only genus known from Indian waters and is represented by three species. The single dorsal and paired pectoral spines are each equipped along the sides with venom glands and are capable of causing extremely painly wounds, even with slight contact. Since these fishes often form schools in shallow coastal waters as well as in estuaries and rivers, they are a constant menace to the unwary fishermen or swimmer.

Genus **Plotosus** Lacepede

Plotosus Lacepede, 1803, *Hist. nat. Poiss.*, **4** : 129 (type-species : *Platystacus anguillaris* Bloch) ; Jayaram and Majumdar, 1968, *Proc. zool. Soc. Calcutta*, **20** : 137 (Review) : Tilak, 1970, *Ann. Zoologici*, **27**(14) : 261 (Revision) ; Jayaram, 1982, *Rec. zool. Surv. India Occ. Pap.*, (37) : 37.

Head depressed, covered with thin skin. Mouth transverse, overhung by snout; lips thick with papillae or small laminated folds;

usually conical teeth in upper jaw, in a narrow rectangular band, those in lower jaw in a crescentric band with a few molar teeth; vomerine teeth molar-like in a Λ-shaped band. Anterior nostril short rounded tubes, in front border of upper lip; posterior nostril slit-like, situated between eye and upper lip. Barbels four pairs around the mouth—nasal, maxillary and two pairs of mandibular, occasionally lateral folds at angles of mouth produced into short barbels. Two dorsal fins, the first small with a smooth or serrated spine, and the second dorsal* very long and confluent with caudal fin. Anal fin very long, also confluent with caudal fin. Pectoral fin with a weak or strong pungent, denticulated spine. Pelvic fin with 10 to 12 rays. A well developed tree-like structure (dentritic organ) between vent and anal fin, of unknown function.

These fishes are primarily marine but are often found in estuaries and the mouths of rivers, and sometimes push well up to freshwater. They are taken by bottom trawls, seines, and hook and line.

Four species, three in our area.

KEY TO SPECIES

1 (a) Body usually with 2 or 3 pale stripes; maxillary barbels extending somewhat behind eyes	...	*P. lineatus*
(b) Body without any stripes; maxillary barbels extending to or beyond opercular margin	...	2
2 (a) Eye 7 to 12% in head length; nasal barbels extending well behind eyes	...	*P. canius*
(b) Eyes larger, 13 to 20% in head length; nasal barbels shorter, extending only as far as posterior edge of eyes or slightly beyond	...	*P. limbatus*+

* According to Tilak (1964, *Sci. & Cult.* 35(3) : 114) this is an extension of the caudal fin and not a dorsal fin.

+ *Plotosus limbatus* Valenciennes has been reported from southeast and southwest coast of India, but its fishery value is most uncertain.

Plotosus canius Hamilton-Buchanan

(Text-fig. 114)

Plotosus canius Hamilton-Buchanan, 1822, *Fishes of Ganges* : 142, 374, pl. 15, fig. 44 (type-locality : rivers of Lower Bengal) ; Day, 1877, *Fishes of India* : 482, pl. 112, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 113, fig. 47 ; Jayaram and Majumder, 1968, *Proc. zool. Soc., Calcutta*, **20** : 142, fig. 2 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 150, fig. 26.



Text-fig. 114. *Plotosus canius* Hamilton-Buchanan

Common Names :

Canine catfish-eel	...	English
Kan-magur	...	Bengali
Kamda	...	Oriya
Ungilayi	...	Telugu
Irung-kellettee	...	Tamil
Vari-choongum, Mushu	...	Malayalam
Walshingti, Walshingala	...	Kannada
Nalshingali	...	Marathi

Distinguishing Characters :

Body elongate, its depth 6.5 to 10.5 times in standard length. Mouth transverse, bordered by thick, fleshy and papillated lips ; four pairs of barbels around mouth ; nasal barbels extending well behind eyes almost to nape, maxillary barbels extending to bases of pectoral fins, mandibular barbels shorter. Eyes small, 7 to 12% of head length. Two dorsal fins, the first short, the second with 130 to 140 soft rays. Anal fin with 106 to 131 soft rays. Caudal fin pointed, confluent with dorsal and anal fins.

Colour : dark olive green over head and body, below soiled creamy-buff ; barbels grey. Fins grey, first dorsal and pectoral fins darker.

Geographical Distribution : Estuaries of Pakistan, India, Sri Lanka, Bangladesh and the Indo-Australian archipelago as far as New Guinea.

Fishery Information : One of the important catfishes of India.

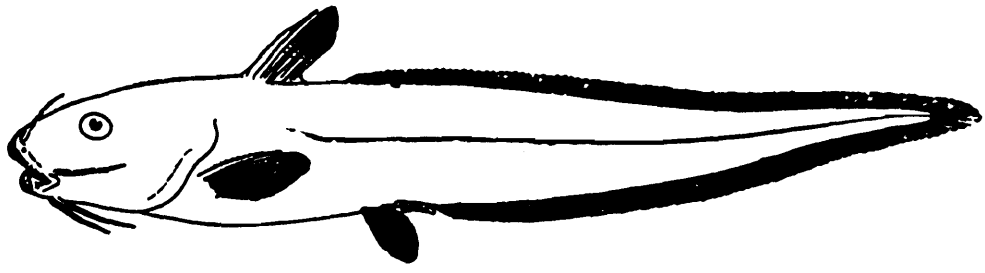
Plotosus lineatus (Thunberg)

[Text-fig. 115]

Silurus lineatus Thunberg, 1791, *K. Vetensk Akad. Nya Handl.*, **12** 190 (type-locality : Indian Ocean).

Plotosus arab (Bleeker) : Day, 1877, *Fishes of India* : 483, pl. 112, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 113 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **3** : 148.

Plotosus anguillaris (Bloch) : Misra, 1969, *Rec. Indian Mus.*, **57** : 177



Text-fig. 115. *Plotosus lineatus* (Thunberg)

Common Names :

Striped catfish-eel	...	English
Kandhia	...	Bengali
Ungilayi	...	Telugu
Kanja-kalutti, Kadal-changuan	...	Tamil
Mushu, Choongan, Moorghee	...	Malayalam
Schinghala	...	Kannada
Kalan, Nalshingali	...	Marathi

Distinguishing Characters :

Body elongate, its depth 6.2 to 7.5 times in standard length. Mouth transverse, with thick and papillose lips ; four pairs of barbels

around mouth; nasal barbels not extending beyond eyes, maxillary extending slightly beyond posterior margin of eyes, outer mandibulars to gill-opening, and inner mandibulars shorter. Two dorsal fins; the first dorsal short, the second with 80 to 100 soft rays. Anal fin with 58 to 82 rays. Caudal fin bluntly pointed, confluent with dorsal and anal fins.

Colour : body chestnut brown with 2 or 3 pale lateral bands, the superior one from above eyes along base of dorsal fin and the lower band from maxilla along middle of side of body; bands said to disappear with age. Vertical fins back edged. Dendretic organs yellow brown.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This colourful marine catfish is one of the most dangerous fishes found on the tropical reefs of the entire Indo-Pacific region, death often resulting from contact with its fin spines. The dorsal and pectoral spines are each equipped along the sides with venom glands and are capable of causing extremely painful wounds, even with slight contact. Since these fishes often form schools in shallow coastal waters as well as in estuaries and rivers, they are a constant menace to the unwary fishermen or swimmer. This catfish is one of the important catfishes in our region and are mostly caught in traps. The flesh of this fish is beleived to have emenagogue properties.

Order : MYCTOPHIFORMES

The majority are small fishes, many living in the depths of the oceans; a number of these deep-sea forms have light producing organs or photophores along the sides of the body. The premaxillae form the gape of the mouth (maxillae completely excluded); the upper jaw is not protrusible. The fins have soft rays without spines, and the pelvic fins are abdominal in position with 8 to 12 rays. Most of the species have a small adipose dorsal fin on the upper surface of the caudal peduncle just in front of the tail. Caudal fin usually forked. Scales small or absent.

KEY TO FAMILIES

1 (a) Caudal fin trilobed; body semitransparent; lateral line extending on to pointed median lobe of caudal fin ... **Harpadontidae**

	(b) Caudal fin forked	...	2
2	(a) Small photophores (light organs) arranged in groups and rows on head and body	...	Myctophidae*
	(b) No photophores on head and body	...	3
3	(a) Pectoral fins set very low down on body; no scales on body	...	4
	(b) Pectoral fins lateral on body	...	5
4	(a) Dorsal fin very high, sail-like, almost as long as body	...	Alepisauridae*
	(b) Dorsal fin low, and much less than half the length of fish	...	Evermannellidae*
5	(a) Upper jaw extending backward to level of eye or slightly in front of it	...	6
	(b) Upper jaw extending beyond level of middle of eye and generally much farther	...	7
6	(a) Dorsal fin set on anterior half of body; anal fin short, with 7 to 11 rays; brilliant green in colour; eyes large, their pupils key hole-shaped	...	Chlorophthalmidae*
	(b) Dorsal fin set behind midpoint of body; anal fin long, with 11 to 17 rays	...	Paralepididae*
7	(a) Pectoral fin distinctly divided into two parts, with uppermost rays greatly prolonged and lower part normal; eyes minute	...	Bathypteroidae*
	(b) Pectoral fins normal, not divided into two parts and without elongate rays	...	8
8	(a) Anal fin with 8 to 16 rays; scales well developed, firmly set	...	Synodidae
	(b) Anal fin with 18 to 27 rays; scales weakly developed, readily deciduous	...	Scopelachidae*

* The fishes of the family Myctophidae occur in large concentrations along the west coast of India, especially near the Angria Banks and off the Bombay shelf waters, and is a potential resource in view of their high vitamin 'A' content as well as oil content (110 litres per ton) but proper technology for harvesting this resource is yet to be developed; the fishes of the families Alepisauridae, Evermannellidae, Chlorophthalmidae, Paralepididae, Bathypteroidae and Scopelarchidae, are of no commercial value in our area.

Family : SYNODIDAE

(Synodontidae in the literature)

[Lizardfishes]

Body elongate, almost cylindrical. Head usually depressed distinctly and lizard-like. Mouth large, with rows of numerous, small, slender and pointed teeth, visible even when mouth is closed; teeth also on palate and tongue, those on palate in 1 or 2 bands. Dorsal fin with 9 to 14 rays; adipose dorsal fin present (absent in one species). Anal fin with 8 to 16 rays.

Lizard-fishes not only look like reptiles, but they also act like reptiles. Most of their time is spent sitting on the bottom with the body at a slight angle, propped up on the front end by the pelvic fins, like a jet fighter ready to take off. Most lizard-fishes are inshore shallow-water forms, usually living on sandy or muddy bottom adjacent to rocky or reef areas. Edible, but of poor quality.

KEY TO GENERA

1 (a) Pelvic fin with 9 rays, the inner ray barely longer than outer; palatine teeth in double bands on each side	...	**Saurida**
(b) Pelvic fin with 8 rays, the inner ray much longer than outer; palatine teeth in a single band on each side	...	2
2 (a) Eye opposite midpoint of upper jaw; head depressed; anal-fin base shorter than dorsal-fin base	...	**Synodus**
(b) Eye nearer to anterior end of upper jaw; head not depressed; anal-fin base longer than dorsal-fin base	...	**Trachinocephalus**

Genus **Saurida** Valenciennes

Saurida Valenciennes, 1849, *Hist. nat. Poiss.*, **22** : 499 (type-species : *Salmo tumbil* Bloch).

Body elongate, more or less rounded. the caudal region sometimes depressed. Head depressed; snout fairly pointed, rather short. Mouth large; teeth in jaws in several series, slender and pointed; teeth on palate in a double band on each side, also on tongue. Dorsal fin with 10 to 13 rays; adipose dorsal fin small, above short anal fin which has 9 to 12 rays. Pelvic fin with 9 rays, the inner ray barely longer than outer. Caudal fin forked.

Numerous closely related species of warm seas, 7 recorded from our waters.

KEY TO SPECIES

1 (a) Pectoral fins short, their tips not reaching to level of pelvic-fin origin; stomach white	...	*S. micropectaralis**
(b) Pectoral fins longer, reaching to or beyond level of pelvic-fin base	...	2
2 (a) Second dorsal-fin ray (sometimes also 3rd and 4th) distinctly elongated in adults; 2 rows of teeth on anterior part of outer palatine tooth band	...	*S. wanieso**
(b) No elongate dorsal-fin rays	...	3
3 (a) Lower jaw clearly projecting beyond tip of snout	...	*S. isarankurai**
(b) Lower jaw not projecting beyond tip of snout	...	4
4 (a) A series (4 to 7) of distinct dark dots on upper edge of caudal fin; stomack black	...	*S undosquamis*
(b) No black dots on upper edge of caudal fin	...	5
5 (a) Pectoral fins very long, reaching far beyond level of first dorsal fin ray	...	*S. longimanus**
(b) Pectoral fins short, just reaching to about level of pelvic-fin bases	...	6
6 (a) Dark cross-bars or a series of dark patches on all fins; pectoral fin with 12 or 13 rays	...	*S. gracilis*
(b) No dark patches/cross-bars on fins; pectoral fin with 14 or 15 rays	...	7
7 (a) Pectoral fin does not extend to pelvic-fin origin	...	*S. pseudotumbil**
(b) Pectoral fin extends to pelvic-fin origin	...	*S. tumbil*

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* *Saurida micropectoralis* Shindo & Yamda, *S. wanieso* Shindo & Yamada, *S. pseudotumbil* Dutt & Sagar, and *S. longimanus* Norman have been reported only recently by Dutt and Sagar (1981) ; and *S. isarankurai* Shindo & Yamada, by Nanda and Ramamurti (in press) from our region, but these are of no fishery importance.

Saurida gracilis (Quoy & Gaimard)

Saurus gracilis Quoy and Gaimard, 1824, *Voy. 'Uranie', Zoologie* : 224 (type-locality : Sandwich Islands) ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 292.

Saurida nebulosa Valenciennes : Day, 1877, *Fishes of India* : 505 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 411, fig. 131.

Common Names :

Slender lizardfish	...	English
Sudung	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and cylindrical, with lizard-like head. Mouth large; teeth in jaws in several series, 1 or 2 rows of teeth on anterior part of outer palatine tooth band. Dorsal fin with 10 or 11 rays. Anal fin with 9 or 10 rays. Pectoral fin with 12 or 13 rays, extending to level of pelvic-fin base. Pelvic fin rays almost equal in length.

Colour : brownish yellow above, silvery below, with obscure mottlings and sometimes cross-bars or sides. Dark cross-bars or a series of dark patches on all fins.

Geographical Distribution : Widespread in the tropical Indo-W. Pacific.

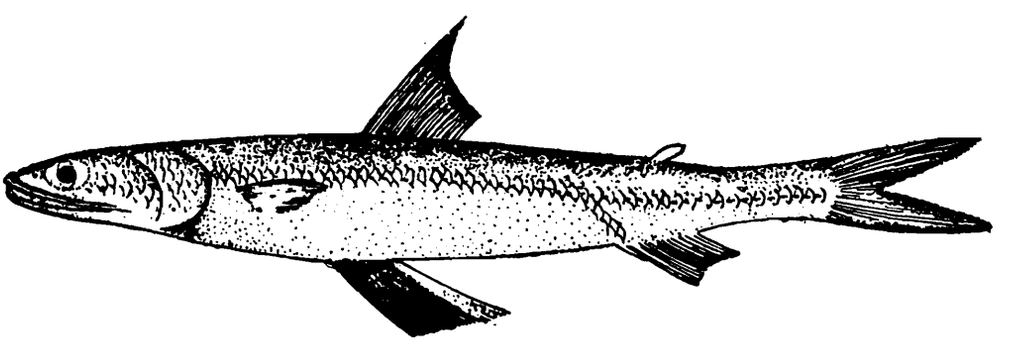
Fishery Information : This species reaches a length of 30 cm and is taken commercially only occasionally in our area.

Saurida tumbil (Bloch)

[Text-fig. 116]

Salmo tumbil Bloch, 1795, *Naturges. ausland. Fische*, **9** : 112, pl. 430 (type-locality : Malabar).

Saurida tumbil : Day, 1877, *Fishes of India* : 504, pl. 117, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 410, fig. 131 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed), **2** : 295, fig. 82,



Text-fig. 116. *Saurida tumbil* (Bloch)

Common Names :

Greater lizardfish	...	English
Bade-mottah	...	Telugu
Oolooway, Naimeen-puna, Cul-nahmacunda, Thumbli	...	Tamil
Arranna	...	Malayalam
Chorbombil	...	Marathi

Distinguishing Characters :

Body elongate and cylindrical, with lizard-like head. Mouth large; teeth in jaws in several rows; teeth in 3 or more rows on anterior part of outer palatine tooth bands. Dorsal fin with 11 to 13 rays. Anal fin with 10 or 11 rays. Pectoral fin with 14 or 15 rays, reaching to level of pelvic-fin base; pelvic fin rays almost equal in length.

Colour : back and upper sides brownish, lower sides and belly white, mottled, with traces of faint darker cross-bars on back. Inner side of pelvic fins dusky black, except for their margins; stomach white.

Geographical Distribution : Tropical Indo-west Pacific.

Lives over muddy bottom of the continental shelf, down to about 100 m.

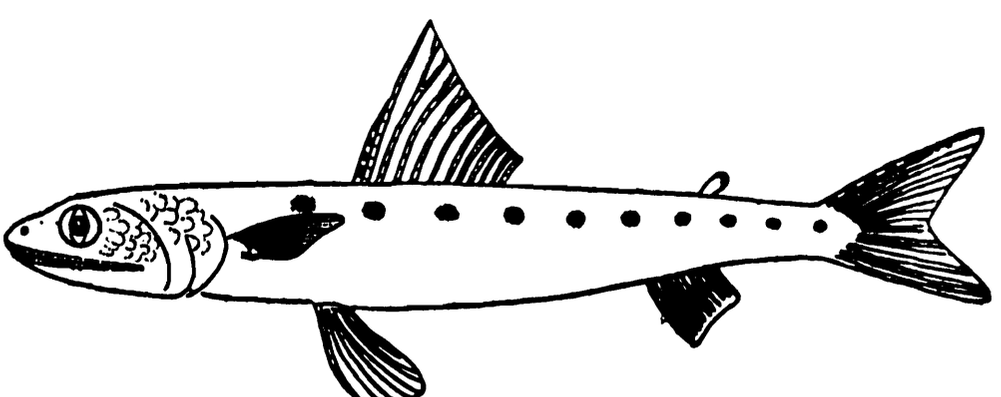
Fishery Information : This is a familar fish of the coastal waters and trawling grounds in our area, and attains a length of 45 cm. The best catches are from the Palk Bay.

Saurida undosquamis (Richardson)

[Text-fig. 117]

Saurus undosquamis Richardson, 1848, Zool. *'Erebus and Terror'*, Fishes : 138, pl. 51, figs. 1-6 (type-locality : N. W. Australia).

Saurida undosquamis : Subha-Rao, 1964, *J. mar. biol. Ass. India*, **6** (2) : 265, fig.; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 296.



Text-fig. 117. *Saurida undosquamis* (Richardson)

Common Name :

Brushtooth lizardfish ... English

Distinguishing Characters :

Body elongate and cylindrical, with lizard-like head. Mouth large; several rows of slender, pointed teeth in both jaws; palatine teeth in 2 pairs of bands, 2 rows of teeth on anterior part of outer palatine tooth bands. Dorsal fin with 11 to 13 rays. Anal fin with 10 to 13 rays. Pectoral fin with 14 or 15 rays, extending beyond level of pelvic-fin base. Pelvic fin with 9 rays, the rays almost equal in length.

Colour : body brown-grey, lighter below, with a series of fairly distinct 8 to 10 dark blotches along lateral line. Upper edge of caudal fin with 4 to 7 dark dots; front edge of dorsal fin with dark dots. Stomach black; liver striped black and white.

Lives over muddy bottoms of the continental shelf, down to about 60 m.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This species is one of the few in the family that is considered a fairly good food fish and reaches a length of 50 cm. Taken commercially in small quantities, mostly at Vizagapatnam (Andhra Pradesh) in the trawl nets.

Genus **Synodus** Scopoli

Synodus Scopoli, 1777, *Introd. Hist. Nat.* : 499 (type-species : *Esox synodus* Linnaeus) ; Cressey, 1981, *Smithsonian Contr. Zool.*, (343) : 1 (Review).

Body elongate, more or less rounded. Head depressed and lizard-like, naked above, the surface of the bones more or less ruguse. Snout rather pointed in profile; eye opposite about mid-point of upper jaw. Mouth large; teeth in jaws in 1 or 2 rows, compressed and pointed; palatine teeth in one pair of bands; tongue dentate. Dorsal fin with 10 to 15 rays, the first two simple; adipose dorsal fin small. Anal fin with 8 to 15 rays, its base shorter than dorsal-fin base. Pelvic fin with 8 rays, the inner ray much longer than the outer ray. Caudal fin forked.

Mostly littoral fishes of moderate size; 21 species, 9 in our region.

KEY TO SPECIES

1 (a) Anteriormost palatine teeth longer than the more posterior teeth and in a discrete group	..	2
(b) Anterior palatine teeth not longer than others and not in a discrete group	...	5
2 (a) Scales above lateral line, 3.5	...	*S. binotatus**
(b) Scales above lateral line, 5.5 (rarely 6.5)	...	3
3 (a) Postoral portion of cheeks scaly	...	*S. englemani**
(b) Postoral portion of cheeks naked	...	4
4 (a) Caudal peduncle with conspicuous lateral spot; very short nasal flap on anterior nares	...	*S. jaculum**
(b) Caudal peduncle without conspicuous black spot; anterior nasal flap short or long	...	*S. variegatus*
5 (a) Posterior pelvic process narrow	...	6
(b) Posterior pelvic process wide	...	8
6 (a) Lateral line scales 58 or more; dorsal fin with two broad bars	...	*S. gibbsi**
(b) Lateral line scales less than 58; dorsal fin with more than two narrow bars when barred	...	7
7 (a) Snout distinctly rounded in dorsal aspect; length of nasal flap nearly equal to base width	...	*S. oculeus**
(b) Snout pointed in dorsal aspect; length of nasal flap much greater than base width	...	*S. macrocephalus**
8 (a) Base of anal fin longer than dorsal-fin base	...	*S. sageneus**
(b) Base of anal fin shorter than dorsal-fin base	...	*S. indicus**

* *Synodus binotatus* Schultz, *S. englemani* Schultz, *S. jaculum* Russel & Cressey, *S. gibbsi* Cressey, *S. oculeus* Cressey, *S. macrocephalus Cressey*, *S. sageneus* Waite and *S. indicus* (Day), are of no fishery importance in our area.

Synodus variegatus (Lacepede)

Salmo variegatus Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 157, pl. 3, fig. 3 (type-locality : not given).

Synodus japonicus (Houttuyn) Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 299.

Common Names :

Variegated lizardfish	...	English
Sudung, Valakka	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and cylindrical, with lizard-like head. Anterior most palatine teeth longer than the most posterior teeth and in a discrete group. Dorsal fin with 11 to 13 rays ; anal fin with 8 to 10 rays. Pectoral fin with 12 or 13 rays, extending to or beyond a line from origin of pelvic fin to dorsal-fin origin. Lateral line with 55 to 61 scales ; scales above lateral line $5\frac{1}{2}$.

Colour : body brownish or greyish above, yellowish on belly ; back and sides of body with 8 or 9 darker cross bands, sometimes joined below by a line. Fins light yellow ; sometimes with faint stripes on dorsal, pectoral and caudal fins.

Geographical Distribution : Widespread in the tropical Indo-W. Pacific.

Fishery Information : The species occurs all along the coast of India and is common in the trawl catches.

Genus **Trachinocephalus** Gill

Trachinocephalus Gill, 1861, *Proc. Acad. nat. Sci. Philad., Suppl.* : 53 (type-species : *Salmo myops* Schneider).

Body elongate and moderately compressed. Head not strongly depressed, but more or less lizard-like, with eyes placed near to tip of snout ; snout short, shorter than eye-diameter. Mouth large, with small, close-set teeth ; a single band of teeth on each side on palate. Dorsal fin with 11 to 14 rays ; small adipose fin present. Anal fin with 15 or 16 rays ; anal-fin base distinctly longer than dorsal-fin base. Pelvic fin with 8 rays, the inner ray much longer than outer.

Monotypic.

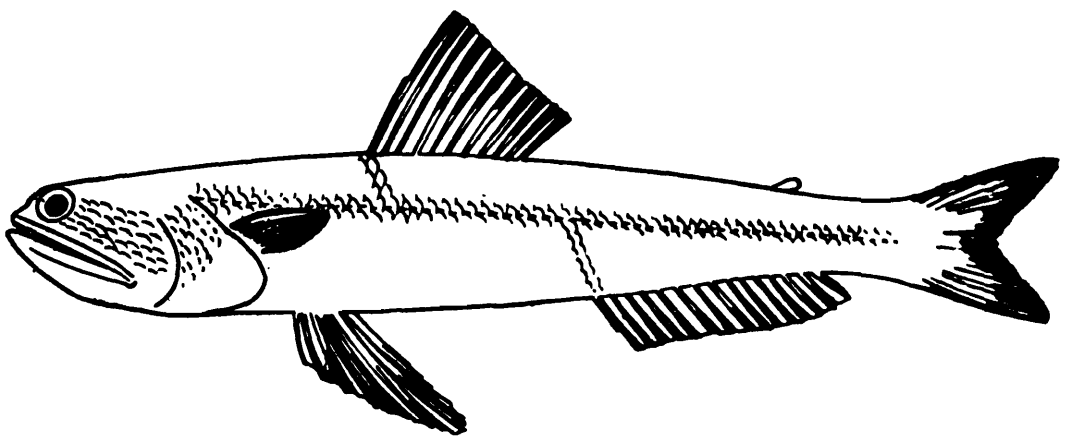
Trachinocephalus myops (Schneider)

[Text-fig. 118]

Salmo myops Schneider (*ex* Forster ms), 1801, *Syst. Ichth.* : 421 (type-locality : St. Helena).

Saurus myops : Day, 1877, *Fishes of India* : 504, pl. 117, fig. 5 ; Day. 1889, *Fauna Br. India*, Fishes, 1 : 409, fig. 130.

Trachinocephalus myops : Misra, 1976, *Fauna of India*, Pisces (2nd ed.), 2 : 302, fig. 84.



Text-fig. 118 *Trachinocephalus myops* (Schneider)

Common Names :

Bluntnose lizardfish	...	English
Chor-Bombil	...	Marathi

Distinguishing Characters :

Body elongate and moderately compressed. Head not strongly depressed, but more or less lizard-like, with eyes placed near to tip of snout ; snout shorter than eye-diameter. Mouth large, with small, close-set teeth ; palatine teeth in a single band on each side. Dorsal fin with 11 to 14 rays ; anal fin with 15 or 16 rays. Pectoral fins rather small. Pelvic fin with 8 rays, the inner ray about 3 times longer than outer ray.

Colour : head and back greenish brown, upper flanks with faint blue-green and yellow irregular longitudinal stripes ; lower flanks and belly silvery. Fins pale yellow.

Geographical Distribution : Occurs in the warm waters of all oceans.

Lives over muddy bottoms of bays and coastal waters.

Fishery Information : Taken commercially only occasionally in our area.

Family : HARPADONTIDAE

[Bombay-Ducks]

Elongate and flatly compressed, translucid fishes, usually with an adipose dorsal fin and trilobed caudal fin. Head short and compressed; eyes very small, near snout and directed forward; snout very short and rounded; mouth very large, bordered above by long, slender pre-maxillary; no maxillary. Jaw teeth unequal and slightly curved, awl-shaped and depressible; inner teeth of lower jaw enlarged and conspicuously hastate (like spear-head); similar teeth in one or two rows on vomer, palatines and pterygoids, as also on tongue and on branchial arches. Pelvic fins extremely long. Head and body naked (except for scales along the lateral line and on part of posterior half). Lateral line extending onto pointed median lobe of caudal fin.

Genus **Harpadon** Le Sueur

Harpadon Le Suer, 1825, *J. Acad. nat. Sci. Philad.*, **5** : 48 (type-species : *Osmerus microps* Le Sueur = *Osmerus nehereus* Hamilton-Buchanan) (Spelt *Harpodon* by later workers).

The genus derives its name from the enlarged teeth in the lower jaw, each ending in a sharp barb. Unequal and partly curved, subulate, depressible teeth in a band on jaws, especially in lower jaw, the inner ones are enlarged and conspicuously hastate. Similar teeth present on vomer, palatines, pterygoids, tongue and branchial arches. Head thick, very short, with very short rounded snout; cleft of mouth very wide, lower jaw prominent.

Four species, three in our waters.

KEY TO SPECIES

1 (a) Adipose dorsal fin absent	...	*H. translucens**
(b) Adipose dorsal fin present	...	2
2 (a) Pectoral fins short, their tips not reaching to level of pelvic-fin origin	...	*H. squamosus**
(b) Pectoral fins long, their tips extending considerably beyond level of pelvic-fin origin	...	*H. nehereus*

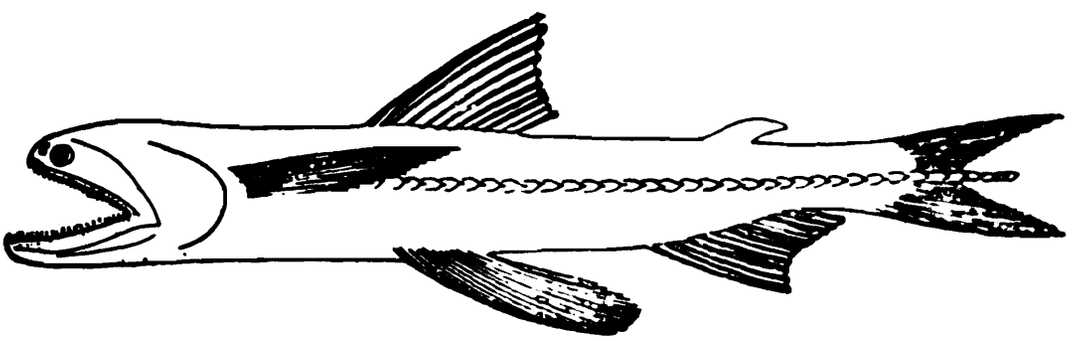
* *Harpadon translucens* Saville-Kent has been recorded only recently (Dutt & Sagar, in press) in our waters; *H. squamosus* Alcock is a deepwater species of no fishery importance in our area.

Harpadon nehereus (Hamilton-Buchanan)

[Text-fig. 119]

Osmerus nehereus Hamilton-Buchanan, 1822, *Fishes of Ganges* : 209 (type-locality : mouth of Ganges R.).

Harpodon nehereus : Day, 1877, *Fishes of India* 505, pl. 118, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 412 ; Misra, 1976, *Fauna of India*, Pisces (2nd ed.), **2** : 287, fig. 80.



Text-fig. 119. *Harpadon nehereus* (Hamilton-Buchanan)

Common Names :

Bombay-duck	...	English
Bumaloh, Lutia, Nehare	...	Bengali
Bombil	...	Oriya
Cucah-sawahri, Coco-mottah	...	Telugu
Vangaravasi	...	Tamil
Bombil, Bunmalo	...	Marathi
Bumla	...	Gujarati

Distinguishing Characters :

Body elongate, somewhat compressed and soft. Eyes very small, covered by adipose membrane ; snout very short. Mouth very wide, armed with slender, recurved and depressible teeth of unequal size ; palatine teeth also large and depressible ; lower jaw longer than upper. Dorsal fin with 12 to 14 rays, followed by a conspicuous adipose fin. Anal fin with 14 or 15 rays. Pectoral fins long, their tips reaching beyond level of pelvic-fin origin. Pelvic fins very long, extending beyond anal-fin origin.

Colour : uniform light grey, speckled with black, translucid when alive ; fins dark.

Geographical Distribution : Indo-W. Pacific.

Inhabits coastal waters and estuaries.

Fishery Information : The Bombay-duck constitutes a fishery of great commercial importance in the country. It occurs along both the coasts but about 98% is caught from the west coast. The major catch is landed in the Satpati—Dahanu area of Maharashtra and the Jaffrabad—Nawabunder area of Gujarat. The remaining 2% is caught in West Bengal, Orissa, Andhra and Tamil Nadu. The season for Bombay-duck lasts from September to May or June with the bulk of the landings taking place during October-December. The annual average catch during 1960-69 period was about 84,000 tonnes and formed about 10% of the marine fish catch. The fishery is supported largely by fishes ranging in size between 90 and 300 mm belonging to 0-2 year classes. The fishing methods are as varied as its distribution. On the Gujarat and Maharashtra coasts it is exclusively caught in the bag net ("Dol"), the fishing operations are carried up to a depth of 40 m. In Bengal and Orissa also bag-nets are in vogue, while in Andhra seines are the principal gears. The flesh of this fish is dried and used as bors d' oeurre or as an accompaniment to curries, is called Bombay-duck; by usuage the name has become attached to the fish itself.

Order : GADIFORMES

Elongate body; usually with long dorsal and anal fins, dorsal fin sometimes divided into 2 or even 3 parts; the fins soft-rayed, usually without spines, but a bony ray occasionally serrate behind. Pelvic fins, if present, below and in front of pectoral fins. Scales cycloid except in macrourids.

These fishes may often be identified by the "cod-look" which is partially due to the location of the pelvic fins ahead of the pectoral fins, sometimes under the throat. Some of them are among the most important food-fishes of the world in the temperate regions of the Pacific and Atlantic Oceans.

KEY TO FAMILIES

1 (a)	Pelvic fins, when present, placed under either beneath eye or posterior part of head, immediately adjacent or relatively close to each other	... 2
(b)	Pelvic fins under, behind, or in front of pectoral fins	... 3
2 (a)	Anus behind head; pelvic and caudal fins usually present; mouth usually protractile	... Ophidiidae*

(b) Anus on throat; pelvic and caudal fins absent; mouth non-protractile	...	Carapidae*
3 (a) Two dorsal fins, the first on nape consisting of an elongated ray and second fin with large notch in middle; no chin barbel	...	Bregmacerotidae
(b) One or two, rarely three dorsal fins, the first not on nape	...	4
4 (a) Second dorsal and anal fins confluent with caudal fin, which tapers to a sharp point	...	Macrouridae*
(b) Second dorsal and anal fins confluent around tip of tail, a small but distinct caudal fin present	...	Moridae*

Family BREGMACEROTIDAE
[Codlets]

Elongate body with short snout. Two dorsal fins, the first of a single elongate ray on head. Second dorsal fin and anal fin long, with large notch in middle. No chin barbels. Fairly large scales. Pelvic fin with 5 soft rays, outer three rays elongate free filaments. Lateral line adjacent to second dorsal fin.

Small tropical fishes of coastal waters and the open sea, usually in depths from 200 to 500 m. but also caught on near surface

One genus only.

Genus **Bregmaceros** Thompson

Bregmaceros Thompson, 1840, *Mag. nat. Hist. Charlesworth*, **4** : 184 (type-species : *Bregmaceros mcclellandi* Thompson) ; Ancona and Cavinto, 1965, *Dana Rep.*, **64** : 1 (Review).

Moderately elongate and compressed; head small, somewhat compressed. Teeth minute, in a single series on both jaws; small teeth on vomer, none on palatines. Gill openings wide, the gill membranes united below throat but not attached to isthmus. Two dorsal fins: the first a single long ray on nape; the second fin long, its origin above vent, and consisting of an anterior and posterior elevated portion con-

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* The fishes of the families Ophidiidae, Carapidae, Macrouridae and Moridae are of no commercial value in our region.

nected by a dwarfed portion of isolated spines. Anal fin similar to second dorsal fin. Pelvic fins jugular, their origin apposed, composed of 5 rays, the outer ones extremely elongate. Scales cycloid, deciduous, of moderate size. Branchiostegal with 7 rays.

Eight species recognised, only one in our area.

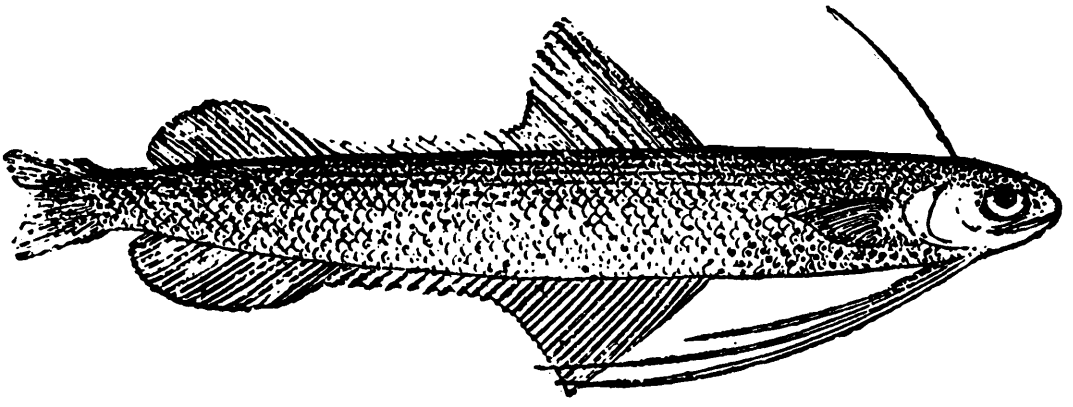
Bregmaceros maccleliandi Thompson

[Text fig. 120]

Bregmaceros macclellandii Thompson, 1840, *Mag. nat.. Hist. Charlesworth*, **4** : 184, fig. (type-locality : Gangetic delta).

Bregmaceros atripinnis (Tickell) : Day, 1877, *Fishes of India* : 418, pl. 41, fig. 1.

Bregmaceros macclellandi : Day, 1889, *Fauna Br. India*, Fishes, **2** : 433, fig. 151.



Text-fig. 120. *Bregamaceros macclellandi* Thomson

Common Names :

Indian cod	...	English
Misalu-magu	...	Telugu
Tenali, Khada	...	Marathi

Distinguishing Characters :

Moderately elongate and compressed. First dorsal fin a single long ray on head reaching to second dorsal fin ; second dorsal fin long, with large notch in middle. Anal fin long, with large notch in middle. Pelvic fins attached to throat and three outer rays long, separate filaments which trail backward for one-half the length of fish.

Colour : brown above, silvery below and minutely dotted with brown. Dorsal fin usually blackish, other fins hyaline or dusky.

Geographical Distribution : Indo-west Pacific.

Fishey Information : This interesting [illegible] caught along the west coast of India supporting a seasonal fishery around Bombay. In 1961-65 the annual average catch was 4,338 tonnes forming 0.59% of the total marine fish catch of India. The fishery commences in October after the south-west monsoon with peak landings but declines by about March. Along other coastal regions of India the species occurs only in stray catches.

Order : ATHERINIFORMES

Opercular and preopercular margin without spines or serrations; ctenoid scales in relatively few species; branchiostegal rays 4 to 15; ligamentous support of pectoral skeleton (Baudelot's ligament) to basicranium; four cuboidal pectoral actinosts; caudal skeleton usually with two large triangular hypural plates, never more than four; swimbladder physoclistic.

KEY TO SUBORDERS

1 (a)	Branchiostegal rays 9 to 15; lateral line usually low on body; single dorsal fin	Exocoetoidei
(b)	Branchiostegal rays 4 to 7; one or two dorsal fins ...	2
2 (a)	Lateral line absent or very weak; usually two dorsal fins, the first, if present, with flexible spines; anal fin usually preceded by a spine ...	Atherinoidei
(b)	Lateral line developed chiefly on head, not on body; single dorsal fin; no spines in fins ...	Cyprinodontoidei*

Suborder : EXOCOETOIDEI

Moderately to extremely elongated fishes; no spines in dorsal fin; dorsal and anal fins set equally far back on body; single dorsal fin; pelvic fin with 6 rays; caudal fin with 13 branched rays; lateral line usually low on body; narial opening single; branchiostegal rays 9 to 15;

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*The fishes of the suborder Cyprinodontoidei represented by the families Cyprinodontidae, Oryziatidae, Poeciliidae and Horaichthyidae, are confined to the fresh and brackish waters of our region.

upper jaw bordered by premaxilla only; parietals absent; scales cycloid.

A large group of silvery surface fishes.

KEY TO FAMILIES

1 (a) Scales small (usually 130 to 350 in lateral line); mouth opening large, both upper and lower jaws extended into long beaks with numerous needle-sharp teeth	...	Belonidae
(b) Scales large (usually 38 to 60 in lateral line); mouth small, only lower jaw prolonged or none of the jaws prolonged; teeth minute, no needle-like teeth	...	2
2 (a) Mouth normal, jaws short and not produced in a long beak; pectoral fins strikingly long, extending beyond dorsal-fin origin; pelvic fins exceptionally large in some species	...	Exocoetidae
(b) Lower jaw usually prolonged, much longer than upper jaw; pectoral and pelvic fins usually short	...	Hemiramphidae

Family : EXOCOETIDAE

[Flyingfishes]

Elongate fishes, their bodies broadly cylindrical (round in cross-section), flattened ventrally in some species. Snout blunt; mouth small, jaw teeth absent or very small. Gill-rakers well developed; upper pharyngeal bones of third gill arches close together, but not fused into a single plate. No spines in fins; dorsal and anal fins set equally far back on body, their bases short and opposed. Pectoral fins high on sides, strikingly long, extending beyond dorsal-fin origin, to form wings used for gliding over the surface of the sea; pelvic fins abdominal in position, and greatly enlarged in many species. Caudal fin deeply forked, its lower lobe longer than upper. Lateral line low down on body; scales large, cycloid (smooth to touch), easily shed.

Identification of a flying fish is not difficult because of the enlarged "flying fins" and, of course, the lopsided tail, with its lower lobe much longer than the upper. Young stages (to about 10 cm) quite different in appearance from adults; juveniles of many species have

a pair of long, flaplike whiskers. As a rule, flying fishes are found offshore, usuall over deep water; however, there are some inshore forms occurring in coastal waters. Although these fishes are present along both the west and east coasts of India, a well marked fishery for flying fishes is limited to the Tamil Nadu coast only. Its scope has been increasing in recent years owing to the rising popularity of these delicately flavoured and highly nutritious fishes.

KEY TO GENERA

1 (a) Pelvic fins short, not reaching or barely reaching anal-fin origin	...	2
(b) Pelvic fins long, reaching well beyond anal-fin origin	...	3
2 (a) A large patch of teeth on vomer; tongue dentate; pectoral fins not reaching beyond posterior part of anal-fin origin; pelvic fin insertion closer to anal-fin origin than to pectoral-fin insertion; dorsal fin with a dark pigmented area	...	**Parexocoetus**
(b) No teeth on vomer or tongue; pectoral fins reaching beyond anal-fin base to, or almost to, caudal-fin base; pelvic-fin insertion closer to pectoral-fin insertion than to anal-fin origin; dorsal fin without pigment	...	**Exocoetus**
3 (a) Origin of anal fin slightly before, under, or not more than 3 rays behind dorsal fin origin; number of rays in dorsal and anal fins the same or differing by not more than 2 rays	...	**Hirundichthys**
(b) Origin of anal fin on the same vertical as 4th ray of dorsal fin or behind this; dorsal fin with 2 to 5 rays more than anal fin	...	4
4 (a) First 2 pectoral rays unbranched	...	**Prognichthys***
(b) Only the first pectoral ray unbranched	...	**Cypselurus**

* The genus *Prognichthys* Breder represented by *P. gibbifrons* (Valenciennes), has been reported only recently in our area.

Genus Cypselurus Swainson

Cypselurus Swainson, 1838, *Natural History of Animals*, Fishes, **1** : 299 (type-species : *Exocoetus appendiculatus Wood* = *E. comatus* Mitchell) (Often spelt as *Cypsilurus*).

Body elongate, thick, somewhat flattened ventrally. Pectoral fins extending to well beyond last ray of dorsal fin, usually reaching to caudal-fin base, greater than *ca.* 45% of standard length, only the first pectoral ray unpranched. Pelvic fins long, reaching well beyond the anal-fin origin ; greater than *ca.* 24% of standard length, inserted nearer to caudal-fin base than to tip of snout. Anal fin shorter than dorsal fin, its origin never in advance of 4th dorsal ray, usually further back. Teeth small in jaws and sometimes on palatines ; no teeth on vomer, pterygoids and tongue.

Many species, 6 in our area.

KEY TO SPECIES**

1 (a) Pectoral fins with distinct dark spots	...	*C. spilopterus*
(b) Pectoral fins without spots	...	2
2 (a) Scale rows across back in front of dorsal fin (predorsal scales) 23 to 29	...	3
(b) Predorsal scales greater than *ca* 33	...	4
3 (a) Palatine-tooth patch long and club-shaped	...	*C. oligolepis*
(b) Palatine teeth usually present, the patch small and oblong	...	C. exsiliens*
4 (a) Dorsal fin with a prominent black spot	...	*C. cyanopterus**
(b) Dorsal fin colourless or only slightly pigmented	...	5
5 (a) Palatine teeth present	...	*C. bahiensis**
(b) Palatine teeth absent	...	*C. furcatus*

** The identity of Cypselurus starksi Abe recently reported from the Andamans is uncertain.

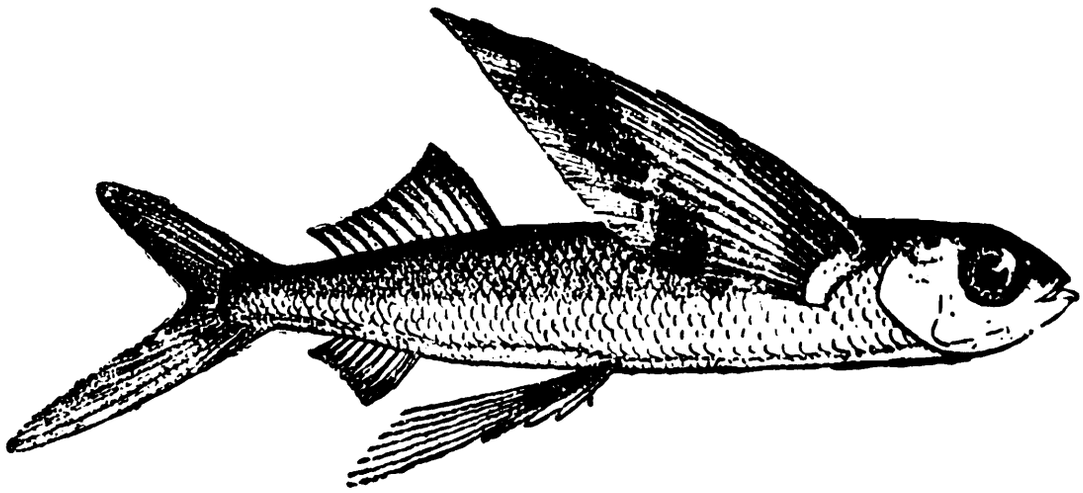
* *Cypselurus exsiliens* (Linnaeus), *C. cyanopterus* (Valenciennes) and *C. bahiensis* (Ranzani) do not contribute to any fishery in our region ; the species *exsiliens*, *cyanopterus* and *furcatus* are often treated under the genus *Cheilopogon* Lowe by some workers which does not seem to be very satisfactory.

Cypselurus furcatus (Mitchell)

[Text fig. 121]

Exocoetus furcatus Mitchell, 1815, *Trans. Lit. Philosoph. Soc.* New York, 1 : 449, pl. 5, fig. 2 (type-locality . not known) ; Day, 1877, *Fishes of India* : 519.

Excoetus altipinnis Valenciennes : Day, 1889, *Fauna Br. India*, Fishes, 1 : 430.



Text-fig. 121. *Cypselurus furcatus* (Mitchell)

Common Names :

Spotfin flyingfish	...	English
Fulanghi, Purava	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, thick, somewhat flattened ventrally. Teeth in jaws conical ; no palatine teeth. Dorsal fin with 13 rays ; anal fin with 10 to 12 rays, its origin 3 rays or more behind dorsal-fin origin. Pectoral fins strikingly long, reach to or near end of dorsal fin. Pelvic fins large, reaching well beyond anal-fin origin. Scales large, 46 to 52 along lateral line ; predorsal scales about 28.

Colour : back iridescent blue, belly silvery. Dorsal fin lightly or not pigmented ; pectoral fins relatively dark and with a pale margin, the central portion crossed by a pale curved stripe ; tail dusky.

Geographical Distribution : Mostly Indian Ocean, also in Atlantic and Central Pacific.

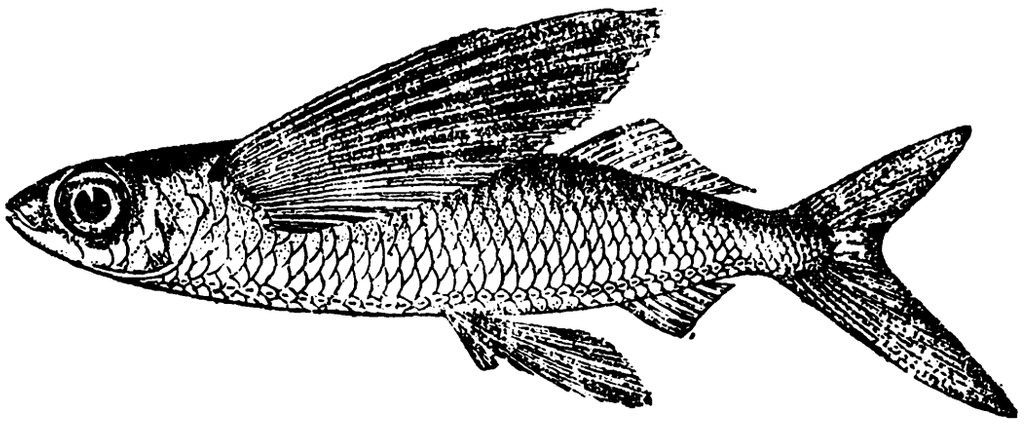
Fishery Information : Taken commercially only occasionally along the Bombay coast.

Cypselurus oligolepis (Bleeker)

[Text-fig. 122]

Exocoetus oligolepis Bleeker, 1866, *Nat. Tijdschr. Dierk.*, **3** : 109 (type-locality : East Indies).

Cypselurus oligolepis : Chandy, 1954, *Rec. Indian Mus.*, **52** : 179; Jones and Kumaran, 1965, *J. mar. biol. Ass, India*, **7**(1) : 111, fig. 5.



Text-fig. 122. *Cypselurus oligolepis* (Bleeker)

Common Names :

Bleeker's flyingfish	...	English
Paravai-Kola	...	Tamil

Distinguishing Characters :

Body fairly robust. Teeth in 2 or 3 rows, small and tricuspid in both jaws; elongate and club-shaped patch of teeth on palatines. Dorsal fin with 11 to 13 soft rays; anal fin with 8 or 9 soft rays, its origin below 6th or 7th dorsal ray. Pectoral fins reaching to posterior third of dorsal fin. Pelvic fins longer than head length, reaching to middle of anal fin, its origin midway between posterior border of eye and base of caudal fin. Scales moderate; 39 to 46 scales in lateral line; 23 to 26 predorsal scales.

Colour : bluish brown above, silvery below. Pectoral fins blackish, tip of fin and lower 4 or 5 rays hyaline. Dorsal fin hyaline, anterior two rays often slightly dusky. Pelvic and anal fins transparent. Caudal fin slightly dusky.

Geographical Distribction : Zanzibar, Muscat, India, through the East Indies, the Philippines, China to Tahiti.

Fishery Information : This flying fish exhibits a seasonal abundance along the coastal waters of the Gulf of Mannar in the Mandapam area during February and March ; it is caught by the shore-seines and it constitutes the majority of the catches on those days when this is caught being a shoaling form.

Cypselurus spilopterus (Valenciennes)

Exocoetus spilopterus Valenciennes, 1846, *Hist. nat. Poiss.*, **19** : 113 (type-locality : Carolines).

Exocoetus poecilopterus (*nec* Valenciennes) Day, 1877, *Fishes of India* : 518, pl. 70, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 430, fig. 138

Cypselurus spilopterus : Chandy, 1954, *Rec. Indian Mus.*, **52** : 178.

Common Names :

Indian-spotted flyingfish	...	English
Gobirange	...	Telugu
Parravy-kolah, Thai-kola	...	Tamil
Pakharu-masa	...	Marathi
Sikkifulanghi, Fulliparava	...	Lakshadweep Is.

Distinguishing Characters :

Body fairly robust, moderately compressed. Teeth comparatively well-developed, simple, in a few rows in both jaws ; a few teeth on each side of palatines. Dorsal fin with 12 to 15 rays. Anal fin with 9 or 10 rays, its origin opposite to 6th ray of dorsal fin. Pectoral fins extending to posterior part of dorsal fin or further. Pelvic fins longer than head length (or scarcely so), extending to about middle of anal fin. Scales moderate, 30 to 32 predorsal scales ; 50 to 55 scales along lateral line.

Colour : back bluish, silvery below. Pectoral fins light bluish, with a narrow hyaline hind border and an indication of a hyaline transverse band, with numerous black spots ; caudal fin dusky ; pelvic and dorsal fins occasionally with a black spot posteriorly.

Geographical Distribution : India and the East Indies.

Fishery Information : Common on the Tamil Nadu asd Andhra coasts and is one of the large-sized flying fishes of Indian waters.

It is usually caught in small numbers along with *Hirundichthys coromandelensis* which accounts for nearly 90% of the flying fish landings of the country.

Genus **Exocoetus** Linnaeus

Exocoetus Linnaeus, 1758, *Systema Naturae* (ed. 10), **1** : 316 (type-species : *Exocoetus volitans* Linnaeus).

Body elongate, thick, somewhat flattened ventrally; snout short and blunt. Pectoral fins strikingly long, extending well beyond dorsal-fin base, usually reaching caudal-fin base, its length greater than *ca.* 69% of standard length. Pelvic fins short, far from reaching anal fin, inserted nearer to pectoral-fin base than to anal-fin origin, its length less than *ca.* 21% of standard length. Teeth very small; no palatine teeth.

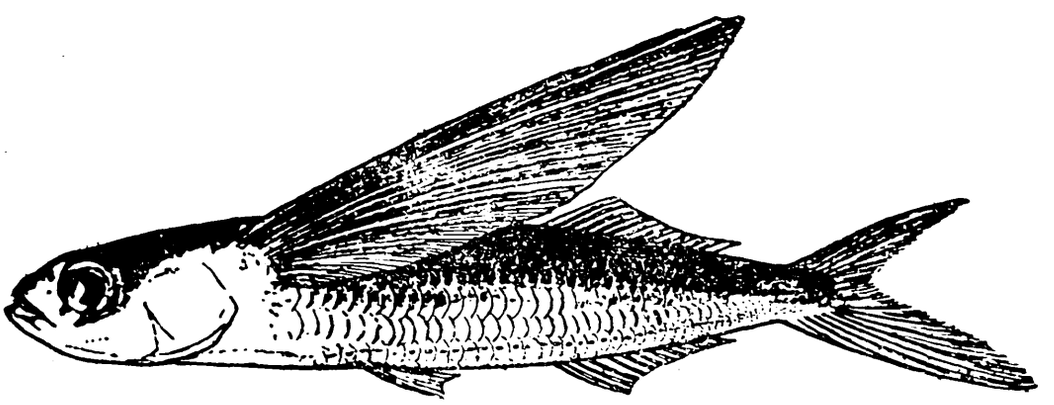
Five species recognised, one in our area.

Exocoetus volitans Linnaeus

[Text-fig. 123]

Exocoetus volitans Linnaeus, 1758. *Systema Naturae* (ed. 10), **1** : 316 (type-locality : Seas of Europe and America).

Exocoetus evolans Linnaeus : Day, 1877, *Fishes of India* : 519, pl. 70, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, **1** : 429.



Text-fig. 123. *Exocoetus volitans* Linnaeus

Common Names :

Tropical two-wing flyingfish	...	English
Parava-kola	...	Malayalam
Pakharu-masa	...	Marathi

Distinguishing Characters :

Body elongate and fairly robust. Snout short and blunt. Teeth very small; no teeth on roof of mouth. Dorsal fin with 12 to 15 soft rays; anal fin with 13 to 15 soft rays. Pectoral fins striking long, extending to caudal-fin base. Pelvic fins short, far from reaching anal fin. Caudal fin deeply forked. Scales rather large: 17 to 20 predorsal scales.

Colour : back iridescent blue, lighter on sides and belly silvery. Dorsal fin colourless, or only slightly pigmented; pectoral fins blackish at base, other fins yellowish.

Geographical Distributon : An oceanic species, widespread in the tropical and subtropical parts of the Indian, Pacific and Atlantic Oceans.

Fishery Information : Of minor fishery importance in our region.

Genus **Hirundichthys** Breder

Hirundichthys Breder, 1928, *Bull. Bingh. Oceanogr. Coll.*, **2** (art. 2) : 14, 20 (type-species : *Exocoetus rubescens* Rafinesque = *E. speculiger* Valenciennes).

Body elongate, thick, somewhat flattened vestrally. Snout blunt, shorter than eye. No teeth on vomer and tongue; palatine teeth present or absent. Dorsal and anal fins set far back on body; number of rays in dorsal and anal fins the same or differing by not more than 2 rays; anal-fin origin slightly before, under, or not more than 3 rays behind origin of dorsal fin. Pectoral fins strikingly long, extending to well beyond last fin-ray of dorsal fin, usually reaching to caudal-fin base. Pelvic fins long, reaching well beyond the anal-fin origin, inserted nearer to caudal-fin base than to tip of snout.

Numerous species recognized, 3 in our area.

KEY TO SPECIES

1 (a) Palatine teeth (on roof of mouth) usually present; pectoral fins dark with a pale basal triangle and a wide white margin (on trailing edge when extended) ... *H. speculiger*•

(b) Palatine teeth absent; pectoral fins without a pale basal triangle ... **2**

2 (a) Jaw teeth in 3 or 4 irregular rows; pectoral fins with a pale transverse wide stripe in entire middle part of fin ... *H. coromandelensis*

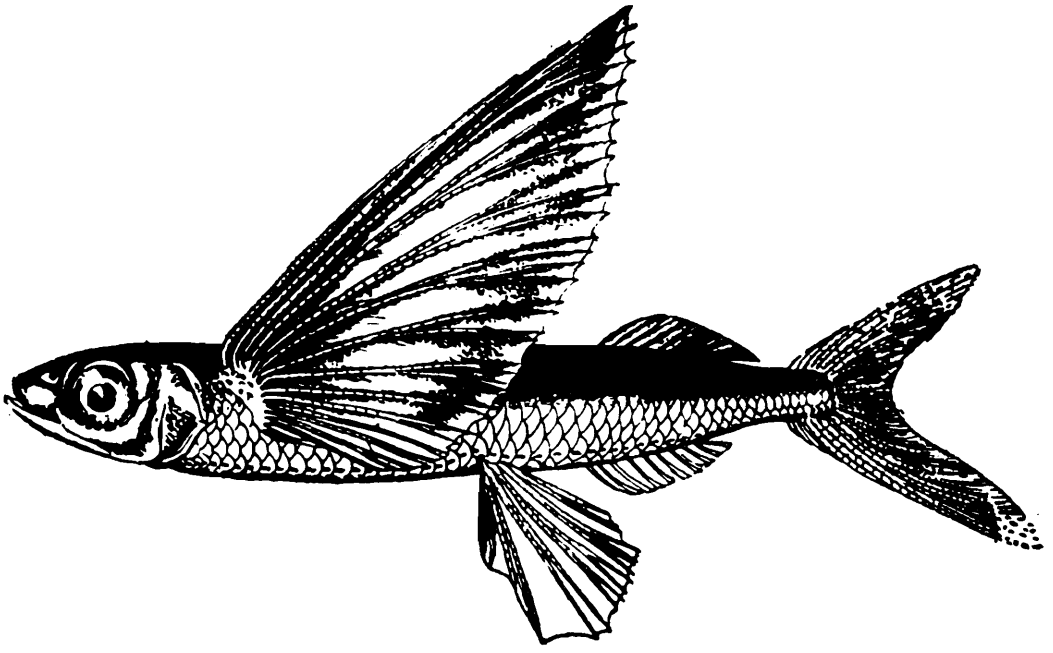
(b) Jaw teeth in a single row; pectoral fins with an in distinct narrow white margin (on trailing edge when extended) ... *H. oxycephalus**

Hirundichthys coromandelensis (Hornell)

[Text-fig. 124]

Cypsilurus coromandelensis Hornell, 1923, *Madras Fish. Bull.*, **15**(4) : 100 (type-locality : Nagapattinam, Tamil Nadu).

Hirundichthys (*Hirundichthys*) *coromandelensis* : Vijayaraghavan, 1973, *Indian J. Fish.*, **20**(1) : 135, fig. 1a, b & c.



Text-fig. 124 *Hirundichthys coromandelensis* (Hornell)

Common Names :

Indian flyingfish	...	English
Kola, Paravai-kola	...	Tamil

Distinguishing Characters :

Body elongate and thick, somewhat flattened ventrally. Snout shorter than eye, blunt; teeth conical, in 3 or 4 irregular rows in jaws; palatine teeth absent. Dorsal fin low, rays at anterior end the longer, with 9 to 12 soft rays. Anal fin with 10 to 12 soft rays, its origin

* *Hirundichthys speculifer* (Valenciennes) and *H. oxycephalus* (Bleeker) have been reported only once in our area.

under or 1 or 2 rays behind dorsal-fin origin. Pectoral fins strikingly long, extending beyond last ray of dorsal fin, only first ray unbranched. Pelvic fins large, reaching to middle of anal-fin base. Scales large, 45 to 50 in lateral series; predorsal scales 29 to 32.

Colour : back deep metallic blue, pale silvery below. Dorsal and caudal fins dusky; anal fin colourless; pelvic fins slightly dusky in their outer half; pectoral fins deep purplish with a fairly large unpigmented or lightly pigmented area in the centre which usually extends up to the lower margin, a white margin on trailing edge of fin.

Geographical Distribution : Arabian Sea and Bay of Bengal.

Fishery Information : This flying-fish contributes a very important seasonal fishery mainly confined to the narrow belt of Tamil Nadu and Pondicherry coasts extending from Muthukadukuppam to Point Calimere. The season starts towards the middle of May and lasts till the middle of July, though occasionally it extends up to the middle of August. It has been reported that the flying-fishes never appear in discoloured and muddy water, and if the monsoons break early and discolour the sea-water with the silt from the rivers, the fishes migrate away from the shore and the season comes to an abrupt end. The method of fishing is rather interesting. A specially built 7-log catamaran ('Kola-catamaran'), sturdy enough to reach the fishing grounds 10 to 20 km out on sea where the depth varies from 60 to 80 m, is used for fishing. The net employed for the capture of the flying-fish is a simple dip-net. The fishermen usually carry with them bundles of screw-pine leaves (*Pandanus odoratissimus*) or leaves of some leguminous shrub (*Tephrosia purpurea*), locally known as 'Kambi', to be used as lures to attract the fish. When a shoal is sighted, the lures are let down from the catamaran on ropes 30 to 40 m in length and are held in a half-submerged position with the help of floats. The fish gather around the lures in great numbers for the purposes of spawning and become preoccupied with egg-laying. Taking advantage of this peculiar spawning habit of the fish, the fishermen quietly draw the lure towards the catamaran and quickly scoop the fish out into it with their dip-nets.

Genus **Parexocoetus** Bleeker

Parexocoetus Bleeker, 1866, *Ned. Tijdschr. Dierk.*, 3 : 126 (type-species : *Exocoetus mento* Cuvier).

Body elongate, fairly robust. Snout blunt, slightly shorter than eye-diameter. Teeth in jaws and on roof of mouth. Dorsal fin high, with a pigmented area. Pectoral fins strikingly long, not reaching

beyond posterior part of anal-fin base, less than *ca* 60% of standard length. Pelvic fins short, not reaching or barely reaching the anal-fin origin, its origin closer to anal-fin than to pectoral-fin insertion.

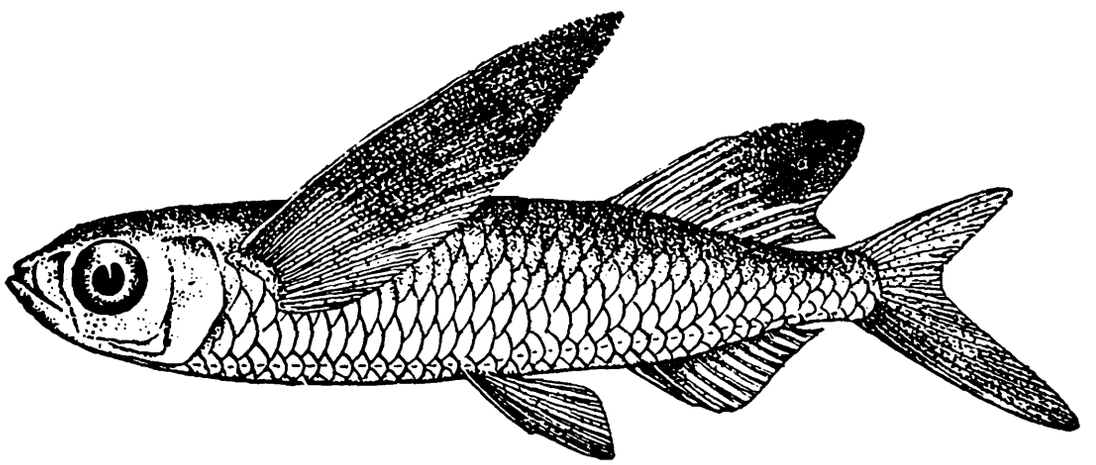
Probably two species, one in our area.

Parexocoetus mento (Cuvier)

[Text-fig. 125]

Exocoetus mento Cuvier, 1846, *Hist. nat. Poiss,* **19** : 124 (type-locality : Pondicherry) ; Day, 1877, *Fishes of India* : 520, pl. 121, fig. 9; Day, 1889, *Fauna Br. India,* Fishes, **1** : 431.

Parexocoetus brachypterus brachypterus Rao and Basheeruddin (*nec* Richardson), 1973, *Indian J. Fish.*, **20**(2) : 629, fig.



Text-fig. 125. *Parexocoetus mento* (Cuvier)

Common Names :

Cuvier's flyingfish	...	English
Pakharu-masa	...	Marathi

Distinguishing Characters :

Body elongate, somewhat compressed, rounded ventrally. Snout blunt, shorter than eye. Dorsal fin high, with 10 to 12 soft rays, the middle rays the longest. Pectoral fins strikingly long, extending to opposite middle or end of dorsal-fin base. Pelvic fins short, not reaching origin of anal fin. Scales large, 38 to 42 along lateral series ; predorsal scales about 18.

Colour : back iridescent blue, becoming silvery along the belly. Dorsal fin black ; pectoral fins dark in their upper half.

Geographical Distribution : East coast of Africa, India and the East Indies.

Pelagic, in oceanic waters.

Fishery Information : This fish is occasionally numerous in the commercial catches at Madras during the period January-February.

FAMILY : HEMIRAMPHIDAE
[Halfbeaks]

Elongate fishes with a prolonged lower jaw (except in *Oxyporhamphus micropterus*) and a short triangular upper jaw. Nostrils in a pit anterior to eyes. Teeth minute, often tricuspid, the part of lower jaw in front of upper jaw without teeth ; no teeth on roof of mouth or tongue. No spines in fins ; dorsal and anal fins posterior in position ; pelvic fins in abdominal position, with 6 soft rays ; pectoral fins usually short. Lateral line running down from pectoral-fin origin and then backward along ventral profile of body. Scales moderately large, cycloid (smooth), easily detached. Tips of lower jaw bright red or orange in most species.

Most species are marine, but some inhabit freshwaters The flesh is delicate but many fine bones make eating troublesome. The halfbeaks are of considerable economic value especially on the Tamil Nadu coast ; about 1274 tonnes of halfbeaks and belonids are annually landed in India. Data on individual species landings is not available but the catch is probably composed largely of *Rhynchorhamphus malabaricus, Hemiramphus far and H. lutkel.* They are collected with seines, or dipnetted under lights at night.

KEY TO GENERA

1 (a) Lower jaw not noticeably elongate, never greatly prolonged beyond upper jaw ; pectoral fins long, 30 to 35% of standard length	...	**Oxyporhamphus***
(b) Lower jaw distinctly elongate ; pectoral fins short or medium length (not more than 28% standard length)	...	2
2 (a) Nasal papilla elongate and pointed, not fimbriate, strongly projecting beyond nasal fossa ; caudal fin rounded or truncate, with longest rays in mildle ; viviparous, anal fin of males more or less transformed into a copulatory organ	...	3

	(b) Nasal papilla rounded, fan-shaped or fimbriate, not projecting or almost not projecting from margin of nasal fossa; caudal fin emarginate or deeply forked, frequently with an elongate lobe; oviparous, anal fin of males of usual structure	...	4
3	(a) Dorsal fin located far posterior to anal-fin origin; anal fin with 14 to 19 rays, its base longer than dorsal-fin base	...	**Dermogenys***
	(b) Dorsal fin located anterior to anal fin; anal fin with 8 to 14 rays, its base shorter than dorsal-fin base.	...	**Zenarchopterus***
4	(a) Dorsal fin with 20 to 25 rays; pectoral-fin rays usually 7 to 9, rather long (25 to 28% standard length)	...	**Euleptorhamphus***
	(b) Dorsal fin with 13 to 18 rays; pectoral-fin rays 10 to 14, short (less than 20% standard length)	...	5
5	(a) Preorbital ridge absent; upper jaw scaleless; gasbladder alveolar	...	**Hemiramphus**
	(b) Preorbital ridge present; upper jaw scaly; gasbladder simple (single-chambered)	...	6
6	(a) Nasal papilla fimbriate; upper jaw arched, dome-shaped; gill-rakers on first arch 52 to 60, on second 40 to 68; lateral line with two branches ascending behind opercle and from pectoral-fin origin	...	**Rhynchorhamphus**
	(b) Nasal papilla not fimbriate; upper jaw flat or slightly arched; gill-rakers 19 to 46 on first arch, on second arch 16 to 37; lateral line with a single branch, ascending from the pectoral-fin origin	...	**Hyporhamphus**

* The fishes of the genus *Oxyporhamphus* Gill represented by *O. micropterus* (Valenciennes) in our area, is of no fishery importance; the genus *Dermogenys* van Hasselt is strictly confined to freshwaters; the fishes of the genera *Zenarchopterus* Gill and *Euleptorhamphus* Gill, do not contribute to any fishery in our region.

Genus **Hemiramphus** Cuvier

Hemiramphus Cuvier, 1817, *Regne Animal.* (ed. 1), **2** : 186 (type-species : *Esox brasiliensis* Linnaeus) ; Parin, Collette and Shcherbachev. 1980, *Trudy Inst. Okean.*, **97** : 111 (Review).

Body elongate, with a greatly prolonged beak-like lower jaw. Upper jaw short, triangular and scaleless. Sensory canal on preorbital branched, with a pore at end of posterior branch (which terminates in a bony ridge near front of orbit) and a pore at end of anterior branch near antero-lateral margin of nasal fossa ; preorbital ridge (bony ridge under nostril) absent. Nasal papilla rounded or fan-shaped, mostly confined to nasal fossa. Dorsal fin with 13 to 15 rays ; anal-fin rays usually 10 to 13. Pectoral fins short, less than 20% of standard length. Caudal fin deeply forked, the lower lobe longer than upper. Gas-bladder alveolar.

KEY TO SPECIES

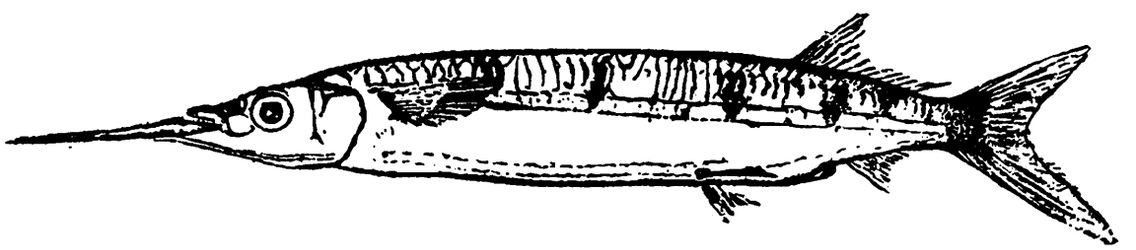
1 (a) Pectoral fins relatively long, 4.5 to 5.4 times in standard length (length greater than distance between their origin and antertior margin of nasal fossa) ; gill-rakers 33 to 48 on first arch ; interorbital width less than diameter of orbit	...	*H. lutkei*
(b) Pectoral fins short, their length 5.2 to 6.8 times in standard length (as a rule less than distance between their origin and anterior margin of nasal fossa) ; gill-rakers on first arch 25 to 36 ; interorbital width greater than diameter of eye or approximately equal to it	...	2
2 (a) Dorsal fin with well-developed anterior lobe, pigmented in anterior part ; body width 1.3 to 1.8 times in its depth ; dark spots (3 to 9) on sides of body	...	*H far*
(b) Dorsal fin without well-developed anterior lobe, pigmented along marsin ; width of body 1.8 to 2.0 times in its depth ; in adult fish, dark spots always absent on body	...	*H. archipelagicus**

* *Hemiramphus archipelagicus* Collette & Parin is rather rare in the catches of our region.

Hemiramphus far (Forsskal)

[Text-fig. 126a]

Esox far Forsskal, 1775, *Descript. Animal.* : 67 (type-locality : Lohaja, Red Sea).
Hemirhamphus far : Day, 1877, *Fishes of India* : 516, pl. 70, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, 1 : 424.



Text-fig. 126a. *Hemiramphus far* (Forsskal)

Common Names :

Black-barred halfbeak	...	English
Mural	...	Tamil

Distinguishing Characters :

Body robust, elongate and fairly compressed. Upper jaw short, triangular, much broader than long, scaleless. Fairly stout tricuspid teeth in 2 to 4 rows in jaws. Total gill-rakers 25 to 36 on first arch, 6 to 10 on upper and 19 to 26 on lower arm. Dorsal fin with 12 to 14 soft rays; anal fin with 10 to 12 soft rays. Caudal fin deeply forked, the lower lobe much longer than upper.

Colour : greenish bluish above, silvery on sides and below, with 3 to 9 (usually 4 to 6) more or less prominent blotches on sides chiefly above lateral stripe; lower jaw dark, tip of peak reddish; a silvery plumeous stripe with blue upper margin on sides of body; upper lobe of caudal fin bright yellow, lower lobe blue.

Geographical Distribution : Widespread in tropical Indo-west Pacific.

Fishery Information : There is a fairly good fishery for this halfbeak at Rameswaram and Kilakarai (Tamil Nadu) from November to April.

Hemiramphus lutkei Valenciennes

[Text-fig. 126b]

Hemiramphus lutkei Valenciennes, 1846, *Hist. nat. Poiss.*, 5 : 49 (type-locality : Manila, Philippines) ; Parin, Collette and Shcherbachev, 1980, *Trudy Inst. Okean*, 97 : 115, fig. 33.

Hemirhamphus georgii Day (*nec* Valenciennes), 1877, *Fishes of India* : pl. 120, fig. 2.

Hemirhamphus marginatus Talwar (*nec* Forsskal), 1968, *J. mar. biol. Ass. India*, 9(1) : 61.



Text-fig. 126b. *Hemiramphus lutkei* Valenciennes

Common Names :

Lutkei halfbeak	..	English
Mural	...	Tamil

Distinguishing Characters :

Body rather compressed but quite robust. Upper jaw short, traingular, much broader than long, scaleless. Teeth stout, in 2 to 4 distinct series. Total gill-rakers 33 to 46 (usually 36 to 41) on first arch. Dorsal fin with 13 to 15 soft rays. Anal fin with 11 to 13 soft rays. Pectoral fins relatively long, 4.5 to 5.4 times in standard length. Origin of pelvic fins twice nearer base of caudal fin than the angle of mouth. Caudal fin deeply forked, the lower lobe longer than upper lobe.

Colour : iridescent blue, belly silvery, with lateral silvery band bordered by narrower black stripe. Dorsal and caudal fins bordered with black.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This species contributes an important fishery at Kilakarai (Gulf of Mannar) and the fishing cum-spawning season is from November to December.

Genus **Hyporhamphus** Gill

Hyporhamphus Gill, 1859, *Proc. Acad. nat. Sci.* Philad., **11** : 131 (type-species : *Hyporhamphus tricuspidatus* Gill) ; Parin, Collette and Shcherbachev, 1980, *Trudy Inst. Okean.*, **97** : 14 (Review).

Body elongate, with a greatly prolonged beak-like lower jaw. Upper jaw short, triangular, scaled. Preorbital ridge well developed ; sensory canal on preorbital branched or unbranched, with an exposed pore on side and another at terminus of canal near anterior margin of nasal fossa ; nasal papilla rounded or fan-shaped, not fimbriate. Dorsal fin with 12 to 17 rays ; anal-fin rays 13 to 16. Pectoral fins short, less than 20% of standard length. Gillrakers 19 to 46 on first arch. Gasbladder simple, not divided into separate chambers.

KEY TO SUBGENERA/SPECIES

1 (a) Preorbital canal simple, without posterior branch ; caudal fin weakly or moderately forked (subgenus *Hyporhamphus*)	...	2
(b) Preorbital canal T-shaped, with posterior branch ; caudal fin strongly forked, usually with elongate lower lobe (subgenus *Reporhamphus* Whitley)	...	5
2 (a) Total gill-rakers 46 to 53 on first arch, on second arch 40 to 47	...	*H. xanthopterus**
(b) Total gill-rakers 19 to 37 on first arch, on second arch 16 to 28	...	3
3 (a) Preorbital distance very short, 2.0 to 2.7 times in diameter of orbit	...	*H. sindensis**
(b) Preorbital much longer, 1.2 to 1.5 times in orbit diameter	...	4
4 (a) Teeth in jaws mostly unicuspid, except for a few tricuspid teeth near base of upper jaw	...	*H. unicuspis**
(b) Teeth in jaws mostly tricuspid	...	*H. limbatus*
5 (a) Length of preorbital 1.0 to 1.2 times in diameter of orbit, and 0.65 to 1.0 times in length of upper jaw projection ; lower jaw long, 0.7 to 0.9 times in head length (in juveniles up to 0.35 times)	...	*H. balinensis**

(b) Length of preorbital 1.35 to 2.15 times in diameter of orbit, and 0.85 to 1.4 times in length of upper jaw projection; lower jaw of moderate length or shorter, 0.8 to 2.0 times in head length (in juveniles up to 0.55 times) .. 6

6 (a) Length of preorbital 1.35 to 1.65 times in diameter of orbit; length of pectoral fin 7.7 to 10.0 times in standard length, equal to distance from their origin to middle of eye or less than this distance ... *H. affinis**

(b) Length of preorbital 1.7 to 2.15 times in diameter of orbit; length of pectoral fin 6.8 to 8.2 times in standard length, equal to distance from their origin to middle of eye or more than this distance ... 7

7 (a) Upper jaw projection pointed; gill-rakers on first arch 36 to 47; pelvic fins inserted slightly closer to origin of lower lobe of caudal-fin than to pectoral-fin origin; lower jaw moderately short, in adult fish its length upto 1.4 times in head length .. *H. dussumieri*

(b) Upper jaw projection blunt and rounded; gill-rakers on first arch 26 to 34; pelvic fins inserted about midway between pectoral-fin base and origin of lower lobe of caudal fin; lower jaw shorter, in adult fish its length upto 2.0 times in head length ... *H. quoyi*

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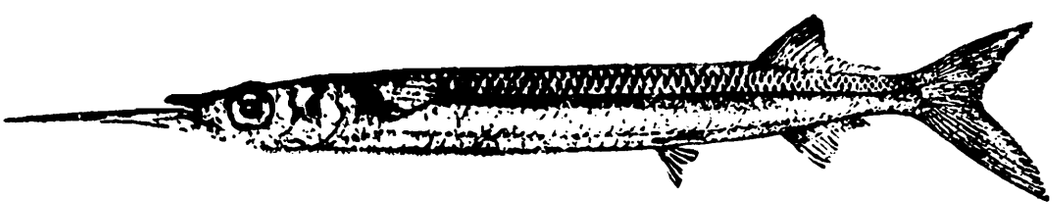
* *Hyporhamphus xanthopterus* (Valenciennes), *H. sindensis* (Regan), *H. unicuspis* Collette & Parin, *H. balinensis* (Bleeker) and *H. affinis* (Gunther), do not contribute to any fishery in our area; all records of *H. unifasciatus* (Ranzani) in our area refer to some other superficially similar species, probably *H. capensis* (Thominot).

Hyporhamphus dussumieri (Valenciennes)

[Text-fig. 127]

Hemiramphus dussumieri Valenciennes, 1846, *Hist. nat. Poiss.*, **19** : 33, pl. 520 (type-locality : Seychelle Is.).

Hemirhamphus reynaldi Valenciennes : Day, 1877, *Fishes of India* : 515 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 425.



Text-fig. 127. *Hyporhamphus dussumieri* (Valenciennes)

Common Names :

Dussumier's halfbeak	...	English
Mural	...	Tamil
Ethuntholi, Oola	..	Andaman Is

Distinguishing Characters :

Body elongate, almost cylindrical. Upper jaw short, triangular, convex, bluntly pointed, scaly, its width much greater than the length, its length 1.0 to 1.3 times in eye-diameter ; lower jaw about as long as head. Length of preorbital 1.7 to 2.2 times eye-diameter. Total gill-rakers on first arch 34 to 47, 10 to 14 on upper and 26 to 32 on lower limb. Dorsal fin with 14 to 16 soft rays ; anal fin with 14 to 16 soft rays. Pectoral fins short. Origin of pelvic fins nearer to base of caudal fin than to origin of pectoral fins, or midway in juveniles. Caudal fin forked, the lower lobe longer than upper lobe.

Colour : body greenish above, with a silvery lateral stripe, silvery below ; ventral part of lateral line with a prominent line of pigment ; fleshy tip of beak red. Fins hyaline, dorsal and caudal fins dusky.

Geographical Distribution : Indo-W. Pacific.

Fishery Information : Common in the shore-seine catches in the Gulf of Mannar and Palk Bay.

Hyporhamphus limbatus (Valenciennes)

Hemiramphus limbatus Valenciennes, 1846, *Hist. nat. Poiss.*, **19** : 44 (type locality : Malabar coast, Bombay, Pondicherry).

Hemirhamphus limbatus : Day, 1877, *Fishes of India* : 516, pl. 119, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 426.

Hemiramphus gorakhpurensis Srivastava, 1967, *J. Bombay nat. Hist. Soc.*, 64(1) : 93 (type-locality : Gorakhpur).

Common Names :

Valenciennes halfbeak	...	English
Sarbara	...	Oriya
Sumb, Toli	...	Marathi

Distinguishing Characters :

Body somewhat compressed. Head length (tip of upper jaw to gill-opening) 3.5 to 3.7 times in trunk ; upper jaw convex, scaly, much broader than long. Teeth minute, tricuspid, in many rows in both jaws. Dorsal fin with 12 to 16 soft rays ; anal fin with 13 to 16 soft rays. Origin of pelvic fins midway between front border of eye and base of caudal fin. Caudal fin emarginate.

Colour : back greenish, belly silvery, with a brilliant silvery lateral stripe on sides of body. Fins hyaline, with margins of dorsal and caudal fins dusky.

Geographical Distribution : Persian Gulf, Sri Lanka, through the East Indies, to the Philippines and China.

Fishery Information : This species is taken commercially in small quantities in our region and is reported in the fishery literature as *H. gaimardi*.

Hyporhamphus quoyi (Valenciennes)

Hemiramphus quoyi Valenciennes, 1846, *Hist. nat. Poiss.*, **19** : 35 (type-locality : New Guinea).

Hyporhamphus quoyi : Talwar, 1962, *Indian J. Fish.*, 9A : 1.

Common Name :

Short-nosed halfbeak	...	English

Distinguishing Characters :

Body almost cylindrical. Upper jaw blunt and rounded, scaly, much wider than long, its length 1.5 to 2.4 times in eye diameter ; lower jaw short, its length upto 2.0 times in head length. Teeth

conspicuously tricuspid, in broad bands in both jaws. Gill-rakers on first arch 26 to 34. Dorsal fin with 15 to 17 soft rays; anal fin with 14 to 16 soft rays. Origin of pelvic fins about midway between base of pectoral fins and origin of lower lobe of caudal fin. Caudal fin forked.

Colour : body dark green above, silvery white below and with silvery lateral stripe on sides. Fins hyaline, caudal and upper part of dorsal more or less dusky. Beak black with fleshy red tip.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This halfbeak contributes a seasonal fishery in the Palk Bay and Gulf Mannar from November to April.

Genus **Rhynchorhamphus** Fowler

Rhynchorhamphus Fowler, 1928, *Mem. Bernice P. Bishop Mus.*, **10** : 75 (type-species : *Hemiramphus georgii* Valenciennes) ; Parin, Collete and Shcherbachev, 1980, *Trudy Inst. Oken.*, *97* : 99 (Review).

Body elongate, with a greatly prolonged beak-like lower jaw. Upper jaw short, triangular, dome-shaped, its length equal to or greater than upper jaw width. Nasal papilla fimbriate. Numerous gillrakers, 47 to 78 on first arch, 40 to 68 on second gill-arch. Dorsal fin with 13 to 17 (usually 14 to 16) soft rays; anal fin with 12 to 16 soft rays; pectoral fin with 10 to 12 soft rays (usually 11). Dorsal-fin base much longer than anal-fin base; origin of dorsal fin slightly in advance of anal-fin base. Caudal fin deeply forked, its lower lobe much longer than upper. Scales large, upper jaw scaly; lateral line with two dorsally directed branches, the additional branch parallel and anterior to pectoral-fin base. Gasbladder simple.

Four species known, two in our region.

KEY TO SPECIES

1 (a) Sum of dorsal and anal fin-rays equal to usually 28 or less (25 to 30) ; less highly domed upper jaw ... *R. malabaricus*

(b) Sum of dorsal and anal fin-rays usually 29 or more (26 to 32) ; more highly domed upper jaw ... *R. georgii**

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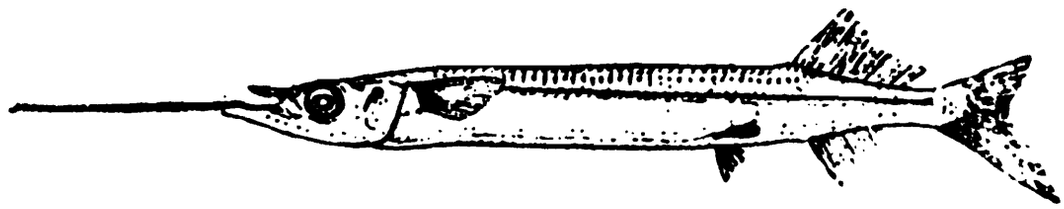
* *Rhynchorhamphus georgii* (Valenciennes) does not contribute to any fishery in our region.

Rhynchorhamphus malabaricus Collette

[Text-fig. 128]

Hemirhamphus georgii Day (*nec* Valenciennes), 1877, *Fishes of India* : 515 (*nec* pl. 120, fig. 2 which is *Hemiramphus lutkei*) ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 424.

Rhynchorhamphus malabaricus : Collette, 1976, *Bull. mar. Sci.*, 26(4) : 84, fig. 8b (type-locality : Myliddy near Kankesanthrai, Sri Lanka).



Text-fig. 128. *Rhynchorhamphus malabaricus* Collette

Common Name :

Long-billed halfbeak ... English

Distinguishing Characters :

Body almost cylindrical. Nasal papilla fimbriate. Upper jaw domed-shaped, much longer than broad, its length about equal to eye-diameter, scaled. Teeth in a few rows in both jaws, mostly pointed. Gillrakers 57 to 71 on first arch. Dorsal fin with 13 to 15 soft rays, Anal fin with 12 to 15 soft rays ; sum of dorsal and anal fin-rays equal to usually 28 or less (25 to 30). Scales thin, 54 to 59 in lateral series.

Colour : body greenish above, silvery below ; with a silvery stripe on sides of body, bordered by a narrow blue stripe. Mandibular flaps black, tip of lower jaw greenish. Fins hyaline, dorsal and caudal fins distinctly bordered with black.

Geographical Distribution : Coasts of southern India and Sri Lanka.

Fishery Information : The fishery for this species is chiefly confined to Theedai (Palk Bay) and is of greatest economic importance in the Palk Bay fisheries. The season of the fishery coincides with the spawning season (March-April). The shore-seine 'Karai-valai' is the most important gear for the capture of halfbeaks in the Palk Bay and Gulf of Mannar.

FAMILY : BELONIDAE
[Garfishes, Needlefishes]

Body elongate, rather slender, with both upper and lower jaws extended into long beaks armed with sharp teeth to its tip. No spines in fins; dorsal fin usually with 10 to 26 soft rays; anal fin usually with 14 to 23 soft rays; dorsal and anal fins posterior in position. Lateral line low down. Scales small, cycloid, easily detached.

Pelagic fishes of warm seas, often congregating into large schools. Rather fierce carnivorous fishes, enter estuaries freely. The bones and sometimes part of the flesh are green, but they are good eating. About 1274 tonnes of garfishes and halfbeaks were landed in India during 1970.

KEY TO GENERA

1 (a) Body ribbon-like, strongly laterally compressed and marked with a series of vertical bars; anal-fin rays 25 to 28	...	**Ablennes**
(b) Body rounded or squarish in cross-section; no vertical bars present; anal-fin rays 13 to 23	...	2
2 (a) Gill rakers present; caudal peduncle strongly depressed (flattened dorso-ventrally) with well-developed lateral keels	...	**Platybelone**
(b) Gill rakers absent or vestigial; caudal peduncle deeper than wide, not strongly depressed, a small lateral keel present on caudal peduncle or no keel at all	...	3
3 (a) One pair of dentigerous upper pharyngeals; origin of dorsal fin opposite to anal fin	...	**Xenentodon***
(b) Two or three pairs of dentigerous upper pharyngeals; origin of dorsal fin more or less behind anal-fin origin	...	4
4 (a) Caudal peduncle without lateral keels; caudal fin rounded, truncate or emarginate, not deeply forked	...	**Strongylura**
(b) Caudal peduncle with small black lateral keels; caudal fin deeply forked	...	**Tylosurus**

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* The monotypic genus *Xenentodon* Regan represented by *X. cancila* (Hamilton-Buchanan), is confined to the fresh waters of our area.

Genus **Ablennes** Jordan & Fordice

Athlennes Jordan and Fordice, 1887, *Proc. U. S. natn. Mus.*, **9** : 342 (type-species : *Belone hians* Valenciennes) (typographical error).

Ablennes Jordan and Fordice, emendation of *Athlennes*, emended by decision of the International Commission on Zoological Nomenclature (cf. Stiles, 1912, *Smithson Publ.* 2060 : 94) ; Parin, 1957, *Trudy Inst. Okean.*, **84** : 57 (Review).

Body elongate and greatly compressed laterally. Upper and lower jaws greatly elongated and studded with small sharp vertical teeth. Gill rakers absent. No teeth no vomer. Dorsal fin with 23 to 27 soft rays; anal fin with 25 to 28 soft rays; origin of dorsal fin behind anal fin. Lateral line running low down; no elevated carina on caudal peduncle.

Two species, one in our area.

Ablennes hians (Valenciennes)

[Text-fig. 129]

Belone hians Valenciennes, 1846, *Hist. nat. Poiss.*, **18** : 321, pl. 548 (type-locality : Bahia, Brazil).

Belone melanostigma Valenciennes : Day, 1877, *Fishes of India* : 509; Day, 1889, *Fauna Br. India*, Fishes, **1** : 418.



Text-fig. 129. *Ablennes hians* (Valenciennes)

Common Names :

Flat needlefish	...	English
Valai-mural	...	Tamil
Dethuntholl, Karuthonakunhi	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and slender, greatly compressed laterally. Upper and lower jaws greatly elongated and studded with small, sharp teeth. Dorsal fin with 23 to 26 soft rays; anal fin with 24 to 28 soft rays; anterior part of both fins with high falcate lobes. Caudal peduncle compressed, with no lateral keels. Caudal fin deeply forked, the lower lobe much longer than upper. Scales very small.

Colour : back bluish green, sides and belly silvery white, with 12 to 14 prominent dark vertical bars on sides of body ; tip of lower jaw red. Dorsal fin with a prominent dark lobe ; pectoral fins with black tips ; pelvic fins yellow.

Geographical Distribution : A world-wide species of tropical and warm temperate seas.

Fishery information : Taken commercially only occasionally in our region especially the Tamil Nadu coast. An unusual large catch in 1965 at Vizhingam (Kerala) yielded 59,625 kg of this species.

Genus **Platybelone** Fowler

Platybelone Fowler, 1919, *Proc. Acad. nat. Sci. Philad.*, **71** : 2 (type-species : *Belone platyura* Bennett) ; Parin 1967, *Trudy Inst. Okean.*, **84** : 3 (Review).

Elongate body, fairly compressed. Developed gillrakers present on first hypobranchial besides a number of rudiments. Dorsal fin with 12 to 16 soft rays ; anal fin with 17 to 21 soft rays. Caudal peduncle strongly depressed, with sharp, almost leaf-shaped lateral keels. Caudal fin forked. Scales rather small.

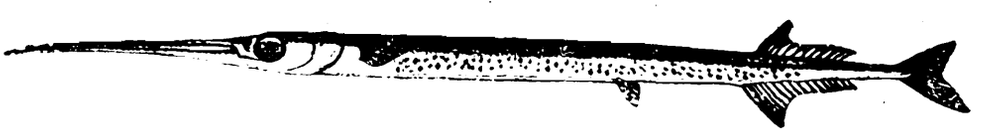
Only one species, with five subspecies, of which only one in our area.

Platybelone argalus platyura (Bennett)

[Text-fig. 130]

Belone platyura Bennett, 1832, *Proc. Comm. Zool. Soc. Lond.*, (pt. 1) : 168 (type-locality : Mauritius) ; Jones and Kumaran, 1965, *J. mar. biol. Ass. India*, **7**(1) : 108, fig. 1.

Belone persimilis (*nec Gunther*) Balan,, 1958, *J. Bombay nat. Hist. Soc.*, **55** : 299.



Text-fig. 130. *Platybelone argalus platyura* (Bennett)

Common Names :

Bennett's needlefish	...	English
Dethuntholi, Oola, Keran	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, rounded in cross-section, its depth 17 to 19 times in standard length. Upper and lower jaws greatly elongated and studded with fine teeth. Five or six developed gillrakers on first hypobranchial besides a number of rudiments. Eyes large, 1.3 to 2.1 times in postorbital distance. Dorsal fin with 12 to 15 soft rays; anal fin with 17 to 20 soft rays. Caudal peduncle strongly depressed, much wider than deep, with sharp, lateral, almost leaf-shaped keels; lateral line passes underneath carina. Caudal fin forked, the upper and lower lobes of equal length.

Colour : bluish green above, silvery white below, with a dark blue stripe along sides of body. Dorsal, anal and pelvic fins hyaline.

Geographical Distribution : Indo-W. Pacific.

Fishery Information : Of minor commercial significance in the Laccadive Sea.

Genus **Strongylura** van Hasselt

Strongylura van Hasselt, 1824, *Alg. Konst-en Letterbode*, **2** : 374 (type species : *Strongylura caudimaculata* van Hasselt = *Belone strongylura* van Hasselt) ; Parin, 1957, *Trudy Inst. Okean*, **84** : 3 (Review).

Body elongate, rounded in cross-section. Upper and lower jaws greatly elongated and studded with sharp teeth. Gill rakers absent. Dorsal-fin rays 12 to 21, its origin more or less posterior to anal-fin origin. Caudal peduncle deeper than wide, without lateral keels; caudal fin emarginate, truncate or rounded.

Several species, 3 in our area.

KEY TO SPECIES

1 (a) Caudal fin rounded, with a distinct black spot near base	...	*S. strongylura*
(b) Caudal fin emarginate or truncate; no black spot near base of caudal fin	...	2
2 (a) Origin of dorsal fin above 4th or 5th ray of anal fin; teeth vertical or slightly directed backwards	...	*S. incisa**

* *Strongylura incisa* (Valenciennes) has been reported only once from the Minicoy Island in our region.

(b) Origin of dorsal fin above 7th to 10th ray of anal fin; teeth usually directed backwards ... *S. leiura*

Strongylura leiura (Bleeker)

Belone leiurus Bleeker, 1850, *Nat. Tijdschr. Ned.-Indie,* **1** : 94 (type-locality : Java) ; Day, 1877, *Fishes of India* : 511.

Belone leiura : Day, 1889, *Fauna Br. India,* Fishes, **1** : 420.

Common Name :

Squaretail needlefish ... English

Distinguishing Characters :

Body elongate, rounded in cross-section. Eyes rather small, 2.7 to 3.6 times in postorbital part of head. Teeth usually directed backwards, but variable and sometimes almost vertical; tongue smooth, no teeth on vomer. Origin of dorsal fin above 7th to 10th ray of anal fin; dorsal fin with 17 to 21 soft rays; anal fin with 23 to 27 soft rays. Caudal fin almost truncate; caudal peduncle roundish or slightly compressed, without carina.

Colour : body greenish-brown above, silvery below; a silvery lateral band on the body which becomes wide posteriorly where it is bordered by a dark stripe. Fins yellow, caudal fin dusky.

Geographical Distribution : Widespread in the neritic waters of the Indo-W. Pacific.

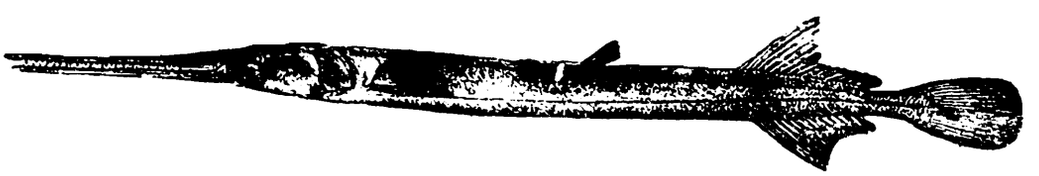
Fishery Information : Taken commercially in small quantities, mostly on the east coast of India.

Strongylura strongylura (van Hasselt)

[Text-fig. 131]

Belone strongylura van Hasselt, 1823, *Alg. Konst. en Letterbode,* **1** : 130 (type-locality : Vizagapatnam) ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 421.

Belone strongylurus : Day, 1877, *Fishes of India* : 512, pl. 118, fig. 6.



Text-fig. 131. *Strongylura strongylura* (van Hasselt)

Common Names :

Roundtail needlefish	....	English
Gania	...	Oriya
Wodlah-muku, Kuddera	...	Telugu
Ooshee-collarchee, Coomeen	...	Tamil
Coplah, Pallankoil	...	Malayalam
Tol	...	Marathi
Dethuntholi, Oala, Keran	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, rounded in cross-section. Upper and lower jaws greatly elongated and studded with sharp teeth. Eyes fairly small, in adults usually 3 or more times in postorbital part of head. Origin of dorsal fin above 4th ray of anal fin ; dorsal fin with 12 to 14 soft rays ; anal fin with 15 to 18 soft rays. Caudal fin emarginate ; no lateral keel on caudal peduncle.

Colour : body bluish-green above, silvery below, with a prominent black spot at base of caudal fin ; silvery lateral band, more distinct posteriorly where it is bordered with a dark stripe.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Fairly good catches of this species are obtained from the coast of Kerala. They are seen in small shoals usually following clupeoid fishes on which they feed.

Genus **Tylosurus** Cocco

Tylosurus Cocco, 1833, *Giorni. Sci. Lett. Sicilia*, **42** : 18 (type-species : *Tylosurus cantraini* Cocco) ; Parin, 1967, *Trudy Inst. Okean.*, **84** : 3 (Review).

Body elongate and cylindrical, rounded in cross-section. Gill rakers absent. Upper and lower jaws greatly elongated and studded with sharp teeth. Dorsal fin with 19 to 27 soft rays, its origin more or less posterior to anal-fin origin. Caudal peduncle deeper than wide. with a weak darkly pigmented lateral keel on each side Caudal fin deeply forked.

Several species, 3 in our area.

KEY TO SPECIES

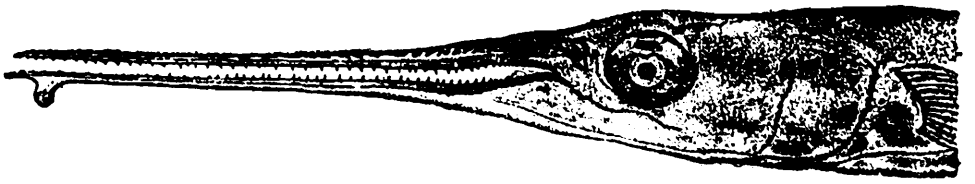
1 (a) Dorsal-fin rays 24 to 27, anal-fin rays 22 to 24; upper jaw rather strongly curved upward at its origin, so that an appreciable gap is formed between the jaws	...	*T acus melonotus*
(b) Dorsal-fin rays 19 to 24; anal-fin rays 19 to 22, upper jaw straight, with no appreciable gap between the jaws	...	2
2 (a) Teeth in upper jaw usually inclined anteriorly to some extent; head length 3 to 3.6 times in body length	...	*T crocodilus*
(b) Teeth in upper jaw more or less straight; head length 2.6 to 3.1 times in body length	...	*T choram*

Tylosurus acus melanotus (Bleeker)

[Text-fig. 132]

Belone melanotus Bleeker, 1850, *Nat. Tijdschr. Ned.-Indie*, **1** : 94 (type-locality : Batavia).

Thalassosteus appendiculatus (Klunzinger) : Jones, 1959, *Indian J. Fish.*, **6**(1) : 50, fig. 5b, c.



Text-fig. 132 *Tylosurus acus melanotus* (Bleeker) : head region.

Common Names :

Keeljawed longtom	...	English
Tol	...	Marathi
Thaludandithuntholi	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, subcylindrical. Upper and lower jaws greatly elongated and studded with sharp teeth ; teeth nearly vertical. A conspicuous appendage (text-fig. 132) sometimes present at tip of lower jaw. Dorsal fin with 24 to 27 soft rays ; anal fin with 22 to 24 soft rays.

Pectoral fin 8.0 to 12.4, pelvic fin 10.0 to 14.1 times in body length. Caudal fin deeply forked, with a long lower lobe. Scales small; lateral line running low down, with a small black keel on caudal peduncle.

Colour : body dark bluish above, silvery white below.

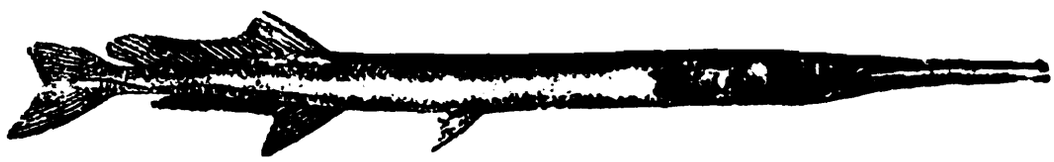
Geographical Distribution : Indo-west Pacific.

Fishery Information : This species is quite common in the commercial catches at Mangalore and from near Mandapam in the Gulf of Mannar. The species has also been reported common from Ratnagiri (Maharashtra State) and the Minicoy Islands in our region.

Tylosurus choram (Rüppell)

[Text-fig. 133]

Belone choram Ruppell, 1837, *Neue Wirbelth Fische* : 72 (type-locality : Red Sea) ; Day, 1877 *Fishes of India* : 510, pl. 118, fig 4 ; Day, 1889, *Fauna Br. India*, Fishes 1 : 419.



Text-fig. 133. *Tylosurus choram* (Ruppell)

Common Names :

Ruppell's alligator-gar	...	English
Tol	...	Maratni

Distinguishing Characters :

Body elongate, subcylindrical. Upper and lower jaws greatly elongated and studded with sharp teeth; teeth more or less straight. Length of head 2.6 to 3.1 times in body length (posterior edge of opercular membrane to base of caudal fin). Dorsal fin with 20 or 21 soft rays; anal fin with 19 or 20 soft rays. Caudal fin forked. Scales small; lateral line forming a narrow keel on caudal peduncle.

Colour : body bluish-green above, silvery below, with a silvery stripe along the sides.

Geographical Distribution : Tropical waters of Indian Ocean.

Fishery Information : Taken commercially only occasionally in our region.

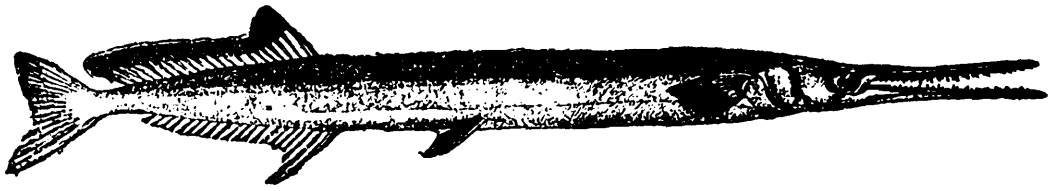
Tylosurus crocodilus (Peron & Le Sueur)*

[Text-fig. 134]

Belone crocodila Peron and Lesueur, 1821, *J. Acad. nat. Sci. Philad.*, **2(2)** : 129 (type-locality : Isle of France).

Belone annulata Valenciennes : Day, 1877, *Fishes of India* : 510, pl. 120, fig. 1 : Day, 1889, *Fauna Br. India*, Fishes, **1** : 419.

Strongylura gigantea (*nec* Temminck & Schlegel) Jones and Kumaran, 1980, *Fishes Laccadive Archipelago* : 133, fig. 111.



Text-fig. 134. *Tylosurus crocodilus* (Peron & Le Sueur)

Common Names :

Giant Longtom	...	English
Wahlah-kuddera	...	Telugu
Pahmum-kolah	...	Tamil
Tol	...	Marathi
Dethuntholi, Oola, Keran	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, rounded in cross-section. Upper and lower jaws greatly elongated and studded with sharp teeth; teeth directed anteriorly in juveniles. Length of head 3.0 to 3.6 times in body length. Dorsal fin with 22 or 23 soft rays; anal fin with 18 to 21 soft rays. Caudal fin forked. Scales small; lateral line forms a very slight keel on caudal peduncle.

Colour : upper surface of head and back dark bluish green, minutely dotted with black, silvery below. Fins largely yellow-green, dusky on pectoral and caudal fins.

Geographical Distribution : A worldwide species in tropical and warm temperate seas.

* This species is often referred to as *Tylosurus indicus* (Le-Sueur) in the recent literature which is an unidentifiable species.

Fishery Information : A fierce predatory fish, very destructive of small fishes. Taken commercially in small quantities in our region.

Suborder : ATHERINOIDEI

Lateral line absent or very weak ; usually two dorsal fins, the first, if present, with flexible spines ; anal fin usually preceded by a spine ; narial openings paired ; 5 to 7 branchiostegal rays ; parietals present.

KEY TO FAMILIES

1 (a) Pectoral fins set midway up on sides of body ; breast not cultrate	...	Atherinidae
(b) Pectoral fins placed abnormally high on body ; breast cultrate, the ventral edge of abdomen reduced to keel	...	Notocheiridae*

FAMILY : ATHERINIDAE

[Silversides]

Elongate and somewhat compressed silvery fishes, rarely exceeding 120 mm total length. Scales cycloid, moderately large ; no lateral line but the posterior lateral scales may have a pit or a rudimentary pore. Mouth generally small, usually terminal ; teeth present or absent on jaws, palatines, pterygoids or on outside of mouth. Two dorsal fins, widely separated. Pectoral fins set high on body ; pelvic fins usually abdominal. Broad silvery lateral band on sides of body.

These fishes are usually not of large enough size to be of value as human food. They are, however, very important as forage for commercial fishes. They are widely used as bait.

KEY TO GENERA

1 (a) Preopercular notch absent	...	Atherion*
(b) Preopercular notch present	...	2

* The family Notocheiridae (= Isoneidae of some recent works) is represented by *Iso flosindicus* Herre (now regarded as *I. nataliensis* Regan) in our area ; unpublished records indicate that this species is common off the coast of Pakistan).

2 (a) Ascending premaxillary process short and broad, its length about ¼ diameter of eye; lateral process of premaxilla broad and flat; dentary sloping generally upwards and backwards ... **Atherinomorus**

(b) Ascending premaxillary moderately long and narrow, 1/3 to ½ diameter of eye; lateral process broad and short; dentary sloping strongly upwards and backwards ... **Hypoatherina***

Genus **Atherinomorus** Fowler

Atherinomorus Fowler, 1903, *Proc. Acad. nat. Sci. Philad.*, **55** : 730 (type-species : *Atherina laticeps* Poey).

Moderately small but robust. Snout blunt or rounded. Preoperculum with a distinct notch. Free edge of premaxilla relatively straight or slightly convex, its ascending process short and broad, and its length about ¼ diameter of eye; lateral process of premaxilla broad and flat. Dentary sloping gently upwards and backwards, with or without a slight tubercle-like elevation at distal end. Teeth on jaws insignificant.

Dr. W. Ivantsoff has recently revised these fishes and these notes are taken from his unpublished account.

KEY TO SPECIES

1 (a) Dentary gently sloping upwards and backwards but never elevated posteriorly; midlateral scale count 39 to 44 ... *A. lacunosus*

(b) Dentary sloping backwards and upwards and with a distinct tubercle-like elevation at its distal end; midlateral scale count 33 to 38 ... *A. duodecimalis*+

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* The genus *Atherion* Jordan & Starks represented by *A. africanus* Smith has been reported only once in our area; the genus *Hypoatherina* Schultz represented by *H. barnesi* Schultz and *H. temminckii* (Bleeker), are of no importance commercially.

\+ *Atherinomorus duodecimalis* (Valenciennes) (syn. *Atherina melanostigma* Day) is of no importance commercially in our area.

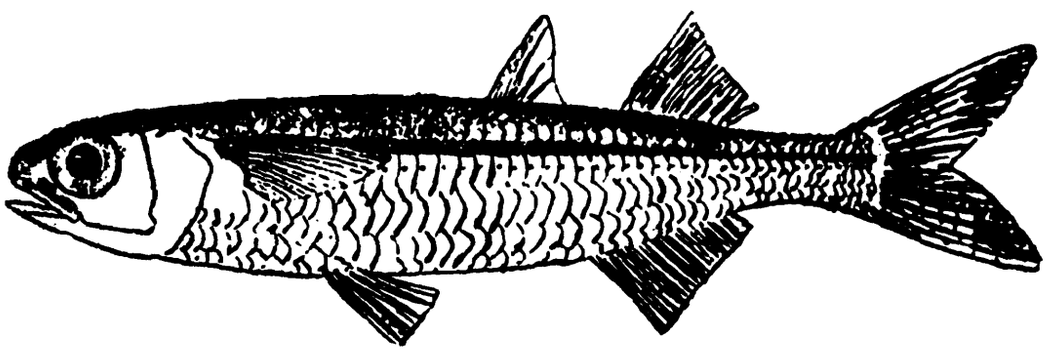
Atherinomorus lacunosus (Forster)

[Text-fig. 135]

Atherina lacunosa Forster. in Bloch and Schneider, 1801, *Syst. Ichthyol.* : 112 (type-locality : Moreton Bay, Queensland).

Atherina pinguis Lacepede : Day, 1876, *Fishes of India* : 344 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 338.

Atherina forskalii Ruppell : Day, 1876, *Fishes of India* : 345, pl. 71, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, 2 : 338, fig. 113.



Text-fig. 135. *Atherinomorus lacunosus* (Forster)

Common Names :

Broad-banded silverside	...	English
Mottechi, Motti-kola-kende	...	Tamil
Thalayil-kallan	...	Malayalam
Koredah	...	Andaman Is.

Distinguishing Characters :

Body subcylindrical and laterally compressed ; head and eyes moderately large. Teeth on jaws small, villiform, usually in more than one row on premaxilla ; also present on vomer and palatines. Dentary gently sloping upwards and backwards but never elevated posteriorly. Posterior edge of preopercle straight, anterior edge with distinct notch above angle. Gill-rakers long and slender, 18 to 25 on lower arm of first arch. Two widely separated dorsal fins, the first with 4 to 7 slender spines, and second dorsal with 1 spine and 8 to 11 soft rays. Anal fin with 1 spine and 12 to 17 soft rays. Body scales large ; midlateral scale count 39 to 44.

Colour : blue-green and translucent in life, with silvery parts of abdomen and head frequently highly iridescent ; midlateral stripe wide, wider than one scale row along side. Fins clear to dusky ; pectoral fin frequently with a blackish blotch.

Geographical Distribution : Indo-west Pacific.

Fishery Information : These fishes are small, congregating in large schools and are taken in commercial quantities in the Andaman Sea and in Tamil Nadu coastal waters.

Order : BERYCIFORMES
[Slimeheads, Soldierfishes]

Body with normal scales, or with bony scutes, often spiny. Often bony ridges and an elaborate muciferous canal system on the head. The group is characterised by several obscure anatomical similarities and externally by the fact that the dorsal fin is preceded by a series of spiny rays and the many-rayed pelvic fins are thoracic in position—that is, just behind the pectoral fins.

Most of the families are deep-sea groups, and many of them are bright red in colour.

KEY TO FAMILIES

1 (a)	Body fairly elongate with large, platelike deciduous scales ; head large and cavernous	...	Melamphaeidae*
(b)	Body relatively deep, with normal scales, or with body scutes, often spiny	...	2
2 (a)	Body with heavy platelike scales over body which form a bony case	...	Monocentridae*
(b)	Scales more or less normal, smooth or with ridges	...	3
3 (a)	Dorsal fin with 10 to 13 spines ; anal fin with 4 spines	...	Holocentridae
(b)	Dorsal fin with 3 to 8 spines	...	4
4 (a)	Abdomen generally with a row of keeled or serrate scales in the middle ; anal-fin base smaller than base of dorsal fin ; pelvic fin with one spine and 6 or 7 soft rays	...	Trachichthyidae*
(b)	Abdomen not serrate ; base of anal fin larger than dorsal-fin base ; pelvic fin with 1 spine and 7 to 13 soft rays	...	Berycidae*

* The fishes of the families Melamphaeidae, Monocentridae and Trachichthyidae are of no commercial value in our area ; the fishes of the family Berycidae are also of no commercial importance in our region though *Beryx splendens* Lowe is considered an excellent food fish in other regions.

FAMILY : HOLOCENTRIDAE
[Squirrelfishes, Soldierfishes]

Body moderately elongate and compressed, the caudal peduncle slender. Head moderate; edges of membrane bones of head serrate or with spines. Teeth small, in bands in jaws, vomer and palatines. Dorsal fin moderately notched, with 11 or 12 stout spines and 12 to 17 soft rays. Anal fin with 4 spines and soft-rayed portion. Pelvic fin with 1 spine and 5 or 7 (usually 7) soft rays. Caudal fin forked, with 17 branched rays. Scales large and coarsely ctenoid. Branchiostegal rays 8.

These are noctural fishes with large eyes, brilliant coloration with red predominating and spiny squamation. Shallow water fishes of coral reefs which occur in all warm seas.

KEY TO SUBFAMILIES/GENERA

1 (a)	Anal-fin rays 7 to 10; angle of preopercle with a stout spine longer than its width at base in young and adult (Subfamily Holocentrinae)	...	2
(b)	Anal-fin rays more than 10; angle of preopercle without spine in adult (Subfamily Myripristinae)	...	3
2 (a)	Last dorsal-fin spine located at middle between the first dorsal-fin ray and the penultimate dorsal-fin spine; ground colour red	...	**Adiorxy****
(b)	Last dorsal fin spine located nearer to the first dorsal-fin ray than the penultimate dorsal-fin spine; ground colour silvery to silvery pink	...	**Flammeo***
3 (a)	Dorsal fin with 11 spines, the last spine forming component of soft dorsal fin; scales finely to moderately ctenoid	...	**Myripristis***
(b)	Dorsal fin with 12 spines, the last spine not forming component of soft dorsal fin; scales coarsely ctenoid	...	**Ostichthys***

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* The genus *Myripristis Cuvier* represented by 6 species in our area, is of practically no commercial importance in our area; the genus *Ostichthys* Cuvier represented by *O. kaianus* (Gunther) and *O. japonicus* (Cuvier); and the genus *Flammeo* Jordan & Evermann represented by *F. opercularis* (Valenciennes), *F. sammara* (Forsskal) and *F. argenteus* (Gunther), are of no fishery value in our area.

** Matsubara and Yamakawa (1982, *Jap. J. Ichthyol.*, 29(1), p. 93) have recently relegated the genus *Adioryx* to *Sargocentron* Fowler, 1904.

Genus **Adioryx** Starks

Adioryx Starks, *Science, N.S.* **28** : 614 (type-species : *Holocentrum suborbitale* Gill) ; Shimizu and Yamakawa, 1979, *Jap. J. Ichthol.*, **26**(2) : 111 (Review).

Last dorsal-fin spine centrally located between the first dorsal-fin ray and the penultimate dorsal-fin spine. Tip of soft dorsal-fin and the caudal-fin lobes not elongate.

This is the largest genus in the family; these fishes can be recognised by their strong preopercular spine and very long dagger-like anal-fin spine, one of four spines preceding the soft rays of the fin.

KEY TO SPECIES

1 (a) Scales between lateral-line and origin of third dorsal-fin spine 3.5	...	*A. spinifer**
(b) Scales between lateral-line and origin of third dorsal-fin spine 2.5	...	2
2 (a) Nostril with one or more spinules	...	3
(b) Nostril without spinules	...	4
3 (a) Lateral-line scales 40 to 43; body without dark areas	...	*A. caudimaculatus*
(b) Lateral-line scales 32 to 37; body uniformly dark	...	*A. violaceus**
4 (a) Posterior portion of nasal bone with a few spinules	...	*A. microstomus**
(b) Posterior portion of nasal bone without spinules	...	5
5 (a) Upper margin of first suborbital bone with a spine projecting horizontally	...	*A. ruber*
(b) Upper margin of first suborbital bone without a spine projecting horizontally	...	6
6 (a) Lateral-line scales 42 to 45	...	*A. lacteoguttatus**
(b) Lateral-line scales more than 46	...	7
7 (a) Spinous dorsal-fin membranes almost entirely black with oblique white bands; pectoral-fin rays 13 to 15 (usually 14)	...	*A. diadema**
(b) A black blotch on distal part of membranes between first and third dorsal-fin spines	...	*A. ittodai**

* *Adioryx spinifer* (Forsskal), *A. caudimaculatus* (Ruppell) (Syn. *Holocentrum andamanense* Day), *A. violaceus* (Bleeker). *A. lacteoguttatus* (Cuvier) and *A. diadema* (Lacepede) do not contribute to any fishery in our area; *A. microstomus* (Gunther) recorded from Maldives and *A. ittodai* (Jordan & Fowler) from Sri Lanka, are likely to occur in our area also.

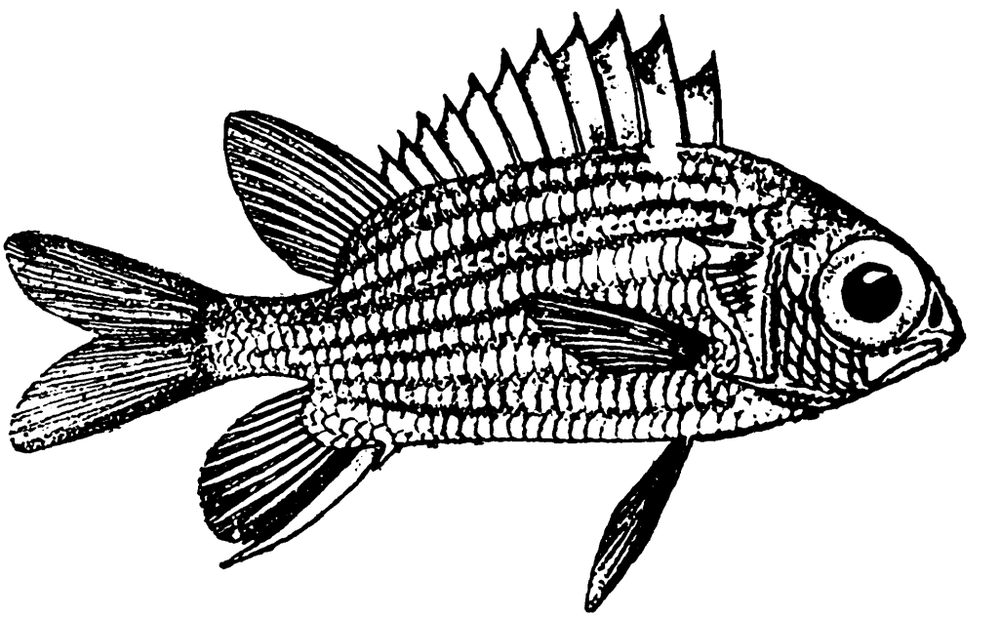
Adioryx ruber (Forsskal)

[Text-fig. 136]

Sciaena rubra Forsskal, 1775, *Descript. Animal.* : 48 (type-locality : Djedda, Red Sea).

?*Rhynchichthys ornatus* Day, 1868, *Proc. zool. Soc. Lond.* : 149 (type-locality : Madras).

Holocentrum rubrum : Day, 1876, *Fishes of India* : 172, pl. 41. fig. 4; Day, 1889, *Fauna Br. India*, Fishes, 2 : 96, fig. 44.



Text-fig. 136. *Adioryx ruber* (Forsskal)

Common Names :

Red soldierfish	...	English
Culkah-catchee, Chenguli	...	Tamil
Katantha-mulli	...	Malayalam
Chirya	...	Marathi

Distinguishing Characters :

Body depth 2.5 to 2.9 times in standard length. Snout profile steep. Nostril moderate, without spinules. Upper margin of first suborbital bone with a stout spine projecting horizontally. Lower jaw not protruding when mouth closed. Opercle with two sharp spines, the upper longer; preopercular spine long, about two-thirds of orbit. Dorsal fin with 11 spines and 13 or 14 soft rays; dorsal-fin spines high. Anal fin with 4 spines and 8 or 9 soft rays, the third anal-fin spine stout and longest. Body scales finely serrated, slightly striated.

Colour : ground colour of head and body crimson to violet; each longitudinal body scale-row with a wide white stripe. Dorsal fin

spines red, spinous dorsal-fin membranes white; anterior margin of soft dorsal-fin red, the rest of fin yellow; pectoral fins yellow; upper and lower margins of caudal fin red, medial rays reddish, the rest of fin yellow.

Geographical Distribution: Most widely distributed species of the genus, being known from the Mediterranean, Red Sea, Indian Ocean, Australia, western Pacific and Japan.

Fishery Information: Of doubtful possible value commercially, frequently occurs in the catches along the East coast of India. It attains a length of 23 cms.

Order : SCORPAENIFORMES
[Mail-cheeked Fishes]

Characterised by a bony ridge across the cheek, the end articulating with the front edge of the preoperculum. Head and body generally spiny or bony plated, sometimes completely encased. Pectoral fins usually rounded, the membranes between lower rays often incised. Caudal fin rarely forked.

Small or moderate-sized fishes of all seas. Many are brilliantly coloured and among the most beautiful of all creatures. Some have poisonus spines, a few with special glands on the spines with secretion of high toxicity so that stabs may prove fatal if not promptly treated.

KEY TO FAMILIES

1 (a) Head completely encased; lower 2 or 3 pectoral rays enlarged and free	...	Triglidae*
(b) Head not completely encased	...	2
2 (a) Pelvic fins widely separated; head greatly depressed, much broader than deep	...	Platycephalidae
(b) Pelvic-fin bases adjacent; head not depressed, usually deeper than breath	...	3
3 (a) No anal spines	...	Cottidae*
(b) Anal spines present	...	4
4 (a) Gill-membranes free from isthmus; wholly or partly scaled	...	Scorpaenidae*
(b) Gill-membranes united with isthmus; no distinct scales	...	Synanceiidae*

* The fishes of the families Triglidae, Cottidae, Scorpaenidae and Synanceiidae, are of no commercial importance in our region.

SUBORDER : PLATYCEPHALOIDEI
FAMILY : PLATYCEPHALIDAE
[Flatheads]

Body elongate and cylindrical; head depressed, usually with ridges and spines. Mouth very large, the lower jaw projecting forward, with fine teeth in jaws and palate, sometimes with canines. Two dorsal fins, the first fin with 6 to 9 spines and second fin with 11 to 14 soft rays; anal fin with 11 to 14 soft rays; pelvic fins widely separated, with 1 spine and 5 soft rays; pectoral fins without free rays. Gill openings wide; gill-rakers rcdimentary. Scales small, ctenoid, covering body. No swimbladder.

KEY TO SUBFAMILIES

1 (a) Head extremely depressed; pelvic fins behind pectoral-fin base; spinous dorsal fin preceded by a single short isolated spine ... **Platycephalinae**

(b) Head moderately depressed; pelvic fins below pectoral-fin base; spinous dorsal fin not preceded by an isolated spine; most are small red fishes ... **Bembrinae***

SUBFAMILY : PLATYCEPHALINAE

All are bottom-dwelling fish of comparatively small size and live either in the salt water of estuaries or within the confines of the continental shelf. Although of somewhat repulsive appearance, these fishes are good eating. Its flesh is white, tender and well flavoured. Its keeping qualities are particularly good.

These fishes have been divided in a number of genera by recent workers but the general habitus of all species is so alike, that I prefer to keep them in one genus. The generic revision of flatheads by Leslie W. Knapp will hopefully resolve this problem.

Genus **Platycephalus** Bloch

Platycephalus Bloch, 1795, *Naturges. Ausland. Fische* : 90 (type-species : *Platycephalus spathula* Bloch) ; Murthy, 1982, *J. mar. biol. Ass. India*, 17(3) : 679 (Review).

Head extremely depressed; caudal peduncle more or less compressed. Body covered with rather small ctenoid scales above, cycloid

* *Bembras japonicus* Cuvier of the subfamily Bembrinae, is likely of occur is our area.

scales on flat underside. Mouth horizontal and wide, the lower jaw slightly projecting. Villiform teeth in bands in both jaws, some near symphysis of upper jaw often enlarged and caninoid; teeth on vomer in a single or two patches, teeth on palatines; tongue smooth. Top of head mostly bony, bearing low ridges or serrations or spines. Two dorsal fins, the first fin of 7 to 9 spines, the first spine short and somewhat isolated; second dorsal fin with 11 to 15 soft rays which are forked excepting the first. Anal fin with 11 to 14 rays, simple and forked except the first ray. Pectoral fins broad-based; pelvic fins behind pectoral-fin bases.

Demersal fishes from coastal and deep water, with 14 species in our region.

KEY TO SPECIES*

1 (a) Lateral line entirely smooth (bearing no spines)	...	2
(b) Lateral line armed with spines	...	7
2 (a) Teeth on vomer in one transverse patch; top of head almost smooth	...	*P. indicus*
(b) Teeth on vomer in two separate patches; top of head of ridges or serrations or spines	...	3
3 (a) Ridges on top of head with spines	...	4
(b) Ridges on top of head serrated	...	6
4 (a) Supraorbital ridge finely serrated and spiny in its entire length; lateral-line with about 68 scales	...	*P. cantori*
(b) Only posterior part of supraorbital ridge serrated	...	5
5 (a) Anterior scales of lateral line keeled, but not spiny; eye with a minute tentacle: lateral line with 82 to 95 scales	...	*P. carbunculus**
(b) Lateral line unarmed; eye without tentacle; lateral line with 90 to 110 scales	...	*P. crocodilus*
6 (a) A stout antrorse (forward-pointed) spine on lower face of preopercle	...	*P. asper**
(b) No antrorse preopercular spine	...	*P. serratus**

* A new species allied to *P. tuberculatus* Cuvier, is being described from Cochin by Knapp and Wongratana.

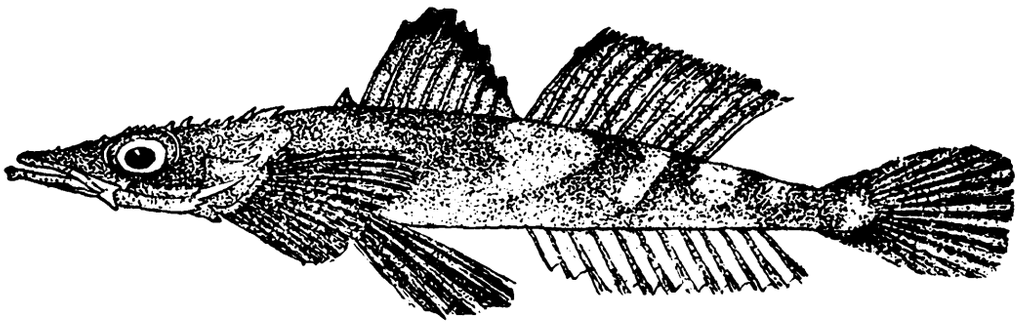
7	(a) All scales of lateral line bearing spines	...	8
	(b) Anterior scales of lateral line only bearisg spines	...	9
8	(a) Spinous dorsal fin with a black blotch between the 6th and 8th spines; preopercular spine long, 3.6 to 4.2 times in head length	...	*P. suppositus*
	(b) Spinous dorsal fin clouded black but without a blotch; preopercular spine short, 6.4 to 8.9 times in head length	...	*P. scaber*
9	(a) Anterior scales of lateral line with 15 to 20 spines	...	10
	(b) Anterior scales of lateral line with 4 to 8 spines	...	11
10	(a) Anterior orbital rim with 4 or 5 spines; opercular ridge finely serrated; lateral line with 52 to 55 scales	...	*P. tuberculatus*
	(b) Anterior orbital rim with a single spine; a few spines only on opercular ridge; lateral line with 73 to 84 scales	...	*P. rodericensis*
11	(a) Anterior scales of lateral line with 7 or 8 spines; lateral line with 72 to 78 scales	...	*P. bengalensis*
	(b) Anterior scales of lateral line with 4 or 5 scales; lateral line with 55 to 63 scales	...	12
12	(a) Scale-rows 7 or 8 between origin of dorsal fin and lateral line; suborbital ridge with 3 distant spines	...	*P. isacanthus**
	(b) Scale-rows 4 to 6 between origin of dorsal fin and lateral line; suborbital ridge with a few distant spines	...	*P. malayanus**

* *Platycephalus carbunculus* Valenciennes recorded from Bombay and the Gulf of Mannar in our region, is rather uncommon in the catches; *P. asper* Cuvier (as *P pristiger* Cuvier) has been recently reported by Murthy (1982) from the Orissa-Andhra coast and the Andamans but the species does not contribute to any fishery; *P. serratus* Cuvier has been recently reported from Laccadives, *P. isacanthus* Cuvier from the Gulf of Mannar and Palk Bay, and *P. malayanus* Bleeker from the Lakshadweep Is.—all these three species do not contribute to any fishery in our waters.

Platycephalus bengalensis Visweswara-Rao

[Text-fig. 137]

Platycephalus bengalensis Visweswara-Rao, 1966, *Ann. Mag. nat. Hist.* (13) **9** : 124, fig. 1 (type-locality : Visakhapatnam)



Text-fig. 137. *Platycephalus bengalensis* Visweswara-Rao

Common Name :

Bengal's flathead ... English

Distingutshing Characters :

Body elongate and subcylindrical; head much flattened, its length 3.0 to 3.3 times in standard length; interorbital space concave. A sharp spine before and behind upper margin of each eye; supraorbital ridge serrated. Preopercular spine strong, not extending to gill-opening. Villiform teeth in both jaws; teeth on vomer in two patches and a narrow band on each palatine, tongue smooth. Two dorsal fins; first fin with 9 spines, second dorsal fin with 11 soft rays. Anal fin with 12 soft rays. Caudal fin slightly rounded. Scales ctenoid; lateral line with 72 to 78 scales, with 7 or 8 spines on anterior scales.

Colour : body dark grey-brown, with some irregular lighter blotches. First dorsal fin dark, with a broad black edge; pectoral, pelvic and caudal fins black, other fins grey.

Geographical Distribution : North-east coast of India.

Fishery Information Common in the trawl catches at Visakhapatnam (Andhra) in April during the period of upwelling when many demersal fishes enter the coastal waters.

Platycephalus cantori Bleeker

Platycephalus carbunculus (*nec* Valenciennes) Day, 1876, *Fishes of India* : 278 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 240.

Platycephalus cantori Bleeker, 1879, *Verh. Akad. Amsterdam*, **19** : 26 (type-locality : Pinang).

Common Name :

Cantor's flathead	...	English

Distinguishing Characters :

Body compressed ; head length about 3.0 times in standard length ; interorbital space narrow and concave on account of the elevated supraorbital ridges. Ridges on top of head spiny ; supraorbital ridge finely serrated and spiny in its entire length ; a spine in front of eye. Villiform teeth in jaws, on vomer in two patches, close together and in elongate bands on palatines. No antrorse preopercular spine. Two dorsal fins ; first dorsal fin with 9 spines, second dorsal fin with 12 soft rays. Anal fin with 11 or 12 soft rays. Caudal fin truncate. Scales ctenoid, except those on belly which are cycloid ; lateral line smooth, with about 68 scales bearing no spines.

Colour : body brownish, with numerous brown spots and 3 vertical bands. Posterior half of first dorsal fin black, second dorsal fin spotted ; pectoral fin with several lines of spots ; caudal fin dark, with one or two ill-defined vertical bands.

Geographical Distribution : West coast and south-east coast of India, Pinang and Singapore.

Fishery Information : Of minor fishery value on the Kerala coast.

Platycephalus crocodilus Tilesius

Platycephalus crocodilus Tilesius, 1812, *Krusenstern's Reise* : pl. 59, fig. 2 (type-locality : Nagasaki, Japan).

Platycephalus punctatus Cuvier : Day, 1876, *Fishes of India* : 277, pl. 60, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 239.

Common Names :

Spotted flathead	...	English
Mench	...	Marathi

Distinguishing Characters :

Body compressed ; head length 2.8 to 2.9 times in standard length ; ridges on top of head with spines, the supraorbital ridge with 3 dis-

tant spines; a feebly-developed rounded interopercular flap. Villiform bands of teeth in jaws, on vomer in two oval, narrow and elongated patches; palatine teeth in 2 or 3 rows. Two dorsal fins; first dorsal fin with 9 spines, second fin with 11 or 12 soft rays. Anal fin with 11 soft rays. Caudal fin rounded. Scales on upper side of body ctenoid, on lower side cycloid; lateral line with 82 to 85 scales bearing no spines.

Colour : body brownish to olive-grey, with several vague cross-bars in young, and numerous rounded dark spots in adults. Fins dark, vaguely spotted.

Geographical Distribution : Widespread in the central tropical Indo-Pacific.

Fishery Information : The species is fairly common in the trawl catches at Madras (Tamil Nadu).

Platycephalus indicus (Linnaeus)

Callionymus indicus Linnaeus, 1758, *Systema Naturae*, ed. 10 : 250 (type-locality : Asia).

Platycephalus insidiator (Forsskal) : Day, 1876, *Fishes of India* : 276; Day, 1889, *Fauna Br. India*, Fishes, 2 : 238.

Common Names :

Indian flathead	...	English
Irrwa	...	Telugu
Oolpathy, Ulupathi	...	Tamil
Orathal	...	Malayalam
Balchat	...	Kannada
Mench	...	Marathi
Arawuddah, Chouurdah	...	Andaman Is.

Distinguishing Characters :

Body much compressed; top of head with only weak ridges of low and feeble spines. A broad band of villiform teeth in upper jaw, some of inner teeth near symphysis enlarged and canine-like; lower jaw with a row of rather large crowded teeth and several rows of smaller teeth at their outer side; vomer with teeth in one transverse patch, palatines with a single row of large caninoid teeth, tongue smooth. Two dorsal fins; first dorsal with 9 spines, second dorsal fin with 12 or 13 soft rays. Anal fin with 13 soft rays. Caudal fin

truncate. Scales on upper parts of body ctenoid, on lower parts cycloid; lateral-line with 118 to 134 scales bearing no spines.

Colour : body brown above, spotted with reddish brown, the belly white. Dorsal fins pale, with indistinct spots; pectoral and pelvic fins strongly spotted; caudal fin yellow, with white-edged oblique bands across upper and lower lobes.

Geographical Distribution Widespread in the central tropical Indo-Pacific.

Fishery Information : Fairly common in the trawl catches in our area.

Platycephalus rodericensis Cuvier

Platycephalus rodericensis Cupier, 1829, *Hist. nat. Poiss.*, **4** : 253 (type-locality : unknown).

Platycephalus macracanthus Bleeker : Day, 1876, *Fishes of India* : 276, pl. 59, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 238.

Common Names :

Large-spinned flathead	...	English
Mench	...	Marathi

Distinguishing Characters :

Body depressed; top of head with ridges bearing spines; supra-orbital ridges with a moderate number of spines; one spine on anterior orbital rim. Opercle with two diverging ridges, ending in spines; preopercular spine long and strong, reaching on to base of pectoral fin. Villiform teeth in both jaws, in two patches on vomer and in narrow bands on palatines. Two dorsal fins; first dorsal fin with 9 spines and second dorsal fin with 12 soft rays. Anal fin with 12 or 13 soft rays. Caudal fin slightly rounded; lateral line with 73 to 84 scales of which anterior 15 to 20 spiny.

Colour : body brownish above, dull white below. Spinous dorsal fin and end of caudal fin blackish; soft dorsal fin with brown spots on rays.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery value in the trawl catches

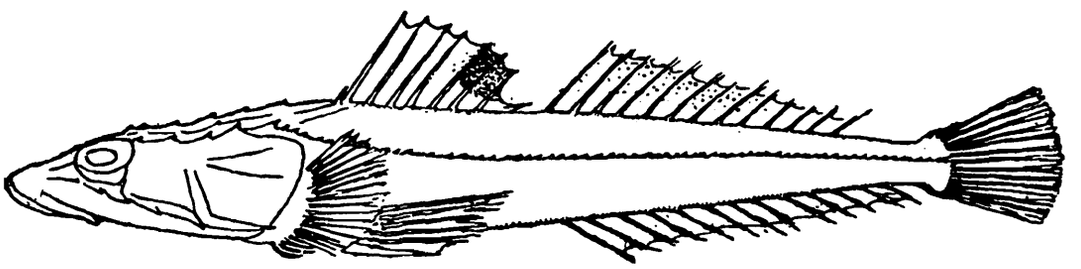
Platycephalus suppositus Troschel

[Text-fig. 138]

Platycephalus suppositus Troschel, 1840, *Wiegmans Arch. Naturgesch.*, **6** : 269 (type-locality : not known).

Platycephalus maculipinna Regan, 1905, *J. Bombay nat. Hist. Soc.*, **16**(2) : 233, pl. A, fig. 3 (type-locality : Muscat) ; George, 1970, *J. mar. biol. Ass. India*, **10**(2) : 355, fig. 1.

Grammopiites suppositus : Knapp, 1979, *Meteor Forsch. Ergebnisse*, (D) 29 : 52.



Text-fig. 138. *Platycephalus suppositus* Troschel

Common Name :

Regan's flathead ... English

Distinguishing Characters :

Body robust and subcylindrical; head spatulate, its length 2.9 to 3.1 times in standard length. Upper jaw (maxilla) reaching to below anterior half of eye. Teeth in villiform bands in jaws; in two oval patches on vomer and narrow elongated bands on palatines. Preopercular spine long, 3.6 to 4.2 times in head length, extends slightly beyond operculum; two shorter spines below it. Two dorsal fins; first dorsal fin with 9 spines and second dorsal fin with 12 or 13 soft rays. Anal fin with 13 or 14 soft rays. Caudal fin rounded. Lateral line spiny along its entire length, 53 to 55 spiny scutes.

Colour : body brownish above and whitish below. Spinous dorsal fin with a distinctive black blotch between the 6th and 8th spines; second dorsal fin with their tips black and with dusky spots on fin membrane; pectoral and anal fins slightly spotted; pelvic and caudal fins with blackish margins.

Geographical Distribution : Ethiopia, Muscat, the Gulf of Oman and west coast of India.

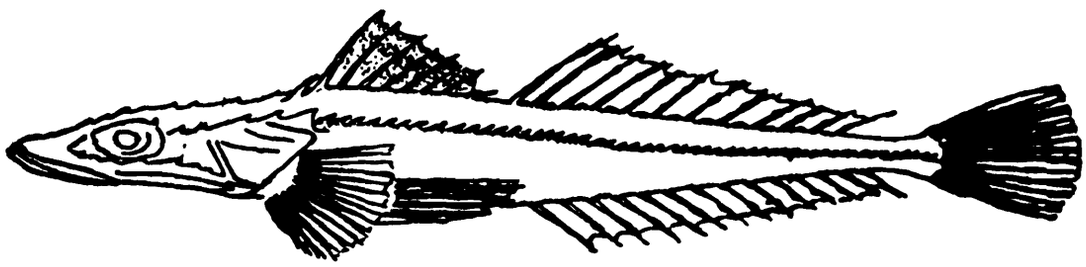
Fishery Information : This is the dominant species of the miscellaneous fish component of the trawl catches at Cochin (Kerala) and contributes 10% by weight along with *Platycephalus scaber* (L.), of the miscellaneous catches.

Platycephalus scaber (Linnaeus)

[Text-fig. 139]

Cottus scaber Linnaeus, 1758, *Systema Naturae*, ed. 10, 1 : 264 (type-locality : unknown).

Platycephalus scaber : Day, 1876, *Fishes of India* : 275, pl. 60, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 236, fig. 86.



Text-fig. 139. *Platycephalus scaber* (Linnaeus)

Common Names :

Rough flathead	...	English
Irrwa	...	Telugu
Vetoolpathy	...	Tamil

Distinguishing Characters :

Body robust and subcylindrical; head spatulate, its length 2.9 to 3.2 times in standard length. Teeth villiform in both jaws; in two oval patches on vomer and narrow elongated band on palatines. Preopercular spine short, 6.4 to 8.9 times in head length, does not extend upto gill-opening. Two dorsal fins; first dorsal fin with 9 spines and second dorsal fin with 12 soft rays. Anal fin with 12 soft rays. Caudal fin rounded. Lateral line spiny along its entire length, with 52 to 54 robust spiny scutes.

Colour : body grey dorsally and whitish below; black regular dots along lateral line, head and body. First dorsal fin clouded with black; soft dorsal fin and anal fin rays with rows of black dots which give a barred appearance; pectoral fins lower half dusky, upper half with rows of light spots; pelvic and caudal fins dusky and black at margins.

Geographical Distribution : Indo-west Pacific.
In sea and estuaries.

Fishery Information : This species along with *Platycephalus suppositus*, is reported to contribute about 10% by weight of the miscellaneous fish component of the trawl catches at Cochin (Kerala State).

Platycephalus tuberculatus Cuvier

Platycephalus tuberculatus Cuvier, 1829, *Hist. nat. Poiss.*, **4** : 258 (type-locality : Trincomale, Sri Lanka) ; Day, 1876, *Fishes of India* : 275, pl. 60, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 237.

Platycephalus townsendi Regan, 1905, *J. Bombay nat. Hist. Soc.*, **16** : 323, pl. 1, fig. 1 (type-locality : Karachi and Muscat).

Common Name :

Knobby flathead ... English

Distinguishing Characters :

Body compressed. Head ridged and spiny above, its length 2.6 to 2.8 times in standard length ; supraorbital, postorbital and suborbital ridges serrated ; 2 to 5 strong spines on anterior orbital rim ; opercular ridge serrated. Preopercular spine strong, not extending to gill-opening. Villiform teeth in both jaws, in two patches on vomer, and on palatines. Two dorsal fins ; first dorsal fin with 8 or 9 spines and second dorsal fin with 11 or 12 soft rays. Anal fin with 11 soft rays. Caudal fin rounded. Lateral line with 52 to 55 scales, the anterior 15 to 20 bearing spines.

Colour : body brownish above, whitish below, with dark mottling and indistinct vertical bands. Spinous dorsal fin blackish-brown, the second dorsal fin spotted ; pectoral fins with brown spots in upper two-thirds and a white margin, and black submarginal band below.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Of minor commercial significance in our area.

Order : Perciformes

This order is the most diversified of all fish orders and indeed the largest vertebrate order. Many of the families are very similar and poorly separated from one another. It is difficult to express in any relatively brief manner the characters which distinguish this vast assemblage from other fishes and further, it is very difficult to prepare a relatively simple operative Key to the numerous families of the order. The fishes of the suborders Blennioidei (10 families), Gobioidei (5 families) and Schindlerioidei (1 family), play no role in the commercial fisheries of our region and have hence been omitted from the

following Key since to be really satisfactory it would be too voluminous and unwieldy and so less operative. The families of the suborders Anabantoidei (2 families), Channoidei (1 family) and Mastacembeloidei (3 families), have also been omitted since they are restricted to the fresh waters of our area.

KEY TO FAMILIES

1 (a) Pectoral fin divided into two parts, the upper part normal with rays attached, the lower with 4 to 7 quite free (unattached), filamentous rays; two widely separated dorsal fins	...	Polynemidae
(b) Pectoral fins normal, without free rays in lower part of fin, lower rays sometimes separate from one another then dorsal fin continuous	...	2
2 (a) Two short dorsal fins, widely separated from each other; pelvic fins subabdominal and markedly behind pectoral-fin base, about equidistant between pectoral-fin base and origin of first dorsal fin	...	3
(b) Dorsal fins with contiguous bases, but if (rather rarely) the fins are separate, the separation is negligible and pelvic fins are situated not on belly but near base of pectoral fins	...	4
3 (a) Lateral line well developed; jaws with strong canine teeth; first dorsal fin with 5 spines	...	Sphyraenidae
(b) No lateral line; teeth in jaws small, feeble, hidden or absent; first dorsal fin with 4 spines	...	Mugilidae
4 (a) A peculiar occipital hook in males; ribs expanded, partly enclosing anterior portion of swim bladder and entirely enclosing posterior portion; lateral line short and rudimentary		Kurtidae
(b) Supraoccipital bone and ribs normal	...	5

5 (a) Anterior part of œsophagus immediately behind last gill arch having lateral sacs (pharyngeal sacs) supplied inside with papillae or longitudinal folds bearing teeth; small uniserial teeth in jaws	...	6
(b) No toothed pharyngeal sacs	...	9
6 (a) A continuous dorsal fin, or two dorsal fins scarcely separated; pelvic fins present or absent; no teeth on roof of mouth	...	7
(b) Two dorsal fins, distinctly though scarcely, separated; pelvic fins always present; vomer and palatines toothed or not	...	8
7 (a) Depth of body slightly greater than length of head; pelvic fins always present; seven branchiostegal rays		Centrolophidae*
(b) Body very deep, its depth about 2 times in head length; pelvic fins absent in adults; five or six branchiostegal rays	...	Stromateidae
8 (a) Caudal peduncle square in cross-section, its least depth less than 5% of standard length, with two low lateral keels on each side near caudal-fin base; 14 or 15 rays in both dorsal and anal fins; vomer and palatines (roof of mouth) toothless	...	*Ariommidae*
(b) Caudal peduncle compressed, its least depth more than 5% of standard length, without lateral keels; usually more than 15 rays in both dorsal and anal fins; minute (almost indistinguishable) teeth on roof of mouth	..	Nomeidae*
9 (a) Premaxillae fixed (nonprotrusible upper jaw), upper jaw often form a long, forward-projecting sword-like process	...	10
(b) Maxillary bones not very firmly attached to premaxillae which are hence free to move forward	...	14

10 (a)	Caudal fin always present, well developed, lunate or strongly notched; body spindle-shaped; keels present on caudal peduncle	...	11
(b)	Caudal fin often absent, but if present then not large nor lunate-shaped; body oblong or elongate, often ribbon-like; no keels on caudal peduncle	...	13
11 (a)	Snout not protruding forward in form of long projection or sword-like process; pelvic fin with 1 spine and 5 soft rays (Mackerel & Tunas)	...	Scombridae
(b)	Snout protruding forward in form of elongate projection or sword-like process; pelvic fin, if present, with 3 rays; pectoral fins set low on body; mouth inferior (Bill-fishes)	...	12
12 (a)	No pelvic fin; a single caudal keel on side; snout long and sword-like in shape and depressed in cross-sectional view; no scales on body; no teeth; base of first dorsal fin short and well separated from base of second dorsal fin	...	Xiphiidae
(b)	Pelvic fin present; a pair of caudal keels on each side; snout somewhat shorter and nearly rounded in cross-sectional view; body covered with small elongated bony scales; many small teeth; base of first dorsal fin long and close to base of second dorsal fin	...	Istiophoridae
13 (a)	Body ribbon-like; single dorsal fin, very long and running almost entire length of body; no finlets behind dorsal and anal fins; body silvery (Ribbonfishes)	..	*Trichiuridae*
(b)	Body elongate and compressed or somewhat fusiform; two dorsal fins; isolated finlets behind dorsal and anal fins usually present; back usually brown	...	Gempylidae
14 (a)	Pelvic fin with 2 strong spines, separated by 3 soft rays; anal fin with 7 spines	...	Siganidae

	(b) Pelvic fin with at most 1 spine	...	15
15	(a) One or more spines, or keels on each side of caudal peduncle, or scales covering body minute, scarcely visible to naked eye but lending a marked roughness to skin, giving the impression of a short bristle; body deeply compressed	...	Acanthuridae
	(b) Caudal peduncle unarmed nor are there scales making the skin bristly	..	16
16	(a) Lateral line high on body, close to dorsal-fin base; colour of body red or pink	...	17
	(b) Lateral line not high on body	..	18
17	(a) Dorsal and anal fins very long and confluent (joined) with caudal fin; total dorsal-fin elements 67 to 74	...	Cepholidae*
	(b) Last ray of dorsal and anal fins not connected to caudal fin by a membrane; dorsal-fin elements 24 or 25; a jet black, hidden blotch (owstoniid' mark) on membrane connecting maxillary and premaxillary	...	Owstoniidae*
18	(a) Lower 5 to 8 rays of pectoral fins simple (unbranched), usually thickened, and sometimes separated from one another; pelvic fins rather far behind pectoral fins	...	Cirrhitidae*
	(b) Lower rays of pectoral fins branched, not thickened	...	19
19	(a) A single pair of nostrils (rarely two); body deep (rarely terete) and laterally compressed; preorbital and usually suborbitals (a ring of bones below eye) not attached to cheek	..	Pomacentridae*
	(b) Two pairs of nostrils; preorbital and suborbitals attached to cheek	...	20
20	(a) Gills $3\frac{1}{2}$, with slit behind, last small or wanting; lower pharyngeals fused into a characteristic structure which bears strong molar teeth	...	21

	(b) Gills 4, with a long slit behind; lower pharyngeals not fused into one bone and not bearing molar teeth	...	22
21	(a) Mouth protractile; jaw teeth mostly separate, usually projecting outward	..	Labridae*
	(b) Mouth non-protractile; jaw teeth fused to form beak-like dental plates (parrotlike teeth)	...	Scaridae
22	(a) Anal fin with 8 spines; pelvic fin with one spine and 2 soft rays	..	Acanthoclinidae*
	(b) Anal fin with not more than 6 spines	..	23
23	(a) Two long barbels behind chin (which can be folded in to a median groove on throat); two widely separated dorsal fins	...	Mullidae
	(b) No barbels on chin	...	24
24	(a) Dorsal fin with 6 to 9 isolated (not connected by membrane) spines, each depressible in a groove; two silvery stripes on sides of body	...	Rachycentridae
	(b) Dorsal fin with no free spines		25
25	(a) First 2 anal-fin spines detached from rest of fin (these spines partially or completely embedded in large carangids); scutes on straight part of lateral line usually present	...	Carangidae
	(b) First 2 anal-fin spines not detached from rest of fin; no scutes on caudal peduncle		26
26	(a) Head flattened with a characteristic transversely laminated, oval-shaped disc	...	Echeneidae*
	(b) No sucking disc on head	...	27
27	(a) Anterior rays of soft dorsal and anal fins markedly elongated, giving both fins a sickle shape; pelvic fins usually small or vestigial; body deep		Monodactylidae
	(b) Anterior rays of soft dorsal and anal fins not elongated, when elongate they do not give either fin a sickle shape		28

28 (a)	Body very deep, its maximum depth more than half the total length; single dorsal fin, spines clearly distinguishable	...	29
(b)	Body oblong or moderately deep, its maximum depth less than half total length; when deep-bodied and with single dorsal fin, there are no spines or the spiny rays hard to distinguish from soft rays	...	32
29 (a)	Pelvic fins unusually large, each with one long, strong spine and 5 soft rays; head encased in exposed rough bones	..	Pentacerotidae*
(b)	Pelvic fins of moderate size or small, if large the spine is neither strong nor thick		30
30 (a)	No procumbent spine in dorsal fin; single continuous (never notched) dorsal fin; body thin, deep and discus-shaped; usually bright coloured	...	Chaetodontidae
(b)	First dorsal-fin spine pointing forward (procumbent) (distinct only in juveniles); spinous part of dorsal fin distinct (nearly separated) from soft-rayed portion (except in Platax)	..	31
31 (a)	Anal fin with 3 spines; gill membranes broadly united to isthmus	...	Ephippidae
(b)	Anal fin with 4 spines; gill membranes narrowly united to isthmus	...	Scatophagidae
32 (a)	Single dorsal fin with no spines or else the spiny rays difficult to distinguish from the soft rays, or, finally, the spiny rays are thin and flexible and similar to soft rays	..	33
(b)	Single or two dorsal fins with well developed spines	..	38
33 (a)	Pelvic fins absent in adults (small, near throat, in juveniles); dorsal and anal fins very long, spines present only in small specimens; caudal peduncle keeled, with scute-like scales	...	Apolectidae

	(b) Pelvic fins present	..	34
34	(a) Body deep, strongly compressed, its depth greater than length of head	...	35
	(b) Body oblong or elongate, moderately compressed, its depth about equal to or less than length of head	...	37
35	(a) No spines in dorsal and anal fins; first pelvic-fin ray in adult prolonged; body disc-like	...	Menidae
	(b) Dorsal and anal fins with spines; first pelvic-fin ray not elongated	...	36
36	(a) Dorsal fin long, its base equal or longer than anal-fin base		Bramidae*
	(b) Dorsal fin short, its base shorter than anal-fin base		Pempheridae
37	(a) Dorsal fin originating on nape and extending to caudal fin; no sharp spines in dorsal and anal fins; forehead prominent (steep and high) in adult males	..	Coryphaenidae
	(b) Dorsal fin originating behind head; dorsal and anal fins with distinct spines	...	Branchiostegidae*
38	(a) Lateral line interrupted or divided into upper and lower parts	...	39
	(b) Lateral line single, not divided into two parts	...	41
39	(a) Pelvic fin with one spine and 4 soft rays, the first of which is thickened and bifurcate	...	Plesiopidae*
	(b) Pelvic fin with 1 spine and 5 soft rays		40
40	(a) Dorsal fin with 3 or fewer spines	..	Pseudochromidae*
	(b) Dorsal fin with 7 spines	..	Pseudogrammidae*
41	(a) Two dorsal fins, well separated, but if close together then not joined by membrane		42

	(b) Single dorsal fin, sometimes deeply notched between spinous and soft parts of fin but in such cases, the membrane joining the two parts is intact	...	48
42	(a) Anal-fin base considerably longer than second dorsal-fin base; mouth large, oblique, with two small canine teeth at front	..	Lactariidae
	(b) Anal-fin base as long as or shorter than second dorsal-fin base		43
43	(a) Mouth small; upper jaw (maxilla) ending far short of eye and even before nostrils; body elongate	..	Sillaginidae
	(b) Mouth moderate-size or large; upper jaw (maxilla) reaching nostrils, but often extending beyond anterior margin of eye		44
44	(a) Scaly process in pelvic-fin axis	...	45
	(b) Pelvic fin without axillary scale	...	47
45	(a) Jaws toothless or with a few minute teeth at front of upper and/or lower jaw; mouth greatly protrusible	...	Emmelichthyidae*
	(b) Jaws with small teeth, in narrow villiform bands; mouth not protractile	..	46
46	(a) Caudal fin forked; preoperculum with a double edge (edge and ridge)	...	Ambassidae
	(b) Caudal fin rounded; preoperculum with a single edge (no ridge)	...	Centropomidae
47	(a) Anal fin with 1 or 2 (usually 21) spines; vent nearer to anal-fin origin than to pelvic fins	...	Apogonidae
	(b) Anal fin with 3 spines; vent anterior, near pelvic-fin base		Acropomatidae*
48	(a) Pelvic fins usually with an axillary scale	...	49
	(b) Pelvic fins without an axillary scale anal spines three	...	60

49 (a)	Teeth setiform (comb-like) but no canine-like teeth; body deep, strongly compressed, discus-shaped	...	Chaetodontidae
(b)	Setiform teeth absent, but if present then canine-like teeth also present		50
50 (a)	Anal fin with 2 spines; lateral line scales extending to hind margin of caudal fin	...	Sciaenidae
(b)	Anal fin with 3 spines; lateral line scales ending at caudal-fin base		51
51 (a)	Dorsal and anal fins rounded and symmetrical so that with the tail they appear as a single three-lobed fin	...	Lobotidae
(b)	Not as above	..	52
52 (a)	Mouth strongly portractile	..	53
(b)	Mouth moderately protrusible	..	54
53 (a)	Head usually naked (but small scales on cheek in few species), upper surface with bony ridges with a nuchal spine on nape: gill membranes united with isthmus	...	Leiognathidae
(b)	Head entirely covered with clearly visible scales, upper surface smooth; gill membranes free from isthmus	...	Gerreidae
54 (a)	Distal end of premaxillae overlapping maxillae externally; molar-like teeth present at sides of jaws; no teeth on roof of mouth		Sparidae
(b)	Maxillae not overlapped by hind tip of premaxillae	...	55
55 (a)	Outer row of teeth in jaws of a peculiar hockey-stick shape, with their bases set horizontally, resembling a radially striated bony plate inside mouth		Kyphosidae
(b)	Typical scalpriform teeth absent		56
56 (a)	Suborbital process well developed, sometimes forming a spine posteriorly	..	57
(b)	Suborbital process either absent or weakly developed	..	58
57 (a)	Teeth usually present on vomer and palatines (roof of mouth); moderately strong spines in dorsal and anal fins		Lutjanidae

	(b) No teeth on roof of mouth; weak spines in dorsal and anal fins	..	**Nemipteridae**
58	(a) No scales on preoperculum (cheeks); lips thick and fleshy; no teeth on roof of mouth	...	**Lethrinidae**
	(b) Scales present on cheeks (preoperculum)		**59**
59	(a) No pores on chin; scales on cheek beginning considerably behind hind end of maxilla (no scales between eye and mouth)		**Pentapodidae**
	(b) Chin with conspicuous pores (2 to 6); scales extending onto entire head (except front of snout, lips and chin)		**Pomadasyidae**
60	(a) Inner ray(s) of pelvic fins attached to abdomen by membrane	...	**61**
	(b) Inner ray of pelvic fins not connected to abdomen by membrane		**62**
61	(a) Dorsal fin with 2 to 9 spines; upper edge of preopercle fused to head	...	**Grammistidae**
	(b) Dorsal fin with 10 spines; upper edge of preopercle free from head; colour usually bright red	...	**Priacanthidae**
62	(a) Dorsal and anal fins each with a well-developed basal scaly sheath; dorsal fin with 10 spines	..	**Kuhliidae**
	(b) Dorsal and anal fins each without or a low basal scaly sheath	...	**63**
63	(a) Mouth large, the upper jaw usually extending to below hind margin of eye; dorsal fin with 7 to 12 spines; operculum with 1 to 3 flat spines	..	**Serranidae**
	(b) Mouth small or moderate, the upper jaw not reaching beyond eye centre; dorsal fin with 12 to 14 spines; operculum with 1 or 2 strong spines	..	**Teraponidae**

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* The fishes of the families Centrolophidae, Nomeidae, Cepholidae, Owstoniidae, Cirrhitidae, Pomacentridae, Labridae, Acanthoclinidae, Echeneidae, Pentacerotidae, Bramidae, Branchiostegidae, Plesiopidae, Pseudochromidae, Pseudogrammidae, Emmelichthyidae and Acropomatidae do not at the present time play any significant role in the commercial fisheries of our region.

SUBORDER : PERCOIDEI
FAMILY : CENTROPOMIDAE
[Seaperches]

Body elongate or oblong, slightly compressed. Mouth large; teeth small, conical in jaws and on roof of mouth. Operculum with a single well-developed spine; preoperculum with single edge (no ridge) and with an enlarged spine at angle. Dorsal fin deeply notched or separated into two fins (between which there are 1 or 2 isolated spines), the first part with 7 or 8 spines, and second part with one spine and 8 to 11 soft rays. Anal fin with 3 spines and 6 to 9 soft rays. Pelvic fin with one strong spine and 5 soft rays. Caudal fin rounded. Scales ctenoid, small to moderate in size, dorsally not extending forward onto head beyond level of midpoint of eye (usually only to level of posterior margin of orbit) but present on cheeks and operculum; scaly sheath at bases of anal and soft dorsal fins; pelvic fin with an axillary scale; pored scales of lateral line continued onto caudal fin, usually reaching to posterior margin of that fin.

Coastal waters, most species being partial to brackish water. Some ascend rivers and others are permanent residents of freshwater.

KEY TO GENERA

1 (a) Upper jaw reaching to below eye; lower edge of preoperculum smooth ... **Psammoperca**

(b) Upper jaw (maxilla) extending behind eye; lower edge of preoperculum with 3 or 4 (rarely more) spines ... **Lates**

Genus **Lates** Cuvier

Lates Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 88 (type-species : *Perca nilotica* Linnaeus) ; Greenwood, 1976, *Bull. Br. Mus. nat. Hist.* (Zool), **29** : 12 (Review).

Body elongate and moderately compressed, with a deep caudal peduncle. Head pointed, with concave dorsal profile, becoming convex in front of dorsal fin. Mouth large, the upper jaw reaching behind eye. Nostrils of each side close together. Lower edge of preoperculum with 3 or 4 (rarely more) large, flattened and triangular spines.

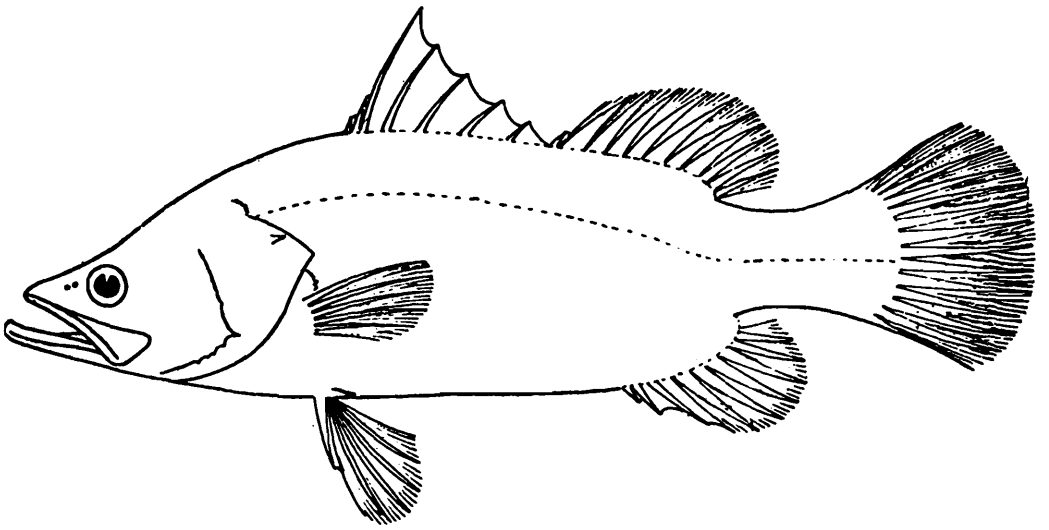
Eight species, seven of which are African and confined to freshwaters, and one marine or estuarine and widely distributed in Indo-Pacific coastal waters.

Lates calcarifer (Bloch)

[Text-fig. 140]

Holocentus calcarifer Bloch, 1790, *Naturges. ausland. Fische,* **4** : 100, pl. 244 (type-locality : ? Indonesia).

Lates calcarifer : Day, 1875, *Fishes of India* : 7, pl. 1, fig. **1**; Day, 1889, *Fauna Br. India,* Fishes, **1** : 440, fig. 139.



Text-fig. 140 *Lates calcarifer* (Bloch)

Common Names :

Giant seaperch	...	English
Bhekti	...	Bengali
Durruah, Bekkut	...	Oriya
Pandu-kopah, Pandu-menu	...	Telugu
Painnee-meen, Keduwa	...	Tamil
Nuddee-meen, Nair-meen	...	Malayalam
Keliji	...	Kannada
Khajura, Jiteda, Khajuri	...	Marathi
Todah	...	Andaman Is

Distinguishing Characters :

Body elongate and moderately compressed, with a deep caudal peduncle. Head pointed, with concave dorsal profile becoming convex in front of dorsal fin. Operculum with a small spine and serrated flap above origin of lateral line, preopercle with a spine in angle and serrated edge behind. Mouth large and slightly oblique, the upper jaw extending to behind eye; teeth villiform in jaws. Dorsal fin with 7 to 9 spines and 10 or 11 soft rays; a very deep notch almost dividing spinous from soft-rayed part of fin. Anal fin rounded, with 3 spines

and 7 or 8 soft rays. Pectoral fins short and rounded. Caudal fin rounded. Scales large, ctenoid; dorsal and anal fins with a scaly sheath.

Colour : two phases, either olive-brown above with silvery sides and belly (usually juveniles) or green-blue above and silvery below; no spots or bars present on fins or body. Eyes bright pink.

Geographical Distribution : Widespread in the Indo-Pacific region.

Fishery Information : This is one of the most important food fishes of India. Though essentially a marine fish, it ascends estuaries and backwaters in pursuit of food and shelter but always returns to estuarine and marine environments for spawning. Juveniles of the species are known to frequent the lower estuarine areas in the Hooghly-Matlah river system and they enter the impoundment along with the tidal water which acts as the main source of seed for brackishwater fish culture in impoundments, popularly known as 'Bhasabadha' fisheries in West Bengal. This species is considered to be a good game fish and is esteemed as a food fish. The maximum length is 152 cm. and the commercial catches are between 45 cm to 61 cm. The gas-bladder of this fish is exported as isinglass.

Genus **Psammoperca** Richardson

Psammoperca Richardson, 1844, *Zool. Voy. Erebus and Terror, Ichth.* : 115 (type-species : *Psammoperca datnioides* Richardson = *Labrax waigiensis* Cuvier) ; Greenwood, 1976, *Bull. Br. Mus. nat. Hist.* (*Zool.*), **29** : 51 (Review).

Body elongate and moderately compressed, with a deep caudal peduncle. Head pointed, with concave dorsal profile becoming convex in front of dorsal fin. Mouth large, the upper jaw reaching to below eye. Lower edge of preoperculum smooth. Nostrils of each side widely separated. Caudal fin rounded.

Probably only one species, *P. waigiensis* (a second nominal species *P. macroptera* Gunther is almost certainly a synonym) ; widely distributed in the coastal waters of the Indo-Pacific.

Psammoperca waigiensis (Cuvier)

Labrax waigiensis Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 83 (type-locality : Waigiu, Australia).

Psammoperca waigiensis : Day, 1889, *Fauna Br. India, Fishes*, **1** 440 (footnote).

Common Names :

Waigen sea-perch	...	English
Chenganni	...	Tamil

Distinguishing Characters :

Body elongate and rather compressed, with a deep caudal peduncle. Head pointed, with concave dorsal profile becoming convex in front of dorsal fin. Mouth moderate large, the upper jaw (maxilla) extending to posterior half of eye. Teeth in villiform bands in both jaws; fine teeth on vomer and palatines, the tongue with a patch of small teeth. Dorsal fin deeply notched but with a low membrane between, the first part with 7 spines, second part with 1 spine and 12 or 13 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin rounded. Scales large, ctenoid; dorsal and anal fins with scaly sheaths; lateral-line scales 45 to 50.

Colour : body reddish brown above, sides lighter with silvery blue. Fins reddish brown, pelvic fins darkish. Eyes glassy.

Geographical Distribution : Indo-Pacific; coastal waters and estuaries.

Fishery Information : This species contributes a minor fishery in the Gulf of Mannar and Palk Bay in the Mandapam area; caught by bamboo stake-traps. It is rated quite high as a food fish and brings a high price.

Family : Ambassidae
[Glassfishes]

Body laterally compressed and somewhat translucent. Mouth fairly large; teeth fine in jaws and on roof of mouth, the upper outer row sometimes enlarged and canine-like. Operculum with a single, poorly developed spine; a characteristic feature of the family is the double edge of the preoperrulum, so that this bone may be said to have an edge and ridge, the lower edge is nearly always dentate, but the hind edge is entire in several species. Dorsal fin of two continuous parts defined by a notch between the last and penultimate spines, the first dorsal fin with 7 spines and a procumbent spine, and the second dorsal fin with one spine and 9 to 17 soft rays; anal fin with 3 spines and 9 to 16 soft rays. Pelvic fin with one strong spine and 5 soft rays, with an axillary scale. Caudal fin forked. Scales small and cycloid; lateral line complete, simply interrupted or very distinctly broken; dorsal and anal fins in a scaly basal sheath.

Fishes of small size (generally under 10 cm) in the Indo-west Pacific region, enter estuaries and penetrate to freshwater. Usually brilliant or silvery whitee in colour.

KEY TO GENERA

1 (a) Scales large, 25 to 30 in the longitudinal series; 1 or 2 transverse rows of scales on cheek .. **Ambassis**

(b) Scales relatively small, 40 or more in the longitudinal series; 4 or more transverse rows of scales on cheek ... 2

2 (a) Preorbital bone entire, on both ridge and edge; preorperculum entire except for few spines at angle .. **Chanda***

(b) Preorbital bone dentate at least on edge; preoperculum dentate at least on lower edge .. **Parambassis***

Genus **Ambassis** Cuvier

Ambassis Cuvier, 1828. *Hist. nat Poiss.*, **2** : 176 (type-species : *Centropomus ambassis* Lacepede).

Body compressed, with fairly large, cycloid scales, easily shed. Mouth quite large and oblique; fine teeth in bands in jaws, roof of mouth and tongue. Gill-rakers well developed, 13 or more on lower arm of first arch. Spinous dorsal fin deeply notched, the last spine (supporting soft fin) more than twice as long as the one before it; second dorsal spine longest and usually much stouter. Lateral line complete, interrupted or obsolete.

Small fishes of the Indo-west Pacific, on coasts, often ascending rivers.

KEY TO SPECIES

1 (a) Supraorbital ridge dentate at least posteriorly; interoperculum entire: preorbital dentate on both edge and ridge 2

(b) Supraorbital ridge smooth, but usually with a single backwardly-directed spine posteriorly (rarely two or absent) ... 3

* The fishes of the genera *Chanda* Hamilton-Buchanan and *Parambassis* Bleeker are restricted to the freshwaters in our region.

2 (a) Posterior edge (i.e. vertical limb) of preoperculum denticulate (with 6 to 13 small serrae)	...	*A. dussumieri**
(b) Posterior edge of preoperculum entire (i.e. smooth)	...	*A. gymnocephalus*
3 (a) Interoperculum smooth	...	4
(b) Interoperculum denticulate posteriorly	...	6
4 (a) One transverse row of scales on cheek; lateral line continuous, or little interrupted	...	*A. commersoni*
(b) Two transverse rows of scales on cheek	...	5
5 (a) Third dorsal spine slightly longer than second dorsal spine; predorsal scales 13 to 16	...	*A. miops**
(b) Third dorsal spine distinctly shorter than second dorsal spine; predorsal scales 17 to 22	...	*A. macracanthus**
6 (a) Posterior margin of preoperculum denticulate	...	*A. dayi**
(b) Posterior margin of preoperculum entire	...	7
7 (a) Predorsal scales 8 or 9	...	*A. kopsii**
(b) Predorsal scales 11 to 16	...	8
8 (a) Gill-rakers 18 to 22 on lower arm of first arch; lateral line continuous throughout its length	...	*A. nalua**
(b) Gill-rakers 24 to 27 on lower arm of first arch; lateral line well interrupted in middle portion	...	*A. interruptus**

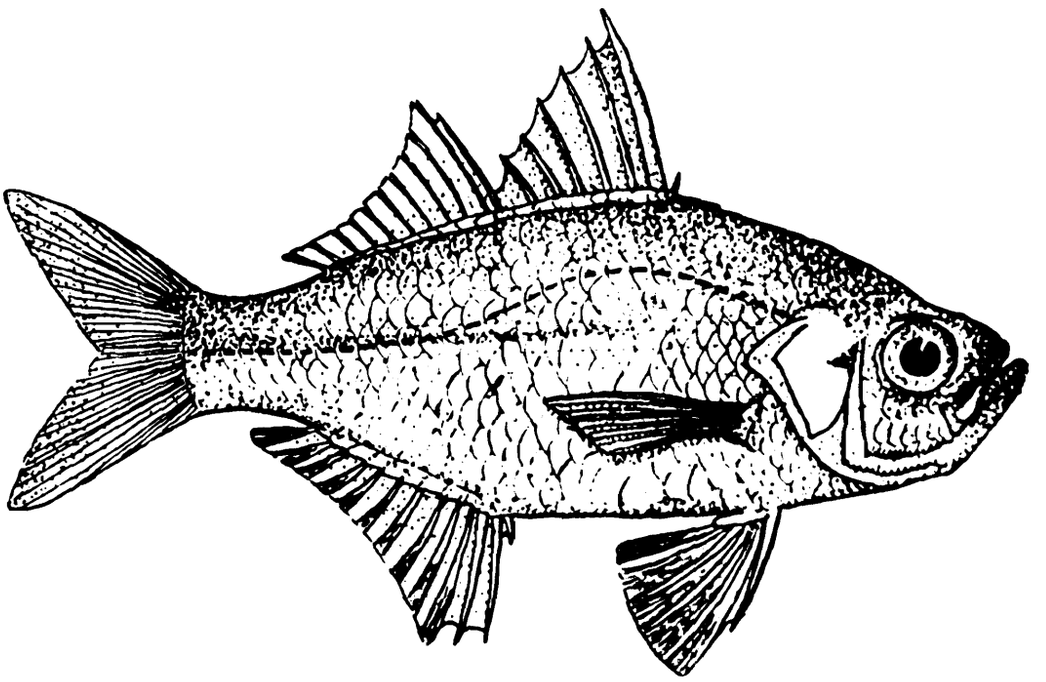
* *Ambassis dussumieri* Cuvier, *A. macracanthus* Bleeker, *A. miops* Gunther, *A. davi* Bleeker, *A. kopsii* Bleeker, *A. nalua* (Hamilton-Buchanan) and *A. interruptus* Bleeker, are caught in the commercial catches in our region in stray numbers only.

Ambassis commersoni Cuvier

[Text-fig. 141]

Ambassis commersonii Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 176, pl. 25 (type-locality : Bourbon ; Pondicherry ; Mahe) ; Day, 1875, *Fishes of India* : 52, pl. 15, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 488.

? *Ambassis urotaenia* Bleeker : Day, 1875, *Fishes of India* : 55, pl. 15, fig. 8 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 489.



Text-fig. 141. *Ambassis commersoni* Cuvier

Common Names :

Commerson's glassy perchlet	...	English
Selanthaan	...	Tamil
Kachki	...	Marathi

Distinguishing Characters :

Body oblong and laterally compressed. Supraorbital ridge smooth, terminating posteriorly in a single backwardly-directed spine ; suborbital entire ; preorbital ridge entire but its edge coarsely serrated. Posterior margin of preopercular ridge serrated, with a strong spine at angle ; interoperculum entire. Mouth large and oblique ; fine teeth in jaws. Gill-rakers 20 to 22 on lower arm of first branchial arch. Dorsal fin with 7 spines, followed by a deep notch, the second part of fin with 1 spine and 9 to 11 soft rays. Anal fin with 3 spines and 9 or 10 soft rays. Scales small, cycloid ; lateral line continuous, or little interrupted ; one row of scales on cheek.

Colour : body silvery with purplish reflections and bright silvery lateral band. Membrane between 2nd and 3rd dorsal spines dusky

Geographical Distribution : Indo-west Pacific.

Fishery Information : This species is fairly common along the coast of India.

Ambassis gymnocephalus (Lacepede)

Lutjanus gymnocephalus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 181 & 216, pl. 23, fig. 3 (type-locality : Indo-Pacific Ocean).

Ambassis gymnocephalus : Day, 1875, *Fishes of India* : 54, pl. 15, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 489.

Common Names :

Naked-head glassy perchlet	...	English
Chandee	...	Oriya
Mullu-tharu	...	Telugu
Nanthan	...	Malayalam

Distinguishing Characters :

Body rather elongate and laterally compressed. Supraorbital ridge dentate, with 2 or 4 well developed spines on its posterior edge ; suborbital edge entire ; preorbital edge and ridge with 2 or 3 small serrae. Posterior edge of preoperculum entire ; interoperculum entire. Mouth large ; fine teeth in jaws. Gill-rakers 23 to 26 on lower arm of first arch. Dorsal fin with 7 spines, followed by a deep notch, second part of fin with one spine and 9 or 10 soft rays. Anal fin with 3 spines and 9 (rarely 10) soft rays. Scales small, cycloid, 26 to 28 scales in longitudinal series ; lateral line interrupted in middle portion by 1 or 2 tubeless scales.

Colour : body silvery, with bright silvery lateral band. Membrane between 2nd and 3rd dorsal spines dusky.

Geographical Distribution : Indo-west Pacific.

Primarily marine, enters estuaries and freshwater.

Fishery Information : This species though small in size, are caught in fairly large numbers along the coast of our region.

FAMILY : SERRANIDAE
[Sea-basses and Groupers]

Body usually robust and moderately elongate. Mouth protractile and the maxilla is exposed for most or all its length. Teeth in a villiform band in jaws, with a few anterior canines and sometimes canines at sides of lower jaw, teeth on vomer and palatines. Operculum with

3 flat spines, the main spine with one above it and one below: hind edge of preopercle usually serrate. Single dorsal fin, the spinous and soft parts sometimes partially separated by a notch, with 7 to 14 spines. Anal fin with 3 spines, mostly strong. Pelvic fins with 1 spine and 5 soft rays, close to base of pelvic fins; axillary pelvic process absent. Caudal fin rounded, truncate, or lunate (never forked). Scales usually ctenoid, sometimes cycloid, firmly embedded in skin; lateral line single and complete, and does not extend onto the tail. Branchiostegal rays 6 to 8.

Carnivorous, chiefly marine fishes of tropical and warm seas, some living in fresh and brackish water, and mostly valuable as food. Some are strikingly or beautifully coloured. This family includes the world's most important food fishes, as well as a few that have been known to cause poisoning. These fishes are oviparous and protogynous or synchronously hermaphrodite.

KEY TO SUBFAMILIES

1 (a) Maxillary generally scaled, without a supplementary (supramaxillary) bone; lateral line, close to dorsal fin, continuous or reduced	...	Anthinae*
(b) Maxillary naked, with a well-developed supplemental bone; lateral line complete, not close to dorsal fin	...	2
2 (a) Scales large, strongly ctenoid; dorsal fin with 13 or 14 spines; caudal fin with 12 branched rays	...	Centrogenysinae*
(b) Scales small, cycloid or ctenoid; dorsal fin with 6 to 12 spines; caudal fin with 15 branched rays body usually robust	...	Epinephelinae

* The fishes of the subfamily Anthiinae are presently of no commercial importance in our region, they are reef-dwelling fishes found in deep-water throughout the tropical Indo-Pacific and are moderate-sized fishes noted for their beauty and brilliant colour, usually shades of red; the subfamily Centrogenysinae is represented by *Centrogenys vaigiensis* (Quoy & Gaimard) (= *Sebastes stoliczkae* Day, 1875) in our area but is of no fishery importance— the genus *Centrogenys* Richardson is often placed in its own family.

SUBFAMILY : EPINEPHELINAE

KEY TO GENERA

1 (a)	Canine teeth present in jaws; dorsal fin with 6 to 11 spines; posterior nostril normal, rounded ...	2
(b)	No canine teeth in jaws; dorsal fin with 10 or 11 spines; posterior nostril usually a vertical slit ...	9
2 (a)	Scales large, 40 to 45 along lateral line ...	3
(b)	Scales small or moderate-sized, 80 or more along lateral line ...	4
3 (a)	Anal fin with 6 soft rays ...	**Chelidoperca***
(b)	Anal fin with 9 soft rays ...	**Aethaloperca***
4 (a)	Dorsal fin with 6 to 8 spines: lower edge of preoperculum with several antrorse spines ...	**Plectropoma***
(b)	Dorsal fin with 9 to 11 spines; lower edge of preoperculum without antrorse spines ...	5
5 (a)	Two or three curved canines on each side of lower jaw; caudal fin deeply lunate (emarginate in juveniles) ...	**Variola**
(b)	No distinct enlarged canines on each side of lower jaw; caudal fin rounded, truncate or emarginate ...	6
6 (a)	Dorsal fin with 9 spines ...	**Cephalopholis**
(b)	Dorsal fin with 11 spines ...	7
7 (a)	No teeth on palatines ...	**Anyperodon**
(b)	Palatines toothed ...	8
8 (a)	Dorsal spines shorter than anterior soft rays, increasing in length posteriorly; body with black and yellow bands in young, becoming mottled dark and yellow in adults; pectoral fin dark or black-banded ...	**Promicrops**
(b)	Dorsal spines more or less equal in length to anterior soft rays, with median ones the longest; colour not as above ...	**Epinephelus**

9 (a) Dorsal fin with 10 spines; anal fin with 10 soft rays; anterior part of head low and flattened, its dorsal profile deeply concave before eyes ... **Cromileptes**

(b) Dorsal fin with 11 spines; anal fin with 11 to 13 soft rays; head normal, with convex profile ... **Dinoperca***

Genus **Anyperodon** Gunther

Anyperodon Gunther, 1859, *Cat. Fishes Br. Mus.*, **1** : 95 (type-species : *Serranus leucogrammicus* Valenciennes).

Body elongate and slightly compressed. Head with a convex profile entirely scaly, the snout naked; border of preoperculum denticulate but without antrorse spines. Teeth in broad villiform bands, a small canine on each side of symphysis in each jaw; small teeth on vomer, palatines toothless. Dorsal fin continuous, without notch, with 11 spines and 14 or 15 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin rounded. Scales small, with about 80 scales in lateral line.

Two species recognised, one in our region.

Anyperodon leucogrammicus (Valenciennes)

Serranus leucogrammicus Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 347 (type-locality : Moluccas and Seychelles).

Anyperodon leucogrammicus : Luther, 1972, *Indian J. Fish.*, **19** : 189, fig. 1.

Common Name :

Whitelined grouper ... English

Distinguishing Characters :

Body slightly compressed. Mouth large and protractile, the lower jaw longer thus giving an acute shape to the front of head region. Preopercular edge rounded and coarsely serrated. A short canine on each side of symphysis in each jaw; vomer toothed, no teeth on palatines. Dorsal fin continuous, with 11 spines and 15 soft rays.

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* The genus *Chelidoperca* Boulenger represented by *C. investigatoris* (Alcock), and the genus *Plectropoma* Oken represented by *P. maculatum* (Bloch) in our region, are of no fishery importance; the monotypic genus *Dinoperca* Boulenger represented by the its type-species *D. petersii* (Day), though known from Sind (Pakistan), has not been reported from our area; the genus *Aethaloperca* Fowler represented by *A. rogaa* (Forsskal), has been recently reported from the Laccadive Sea.

Anal fin with 3 spines and 9 soft rays. Scales small, with about 80 on lateral line; maxillary scaled.

Colour : background colour reddish brown, with bright orange or brownish-red spots; five pale silvery blue streaks on sides, the upper two broken into elongate blotches. Spinous dorsal fin with brownish red spots as on body.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This species is reported more abundant around coral heads in lagoons in deeper waters and is of minor fishery significance at Port Blair in the Andaman Sea in our region.

Genus **Cephalopholis** Schneider*

Cephalopholis Schneider, 1801, *Syst. Ichth. Bloch.* : 311 (type-species : *Cephalopholis argus* Schneider).

Small groupers with robust, somewhat compressed bodies. Mouth large; teeth in jaws small, one or more enlarged canines on each side of symphysis of each jaw, or with median teeth of inner band enlarged; small band of fine teeth on vomer and palatines. Preoperculum rounded, very finely serrated. its lower edge without antrorse spines. Dorsal fin continuous, with 9 spines and 13 to 18 soft rays; anal fin with 3 spines and 8 or 9 soft rays. Caudal fin truncate or rounded. Scales moderate-sized, strongly ctenoid.

Small brilliant groupers, rather abundant in tropical seas. Fairly numerous species, 6 in our area, not easy to identify, variation often puzzle even an expert.

KEY TO SPECIES

1 (a) Anal fin with 8 soft rays	...	2
(b) Anal fin with 9 soft rays	...	3
2 (a) Body dark chocolate brown to a very pale red/brown; 8 more or less distinct darker vertical bars on body, almost disappearing when basic colour is pale red/brown; head often with small black-edged blue spots that may extend onto front part of body	...	*C. pachycentron*

* Smith (1971 *Bull. Am. Mus. nat. Hist.*, **175**, p. 91) treats this as a subgenus of *Epinephelus* Bloch.

	(b) Body reddish brown, with spots all over body (not just on head and front of body); body with horizontal blue bars	...	*C. boenack*
3	(a) Scale-rows 11 to 15 between lateral line and origin of dorsal fin	...	4
	(b) Scale-rows 6 to 10 between lateral line and origin of dorsal fin	...	5
4	(a) Body and fins brilliant red; head and front of body with numerous white spots as to appear as reticulations on cheeks	...	*C. sonnerati*
	(b) Body dark reddish brown; pectoral and caudal fins broadly edged with white; spots on head and front of body yellow or blue	...	*C. nigripinnis**
5	(a) Scale-rows 6 or 7 between lateral line and origin of dorsal fin; dark saddle-like blotches on caudal peduncle	...	*C. leopardus*
	(b) Scale-rows 9 or 10 between lateral line and origin of dorsal fin; head and body with blue spots	...	6
	(a) Second anal spine somewhat longer than third; soft dorsal, anal and caudal fins with yellow margins; soft dorsal fin with 15 to 17 rays	...	*C. argus*
	(b) Second and third anal spines subequal; soft dorsal, anal and caudal fins with narrow dark margins; soft dorsal fin with 14 or 15 rays	...	*C. miniatus*

Cephalopholis argus Schneider

Cephalopholis argus Schneider, 1801, *Syst. Ichth. Bloch* : 311, pl. 61 (type-locality : East Indies).

Serranus guttatus Day (*nec* Bloch), 1875, *Fishes of India* : 24, pl. 6, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 1 : 457.

Common Names :

Bluespotted argus	...	English
Balufana, Neelachammam	...	Lakshadweep Is.

* *Cephalopholis nigripinnis* (Valenciennes) reported from Sri Lanka, is likely to occur in our waters also.

Distinguishing Characters :

A small-sized serranid fish with a stout body. Mouth oblique, the lower jaw strongly projecting, and the maxillary (upper jaw) extending to vertical from hind edge of eye or slightly beyond in young specimens. Broad bands of fine teeth in jaws, with a pair of canines near symphysis of both jaws; teeth on vomer and palatines in a narrow villiform band. Dorsal fin with 9 spines and 15 to 17 soft rays. Anal fin with 3 spines and 9 soft rays; the second spine stronger and slightly longer than third spine, much shorter than soft rays. Caudal fin rounded. Scales ctenoid; lateral line with 93 to 98 scales; 10 rows of scales between lateral line and origin of dorsal fin.

Colour : Head, body and fins dark background colour usually deep purplish black, sometimes dark brown, with blue spots on body; usually 4 to 6 circular whitish bands around the body, beginning at about the second dorsal fin, and a conspicuous whitish area under the pectoral-fin base. Soft dorsal fin, anal and caudal fins with yellowish margins; tip of membrane of dorsal spines purplish red.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow coral reefs and rocky areas.

Fishery Information : This beautiful blue-spotted argus occasionally reaches a length of 45 cms, but most specimens are much smaller. Although considered an excellent food fish, it is one of the species that in certain localities of the Indo-Pacific has been known to cause tropical fish poisoning. Because of its quick colour changes, the blue-spotted argus proves to be a fascinating fish in the aquarium.

Cephalopholis boenack (Bloch)

Bodianus boenack Bloch, 1790, *Naturges. ausland.* Fische, 4 : 43 (type-locality : Japan).

Serranus boenack : Day, 1875, *Fishes of India* : 23, pl. 6, fig. 1; Day, 1889, *Fauna Br. India,* Fishes, 1 : 455.

Serranus boelang Valenciennes : Day, 1875, *Fishes of India* : 26, pl. 7, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, 1 : 458.

Common Names :

Bluelined coralcod	...	English
Bontoo	...	Telugu
Verri-cullawah	...	Tamil
Hekaru, Gobra	...	Marathi
Varianchamman	...	Lakshadweep Is.

Distinguishing Characters :

A small-sized serranid with a stout body. Mouth somewhat oblique, the maxillary extending to vertical from hind margin of eye, or slightly beyond. Teeth fine, in bands in jaws, with a pair of moderate or strong canines on each side of symphysis of each jaw; minute teeth on vomer and palatines. Dorsal fin with 9 spines and 15 to 17 soft rays. Anal fin with 3 spines and 8 soft rays; the second spine stronger and somewhat longer than third spine. Caudal fin rounded. Scales on body strongly ctenoid; lateral line with 75 to 88 scales; 8 to 10 rows of scales between lateral-line and dorsal-fin origin.

Colour : variable, reddish brown with horizontal blue bars; head and body dark brown with numerous undulose narrow blue lines, often extending on to fins; inside of gill-opening and mouth orange. Spinous dorsal fin tipped with black.

Geographical Distribution : Widepread in the tropical Indo-west Pacific.

Inhabits coastal waters

Fishery Information : Taken occasionally on the Tamil Nadu, Kerala and Goa coasts.

Cephalopholis leopardus (Lacepede)

Labrus leopardus Lacepede, 1802, *Hist. nat. Poiss.*, **6** : 450, pl. 18, fig. 1 (type-locality : Great Equatorial Ocean = Indo-Pacific).

Serranus leopardus : Day, 1875, *Fishes of India* : 25, pl. 6, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **1** : 457.

Common Name :

Leopard coralcod ... English

Distinguishing Characters :

A small-sized serranid with a stout body. Mouth somewhat oblique, the maxillary (upper jaw) extending beyond posterior border of eye. Teeth villiform, forming rather broad bands, with a pair of short but strong canines on each side of symphysis of each jaw; teeth on vomer and palatines. Dorsal fin with 9 spines and 14 or 15 soft rays. Anal fin with 3 spines and 9 soft rays; second spine stronger and longer than third. Caudal fin rounded. Head covered with cycloid scales, on body ctenoid; lateral line with 72 to 87 scales; 6 or 7 rows of scales between lateral line and origin of dorsal fin.

Colour : body orange to reddish, finely spotted with small bright red spots; 1 or 2 distinctive dusky to blackish occellated saddle-like blotches on caudal peduncle above; a dark brown streak from eye to edge of operculum. Pectoral fins yellowish orange; distal edges of dorsal and anal fins with a bright red streak, below this a white streak, then a dark-red one.

Geographical Distribution : Widepread in the tropical Indo-west Pacific.

Inhabits shallow coral reefs and rocky reefs.

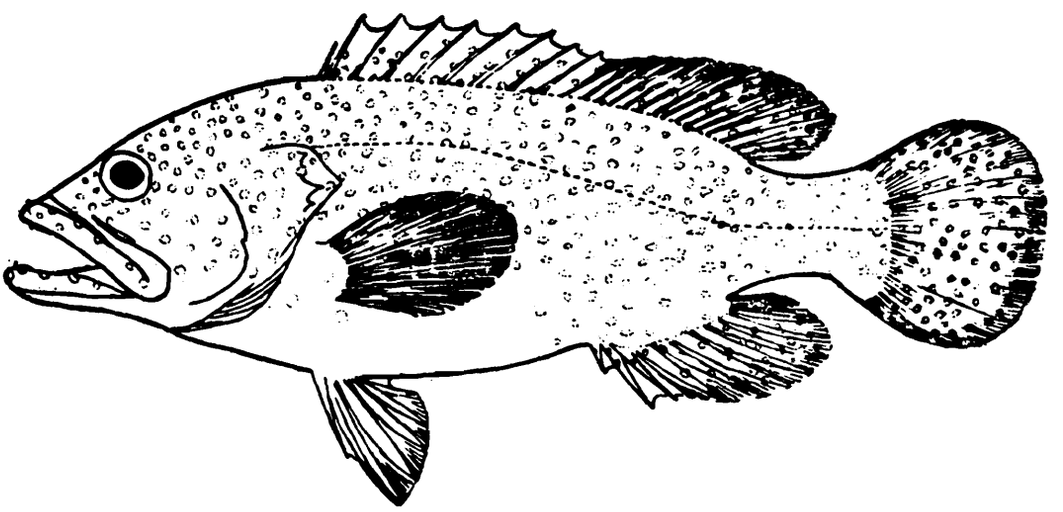
Fishery Information : Taken commercially only occasionally on the Tamil Nadu and Kerala coasts.

Cephalopholis miniatus (Forsskal)

[Text-fig. 142]

Perca miniata Forsskal, 1775, *Descript. animal.* : 41 (type-locality : Djedda, Red Sea).

Serranus miniatus : Day, 1875, *Fishes of India* : 24, pl. 6, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, 1 : 456.



Text-fig. 142. *Cephalopholis miniatus* (Forsskal)

Common Names :

Vermilion seabass	...	English
Sikkifana, *Chencheerachamman*	...	Lakshadweep Is.

Distinguishing Characters :

A small serranid fish with a stout body Mouh oblique, the lower jaw projecting, maxillary (upper jaw) extending to posterior margin of eye or slightly beyond. Teeth in narrow bands in jaws, with a pair of

canines in front of each jaw. Dorsal fin with 9 spines and 14 or 15 soft rays. Anal fin with 3 spines and 9 soft rays, the 2nd and 3rd spines subequal. Caudal fin rounded. Scales extending more or less onto basal portions of fins; lateral line with 104 to 105 scales; 9 rows of scales between lateral line and origin of dorsal fin.

Colour : body orange-red to brownish, brighter on belly; head, body and vertical (unpaired) fins with small blue spots, ringed with dark brown; pectoral and pelvic fins sometimes with a few spots also; inside of gill-opening tinged with red; vertical and pelvic fins with narrow dark brown margins.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits rocky reefs and rocky areas.

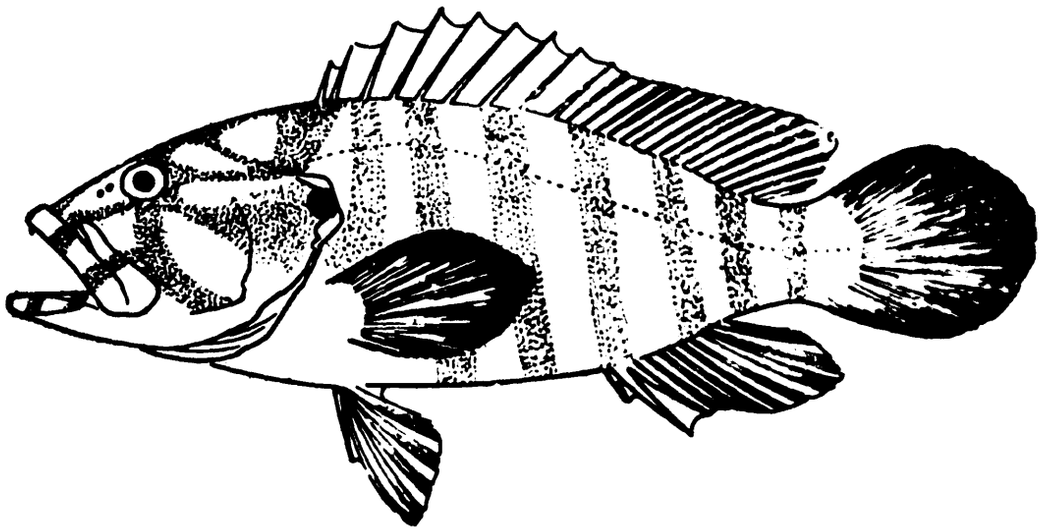
Fishery Information : Taken commercially only occasionally in our region.

Cephalopholis pachycentron (Valenciennes)

[Text-fig. 143]

Serranus pachycentron Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 295 (type-locality : East Indies).

Cephalopholis pachycentron : Murthy, 1969, *Bull. cent. mar. Fish. Res. Inst.*, (10) : 14.



Text-fig. 143. *Cephalopholis pachycentron* (Valenciennes)

Common Name :

Brown-banded seabass ... English

Distinguishing Characters :

A small serranid fish with a stout body. Mouth somewhat oblique, the maxillary (upper jaw) extending to opposite hind border of eye or slightly beyond. Teeth in jaws forming narrow bands, a pair of canines each near symphysis of both jaws. Dorsal fin with 9 spines and 15 to 17 soft rays. Anal fin with 3 spines and 8 soft rays; the 2nd spine stronger and generally considerably longer than 3rd spine. Caudal fin rounded. Scales strongly ctenoid on body; scales extending more or less onto basal portions of fins; lateral line with 72 to 97 scales; 8 to 10 rows of scales between lateral line and origin of dorsal fin.

Colour : varies from dark chocolate brown to a very pale red-brown, with often eight indistinct cross bands on body, almost disappearing when the ground colour of the body is pale red-brown; head often with small black-edged blue spots that may extend onto front part of body; 4 or 5 dark brown streaks radiating from eye to upper jaw and posterior part of head; a blackish-brown blotch between upper and lower opercular spine. Tip of dorsal fin black; soft dorsal and anal fins with narrow white margins.

Geographical Distribution : Indo-west Pacific.

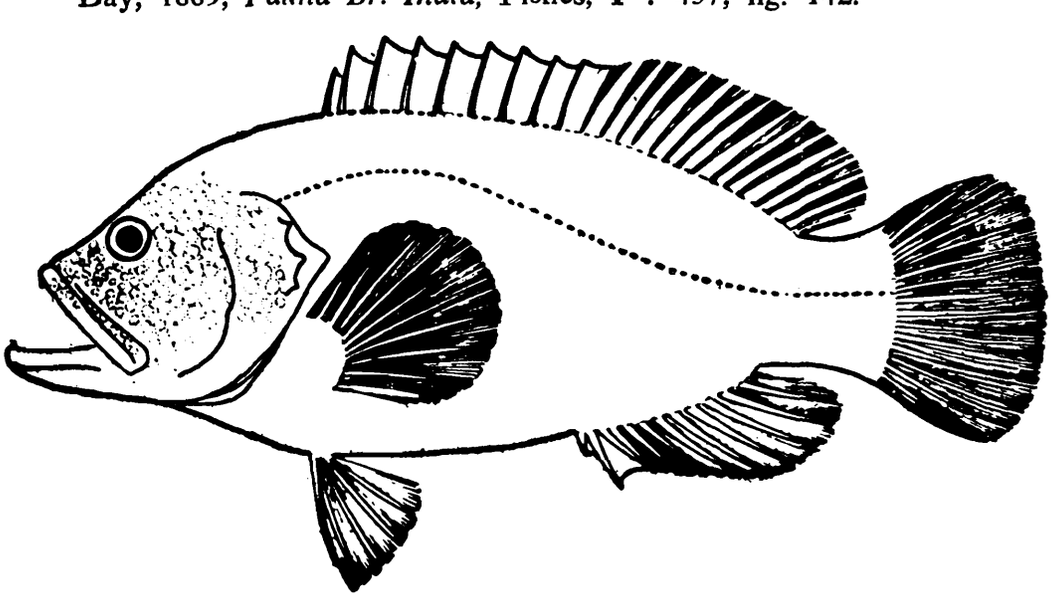
Inhabits shallow coral reefs and rocky areas.

Fishery Information : Of minor commercial significance in the Gulf of Mannar in the Mandapam area.

Cephalopholis sonnerati (Valenciennes)

[Text-fig. 144]

Serranus sonnerati Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 299 (type-locality : Pondicherry; Ceylon) ; Day, 1875, *Fishes of India* : 25, pl. 7, fig. 1; Day, 1889, *Fauna Br. India,* Fishes, **1** : 457, fig. 142.



Text-fig. 144. *Cephalopholis sonnerati* (Valenciennes)

Common Names :

Tomato seabass	...	English
Bontoo	...	Telugu
Siggapu-cullawah	...	Tamil
Chem-kalava	...	Malayalam
Hekaru, Gobra	...	Marathi
Ryfana, Chencheera-chammam	...	Lakshadweep Is.

Distinguishing Characters :

A small-sized serranid fish, with a stout body. Mouth rather oblique, the lower jaw projecting, the maxilla (upper jaw) extending to below posterior border of eye or slightly beyond. Teeth villiform in broad bands, with a pair of canines at symphysis of each jaw, no canine teeth at sides of jaws; fine teeth on vomer and palatines, none on tongue. Dorsal fin with 9 spines and 14 or 15 soft rays. Anal fin with 3 spines and 9 soft rays, the second and third spines subequal. Caudal fin rounded. Scales strongly ctenoid; lateral line with 110 to 112 scales; 11 to 14 scale-rows between lateral line and origin of dorsal fin; fine scales extending onto basal portion of fins.

Colour : body and fins brilliant tomato red; head with numerous white spots appearing as reticulations on cheeks; sometimes spots on body also. All fins with black margins.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coral reefs and rocky reefs.

Fishery Information : Taken commercially in small quantities on the Tamil Nadu coast.

Genus **Cromileptes** Swainson

Cromileptes Swainson, 1839, *Natural History of Animals. Fishes*, **2** : 201 (type-species : *Serranus altivelis* Valenciennes).

Body strongly compressed. Head anteriorly very low, with a smoothly concave profile, becoming convex before the dorsal fin. Hind nostril a vertical slit. Preoperculum finely serrated along its upper edge, but without any enlarged spinules at angle; operculum with 2 spines. Teeth in jaws in broad villiform bands, no canine teeth in jaws; teeth on vomer and few on palatines, tongue edentate. Dorsal

fin continuous, with no notch, with 10 spines and 18 or 19 soft rays. Anal fin with 3 spines and 10 soft rays. Caudal fin rounded. Scales small, cycloid.

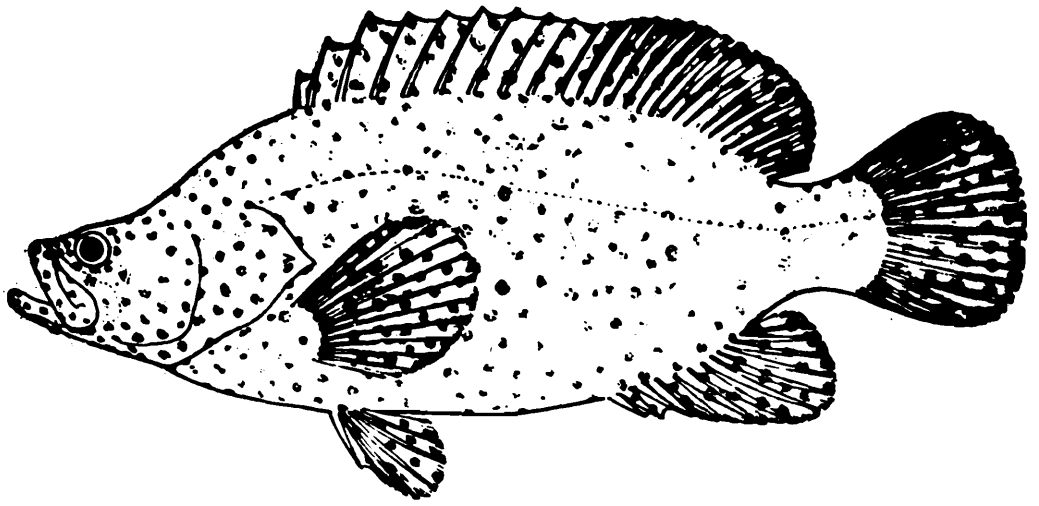
Monotypic.

Cromileptes altivelis (Valenciennes)

[Text-fig. 145]

Serranus altivelis Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 324 (type-locality : Java) ; Day, 1875. *Fishes of India* : 9, pl. 1, fig. 2.

Cromileptes altivelis : Day, 1889, *Fauna Br. India*, Fishes, **1** : 441, fig. **140.**



Text-fig. 145. *Cromileptes altivelis* (Valenciennes)

Common Name :

Humpback seabass ... English

Distinguishing Characters :

A moderate-sized compressed serranid fish, with the upper profile of head concave, the concavity increasing with age. Teeth villiform in jaws, no canine teeth. Preoperculum finely serrated along its upper edge, but without any enlarged spinules at angle. Dorsal fin continuous, with 10 spines and 18 or 19 soft rays; the spines gradually increasing in size, the soft rays long and about half length of head, slightly longer than longest fin-spine. Anal fin with 3 spines and 9 to 11 soft rays. Caudal fin rounded.

Colour : body light brown with numerous dark brown spots; head and all fins similarly spotted; with age the relative size of spots decrease and the number of spots increases.

Geographical Distribution : Seas of India, the East Indies, the Philippines and Australia.

Inhabits shallow waters of coral and rocky reefs.

Fishery Information : Of minor fishery value in our area.

Genus **Epinephelus** Bloch

Epinephelus Bloch, 1793, *Naturges. Auslaml. Fische*, **6** : 11 (type species : *Epinephelus marginalis* Bloch = *E. fasciatus* Forsskal).

Body robust, not strongly compressed. Mouth large, with a well-developed supramaxilla. Operculum with 3 spines ; preopercle serrated. Teeth in jaws small and in many rows, usually one or more pairs of enlarged canine teeth near symphysis of each jaw ; vomer and palatines toothed, tongue edentulous. Dorsal fin with 11 spines and 12 to 20 soft rays, the longest dorsal spines longer than anterior dorsal soft rays. Anal fin with 3 spines and 7 to 9 soft rays. Caudal fin rounded to slightly lunate. Scales moderate to small, strongly ctenoid.

Circumtropical in distribution and includes moderate to large-sized groupers. Includes nearly 100 species, of which 22 from our region.

KEY TO SPECIES**

1	(a) Caudal fin subtruncate, truncate or emarginate	...	2
	(b) Caudal fin rounded	...	8
2	(a) Depth of body 2.4 to 2.7 times in standard length ; head and body deep blue or purplish, with numerous fine dots ; fins and lips yellow	...	*E. flavocaeruleus*
	(b) Depth of body 2.8 to 3.4 times in standard length	...	3
3	(a) Dorsal fin with 18 to 20 soft rays ; head with spots, confluent into wavy lines on body	...	*E. undulosus*
	(b) Dorsal fin with 14 to 17 soft rays	...	4
4	(a) Anal fin with 9 (rarely 10) soft rays ; body uniform brown	...	*E. modestus*
	(b) Anal fin with 8 soft rays	..	5
5	(a) Middle opercular spine nearer to lower than to upper spine	...	*E. diacanthus*
	(b) Middle opercular spine about equidistant from lower and upper spines	...	6
6	(a) Dorsal fin with 14 or 15 soft rays ; dark streaks across cheeks, oblique stripes or lines of spots along body	...	*E. morrhua*

** *Epinephelus gauza* (L) has recently been reported from Vizagapatnam.

	(b) Dorsal fin with 15 to 17 soft rays; body with small or large spots or network of light lines	...	7
7	(a) Preopercular angle with 2 to 4 strong serrae; dark spots on body rather large; caudal fin edged dusky black with a distinct fine white outer margin	...	*E. areolatus*
	(b) Preopercular angle with several small serrae; body and fins with numerous small hexagonal spots or light network; caudal fin without white edge	...	*E. chlorostigma*
8	(a) Pectoral fins long, longer than head without snout; large dark spots on body, separated by narrow pale interspaces forming a broad network; dorsal fin with 16 to 18 soft rays	...	*E. megachir*
	(b) Pectoral fins rather short, as long as or shorter than postorbital part of head	...	9
9	(a) Last dorsal-fin spine considerably shorter than third dorsal spine	...	10
	(b) Last dorsal-fin spine not or slightly shorter than third dorsal spine	...	15
10	(a) Middle opercular spine about equidistant from lower and upper ones	...	11
	(b) Middle opercular spine closer to lower than to upper spine	...	13
11	(a) Pored scales in lateral line 56 to 61; small blackish spots on body, spots on head very small and widely separated; five dark cross-bands distinct in young; pectoral fins pale, with dark spots	...	*E. malabaricus*
	(b) Pored scales in lateral line 49 to 51	...	12
12	(a) Head and body with numerous dark orange-red spots except ventrally and posteriorly, those on head denser; pectoral fins yellowish gray-brown, without black spots	...	*E. stoliczkae**

* *Epinephelus stoliczkae* (Day) has been reported from Pakistan and is likely to occur in our area also.

(b) Head and body with small scattered blackish spots; pectoral fins dark, with black spots basally ... *E. corallicola*

13 (a) Gill-rakers long, the longest one much longer than gill-lamellae; head and body with numerous black spots, in young with white blotches ... *E. maculatus*

(b) Gill-rakers much shorter than gill-lamellae ... 14

14 (a) Pored scales in lateral line 48 to 50; body with numerous small pale yellow or white dots, the inter-spaces between them reticulated or forming undulous oblique lines ... *E. summana*

(b) Pored scales in lateral line 60 to 66; body with 4 longitudinal dark lines broken into spots with inter-ruptions in places, ventral surface of body blackish ... *E. latifasciatus*

15 (a) Middle opercular spine about equi-distant from lower and upper spines ... 16

(b) Middle opercular spine closer to lower than upper spine ... 20

16 (a) Teeth on middle side of lower jaw in 2 rows; upper part of head and body, pelvic and anal fins, and upper half of caudal fin covered with orange to orange-red spots ... *E. bleekeri*

(b) Teeth on middle side of lower jaw in 3 or more rows ... 17

17 (a) Maxillary (upper jaw) extending to below posterior border of eye or not so far; body orange-red, with 6 red cross-bands; spinous dorsal fin membrane edged with black ... *E. fasciatus*

(b) Maxillary extending beyond vertical from posterior border of eye ... 18

18 (a) Distinct black blotch or black saddle-like spot on dorsal side of caudal peduncle; hexagonal dark spots on body, head and fins ... *E. hexagonatus*

(b) No prominent black blotch or black saddle-like spot on dorsal edge of caudal peduncle; if body is brown spotted or black spotted, these may occur on caudal peduncle but are not notably intensified as a black blotch on caudal peduncle ... 19

19 (a) Body with hexagonal brown blotches separated by white lines dorsally, these becoming round brown spots ventrally; a large black blotch at base of spinous dorsal fin ... *E. melanostigma*

(b) Body with numerous scattered blackish spots, the spots on head as large as pupil and close-set ... *E. tauvina*

20 (a) Maxillary extending to below posterior border of eye; body with white or blue spots of various types, usually large and chalky white in adults and ocelli in young ... *E. coeruleopunctatus*

(b) Maxillary extending beyond posterior border of eye ... 21

21 (a) Body with numerous close-set dark brown spots, so that the pale colour of narrow interspaces contrasts highly with dark spotting, especially on head; 4 black blotches—3 along base of dorsal fin and one forming a distinctive black saddle on caudal peduncle ... *E. fuscoguttatus*

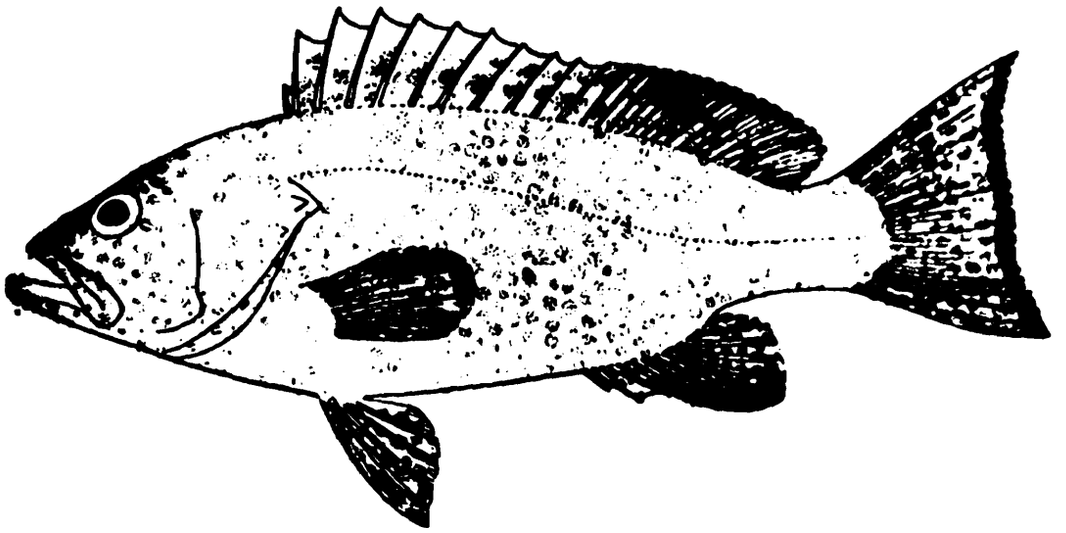
(b) Body with large, round to more or less hexagonal dark brown to blackish spots, the spots sometimes enlarged to form a reticulated pattern; no dark blotches along base of dorsal fin and on upper edge of caudal peduncle ... *E. merra*

Epinephelus areolatus (Forsskal)

[Text-fig. 146]

Perca summana areolata Forsskal, 1775, *Descript. Animal.* : 42 (type-locality : Djedda, Red Sea).

Serranus angularis Valenciennes : Day, 1875, *Fishes of India* : 22, pl. 5, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 1 : 454.



Text-fig. 146. *Epinephelus areolatus* (Forsskal)

Common Names :

Areolated grouper	...	English
Kalava	...	Malayalam

Distinguishing Characters :

A fairly small serranid fish with a slender and laterally compressed body, its depth 3.0 to 3.4 times in standard length. Preoperculum with a convex and finely serrated upper edge. and 2 to 4 strong serrae at angle; operculum with a convex upper border and 3 flat spines, the middle spine equidistant from upper and lower. Maxillary (upper jaw) extending to vertical through posterior edge of eye. A pair of canines on each side of symphysis in both jaws; teeth in narrow bands, in 2 rows on sides of jaws, teeth of inner row longer and depressible. Dorsal fin with 11 spines and 15 or 16 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate or slightly emarginate.

Colour : ground colour of head, body and fins pale brown, with numerous dark green-brown spots; spots on the fins darker. Caudal fin edged dusky black but with a distinctive fine white outer margin.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters down to 80 m.

Fishery Information : This perch forms an important element of the rock cod ('Kalava') fishery off the Kerala coast in depths of 63 to 100 m.

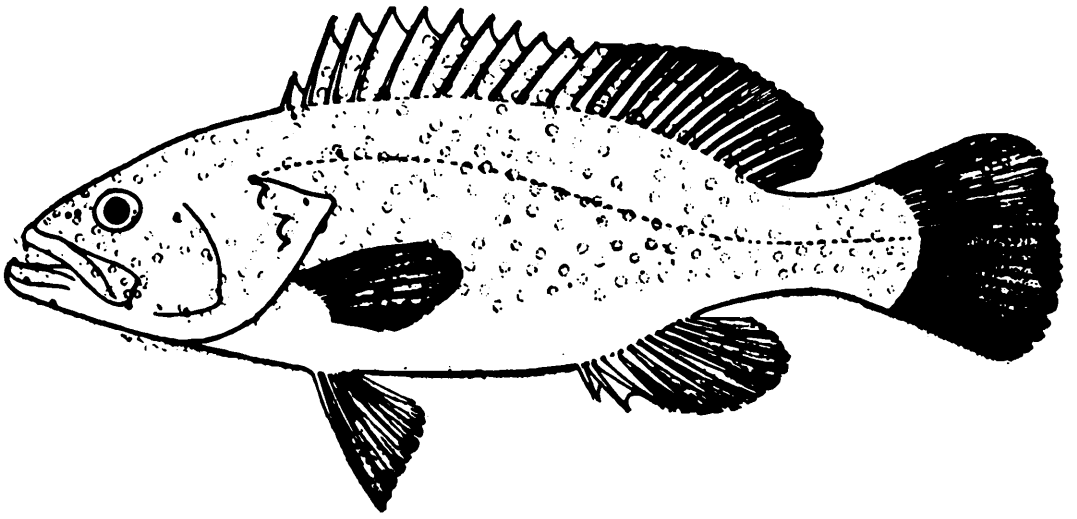
Epinephelus bleekeri (Vaillant & Bocourt)

[Text-fig. 147]

Serranus bleekeri Vaillant and Bocourt, 1877, *Mission scient. Mexique. Poissons* : 69 (type-locality : unknown).

Serranus waandersi Day (*nec.* Bleeker), 1875, *Fishes of India* : 12, pl. 8, fig. 1.

?*Serranus coromandelicus* Day, 1878, *Fishes of India* : 746 (type-locality : Madras) ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 445.



Text-fig. 147. *Epinephelus bleekeri* (Vaillant & Bocourt)

Common Name :

Bleeker's grouper ... English

Distinguishing Characters :

A medium-sized serranid fish with an elongate and laterally compressed body, its depth 3.0 to 3.5 times in standard length. Preoperculum with a convex, finely serrated upper edge and a shallow notch above its angle, but no enlarged spinules on latter ; operculum with a straight upper border and 3 flat spines, the middle spine about equidistant from lower and upper spines. Teeth in narrow bands, in 2 series on sides of jaws, teeth of outer row longer, those of inner row shorter and depressible ; canines at front of jaws. Dorsal fin with 11 spines and 16 or 17 soft rays ; last dorsal spine slightly shorter than third spine. Pectoral fins short, slightly shorter tan postorbital part of head. Caudal fin truncate. Scales ctenoid.

Colour : ground colour reddish brown above, paler below ; upper parts of head and body, pelvic and anal fins, and upper half of caudal

fin with orange to orange-red spots; lower half of caudal fin and outer edge of anal fin purple-brown.

Geographical Distribution : Mauritius, Persian Gulf, India, Sri Lanka, Thailand and China.

Inhabits shallow waters of coral and rocky areas.

Fishery Information : Taken commercially only occasionally on the Tamil Nadu coast and at Bombay.

Epinephelus chlorostigma (Valenciennes)

Serranus chlorostigma Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 352 (type-locality : Seychelles).

Serranus areolatus Day (*nec* Forsskal), 1875, *Fishes of India* : 12, pl. 1, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 445.

Common Names :

Brown-spotted reef-cod	...	English
Kalava	...	Malayalam
Hekru	...	Marathi

Distinguishing Characters :

A fairly small serranid fish, its depth 3.0 to 3.4 times in standard length. Preoperculum evenly serrated behind, produced at angle, armed with several small serrae; operculum with 3 flat spines, nearly equidistant. Maxillary (upper jaw) reaches to vertical through posterior margin of pupil. A pair of small canines or each side of symphysis in each jaw; teeth on middle of side of lower jaw in 2 rows. Dorsal fin with 11 spines and 16 or 17 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate. Scales cycloid on head, ctenoid on body.

Colour : generally brownish, with numerous closely set hexagonal or roundish darker spots, the interspaces forming as a whole a pale reticulation. Fins spotted like the body.

Geographical Distribution : Widespread in the central tropical Indo-west Pacific.

Fishery Information : This perch is an important component of the rock cod ('Kalava') fishery off the south-west coast of India in depths of 63 to 100 m.

Epinephelus coeruleopunctatus (Bloch)

Holocentrus coeruleopunctatus Bloch, 1790, *Naturges. Ausland. Fische,* **4** : **94,** pl. 242, fig. 2 (type-locality : not given).

Serranus tumilabris Day (*nec* Valenciennes), 1875, *Fishes of India* : **16, pl. 3,** fig. 3.

Serranus hoevenii Bleeker : Day, 1889, *Fauna Br. India,* Fishes, **1** : **449.**

Serranus dermochirus Valenciennes : Day, 1875, *Fishes of India* : 21 ; **Day,** 1889, *Fauna Br. India,* Fishes, **1** : 453.

Common Names :

White-spotted reef-cod	...	English
Fana, Chammam	...	Lakshadweep Is.

Distinguishing Characters :

A small serranid fish, its depth 2.8 to 3.0 times in standard length. Preoperculum with rounded and serrated edge, the serrae scarcely enlarged at angle ; operculum with three flat spines, the middle spine nearer to lower than to upper spine. Maxillary (upper jaw) extending to below posterior border of eye. A pair of short canines on each side of symphysis in each jaw ; teeth villiform, those on lower jaw at middle of sides in 3 rows. Dorsal fin with 11 spines and 15 or 16 soft rays, the last spines increasing in length to the 3rd or 4th. Anal fin with 3 spines and 8 soft rays. Pectoral fin as long as postorbital part of head. Caudal fin rounded. Scales ctenoid.

Colour : variable, mainly purple-brown with white or blue spots of various types.

Geographical Distribution : Widespread in the Indo-Pacific.

Fishery Information : Taken commercially in small quantities, mostly on the Tamil Nadu and Goa coasts.

Epinephelus corallicola (Valenciennes)

Serranus corallicola Valenciennes, 1828, *Hist. nat. Poiss.,* **2** : 336 (type-locality : not given) ; Day, 1875, *Fishes of India* : 20 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 451.

Common Names :

Duskyfin grouper	...	English
Goudarufana, Poochachammam	...	Lakshadweep Is.

Distinguishing Characters :

A fairly small serranid, its depth about 3 times in standard length. Preoperculum finely serrated behind, its angle rounded with a few enlarged serrae ; operculum with 3 flat spines, the spines nearly equidistant. Teeth in rather broad bands, in at least 3 series on sides of lower jaw ; a pair of short canines on each side of symphysis in each jaw. Dorsal fin with 11 spines and 16 or 17 soft rays, the last spines considerably shorter than 3rd spine. Anal fin with 3 spines and 8 soft rays. Pectoral fin short, as long as postorbital part of head. Caudal fin rounded. Scales cycloid, but in young specimens ctenoid ; pored scales about 50 in lateral line to caudal-fin base.

Colour : brown with widely-spaced small blackish spots on head, body and fins ; a black blotch on dorsal line at base of fin and another on dorsal edge of caudal peduncle ; all fins with a narrow whitish edge ; pectoral fins dark, with black spots basally.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken by fishermen rather infrequently on the Tamil Nadu coast.

Epinephelus diacanthus (Valenciennes)

Serranus diacanthus Valenciennes, 1828, *Hist. nat. Poiss.*, **2** : 319 (type-locality : Malabar) ; Day, 1875, *Fishes of India* : 17, pl. 3, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 449.

Common Names :

Six-barred reef-cod	...	English
Hekaru, Gobra	..	Marathi

Distinguishing Characters :

A medium-sized serranid, its depth 2.9 to 3.0 times in standard length. Preoperculum finely serrated behind, somewhat produced at angle and armed with two strong spines ; operculum with 3 flat spines, the middle spine nearer to lower than to upper one. Maxillary (upper jaw) extending to below posterior border of eye. A pair of canines on each side of symphysis in each jaw ; teeth on lower jaw at middle of sides in 2 rows. Dorsal fin with 11 spines and 15 to 17 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate in adult, rounded in the young. Scales ctenoid.

Colour : body brownish, sometimes with faint dark patches, with six dark brown broad vertical bars. Fins sometimes spotted with darker colour.

Geographical Distribution : Widespread in the central tropical Indo-Pacific.

Fishery Information : This perch is an important component of the rock cod ('Kalava') fishery off the Kerala coast in depth of 63 to 100 m. It grows to a length of 46 cm. Common in the commercial catches off Bombay also.

Epinephelus fasciatus (Forsskal)

Perca fasciata Forsskal, 1775, *Descript. Animal.* : 40 (type-locality : Red Sea).
Serranus fasciatus : Day, 1875, *Fishes of India* : 15, pl. 3, fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 448.
Serranus erythrurus Valenciennes : Day, 1875, *Fishes of India* : 18 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 450.

Common Names :

Red-banded grouper	...	English
Teda	...	Marathi
Ryfana, Chammam	...	Lakshadweep Is.

Distinguishing Characters ;

A small serranid, with an oblong and somewhat robust body, its depth 2.7 to 3.0 times in standard length. Preoperculum with a convex, finely serrated upper edge, its angle slightly produced and bearing enlarged spinules ; operculum with upper edge straight and with 3 flat spines, the middle spine equidistant from upper and lower spines. Maxillary (upper jaw) extending to below posterior border of eye or not so far. Teeth in narrow bands, in 3 (rarely 2) rows on middle side of lower jaw, those of the inner series longer and depressible ; a pair of canines at front of jaws. Dorsal fin with 11 spines and 16 soft rays ; last spine slightly shorter than 3rd spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins rather short, about equal to postorbital part of head. Caudal fin rounded. Scales on head cycloid, on body ctenoid.

Colour : ground colour orange-red on head, body and fins ; a red band from tip of snout along dorsal part of head through eye to front of dorsal fin ; 5 or 6 red bands on body which tend to fade with age. Margin of spinous dorsal fin black.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Inhabits shallow waters of coral and rocky areas.

Fishery Information : Of minor importance commercially along the west coast of India.

Epinephelus flavocaeruleus (Lacepede)

Holocentrus flavocaeruleus Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 367 (type-locality : Mauritius).

Serranus flavo-caeruleus : Day, 1875, *Fishes of India* : 15, pl. 3, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 448.

Common Names :

Yellowtail reefcod	...	English
Mungil-cullawah	...	Tamil
Manja-kalava	...	Malayalam
Chamman	...	Lakshadweep Is.

Distinguishing Characters :

A small serranid, its depth 2.4 to 2.7 times in standard length. Preoperculum coarsely serrated, with 3 or 4 enlarged serrae at angle; operculum with 3 flat spines, the middle spine about equidistant from lower and upper spines. Maxillary (upper jaw) extending beyond vertical from posterior edge of eye. Teeth in narrow bands in jaws, in 2 rows on sides of lower jaw ; a pair of canines in front of each jaw. Dorsal fin with 11 spines and 15 to 17 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate or slightly emarginate. Scales ctenoid.

Colour : body deep blue or purplish with numerous fine dots; fins and lips brilliant yellow ; the extent of the two colours varies, but the species is unmistakable.

Geographical Distribution : Widespread in the central Indo-Pacific.

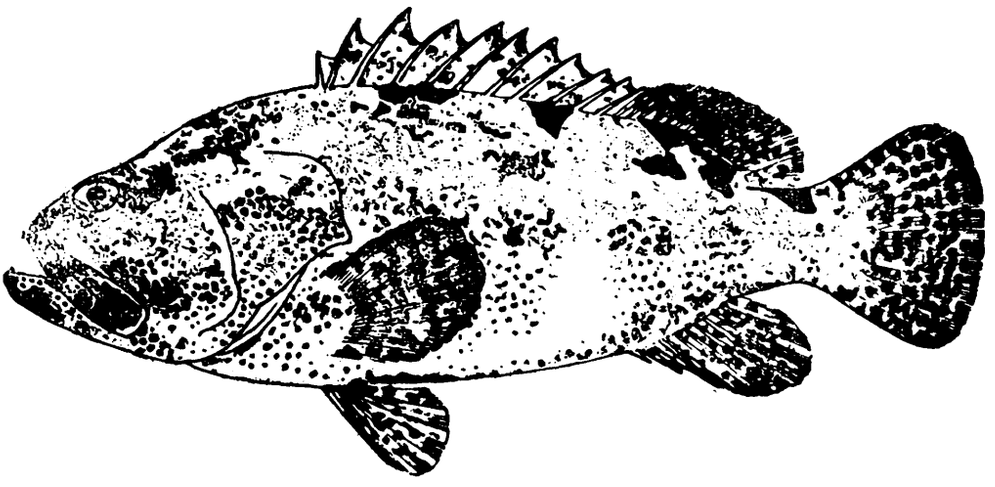
Fishery Information : Taken commercially only occasionally in our region.

Epinephelus fuscoguttatus (Forsskal)

[Text-fig. 148]

Perca summana fuscoguttatus Forsskal, 1775, *Descript. animal.* : 42 (type-locality : Djedda, Red Sea).

Serranus fuscoguttatus : Day, 1875, *Fishes of India* : 22, pl. 5, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, 1 : 454



Text-fig. 148. *Epinephelus fuscoguttatus* (Forsskal)

Common Names :

Brown-marbled grouper	...	English
Fana, Chammam	...	Lakshadweep Is.

Distinguishing Characters :

A large serranid, with an oblong and laterally compressed body, its depth about 3 times in standard length. Preoperculum obtusely rounded and finely serrated along its upper edge, no enlarged spinules at angle; operculum with upper edge strongly convex and with 3 flat spines, the upper and lower of which are poorly developed, the lowest closest to edge of operculum. Maxillary (upper jaw) extending beyond posterior border of eye. Teeth small, in narrow bands in young, in broad bands in adults, those of inner series longer and depressible; canines in front of jaws. Dorsal fin with 11 spines and 14 or 15 soft rays. Anal fin with 3 spines and 8 soft rays. Pectoral fins shorter than postorbital part of head. Caudal fin rounded. Scales cycloid in adults, ctenoid in young.

Colour : ground colour varying from olive-yellow to light brown, covered with numerous close-set dark brown spots, so that pale colour of narrow interspaces contrasts highly with dark spotting, especially on head, 4 black blotches, 3 along base of dorsal fin and one forming a black saddle on caudal peduncle.

Geographical Distribution : Widespread in the central Indo-Pacific.

Inhabits coastal areas and coral reefs, down to 60 m.

Fishery Information : This heavy-bodied species reaches a length of about 100 cms and is taken commercially in small quantities in our region.

Epinephelus hexagonatus (Schneider)

Holocentrus hexagonatus Schneider, 1801, *Syst. Ichthy.* Bloch. : 323 (type-locality : Tahiti).

Serranus hexagonatus : Day (partim), 1875, *Fishes of India* : 14, pl. 12, fig 3.

Common Names :

Honeycomb reefcod	...	English
Sikkisikkifana, Pullichammam	...	Lakshadweep Is.

Distinguishing Characters :

A fairly small serranid, its depth 3.2 to 3.5 times in standard length. Preoperculum with a rounded and finely serrated upper edge, the serrae somewhat enlarged at angle ; operculum with 3 flat spines, the middle spine equidistant from upper and lower. Maxillary (upper jaw) extends slightly beyond posterior border of eye. A pair of canines on each side of symphysis in each jaw ; teeth on lower jaw at middle of sides in 3 rows. Dorsal fin with 11 spines and 16 soft rays, the last spine slightly shorter than 3rd spine. Anal fin with 3 spines and 8 soft rays. Caudal fin rounded. Scales ctenoid ; pored scales about 60 in lateral line to caudal-fin base.

Colour : background colour white or light tan, with hexagonal dark reddish-brown or blackish spots dorsally forming a network pattern ; 5 dark blotches along back are clear, two along base of soft dorsal fin and one on dorsal side of caudal peduncle. Pectoral fins dusky or orange, without spots.

Geographical Distribution : Laccadive Sea, India, to the Philippines. Southern Japan and Bikini Atoll.

Coastal waters and trawling grounds.

Remarks : The present species is closely related to *E. merra*, but differs from the latter species in having the pectoral fin without spot (vs. with distinct black spots) and teeth on middle of side of lower jaw in 3 rows (vs. 2 rows).

Fishery Information : Forms a small fishery at Port Blair in the Andaman Sea in our region.

Epinephelus latifasciatus (Temminck & Schlegel)

Serranus latifasciatus Temminck and Schlegel, 1842, *Fauna Japan.*, Pisces : 6 (type-locality : Nagasaki, Japan) ; Day, 1888 *Fishes of India* Suppl. : 780 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 455.

Serranus grammicus Day, 1867 : Day, 1875, *Fishes of India* : 23, pl. 5, fig. 4.

Common Name :

Lateralband grouper ... English

Distinguishing Characters :

A fairly small serranid fish with a laterally compressed body, its depth 2.9 to 3.5 times in standard length. Preopercular border produced at angle, armed with several enlarged serrae; operculum with 3 flat spines, the middle spine much nearer to lower than to upper. A pair of short canines on each side of symphysis in each jaw; teeth in 2 rows on sides of lower jaw. Gill-rakers moderately long, but much shorter than gill lamellae. Dorsal fin with 11 spines and 12 to 14 soft rays, the last spine considerably shorter than third spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins short, as long as postorbital part of head. Caudal fin rounded. Scales cycloid or feebly ctenoid; 60 to 66 pored scales in lateral line to caudal-fin base.

Colour : greyish, with a golden gloss about the head; four narrow black lines (sometimes broken into spots) on posterior part of head—one extending to caudal fin and two to base of dorsal fin. Dorsal and caudal fins with large black spots; anal fin with a black edge.

Geographical Distribution : India to China, Taiwan and Southern Japan.

Fishery information : Taken commercially occasionally on the Tamil Nadu coast only.

Epinephelus maculatus (Bloch)

Holocentrus maculatus Bloch, 1790, *Naturges. Ausland. Fische,* **4** : 96, pl. 242, fig. 3 (type-locality : East Indies).

Serranus maculatus : Day, 1875, *Fishes of India* : 14, pl. 2, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 447.

Epinephelus fario (*nec* Thunberg) Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 226, fig. 190.

Common Names :

Bloch's rockcod	...	English
Hekaru, Gobra	...	Marathi

Distinguishing Characters :

A fairly small serranid fish, its depth 2.6 to 3.1 times in standard length. Preopercular border somewhat produced at angle, armed with enlarged serrae; operculum with 3 flat spines, the middle nearer to lower than to upper. A pair of short canines on each side of symphysis of each jaw; teeth on middle of side of lower jaw in 2 rows. Gill-rakers longer than gill-lamellae. Dorsal fin with 11 spines and 15 or 16 soft rays, the last spine considerably shorter than 3rd spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins as long as postorbital part of head. Caudal fin rounded. Scales ctenoid; pored scales in lateral line to caudal-fin base 45 to 50.

Colour : brown to yellow with numerous black spots on head, body and fins; young with white blotches; all fins dark.

Geographical Distribution : Widepread in the tropical Indo-west Pacific.

Inhabits coastal waters.

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea.

Epinephelus malabaricus (Schneider)

Holocentrus malabaricus Schneider, 1901, *Syst. Ichthy. Bloch* : 319, pl. 63 (type locality : Tranquebar).

Serranus malabaricus : Day, 1875, *Fishes of India* : 19, pl. 4, fig. 2.

Serranus salmoides (Lacepede) : Day, 1875, *Fishes of India* : 20, pl. 4, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 1 : 452.

Common Names :

Malabar reefcod	...	English
Bontoo	...	Telugu
Punni-calawah, Kalava	...	Tamil
Hekaru, Gobra	...	Marathi

Distinguishing Characters :

A large serranid, with an elongate and thick-set body. Preopercular border rounded, the serrae enlarged at angle; operculum with

3 flat spines, the spines equidistant. A pair of short canines on each side of symphysis in each jaw; teeth small, in bands in jaws, in 2 rows on sides of lower jaw. Dorsal fin with 11 spines and 15 or 16 soft rays, the last spine considerably shorter than third spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins as long as postorbital part of head. Caudal fin rounded. Pored scales in lateral line to caudal-fin base 56 to 61.

Colour : brownish with very small blackish spots on body, head and fins, the spots on head widely separated; 5 dark cross-bands on body, distinct in young specimens but indistinct in large specimens.

Geographical Distribution : Widepread in the tropical Indo-west Pacific.

Fishery Information : This grouper is fairly common in the trawling grounds of the coast of India where specimens of 45 cms in length are frequent in the commercial catches. Specimens measuring about 240 cms have been reported off the Kerala and Goa coasts.

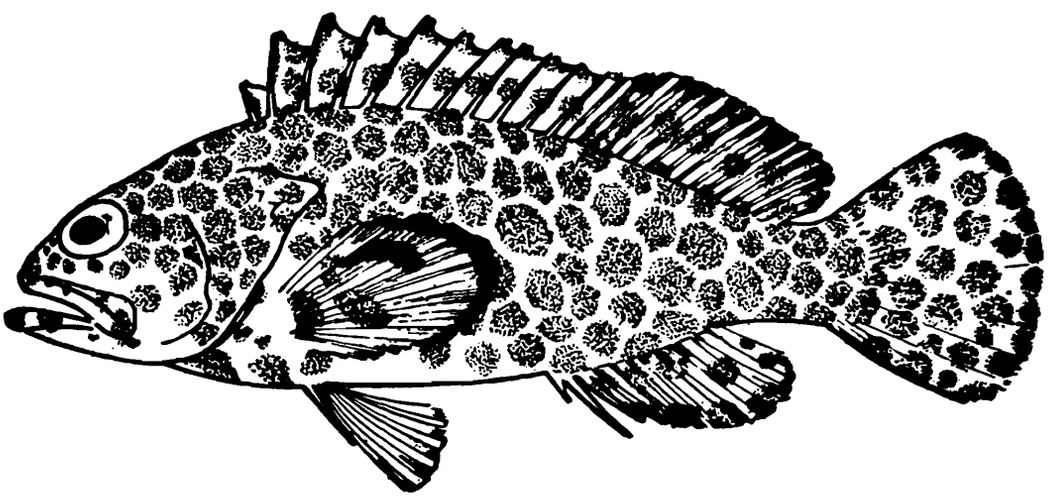
Epinephelus megachir (Richardson)

[Text-fig. 149]

Serranus megachir Richardson, 1846, *Rep. Ichth. China Japan* : 230 (type-locality : Canton, China).

Serranus merra Day (*nec* Bloch), 1875, *Fishes of India* : 13, pl. 2, fig. 2.

Serranus gilberti Day (*nec* Richardson), 1878, *Fishes of India* : 746; Day, 1889. *Fauna Br. India,* Fishes, **1** : 446.



Text-fig. 149. *Epinephelus megachir* (Richardson)

Common Names :

Honeycomb grouper	...	English
Bontoo	...	Telugu
Pulli-cullawah	...	Tamil



Epinephelus malabaricus (Schneider)

Distinguishing Characters :

A small serranid, with an oblong and laterally compressed body, its depth 2.9 to 3.2 times in standard length. Preoperculum with a convex, finely serrated upper edge and a wide shallow notch above its angle, the latter without enlarged spinules; operculum with 3 flat spines, the spines equidistant. A pair of short canines on each side of symphysis in each jaw; teeth in narrow bands, in 2 rows on sides of jaws, those of inner series longer and depressible. Dorsal fin with 11 spines and 16 to 18 soft rays. Anal fin with 3 spines and 8 soft rays. Pectoral fins broad and long. slightly longer than head without snout. Caudal fin rounded. Scales ctenoid.

Colour : ground colour of head, body and fins pale brown, overlain by large honeycomb-like red blotches; breast with a W-shaped mark; underside of head with obscure red blotches. Pectoral fins with several indistinct red blotches, a curved red band across upper half of fins and a broad dusky black margin.

Geographical Distribution : Widespread in the central tropical Indo-west Pacific.

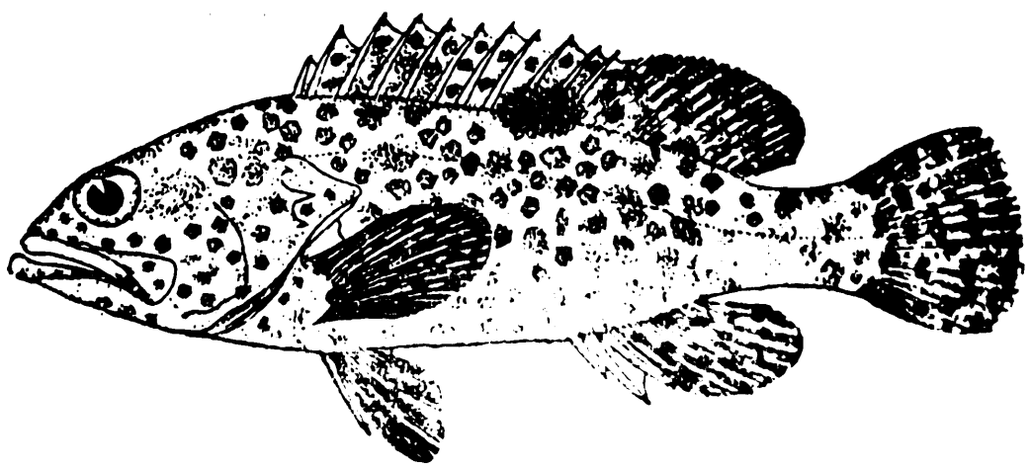
Inhabits coastal waters, down to 80 m.

Fishery Information : Taken commercially only occasionally at Port Blair in the Andaman Sea.

Epinephelus melanostigma Schultz

[Text-fig. 150]

Epinephelus melanostigma Schultz, 1953, *Bull U. S. natn. Mus.*, (202) **1** : 348, fig. 54 (type-locality : Swains Is., Samoan group) ; Jones and Kumaran, 1964, *J. mar. biol. Ass. India*, **6**(2) : 286, fig. 2.



Text-fig. 150. *Epinephelus melanostigma* Schultz

Common Names :

Schultz's rockcod	...	English
Sukkisikkifana, Fullichammam	...	Lakshadweep Is.

Distinguishing Characters :

A small serranid, its depth 3.2 to 3.4 times in standard length. Preoperculum edge notably convex, finely serrated; operculum with 3 flat spines, the middle spine equidistant from upper and lower spines. Maxillary (upper jaw) extending slightly beyond vertical from posterior border of eye. A pair or two of short canines on each side of symphysis in each jaw; teeth on middle of side of lower jaw in 3 or more rows. Dorsal fin with 11 spines and 15 soft rays, the last spine equal to or slightly shorter than third spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins rather short, as long as postorbital part of head. Caudal fin rounded.

Colour : light brown, with brown hexagonal spots on head and body separated by whitish interspaces. A large black blotch below bases of 8th to 11th dorsal-fin spines extending on back and basal half of fin; fins with dark spots; soft dorsal, soft anal, pectoral and caudal fins with white narrow margins.

Geographical Distribution : Minicoy Island, the Philippines, and the Marshall and Marianas Islands.

Fishery Information : This species has been reported only once from Indian waters but the species is likely to be found more frequently when the perches of the Laccadive Sea are exploited.

Epinephelus merra Bloch

Epinephelus merra Bloch, 1793, *Naturges. Ausland. Fische*, **7** : 17, pl. 329 (type-locality : Japanese Sea).

Serranus hexagonatus Day (*nec* Bloch) (partim), 1875, *Fishes of India* : 14, pl. 2, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **1** : 447.

Common Names :

Wire-netted reefcod	...	English
Bontoo		Telugu
Pulli-cullawah	...	Tamil
Sikkisikkifana, Fullichammam	...	Lakshadweep Is.

Distinguishing Characters :

A fairly small serranid, its depth 3.2 to 3.4 times in standard length. Preoperculum border rounded, finely serrated, the serrae somewhat enlarged at angle ; operculum with 3 flat spines, the middle spine somewhat nearer lower than upper spine. Maxillary reaches below posterior margin of eye or slightly beyond. A pair of canines on each side of symphysis in each jaw ; teeth on lower jaw at middle of sides in 2 rows, the inner row longest and depressible. Dorsal fin with 11 spines and 16 or 17 soft rays, the last spine slightly shorter than third spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins rather short, shorter than postorbital part of head. Caudal fin feebly rounded. Scales mostly ctenoid ; 48 to 50 pored scales in lateral line to caudal-fin base.

Colour : background colour white below, very light yellowish above ; dark orange-brown, round to more or less hexagonal spots on head, body and fins, those on belly and ventrally on sides more widely spaced than dorsally. Pectoral fins light yellowish, with distinct black spots.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This perch is an important component of the Rock Cod ('Kalava') fishery off the south-west coast of India in depths of 63 to 100m. It is also taken commercially along the Tamil Nadu coast and the Andaman Islands.

Epinephelus modestus Gilchrist & Thompson

Epinephelus modestus Gilchrist and Thompson, 1909, *Ann. S. Afr. Mus.*, **6**(3) : 218 (type-locality : Natal) ; Talwar, 1975, *Proc. zool. Soc., Calcutta*, **26** : 8.

Common Name :

Modest rockcod ... English

Distinguishing Characters :

A fairly small serranid fish. Preopercular edge finely serrated, the serrae coarser at angle ; operculum with 3 flat spines, the spines equidistant. Teeth in 4 or 5 rows in upper jaw with an outer enlarged series, in 2 rows on sides of lower jaw ; canines small. Dorsal fin with 11 spines and 14 or 15 soft rays. Anal fin with 3 spines and

9 or 10 soft rays. Caudal fin truncate. Scales ctenoid on body, cycloid on head.

Colour : body uniformly brown, lighter below.

Geographical Distribution : South-west coast of India and the Natal coast of Africa.

Fishery Information : This perch is quite common in the trawl catches off the Kerala coast at a depth of about 250 to 300 m.

Epinephelus morrhua (Valenciennes)

Serranus morrhua Valenciennes, 1833, *Hist. nat. Poiss.*, **9** : 434 (type-locality : Mauritius) ; Day, 1875, *Fishes of India* : 21, pl. 5, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 453.

Common Names :

Banded-check reef-cod	...	English
Lagganfana	...	Lakshadweep Is.

Distinguishing Characters :

A fairly small serranid, its depth 3.0 to 3.3 times in standard length. Preoperculum serrated behind, somewhat produced at its angle and armed with several enlarged serrae ; operculum with 3 flat spines, the spines equidistant. Maxillary (upper jaw) extending below posterior half of eye. A pair of canines on each side of symphysis in each jaw ; teeth on middle of sides of lower jaw in 2 rows. Dorsal fin with 11 spines and 14 or 15 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate in adult, rounded in young. Head with cycloid scales, body with ctenoid scales.

Colour : brownish grey with several dark thin streaks horizontally across cheeks, curved stripes or line of spots along body ; younger fish reddish, with few indistinct subvertical darker bands and yellowish fins.

Geographical Distribution : Widespread in the central tropical Indo-Pacific.

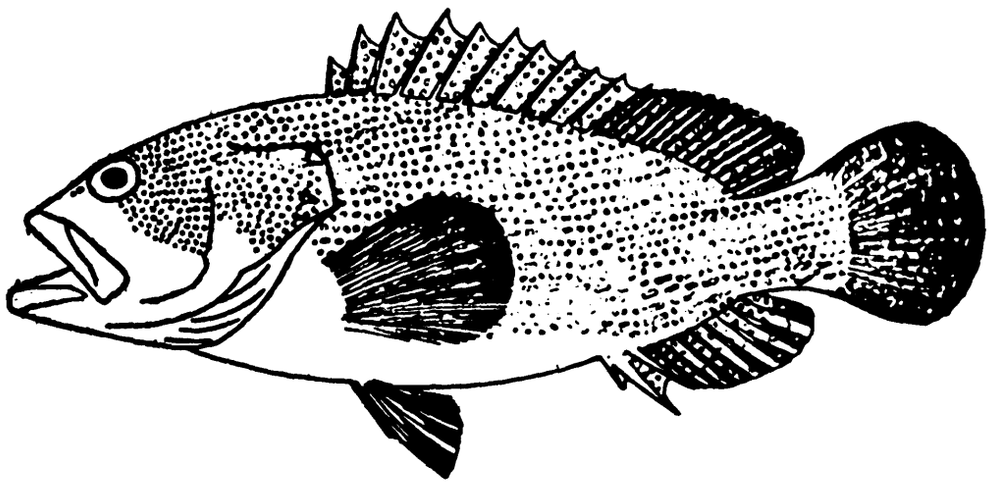
Fishery Information : Taken commercially only occasionally on the Tamil Nadu coast.

Epinephelus summana (Forsskal)

[Text-fig. 151]

Perca summana Forsskal, 1775, *Descript. Animalium* : 42 (type-locality : Arabia).

Serranus summana : Day, 1875, *Fishes of India* : 21, pl. 4, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 453.



Text-fig. 151. *Epinephelus summana* (Forsskal)

Common Name :

Suman grouper ... English

Distinguishing Characters :

A small serranid, with an oblong and laterally compressed body, its depth 2.8 to 3.0 times in standard length. Preoperculum with a convex and finely serrated upper edge, and a shallow notch above its angle, the serrae at angle not enlarged ; operculum with a strongly convex upper edge and 3 flat spines, the middle spine closer to the lower spine. Teeth in narrow bands, in 2 rows on sides of lower jaw, the inner ones longer and depressible ; a pair of short canines on each side of symphysis in each jaw. Gill-rakers short, shorter than gill-lamellae. Dorsal fin with 11 spines and 14 or 15 soft rays, the last spine considerably shorter than third spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins short, nearly as long as head without snout. Caudal fin rounded. Scales ctenoid, those on head cycloid ; pored scales in lateral line 48 to 50 to caudal-fin base.

Colour : ground colour dark brown, overlain by numerous pale yellow or white dots on head, body and median fins, sometimes forming short and uneven pale lines ; dark brown vertical bands often present. Caudal fin, soft dorsal-fin and anal-fin with a dark brown margin and a fine (but distinct) white edge.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coral and rocky areas.

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea.

Epinephelus tauvina (Forsskal)

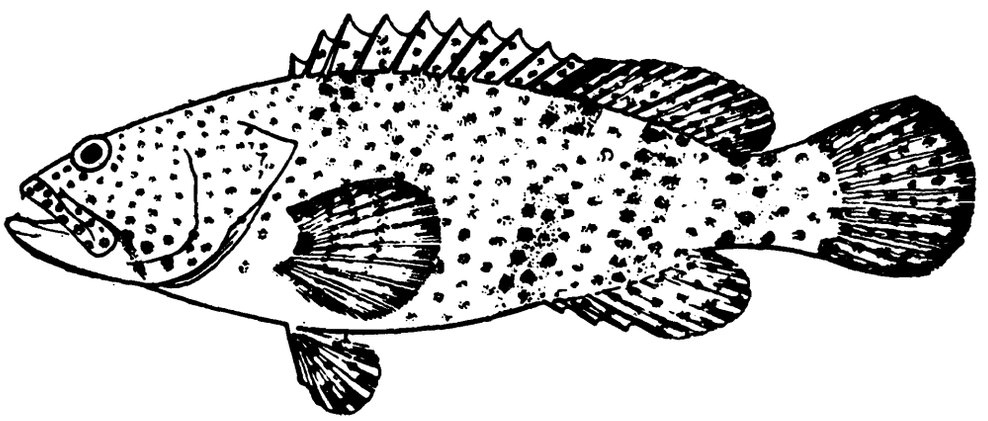
[Text-fig. 152]

Perca tauvina Forsskal, 1775, *Descript. Animal.* : 39 (type-locality : Djedda, Red Sea).

?*Serranus semipunctatus* Valenciennes : Day, 1875, *Fishes of India* : 20; Day, 1889, *Fauna Br. India,* Fishes, **1** : 452.

Serranus pantherinus (Lacepede) : Day, 1889, *Fauna Br. India,* Fishes, **1** : 451.

Epinephelus elongatus Schultz : Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 228, fig. 192.



Text-fig. 152. *Epinephelus Tauvina* (Forsskal)

Common Names :

Greasy grouper	...	English
Bontoo	...	Telugu
Punni-calawah	...	Tamil
Panni-kalava	...	Malayalam
Hekaru, Gobra	...	Marathi
Salai	...	Gujarati
Chammam	...	Lakshadweep Is

Distinguishing Characters :

A large serranid, with an elongate and thick-set body, its depth 2.9 to 3.3 times in standard length. Preoperculum with a slightly convex serrated upper edge and several strong spinules at lower angle; operculum with a straight upper edge and 3 flat spines, the middle spine closer to lower one. Gillrakers 27 to 30 on lower arm of first

arch. Maxillary (upper jaw) extending beyond posterior border of eye. Teeth in narrow bands in the young, in broad bands in adults, in 3 rows on sides of lower jaw in adults, canines small, disappearing with age. Dorsal fin with 11 spines and 15 or 16 soft rays, the last spine slightly shorter than postorbital part of head. Anal fin with 3 spines and 8 soft rays. Pectoral fins moderate, slightly shorter than postorbital part of head. Caudal fin rounded. Scales ctenoid in young, cycloid in adults.

Colour : ground colour light brown, with darker vertical or oblique bands; upper parts of head and body, and base of pectoral fins with red-brown spots; spots on cheek arranged in regular series from eye to preoperculuar angle; spots in large adults obscure or absent. Very variable, most markings last with age.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Inhabits shallow areas, down to 60 m.

Fishery Information : One of the largest species, attains at least 220 cms and a weight of 220 kgm, and occurs in both offshore waters and in the estuaries. When young this fish is of good edible quality, but when it grows to a larger size its flesh is slightly coarse. This species predominantly occurs on the east coast of India and the best catches are obtained from the Andhra and Tamil Nadu coasts. This species also constitutes an important element in the perch fishery of the Kerala coast. Large individuals are reported to be aggressive and dangerous.

Epinephelus undulosus (Quoy & Gaimard)

Bodianus undulosus Quoy and Gaimarl, 1824, *Voy. Uranie et Physic.*, **2**, Zool : 310 (type-locality : Waigui and Rawak, New Guinea).

Serranus undulosus : Day, 1875, *Fishes of India* : 13, pl. 2, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 446.

Common Names :

Brown-lined reefcod	...	English
Hekaru, Gobra	...	Marathi

Distinguishing Characters :

A fairly small serranid, its depth about 2.8 times in standard length. Preoperculum minutely serrated, some enlarged serrae at its angle; operculum with 3 flat spines, the middle spine nearer to lower than to upper spine. Maxillary (upper jaw) extending to below posterior border of eye. Teeth in narrow bands, in 2 rows along sides

of lower jaw; a pair of small canines in front of each jaw. Dorsal fin with 11 spines and 18 to 20 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin truncate or slightly emarginate. Scales ctenoid.

Colour : head with longitudinal series of dark brown spots, confluent into wavy lines on upper part of body and caudal fin. Spinous dorsal fin with black margin; pectoral fins light yellow.

Geographical Distribution : Sea of Oman, Sri Lanka, India, through the East Indies, to China, the Philippines and Melanesia.

Fishery Information : Contributes a small fishery along the Tamil Nadu coast. It grows to a length of 122 cms.

Genus **Promicrops** Gill*

Promicrops Gill, in Poey, 1868, *Repertorio fisico-nat. Isla de Cuba*, 2 : 287 (type-species : *Serrasus guaza* Poey=*S. itajara* Lichtenstein).

Body rather elongate, nearly rounded in cross-section. Preoperculum with a rounded border, its upper edge finely serrated or smooth, without antrorse spines. Teeth in broad bands in jaws. two pairs of canine teeth at front of each jaw; palatines toothed. Dorsal fin with 11 strong spines, the spines shorter than anterior soft rays, increasing in length posteriorly; spinous and soft dorsal fins continuous, not separated by a deep notch. Anal fin with 3 spines and 8 soft rays.

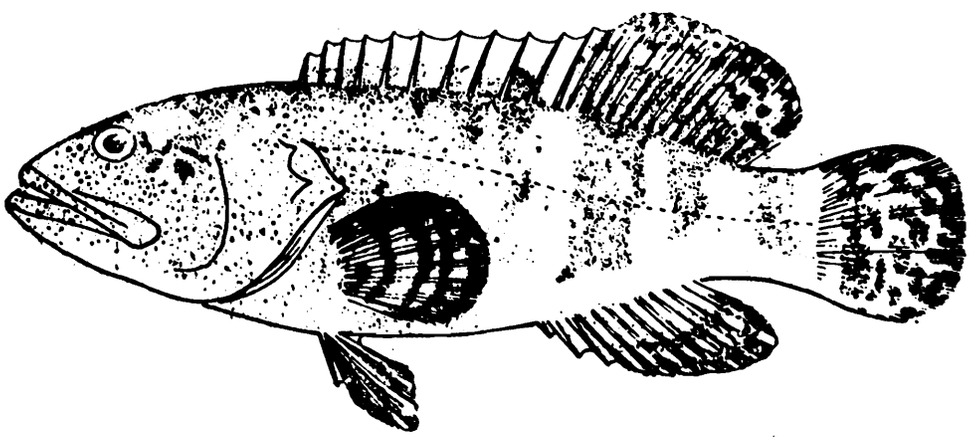
Two species, one Atlantic and the other Indo-Pacific.

Promicrops lanceolatus (Bloch)

[Text-fig. 153]

Holocentrus lanceolatus Bloch, 1790, *Naturges. ausland. Fische*, 4 : 92, pl. 242, fig. 1 (type-locality ; East Indies).

Serranus lanceolatus : Day, 1875, *Fishes of India* ; 18, pl. 4, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 450.



Text-fig. 153. *Promicrops lanceolatus* (Bloch)

* Smith (1971, *Bull. Am. Mus. nat. Hist.* **146**, p. 153) treats this as a subgenus of *Epinephelus* Bloch.

Common Names :

Mottled brown seabass	...	English
Kolayi	...	Oriya
Punni-min, Pilli-punni	...	Telugu
Wutla-callawah	...	Tamil
Kurrupu	...	Malayalam
Hekaru, Gobra	...	Marathi

Distinguishing Characters :

A large serranid, with a robust body. Preoperculum with a rounded border, its upper edge finely serrated or smooth. Teeth rather small, in broad bands in adults (narrow bands in young) ; two pairs of short canine teeth at front of each jaw. Dorsal fin with 11 spines and 14 or 15 soft rays, the spines short, increasing in length from 1st to 11th ; the soft rays comparatively long, about twice length of longest spine. Anal fin with 3 spines and 8 soft rays. Caudal fin rounded. Scales moderate-sized, very rugose.

Colour : in large adults of 90 cm or more uniformly dark brown ; smaller fish beautifully mottled—ground colour grey with broad irregular dark brown bands, often broken up to form patches or a mottling of grey blotches and irregular dark, variegated bars ; fins golden-yellow, spotted with black.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters around coral reefs.

Fishery Information : This grouper is one of the largest bony fishes found in the world today, for it grows to a length of over 180 cms and a weight in the vicinity of 350 kgm ; fish of 100 to 150 kgms are fairly common. As a food fish this grouper is coarse when very large, but fish up to about 15 kgms are of both excellent flavour and texture. It occurs on both the coasts of South India, but more abundant in the rock-cod fishery at Madras. The usual catches vary in length from 30 cm to 60 cm., but exceptionally large specimens of about 3 m length have been recorded. Large specimens can be aggressive and dangerous, and are often feared more than sharks.

Genus **Variola** Swainson

Variola Swainson, 1839. *Natural History Animals*, Fishes, **2** : 202 (*type-species*) ; *Variola longipinna* Swainson = *Variola louti* (Forsskal).

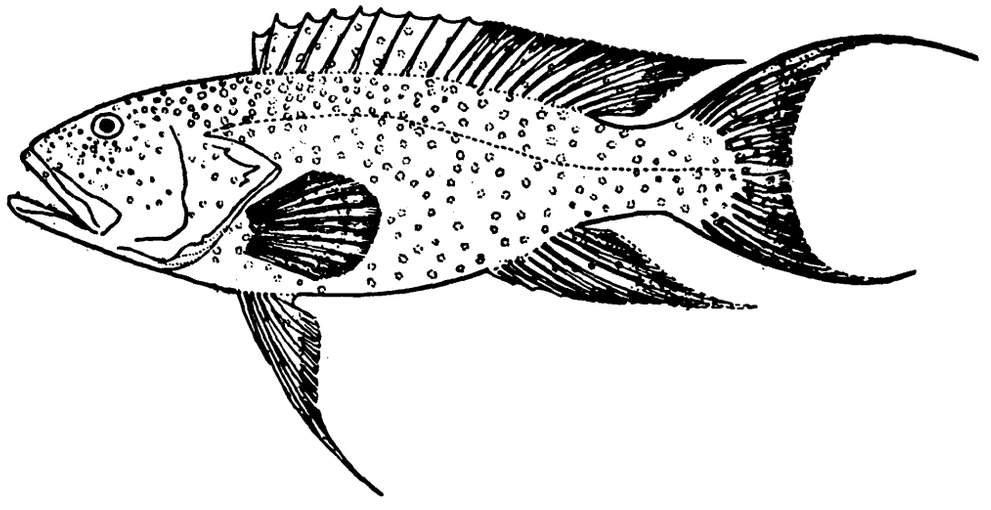
Body smooth and highly ornate, with small ctenoid scales, the head with cycloid scales. Lower jaw prominent. Preoperculum edge weakly serrated, its angle rounded and devoid of antrorse spines. Teeth in jaws villiform, with outer row enlarged ; 1 or 2 curved canines on each side of upper jaw ; lower jaw with a canine on each side anteriorly and 2 or 3 canines halfway along jaw ; villiform teeth on vomer and palatines, tongue smooth. Dorsal fin continuous, without notch, with 9 spines and 13 or 14 soft rays. Anal fin with 3 spines and 8 soft rays ; soft dorsal and soft anal fins forming triangular lobes. Caudal fin deeply lunate, emarginate in young. Scales over 115 in lateral series.

Two species, one in our area.

Variola louti (Forsskal)

[Text-fig. 154]

Perca louti Forsskal, 1775, *Descript. Animal.* : 40 (type-locality : Red Sea).
Variola louti : Day, 1875, *Fishes of India* : 26, pl. 7, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 459, fig. 143.



Text-fig. 154. *Variola louti* (Forsskal)

Common Names :

Moontail seabass	...	English
Kanduryhou, Kathivalu	...	Lakshadweep Is.

Distinguishing Characters :

A medium-sized serranid, with an elongate, smooth, highly ornate body. Mouth large, the lower jaw projecting. Teeth in jaws villiform, the outer row enlarged; 1 or 2 curved canines on each side of upper jaw; lower with a canine on each side anteriorly and 2 or 3 canines half-way along jaw; villiform teeth on vomer and palatines. Dorsal fin with 9 spines and 13 or 14 soft rays. Anal fin with 3 spines and 8 soft rays. Dorsal, anal and pelvic fins ending posteriorly in a point. Caudal fin deeply lunate, emarginate in juveniles. Scales small, 115 to 120 in lateral line.

Colour : background yellowish brown or orange, spotted profusely with small blue spots; occasionally black blotches present on body and head. Fins red and spotted with blue spots, and with a broad yellow margin.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Inhabits coral reefs, down to 60 m.

Remarks : This brilliantly coloured species is best recognised by the deeply concave caudal fin with elongate pointed lobes, pointed soft dorsal and anal fins, everywhere with small red or pinkish spots on a background of yellowish brown or orange.

Fishery Information : Taken commercially only occasionally in our area. A very beautiful and common reef fish.

FAMILY : GRAMMISTIDAE
[Soapfishes]

Body oblong and fairly compressed. Mouth moderately large; supramaxillary present; lower jaw projecting and chin usually with terminal appendage. Teeth in villiform bands in jaws, vomer and palatines. Opercle with 3 distinct spines (2 in one species). Dorsal fin with 2 to 9 spines and 12 to 27 soft rays. Anal fin with 2 or 3 short spines (except *Rypticus* which has none) and 8 to 17 soft rays. Pelvic fin with 1 spine and 5 soft rays, the innermost ray broadly joined to abdomen by a membrane; origin of pelvic fins below or slightly in front of base of pectoral fins Scales mainly ctenoid and not embedded, or cycloid and often embedded; small with about 75 to 140 rows along the single complete lateral line. Skin with a thick coat or visied mucous containing the toxin 'grammistin' which can create soapsud-like effect.

The soapfishes are a peculiar group of fishes. As a result of any activity—being handled or threshing about in the water—their body mucous creates soapsud-like effect, either in the water or on the hands as the case may be.

KEY TO GENERA

1 (a) Scales mainly ctenoid, not embedded; preopercular margin coarsely serrate; subopercle and interopercle partially serrate	...	2
(b) Scales cycloid, often embedded; preopercular margin smooth except for 1 to 4 spines on upper limb; subopercle and interopercle smooth	...	3
2 (a) Dorsal fin with 8 spines; anal fin with 2 spines	...	**Diploprion**
(b) Dorsal fin with 9 spines; anal fin with 3 spines	...	**Aulacocephalus***
3 (a) Fleshy flap on chin large, about as long as eye diameter; anal fin with 3 spines	...	**Pogonoperca***
(b) Fleshy flap on chin very small; anal fin with 2 spines	...	**Grammistes***

Genus **Diploprion** Cuvier

Diploprion Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 137 (type-species : *Diploprion bifasciatum* Cuvier) ; Randall *et al*, 1971, *Publ. Seto. Mar. Biol. Lab.*, **19**(2/3) : 172 (Review).

Body deep and very compressed. Preopercular margin coarsely serrate; subopercle and interopercle serrate; interorbital space strongly convex. Dorsal fin with 8 spines and 13 to 16 soft rays; anal fin with 2 spines and 12 or 13 soft rays. Pelvic fins very long, reaching posterior to anus.

Two species known, one in our area.

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* The monotypic genus *Pogonoperca* represented by *P. punctata* (Valenciennes), is not a common species in our area; the monotypic genus *Grammistes* Bloch represented by *G. sexlineatus* (Thunberg), is reported to have the flesh bitter; the monotypic genus *Aulacocephalus* Bleeker represented by its type-species, *A. temminckii* Bleeker has been reported only once from Port Blair in our regnon.

Diploprion bifasciatum Cuvier

Diploprion bifasciatum (Kuhl and van Hasselt) Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 137, pl. 21 (type-locality : Java) ; Day, 1875, *Fishes of India* : 28, pl. 9, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 462.

Common Names :

Two-band sea-perch	...	English
Anoovah-meen	...	Tamil

Distinguishing Characters :

Body deep and very compressed, its depth 2.0 to 2.4 times in standard length. Mouth very oblique ; teeth in villiform bands in jaws. Gill rakers long. Dorsal fin with a deep notch between spinous and soft parts, with 8 spines and 13 to 16 soft rays. Anal fin with 2 spines and 12 or 13 soft rays. Pelvic fins very long, the tips extending posterior to spinous portion of anal fin. Caudal fin rounded. Scales on body ctenoid except those on nape, thorax, abdomen and bases of dorsal and anal rays ; lateral-line scales 80 to 88.

Colour : body light yellow with 2 black bars, one on head through eye and a broader one on side of body. Soft dorsal, anal and caudal fins yellow.

Geographical Distribution : India and Sri Lanka, through the Indo-Malayan region and China, to southern Japan and Australia.

Fishery Information : Of minor fishery value in our area.

Family : Teraponidae

(Often spelt Theraponidae in the literature)
[Grunters]

Small perch-like fishes. Body oblong or oblong-ovate, moderately compressed. Mouth usually moderate, with gape oblique ; jaws equal. Operculum with two spines, the lower spine longer and stronger ; preoperculum serrate, serrations more prominent in juveniles. Teeth conic or flattened, with outer row enlarged and followed by a band of villiform teeth ; vomer and palatines edentulous except in a few species. Dorsal fin nearly divided by a deep notch in some species, with 11 to 14 spines and 8 to 14 soft rays. Anal fin with 3 spines and 7 to 12 soft rays. Caudal fin rounded, truncate or emarginate. Scales finely ctenoid, adherent ; lateral line continuous. Dark longitudinal stripes often present on body, and dark stripes on caudal fin.

Fishes of small to moderate maximum size. Inhabitants of salt, brackish and fresh waters throughout the Indo-west Pacific region. Fifteen genera, 2 in our area.

KEY TO GENERA

1 (a) Posttemporal covered with skin and scales, not expanded posteriorly, not with a serrate edge; gill membranes joined to isthmus ... **Pelates**

(b) Posttemporal expanded and serrate posteriorly, exposed posteriorly, skin and scale covering reduced; gill membranes free from isthmus ... **Terapon**

Genus **Pelates** Cuvier

Pelates Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 146 (type-species : *Pelates quadrilineatus* Cuvier) ; Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 249 (Revision).

Marine teraponids with an unexposed, non-serrate posttemporal, covered with skin and scales. Scales 66 or more in lateral line. Body with distinct longitudinal stripes; distinct black blotch on anterior of spinous dorsal fin.

Two species, one in our area.

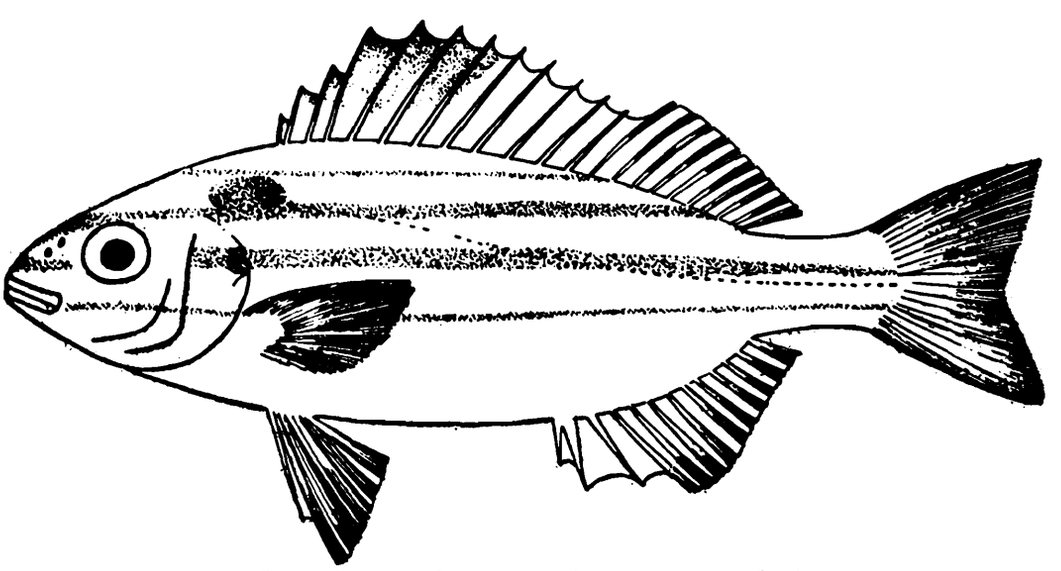
Pelates quadrilineatus (Bloch)

[Text-fig. 155]

Holocentrus quadrilineatus Bloch, 1790, *Naturges. ausland. Fische*, **4** 82, pl. 238, fig. 2 (type-locality : "the Orient").

Therapon quadrilineatus : Day, 1875, *Fishes of India* : 70, pl. 18, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 507.

Pelates quadrilineatus : Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 249, fig. 82.



Text-fig 155. *Pelates quadrilineatus* (Bloch)

Common Name :

Four-lined therapon ... English

Distinguishing Characters :

A small species. Body moderately deep, compressed, its depth 2.6 to 3.2 times in standard length. Mouth oblique, its upper jaw (maxillary) reaching to vertical through posterior nostril. Teeth in two bands in lower jaw; in three rows or a band in upper jaw, outer rows enlarged; no teeth on vomer or palatines. Gill-rakers 22 to 27 on lower arm of first branchial arch. Preoperculum evenly serrate in young. serrations larger along vertical edge with age; lower opercular spine fairly strong, not extending beyond edge of opercular lobe except in some juveniles. Dorsal fin with 12 or 13 spines and 9 to 11 soft rays. Anal fin with 3 spines and 9 or 10 soft rays. Caudal fin slightly emarginate. Scales small, 66 to 75 along lateral line, 9 to 11 above lateral line.

Colour : body silvery with five horizontal black stripes—first, running under spinous dorsal to anterior of soft dorsal; second, from dorsal edge of eye to posterior of soft dorsal base; third, from rear of eye to upper edge of caudal peduncle; fourth, from stripe under eye to caudal-fin base; fifth (sometimes lacking), from below pectoral-fin base to base of caudal peduncle. A blotch of variable intensity (sometimes lacking entirely) on side of body posterior to nape. Juveniles with 6 or 7 vertical bars present in addition to striped pattern. Spinous dorsal fin with black blotch dorsally between third and seventh spines; anal fin yellow, darker along edges; caudal fin yellow with dusky edges; pectoral and pelvic fins yellowish.

Geographical Distribution : Widespread in the Indo-west Pacific.

Inhabits marine and brackish waters.

Fishery Information : This species grows to about 20 cm and is noted for the croaking noise it invariably makes when removed from the water. A common species in the commercial catches of our area, near river mouths and brackish water.

Genus **Terapon** Cuvier

Terapon Cuvier, 1817, *Regne Animal*, (ed. 1), **2** : 295 (type-species : *Holocentrus servus* Bloch = *Terapon jarbua*) ; Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 254 (Revision).

Opercular spine extremely elongate, extends beyond the edge of the opercular lobe. Posttemporal expanded and serrate posteriorly,

exposed posteriorly. Spinous dorsal fin deeply emarginate. Body with distinct longitudinal stripes; parallel transverse stripes on caudal lobes; spinous dorsal fin with large black blotch on middle rays.

Three species recognised, all in our region; all marine but entering into brackish and freshwater.

KEY TO SPECIES

1 (a) Lateral line with 46 to 56 scales 6 to 8 scales above lateral line	...	*T theraps*
(b) Lateral line with 70 or more scales; 10 to 17 scales above lateral line	...	2
2 (a) Two to four straight longitudinal stripes along side of body; gill-rakers 18 to 24 on lower arm of first gill arch	..	*T puta*
(b) Three downward curved longitudinal stripes along body; gill-rakers 12 to 15 on lower arm of first gill arch	...	*T jarbua*

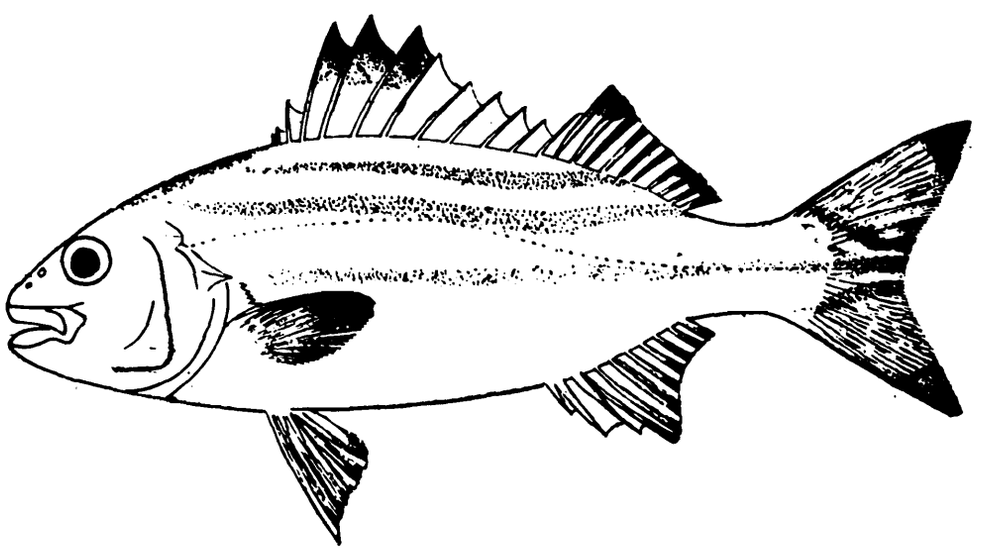
Terapon jarbua (Forsskal)

[Text-fig. 156]

Sciaema jarbua Forsskal, 1775, *Descript, Animalium* : 50 (type-locality : Djedda, Red Sea).

Therapon jarbua : Day, 1875, *Fishes of India* : 69, pl. 18, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **1** : 505, fig. 153.

Terapon jarbua : Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 255, fig. 47.



Text-fig. 156. *Terapon jarbua* (Forsskal)

Common Names :

Jarbua terapon	...	English
Boorgooni, Jeerpye	...	Bengali
Gahnu	...	Oriya
Baikeeli	...	Telugu
Palin-keetchan	...	Tamil
Gore	...	Kannada
Naveri	...	Marathi
Galikooru, Kallakeedam, Kotha	..	Lakshadweep Is.

Distinguishing Characters :

A small species. Body moderately deep, slightly compressed. Mouth slightly oblique, its upper jaw (maxillary) reaching to vertical through front edge of eye in young, to vertical through anterior pupil in large adults. Teeth conic, strong, slightly recurved, the outer row much enlarged; teeth on palate in young, lacking in adults. Gill-rakers 12 to 15 on lower arm of first arch. Dorsal fin notched, with 11 or 12 spines and 9 to 11 soft rays. Anal fin with 3 spines and 7 to 10 soft rays. Caudal fin emarginate. Scales small, 75 to 100 in lateral line, 13 to 17 above lateral line

Colour : body silvery greyish-blue, above, silvery white below, with three or four longitudinal downwardly curved stripes; body coloration in juveniles consists of a series of disconnected spots, the spots joining vertically and horizontally to give patterns of discontinuous stripes and bars. Spinous dorsal fin with blackish border on upper two-thirds of membrane between third and sixth spines (lacking in juveniles); soft dorsal fin with first three membranes tipped with black, and fifth to seventh membranes black; caudal fin with dark tips and three horizontal or oblique stripes.

Geographical Distribution : Indo-west Pacific

Inshore waters; in addition it also moves considerable distances upstream into fresh water.

Fishery Information : One of the most common species and a good aquarium fish; present all along the coast of India and reaches a length of 33 cm. The fish is usually salt-cured.

Terapon puta Cuvier

Therapon puta Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 131 (type-locality : Pondicherry, Mahe) ; Day, 1875, *Fishes of India* : 68, pl. 18, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 505.

Terapon puta : Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 262, fig. 52.

Common Names :

Small-scaled banded grunter	...	English
Tadikiri	...	Oriya
Keelputa	...	Telugu
Kove-keetchan	...	Tamil
Keetchan	...	Malayalam
Naveri	...	Marathi
Golikooru	...	Lakshadweep Is.

Distinguishing Characters :

A small species. Body elongate, moderately deep, compressed. Mouth horizontal, its upper jaw (maxillary) reaching to vertical through posterior nostril. Teeth strong, outer row enlarged, the inner teeth in bands and villiform ; no teeth on roof of mouth. Gill-rakers 18 to 24 on lower arm of first arch. Dorsal fin deeply notched, with 11 or 12 spines and 9 to 11 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin emarginate. Scales small, 70 to 85 in lateral line.

Colour : body greyish or brownish above with three or four straight longitudinal stripes. Dorsal fin with blackish blotch along upper edge between third or fourth and seventh or eighth spines ; caudal fin with an oblique bar across upper lobe and blotch at tip, middle caudal rays with stripe, one or two bars running obliquely across lower caudal lobe. Young with six or seven vertical bars.

Geographical Distribution : Indo-west Pacific.

A marine species that enters into brackish and fresh waters.

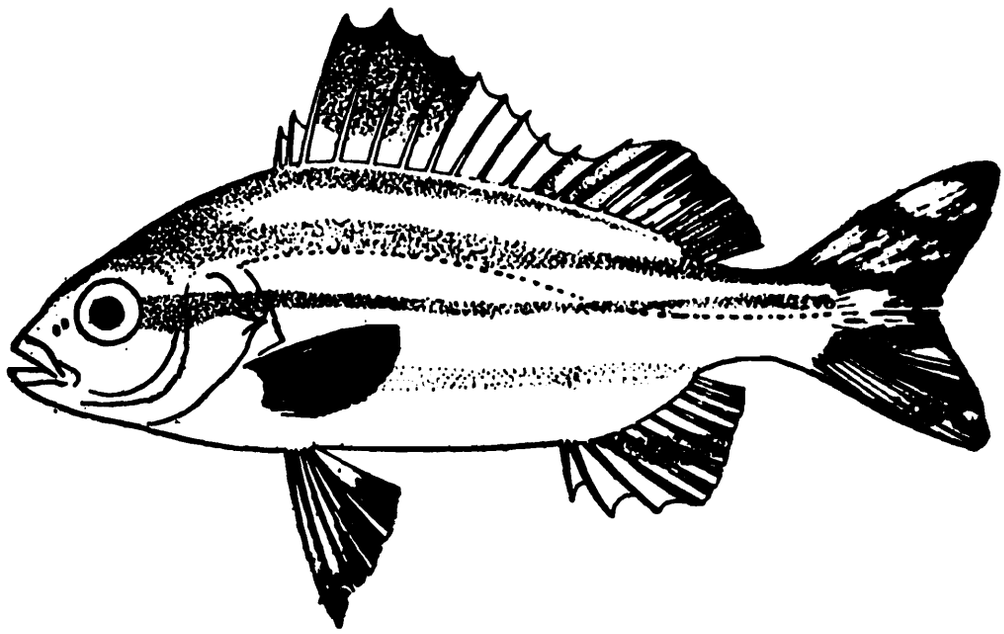
Fishery Information : Common in the commercial catches in our area.

Terapon theraps Cuvier

[Text-fig. 157]

Therapon theraps Cuvier, 1828, *Hist. nat. Poiss.*, **3** : 129, pl. 53 (type-locality : Java ; Mahe) ; Day, 1875, *Fishes of India* : 70, pl. 18, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 506.

Terapon theraps : Vari, 1978, *Bull. Am. Mus. nat. Hist.*, **159** : 259, figs. 49, 50.



Text-fig. 157. *Terapon theraps* Cuvier

Common Names :

Largescaled terapon	...	English
Gahnu	...	Oriya
Kutta-keetchan	...	Tamil
Dadadada	...	Marathi
Kallakeedam		Lakshadweep Is.

Distinguishing Characters :

A small species. Body moderately deep, compressed. Mouth oblique, the upper jaw (maxillary) reaching to vertical through anterior edge of eye in young, falling short with age. Teeth strong, conic, the outer row enlarged followed by a band of smaller teeth in each jaw; no teeth on roof of mouth. Gill-rakers 14 to 17 on lower arm of first arch. Dorsal fin notched, with 11 or 12 spines and 9 to 11 soft rays. Anal fin with 3 spines and 7 to 9 soft rays. Caudal fin emarginate. Scales small, 46 to 56 in lateral line, 6 to 8 above lateral line.

Colour : body dusky above, silvery below, with four horizontal stripes. Spinous dorsal fin uniformly dark in smaller juveniles, clear with a black blotch on upper membrane between third and seventh spines in adults; soft anal fin with black blotch; caudal lobes with two bars, upper with black tip.

Geographical Distribution : Indo-west Pacific.

Found in inshore waters, often brackish water.

Fishery Information : A common species in the commercial catches in bays and estuaries of our area.

FAMILY : KUHLIIDAE
[Flagtails]

Rather elongate or oval, fairly compressed body with moderate ctenoid scales. Mouth moderate, with fine teeth in bands in jaws and on palate. Single dorsal fin, with a deep notch before soft dorsal fin, with 10 strong spines; anal fin with 3 spines. Dorsal and anal fins each with a well-developed scaly sheath; no scaly pelvic axillary process. Caudal fin emarginate or forked.

Single genus only.

Genus **Kuhlia** Gill

Kuhlia Gill, 1861, *Proc. Acad. nat. Sci. Philad.*, 13 : 48 (type-species : *Perca ciliata* Cuvier).

For characters of the genus, see those of the family.

About 6 species, two in our area.

KEY TO SPECIES

1 (a) Caudal fin with 5 dark stripes; gill-rakers 23 to 25 on first arch ... *K. mugil*

(b) Caudal fin not with 5 dark stripes; gillrakers 17 to 19 on first arrh ... *K. rupestris*

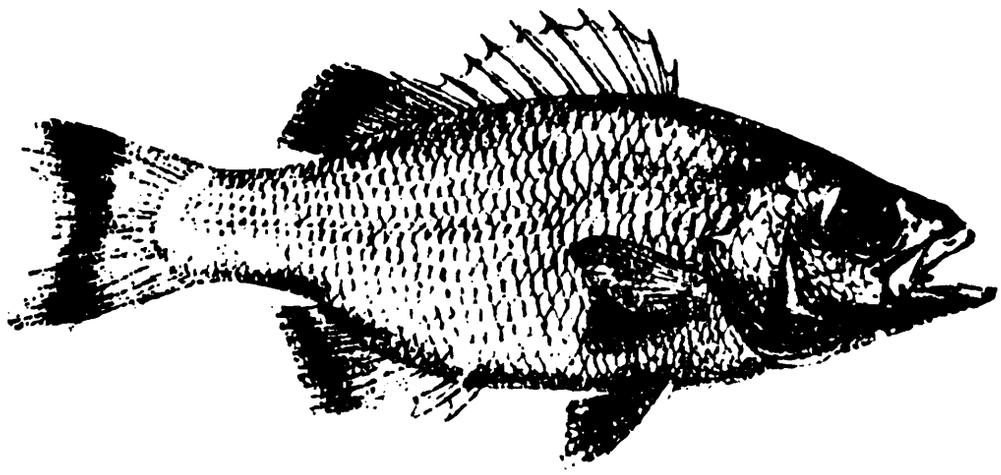
Kuhlia mugil (Forster)

[Text-fig. 158]

Sciaena mugil Forster (in Bloch & Schneider), 1801, *Systema Ichthyol.* : 541 (type-locality : Tahiti).

Dules argenteus Bennett : Day, 1875, *Fishes of India* : 67, pl. 18, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, 1 : 504.

Kuhlia taeniura (Cuvier) : Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 242, fig. 204.



Text-fig. 158. *Kuhlia mugil* (Forster)

Common Names :

Barred flagtail	...	English
Kattaphuli, Mullan	..	Lakshadweep Is.

Distinguishing Characters :

Depth of body about 2.7 times in standard length. Interorbital width about equal to eye-diameter. Mouth moderate, with fine teeth in jaws and on palate. Gillrakers 23 to 25 on first arch. Dorsal fin deeply notched, with 10 spines and 10 or 11 soft rays. Anal fin with 3 spines and 10 to 13 soft rays. Caudal fin deeply forked.

Colour : bluish above, silvery on sides and belly. Fins yellowish; caudal fin with 5 black cross-stripes.

Geographical Distribution : Widespread in the tropical central Indo-Pacific.

On coral reefs and in estuaries and freshwater.

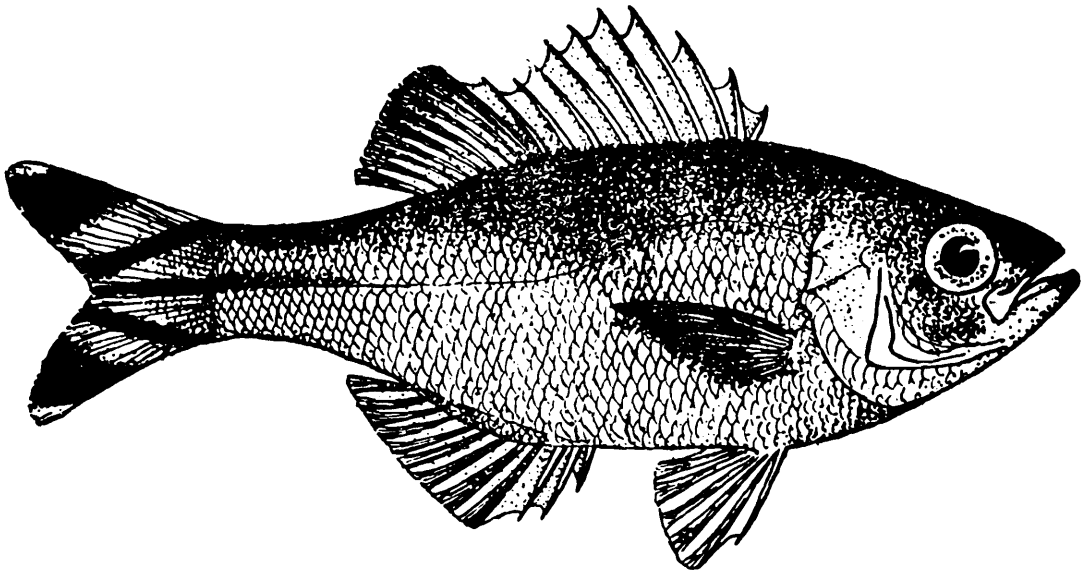
Fishery Information : Taken commercially only occasionally in our area.

Kuhlia rupestris (Lacepede)

[Text-fig. 159]

Centropomus rupestris Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 252, 273 (type-locality : Reunion Is.).

Dules marginatus Day (*nec* Cuvier), 1875, *Fishes of India* : 67, pl. 18, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **1** : 503, fig. 152.



Text-fig. 159. *Kuhlia rupestris* (Lacepede)

Common Name :

Spotted flagtail ... English

Distinguishing Characters :

Depth of body 2.6 to 3.0 times in standard length Interorbital width about equal to eye-diameter. Mouth moderate, with fine teeth in jaws and on palate. Gill-rakers 17 to 19 on first arch. Dorsal fin deeply notched, with 10 spines and 11 soft rays Anal fin with 3 spines and 11 to 13 soft rays. Caudal fin moderately emarginate.

Colour : body silvery, brownish above.

Geographical Distribution : Widespread in the tropical central Indo-Pacific.

Fishery Information : Taken commercially only occasionally in our region.

FAMILY : PRIACANTHIDAE

[Bigeyes]

Body ovoid; with small, strongly ctenoid scales, difficult to detach. Mouth large and oblique, the lower jaw projecting; small conical teeth

in a narrow band in jaws. Eyes conspicuously large. Dorsal fin with 10 spines and 11 to 15 soft rays. Anal fin with 3 spines and 10 to 16 soft rays Pectoral fins small ; no axillary scale. Pelvic fins large, originating in advance of pectoral fins and broadly joined to body along their length by a membrane, wtth a single strong spine and 5 soft rays. Caudal fin truncate or lunate. Scales small. ctenoid, completely covering head (including maxilla) Colour usually bright red.

These fishes are bottom-dwelling marine fishes. The presence of a membrane connecting the inner ray of the pelvic fins with the abdomen is a great help in identification. In most regions priacanthids are considered food fishes of only modest value. Two genera, both in our area.

KEY TO GENERA

1 (a) Body ovate ; middle spines of dorsal fin longest ; scales large, less than 55 in lateral line ... **Pristigenys***

(b) Body oblong ; last spine of dorsal fin longest ; scales more than 70 in lateral line ... **Priacanthus**

Genus **Priacanthus** Oken

Priacanthus Oken, 1817, *Isis* : 1183 (on "Les Priacanthes" Cuvier) (type-species : *Anthias macrophthalmus* Bloch).

For diagnosis of genus, see those of famly.

About 8 rather doubtful species found in most warm seas, 4 in our area.

KEY TO SUBGENERA/SPECIES

1 (a) Pelvic fins very large, conspicuously longer than head ; pelvic-fin spine about 31% of standard length ; pelvic fins jet black (subgenus *Cookeolus* Fowler) *P. boops*

(b) Pelvic fins shorter than head length ; pelvic-fin spine less than 30% of standard length (subgenus *Priacanthus*) 2

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* The occurrence of the genus *Pristigenys* Agassiz represented by *P. niphonius* (Cuvier) in our area, is of no fishery importance ; some workers prefer to use the generic name *Pseudopriacanthus* Bleeker for this species.

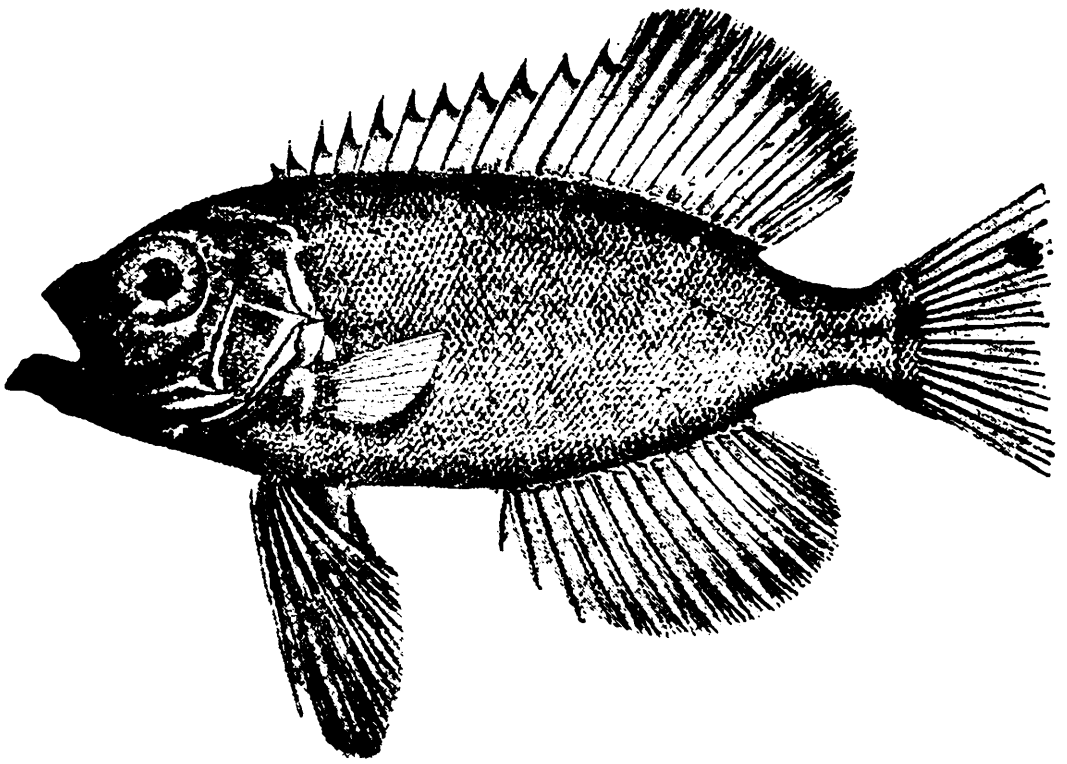
2 (a)	Dorsal fin with 14 or 15 soft rays; spine at angle of preoperculum short, indistinct in large adults; pelvic fins black or partly black, no spots	... *P. hamrur*
(b)	Dorsal fin with 12 or 13 soft rays; spine at angle of preoperculum strong	3
3 (a)	Dorsal and pelvic fin spines strongly spinulose; no spots on pelvic fins	... *P. cruentatus**
(b)	Dorsal and pelvic fin spines feebly spinulose	... 4
4 (a)	Caudal fin lunate, the lobes with filaments; pelvic fins with distinct blackish red spots, other fins without spots	... *P. tayenus*
(b)	Caudal fin truncate or slightly emarginate; yellow-brown spots on dorsal, anal and pelvic fins	... *P. macracanthus**

Priacanthus boops (Schneider)

[Text-fig. 160]

Anthias boops Schneider, 1801, *Syst. Ichth.* Bloch : 308 (type-locality : Atlantic Ocean near St. Halena).

Priacanthus boops : Talwar, 1975, *Newsl. zool. Surv.* India, **1**(1) : 8.



Text-fig. 160. *Priacanthus boops* (Schneider)

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* *Priacanthus cruentatus* (Lacepede) is rare in our area; the occurrence of *P. macracanthus* Cuvier in our area is most uncertain.

Common Name :

Long-finned Bulleye — English

Distinguishing Characters :

Body stocky and compressed; eyes very large. Mouth oblique, the lower jaw prominent. Preoperculum serrated, the spine at angle flat, rather broad and short. Teeth villiform, in narrow bands in jaws. Gillrakers 17 or 18 on lower arm of first arch. Dorsal fin with 10 strong, feebly spinulose spines and 12 soft rays. Anal fin with 3 spines and 12 soft rays. Pelvic fins very large, considerably longer than head, its spine strong. Caudal fin truncate. Scales small, ctenoid, difficult to detach.

Colour : body crimson-red, lighter below. Pelvic fins jet black; membranes of spinous dorsal and anal fins, the anterior rays of soft dorsal and anal fins, and caudal fin dusky. Peritoneum silvery.

Geographical Distribution : East coast of Africa, south-west coast of India, the Pacific Ocean and tropical Atlantic Ocean.

Fishery Information : This species is of minor fishery value being caught in the trawl catches off the Kerala coast at 250—300 m.

Priacanthus hamrur (Forsskal)

Sciaena hamrur Forsskal, 1775, *Descript. Animal.* : 45 (type locality : Djedda, Red Sea).

Priacanthus blochii (Bleeker) : Day, 1876, *Fishes of India* : 48, pl. 8, fig. 2.

Priacanthus hamrur : Day, 1889, *Fauna Br. India*, Fishes, 1 : 482.

Priacanthus fax Alcock (*nec* Valenciennes), 1897, *J. Asiatic Soc. Beng.*, 65(2) : 311.

Cookeolus boops Munro (*nec* Schneider), 1955, *Mar. Freshw. Fishes Ceylon* : 321.

Common Names :

Dusky-finned Bulleye	...	English
?Paswa	...	Tamil
Lobodugini, Kulakkathi, Mannaram	...	Lakshadweep Is.

Distinguishing Characters :

Body stocky and compressed; eyes very large. Mouth oblique, the lower jaw prominent. Preoperculum serrated, the spine at angle short (indistinct in large adults). Gillrakers 18 to 24 on lower arm of first arch. Dorsal fin with 10 spines and 14 or 15 soft rays Anal fin with 3 spines and 18 to 24 soft rays. Pelvic fins shorter than head Caudal fin feebly crescentic. Scales small, ctenoid, difficult to detach.

Colour : body red to purplish red, lighter below. Pelvic fins black or partly black, no spots but usually a dusky margin to dorsal, anal and caudal fins. Bars sometimes present on body.

Geographical Distribution : Widespread in the central Indo-Pacific

Bottom-living, from shallow waters to depth of 250 m.

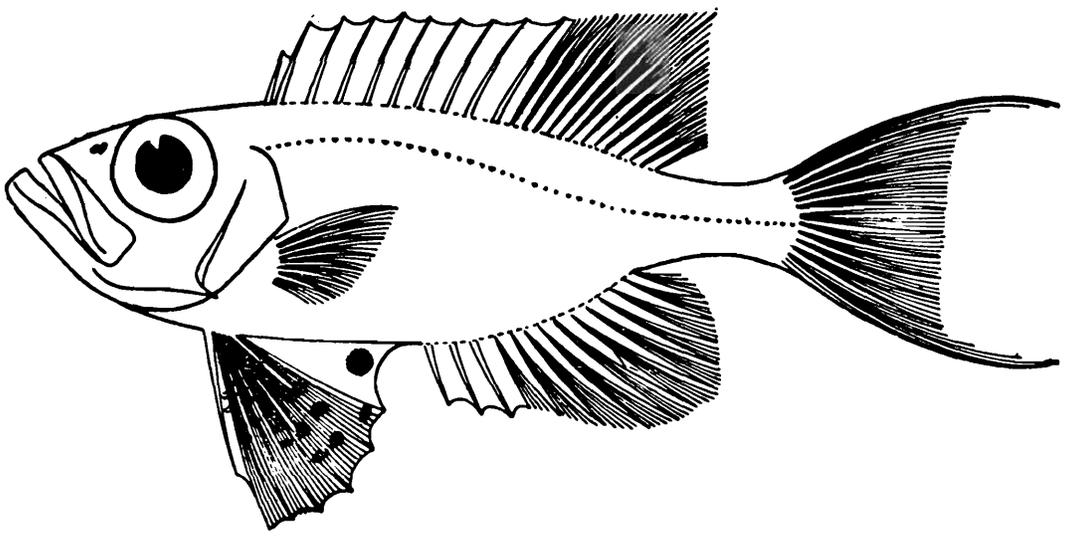
Fishery Information : This species is common in the trawl catches off the east coast of India in depths ranging from 60 to 250 m.

Priacanthus tayenus Richardson

[Text-fig. 161]

Priacanthus tayenus Richardson, 1846, *Ichth. China Japan* : 237 (type-locality : Canton, China).

Priacanthus holocentrum Bleeker : Day, 1888, *Fishes of India* Suppl. : 783; Day, 1889, *Fauna Br. India,* Fishes, 1 : 482 (*nec* fig. 148).



Text-fig. 161. *Priacanthus tayenus* Richardson

Common Names :

Purple-spotted bigeye	...	English
Pusuwa	...	Tamil

Distinguishing Characters :

Body stocky and compressed; eyes very large. Mouth oblique, lower jaw prominent. Preoperculum serrated, a strong serrated spine

at angle. Rather strong pointed teeth in a few rows in upper jaw, some enlarged near symphysis; lower jaw with a single row of conical teeth. Gillrakers 17 or 18 on lower arm of first arch. Dorsal fin with 10 spines and 12 or 13 soft rays. Anal fin with 3 spines and 11 to 13 soft rays; soft part of dorsal and anal fins angulate or pointed. Pelvic fins shorter than head length, joined to body by a membrane. Caudal fin lunate, the lobes often with filaments. Scales small, ctenoid, difficult to detach.

Colour : body brilliant crimson red, paler below. Pelvic fins with distinct blackish red spots, other fins without spots.

Geographical Distribution: Widespread in the tropical Indo-Pacific.

A bottom fish found in shallow water down to depths of 150 to 200 m. Small fish mainly occur inshore.

Fishery Information : Common in the trawl catches in depths ranging from 60 to 90 m. in our area.

FAMILY : APOGONIDAE
[Cardinal-fishes]

Six to eight spines in first dorsal fin; one spine plus 8 to 14 branched soft rays in the second dorsal. Anal fin with 2 (one in *Brephostoma*) spines and 8 to 18 branched soft rays. Pelvic fin with one spine and 5 branched soft rays; pelvic axillary scaly process not developed. Scales usually ctenoid, but cycloid in several groups and absent in *Gymnapogon*; scaly sheath on dorsal and anal fins absent. Mouth usually large; teeth usually in villiform bands in jaws (absent in *Brephostoma*), usually on vomer, sometimes on palatines; enlarged canines on the premaxillae, dentaries or vomer in some groups. Branchiostegal rays 7.

Cardinal-fishes usually occur in shallow water, but there are few species that are found only in deep water. Many of the cardinals are attractively patterned and often brightly coloured. Being mostly quite small, they are practically of no fishery significance but they play an important part in the food cycles of larger carnivorous forms.

About 22 genera, 12 in our waters.

KEY TO GENERA

1 (a) Anal fin with one spine; first dorsal fin with 5 spines; no teeth in jaws	...	**Brephostoma***
(b) Anal fin with 2 spines: dorsal fin with 6 to 9 spines; teeth in jaws present	...	2
2 (a) Opercle with two major spines first dorsal fin with 9 spines	...	**Synagrops**
(b) Opercle with a single, poorly developed spine; first dorsal fin with 6 to 8 spines	...	3
3 (a) Distinct canine teeth present	...	4
(b) Teeth feeble, no canines	...	6
4 (a) Body robust, fusiform, with strong ctenoid scales; lateral line complete	...	**Cheilodipterus***
(b) Body feeble and flabby, naked or with cycloid scales; lateral line incomplete or absent	...	5
5 (a) Body naked (no scales); preopercle spine large	...	**Gymnapogon***
(b) Body scaly; preopercle spine absent	...	**Pseudamia***
6 (a) Longest secondary (procurrent) caudal rays fused and unsegmented; all secondary rays spinous	...	**Sphaeramia***
(b) Longest secondary caudal rays bilateral and segmented	...	7
7 (a) Lateral line incomplete; preopercle always smooth	...	8
(b) Lateral line complete; if incomplete, preopercle always serrated	...	9
8 (a) Palatine teeth present; gillrakers 11 to 13 on first branchial arch	...	**Foa***
(b) Palatine teeth absent; gillrakers 5 to 9 on first branchial arch	...	**Fowleria***
9 (a) Preopercle edges smooth	...	10
(b) Preopercle edges serrated	...	11

10 (a) Visible first dorsal spines 7; anal fin with 8 soft rays; scales ctenoid	...	**Apogonichthys***
(b) Visible first dorsal spines 6; anal fin with 9 soft rays; scales cycloid or weakly ctenoid		**Rhabdamia***
11 (a) Anal fin with 12 or more rays	...	**Archamia***
(b) Anal fin with 10 or less rays	...	**Apogon**

Genus **Apogon** Lacepede

Apogon Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 411 (type-species : *Apogon ruber* Lacepede) ; Fraser, 1972, *J. L. B. Smith Inst Ichthy., Ichthy Bull.*, (34) : 17 (Revision).

Fairly elongate oblong body, with ctenoid scales. Posterior margin of preopercle serrated. Teeth in jaws feeble, no canine teeth; palatine teeth present. Six spines in first dorsal fin. Anal fin with 2 spines and 10 or less soft rays. Lateral line complete.

Apogon is a large and varied group and the numerous species known from our area could be assigned to five subgenera keyed below. A key to the various species shall, however, have to await further work. Only one species of the subgenus *Nectamia* Jordan is of some fishery importance in our region.

KEY TO SUBGENERA

1 (a) Preopercular ridge strongly serrated	...	*Pristiapogon*
(b) Preopercular ridge smooth or weakly serrated at angle	...	2
2 (a) Large supramaxilla present; visible first dorsal spines 6	...	*Yarica*
(b) Supramaxilla absent; visible dorsal spines 6 or 7	...	3
3 (a) Visible first dorsal spines 6; uroneurals absent	...	*Apogon*
(b) Visible first dorsal spines 6 or 7; a pair of uroneurals present	...	4

* The placement of the genera *Brephostoma* Alcock and *Synagrops* Gunther in the family Apogonidae are not in agreement with current concepts of the family but are here provisionally assigned; the fishes of the genera *Chellodipterus* Lacepede, *Gymnapogon* Regan, *Pseudamia* Bleeker, *Sphaeramia* Fowler & Bean, *Foa* Jordan & Evermann, *Apogonichthys* Bleeker, *Rhabdamia* Weber and *Archamia* Gill, do not contribute to any fishery in our area.

4 (a) Visible first dorsal spines 6 or 7; 10 to 27 well developed gill-rakers on first arch; 23 to 26 pored lateral-line scales ... *Nectamia*

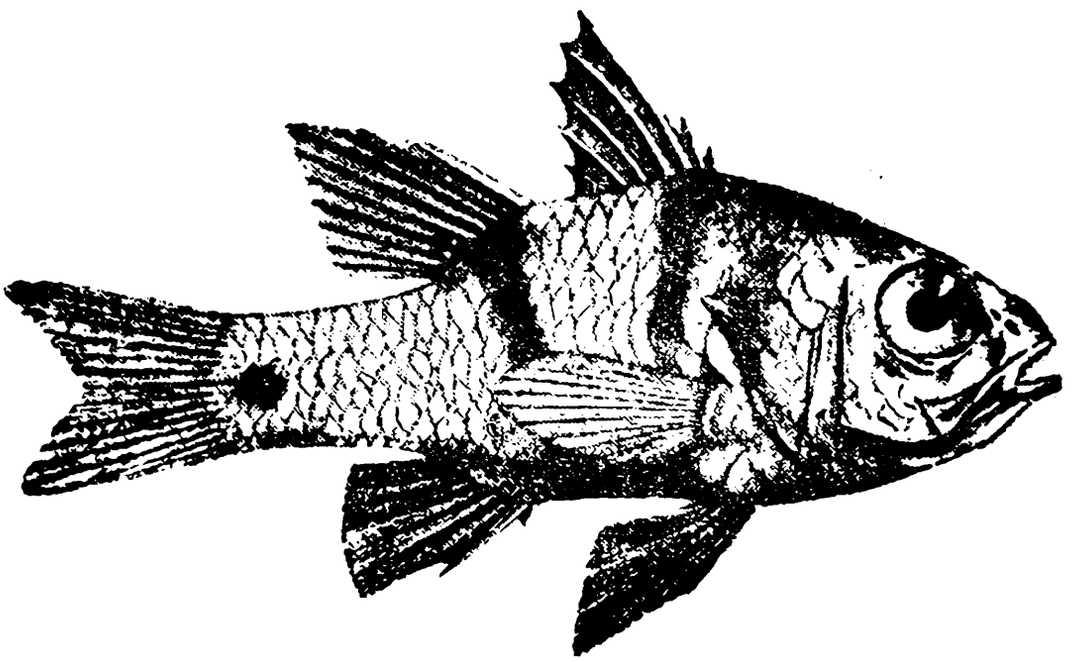
(b) Visible first dorsal spines 7; 9 or 10 well developed gill-rakers on first arch; 35 to 37 pored lateral-line scales ... *Lepidamia*

Apogon (Nectamia) taeniatus (Cuvier)

[Text-fig. 162]

Apogon taeniatus Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 159 (type-locality : Red Sea) ; Day, 1875, *Fishes of India* : 59, pl. 8, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 493.

Apogon bifasciatus Ruppell : Day, 1875, *Fishes of India* : 62, pl 16, fig. 9 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 497.



Text-fig. 162. *Apogon taeniatus* (Cuvier)

Common Name :

Twobelt cardinal ... English

Distinguishing Characters :

Body rather robust and slightly compressed. Preopercular ridge smooth with slight undulations at the angle, posterior and ventral edges smooth. Eye-diameter 3.0 to 3.3 times length of head, slightly more than snout length. Mouth fairly large; teeth in villiform bands in both jaws, none noticeably enlarged. Two dorsal fins, the first fin with 7 spines, the second fin with 1 spine and 9 soft rays. Anal fin

with 2 spines and 8 soft rays. Caudal fin feebly emarginate or even subtruncate. Scales ctenoid (rough to touch); lateral line complete, with 25 scales.

Colour : dull silvery, with two black bands round body, the first through bases of anterior three dorsal-fin spines and axil of pectoral fin, and the second through middle of second dorsal fin and anal-fin origin; a black blotch occasionally present near end of lateral line. Fins mainly faint pink, margins dusky; a dark band across soft dorsal fin.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Very common at Madras and grows up to 15 cms in length.

FAMILY : SILLAGINIDAE
[Whitings]

Elongate tapering body with fairly small scales, most easily shed. Operculum with a small, sharp spine; lower part of preopercle sharply angled inwards to meet that of the other side, thus forming the ventral side of head. Mouh small, terminal; end of maxilla slides below preorbital bone. Teeth small villiform bands in jaws, in one genus an outer series of caninoids; small teeth on vomer, none on palatines. Two dorsal fins, the first with 10 to 13 slender spines, the second with 1 spine and 16 to 27 soft rays. Anal fin with 2 slender spines and 14 to 26 soft rays. Caudal fin emarginate. Swimbladder absent, poorly developed, or highly complex.

Small shore fishes of shallow water of the tropical Indo-Pacific, often found in estuaries. Though mostly small, they are much esteemed, as the flesh in delicate and tasty. In India, they form a small but important fishery.

Four genera, 3 in our area.

KEY TO GENERA

1 (a) Pelvic fin with the spine inconspicuous and almost hidden by the much thickened club-shaped outer pelvic ray; swimbladder reduced, without post-coelomic projections into the tail section ... **Sillaginopodys***

(b) Pelvic-fin spine of normal size, the outer pelvic ray normal, not club-shaped 2

* The monotypic genus *Sillaginopodys* Fowler represented by its type-species, *S. chondropus* (Bleeker) is rather rare in the catches of our area.

2 (a) Snout and head greatly depressed; second dorsal spine very elongate; eyes small, 3 to 11% of head length swim-bladder vestigial or absent	...	**Sillaginopsis**
(b) Snout and head not depressed; second dorsal spine not elongate eyes normal, 17 to 22% of head length; swimbladder present	...	**Sillago**

Genus **Sillaginopsis** Gill

Sillaginopsis Gill. 1861, *Proc. Acad. nat. Sci. Philad.* : 505 (type-species : *Sillago domina* Cuvier = *Cheilodipterus panijus* Hamilton Buchanan) ; McKay, 1980, *J. mar. biol. Ass. India*, **18**(2) : 384 (Review).

Snout and head greatly depressed; eyes very small, 3 to 11% of head length and almost covered by adipose tissue. Mouth small; teeth villiform, in bands on jaws and vomer, the outer row in jaws slightly enlarged. Two dorsal fins; first dorsal fin with 10 spines, the second spine very elongate, and second fin with 1 spine and 25 to 27 soft rays. Pelvic-fin spines of normal shape. Scales small; lateral line with 84 to 99 scales. Swimbladder absent or vestigial.

Monotypic.

Sillaginopsis panijus (Hamilton Buchanan)

Cheilodipterus panijus Hamilton-Buchanan, 1822, *Fishes of Ganges* : 57, 367 (type-locality : Ganges estuaries).

Sillago panijus : Day, 1876, *Fishes of India* : 315 (footnote) ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 223, fig. 80.

Sillago domina Cuvier : Day, 1876, *Fishes of India* : 264, pl. 58, fig. 3.

Common Names :

Gangetic whiting	...	English
Tool-maach, Tool-belle	...	Bengali
Tool-danti	...	Oriya
Yarra-soring	...	Telugu

Distinguishing Characters :

Body elongate, partly cylindrical. Head and snout greatly depressed; eyes very small. Teeth in villiform bands in jaws and on vomer, the outer row in both jaws slightly enlarged with the two anterior-most teeth in upper jaw caninoid. Lower gillrakers 6 on first

arch. Two dorsal fins; the first with 10 spines, the second spine filamentous; second fin with 1 spine and 26 or 27 soft rays. Anal fin with 2 spines and 24 to 26 soft rays. Scales small; lateral line with 84 to 88 scales. Swimbladder absent.

Colour : body greenish-yellow above, lower half paler to whitish; fins pale brownish.

Geographical Distribution : South-west and east coast of India, Burma, southwards to Malaysia and rarely to the Indonesian archipelago.

Fishery Information : This species attains a length of 44 cms and forms one of the commercially important components caught in the Hooghly estuary during the months January, February, November and December. Also fairly common in the catches of the Tamil Nadu coast.

Genus **Sillago** Cuvier

Sillago Cuvier, 1817, *Regne Animal*, **2** (ed. 1) : 258 (type-species : *Sillago sihama* (Forsskal) ; McKay, 1980, *J. mar. biol. Ass. India*, **18**(2) : 381 (Review).

Body elongate, snout pointed; eyes 17 to 22% of head length. Mouth small, terminal. Small villiform teeth in jaws and on vomer, palatines edendate. First dorsal fin with 10 to 13 spines (normally 11 or 12), none of them with a setaceous prolongation. Scales moderately small, 50 to 80 in lateral series. Swimbladder present, variously formed, simple or complex, with a ductlike process normally present on the ventral surface.

Several species known, 7 in our area.

KEY TO SPECIES*

1 (a) Base of pectoral fin with a conspicuous dark brown, black or blue-black blotch or spot; body with irregular dark blotches; dorsal fin with 19 to 21 soft rays; anal fin with 18 to 20 soft rays	...	*S. maculata*
(b) Base of pectoral fin without a dark brown or blackish blotch, or spot; body without dark blotches, although the belly or sides may be darkened; dorsal soft rays 21 to 23; anal soft rays 21 to 24	...	2

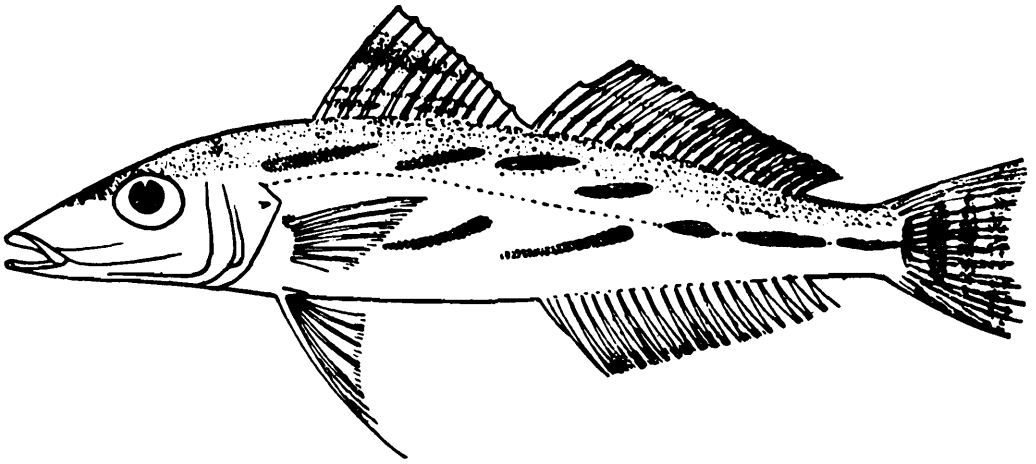
2 (a) Second dorsal fin with at least 5 rows of dusky-brown or black-brown spots that may be quite separate or somewhat confluent; swimbladder with only one post-coelomic extension ... *S. vincenti**

(b) Second dorsal fin with or without rows of dusky spots on the membranes, and when spots are present these may be confluent; swimbladder with two very distinct posterior extensions ... *S. sihama*

Sillago maculata Quoy & Gaimard

[Text-fig. 163]

Sillago maculata Quoy and Gaimard, 1824, *Voy. Uranie et Physic., Zool.* : 261, pl. 5, fig. 2 (type-locality : Sydney, New South Wales) ; Day, 1876, *Fishes of India* : 265, pl. 58, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 224.



Text-fig. 163. *Sillago maculata* Quoy & Gaimard

Common Name :

Trumpeter sillago ... English

* *Sillago vincenti* McKay is of no fishery value in our area ; Dutt and Sujatha, 1980 (*Mahasagar—Bull. nat. Inst. Oceanogr.*, **13**(4) : 371-375) have recently recorded *S. parvisquamis* Gill, *S. macrolepis* Bleeker and *S. argentifasciata* Martin & Montalban, from Vizagapatnam in our area ; Dutt and Sujatha (in press) have also recently discovered a new species of *Sillago* from Vizagapatnam.

Distinguishing Characters :

Body elongate, snout pointed; upper profile of head slightly convex. Mouth small, terminal; villiform teeth in jaws. Two dorsal fins; the first fin with 11 spines, and second fin with 1 spine and 19 to 21 soft rays. Anal fin with 2 spines and 18 to 20 soft rays. Scales small, mostly cycloid; lateral line with 70 to 75 scales. Swimbladder with the posterior extension (post-coelomic) single and tapering to a fine point, or rounded.

Colour : back light brown, lower flanks and belly whitish or silvery, with a silvery stripe along middle of flanks: irregular dusky or black blotches on body; a conspicuous blue-black or brown spot at base of pectoral fin. Spinous dorsal fin blotched on membrane, the second dorsal fin blotched to form 2 horizontal or slightly converging bars; anal fin yellow, with a horizontal stripe very finely speckled with black or dark brown and with a white margin; upper and lower margins of caudal fin brown, hind margin dark.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters, estuaries and trawling banks.

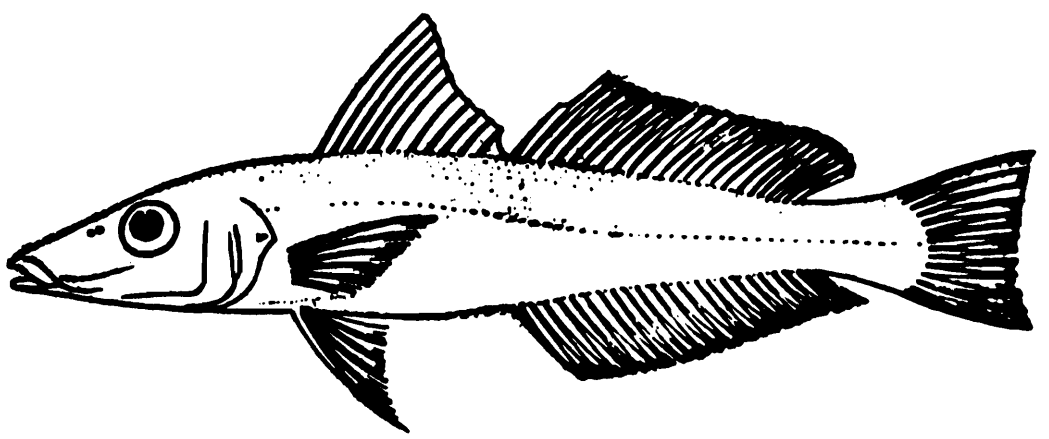
Fishery Information : This species attains a length of 30 cm. and is occasionally caught in the catches around South India.

Sillago sihama (Forsskal)

[Text-fig. 164]

Atherina sihama Forsskal, 1775, *Descript. Animal.* : 70 (type-locality : Lohaja, Red Sea).

Sillago sihama : Day, 1876, *Fishes of India* : 265, pl. 57, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, 2 : 224.



Text-fig. 164. *Sillago sihama* (Forsskal)

Common Names :

Silver sillago	...	English
Toul-danti	...	Oriya
Soring, Tella-Soring, Arriti-ki	...	Telugu
Culingah, Kilangan	...	Tamil
Cudeerah, Pooyan	...	Malayalam
Kane		Kannada
Mudadi, Renvi	...	Marathi
Kunga	..	Gujarati
Thol-o-dah	...	Andaman Is

Distinguishing Characters :

Body elongate, snout pointed; upper profile of head slightly convex. Mouth small, terminal; teeth villiform in jaws and on vomer. Two dorsal fins; the first with 11 (rarely 10) spines, and second fin with 1 spine and 20 to 23 soft rays. Anal fin with 2 spines and 21 to 24 soft rays. Scales small, cycloid; lateral line with 66 to 72 scales. Swimbladder with two very distinct post-coelomic extensions, two anteriorly directed extensions and an antero-lateral convoluted tube that may send off small blind tubules, continues along the lateral wall of the abdomen to the region of the vent or little beyond.

Colour : back light brown, lower ventral flanks and belly whitish or silvery; without dark blotches. Both dorsal fins and caudal fin dusky, other fins pale.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow sandy bottoms of shores and bays, also estuaries.

Fishery Information : This is an inshore species that frequently penetrates estuaries for considerable distance and supports fishery along the east coast of India; the fishing season in this area extends from May to December. Very heavy catches, constituted by fish ranging from 15 to 24 cm., frequently occur during this period. Most of the whiting catches in this area are by bag-nets and shore seine operations. It is an important food fish of delicate flavour.

FAMILY : LACTARIIDAE

[False Trevallies]

Body oblong, strongly compressed, slightly deeper than length of head, the upper and lower profiles similar. Mouth large and oblique, with prominent lower jaw; a pair of small, sharp canine teeth at front of each jaw. Two dorsal fins, the first with 7 or 8 spines, the second with 1 spine and 20 to 22 soft rays. Anal fin with 3 spines and 25 to 28 soft rays. Pelvic fins just below pectoral-fin bases. Caudal fin forked. Scales moderate-sized, cycloid, very easily shed.

A small family with a monotypic genus.

Genus **Lactarius** Valenciennes

Lactarius Valenciennes, 1833, *Hist. nat. Poiss.*, **9** : 237 (**type-species** : *Scomber lactarius* Linnaeus).

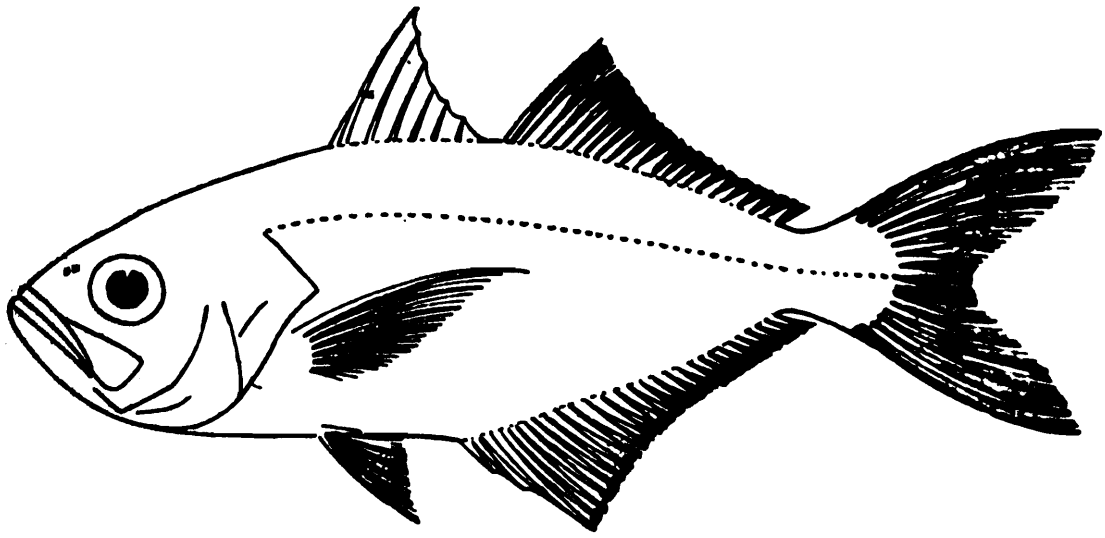
For characters of the only genus, see those of family.

Lactarius lactarius (Schneider)

[Text-fig. 165]

Scomber lactarius Schneider, 1801, *Syst. Ichthy. Bloch.* : 31 (**type-locality** : Tranquebar).

Lactarius delicatulus Valenciennes : Day, 1876, *Fishes of India* : 245, pl. 53, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 196, fig. 67.



Text-fig. 165. *Lactarius lactarius* (Schneider)

Common Names :

False trevally	...	English
Kuthuppu	...	Telugu
Sudumbu, Suthumbu	...	Tamil
Parava, Adavu	...	Malayalam
Saundala	...	Kannada
Pervi, Saundala	...	Marathi
Chapla, Dangri	...	Gujarati

Distinguishing Characters :

Body oblong and strongly compressed. Head large, about 2.5 times in standard length. Mouth rather large and oblique, with prominent lower jaw. Teeth small in jaws, with a pair of small, sharp canine teeth in front of each jaw. Two dorsal fins; the first with 7 or 8 spines, the second with 1 spine and 20 to 22 soft rays. Anal fin with 3 spines and 25 to 28 soft rays, its base longer than that of second dorsal fin. Pectoral fins long and pointed; pelvic fins just below pectoral-fin bases. Caudal fin forfitted. Scales medium-sized, cycloid, very easily shed

Colour : body silvery-grey, with blue iridescence above and silvery-white below; a dusky spot on upper part of operculum. Fins pale yellow; dorsal and caudal fin sometimes with dusky margins.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Remarks *Lactarius lactarius* appears very similar to the carangids but may be distinguished by its compressed peduncle, by its lack of 2 detached anal-fin spines, its lack of scutes and keels, and by the long anal fin.

Fishery Information : *Lactarius lactarius* is very common throughout our coastal waters in sandy bottoms. It is a highly valued food-fish and brings a moderately high price. These fishes are generally caught in trawl and drift nets, and the largest specimen so for is 350 mm total length from Veraval (Gujarat) having a weight of 520 gms. The landings from grounds more than 30 m. in depth generally contained bigger individuals of *L. lactatius* while the near shore catches are dominated by juveniles. This species contributed 0.43% to 2.37% of the India's total annual marine landings during the period 1959-1970.



Lactarius lactarius (Schneider)

FAMILY : RACHYCENTRIDAE
[Cobias]

Body elongate and subcylindrical, with broad and depressed head. Eyes small, encircled by a narrow adipose eyelid. Gill openings wide; gill membranes separated and free from isthmus. Mouth large, with fine teeth in jaws, on palate and tongue. Two dorsal fins, the first fin of 6 to 9 very short, broad free spines (not connected by a membrane), and each depressible into a groove; no finlets. Anal fin long, with 2 or 3 weak spines and 22 to 28 soft rays. Caudal fin lunate in adults (but rounded in young and median rays prolonged). Scales minute and embedded in thick skin, extended onto head and operculum. Three dark stripes on sides of body.

Comprises of a single genus and species which occurs in all warm waters. Solitary, usually in the vicinity of coral reefs.

Genus **Rachycentron** Kaup

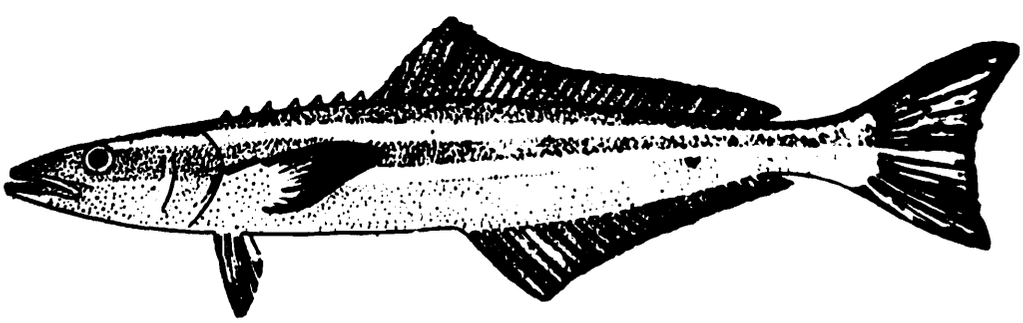
Rachycentron Kaup. 1826, *Isis*, **19** : 89 (type-species : *Rachycentron typus* Kaup = *Rachycentron canadus* (L.)).

For characters of the only genus, see those of family.

Rachycentron canadus (Linnaeus)
[Text-fig. 166]

Gasterosteus canadus Linnaeus, 1766, *Systema Naturae*, **1** (ed. 12) : 213 (type-locality : Carolina).

Elacate nigra (Bloch) : Day, 1876, *Fishes of India* : 256, pl. 55, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 213.



Text-fig. 166. *Rachycentron canadus* (Linnaeus)

Common Names :

Black kingfish	...	English
Peddah-mottah	...	Telugu
Cuddul-verarl, kadal-viral	...	Tamil
Neimeen	...	Malayalam
Sakala, Madusa	...	Marathi

Distinguishing Characters :

Body cigar-shaped; head broad and depressed. Mouth large, terminal, with projecting lower jaw; fine teeth in bands in jaws, on palate and tongue. Two dorsal fins; the first with 6 to 9 (usually 8) short free spines, not connected by a membrane, and second fin long with 1 to 3 spines and 26 to 33 soft rays. Anal fin similar to soft dorsal fin, with 2 or 3 spines and 22 to 28 soft rays. Caudal fin lunate in adults, upper lobe longer than lower (caudal fin rounded in young, the central rays much prolonged). Scales small, embedded in thick leathery skin, lateral line slightly wavy anteriorly.

Colour : back and sides dark brown, with two narrow black bands along the sides; young specimens with two sharply defined narrow silvery bands along the sides; belly yellowish.

Geographical Distribution : World-wide in tropical and subtropical seas.

Pelagic, but also found over shallow coral reefs and off rocky shores, occasionally in estuaries.

Fishery Information : This large, streamlined fish reaches a weight of 45 kgms and a length of over 1.5 m. It is an excellent game fish of average food value. This fish occurs all round the year in the commercial catches of our region. A steady increase in the catches were noted from 1975 onwards. With an estimated average catch of 438 tonnes per year, Tamil Nadu accounts for the maximum followed by Kerala. They are landed predominantly by drift gill-nets, hand lines and troll-lines.

Family : Carangidae

[Jacks, Kingfishes]

Body greatly or moderately compressed; caudal peduncle rather slender. Head compressed, usually keeled dorsally. Teeth in jaws usually feeble, either in a single row or in bands; teeth on roof of

mouth (vomer and palatines), becoming smooth with age. Two more or less separate dorsal fins; spinous dorsal fin short-based, with slender or short spines (sometimes disappearing with age) usually connected by membrane, folding into a groove; soft dorsal fin with a long base. Anal fin usually with 3 spines, with the first 2 separate from rest of the fin; finlets behind dorsal and anal fins in a few species. Caudal fin widely forked. Scales small, thin, cycloid, sometimes absent. Lateral line arched anteriorly, becoming straight posteriorly; scutes (enlarged and thickened scales in lateral line) present and prominent or reduced in some species and absent in some genera.

This family contains some very important food fishes and plays a significant part in the commercial fisheries of our region. Mostly swift carnivorous fish, some reaching a large size. These fishes constitute a fairly high proportion of the catches both on the east and west coasts of India; they contribute along with fishes of the families Coryphaenidae and Rachycentridae, about 3% of the total marine fish catches in the annual average landings. The highest yields of carangids are from Tamil Nadu where they form 9.82% of the marine fishes of the state, ranking next is Kerala with 3.7%. In Maharashtra, West Bengal and Orissa carangid catches are poor.

KEY TO GENERA

1 (a) Posterior part of lateral line with scutes; pectoral fins relatively long, usually falcate	...	2
(b) No scutes in lateral line (only pored scales, not enlarged); pectoral fins short, not falcate	...	13
2 (a) One or more finlets behind second dorsal and anal fins	...	3
(b) No finlet in dorsal and anal fins	...	4
3 (a) A single detached finlet behind dorsal and anal fins		**Decapterus**
(b) 8 or 9 finlets behind second dorsal and anal fins	...	**Megalaspis**
4 (a) Body superficially naked, the scales minute and embedded in skin; first dorsal fin with 6 small spines, not connected by a membrane; dorsal and anal fin lobes extremely long and filamentous, especially in juveniles	...	**Alectis**

	(b) Body with small scales, not embedded in skin; first dorsal fin with 7 or 8 spines, connected by a membrane; none of anterior soft rays of dorsal or anal fins as long as body depth	...	5
5	(a) A groove along belly (accommodating pelvic fins, anus and anal-fin spines)	...	**Atropus**
	(b) No groove along belly	...	6
6	(a) Gillrakers extremely long, feather-like, and reach into mouth alongside tongue	...	**Ulua**
	(b) Gillrakers of normal shape and size, not reaching into mouth	...	7
7	(a) No teeth in upper jaw	...	8
	(b) Teeth present in both jaws	...	9
8	(a) Single series of minute teeth in lower jaw; rudimentary teeth on tongue	...	**Selaroides**
	(b) No teeth in either jaw; lips papillose	...	**Gnathanodon**
9	(a) Tongue, roof and floor of mouth white, the rest dark; no teeth on roof of mouth	...	**Uraspis**
	(b) Lining of mouth not distinctly white and dark; teeth present on roof of mouth (vomer and palatines)	...	10
10	(a) Adipose tissue of eye covering all but central slit	...	**Atule**
	(b) Adipose tissue leaving anterior half of eye exposed	...	11
11	(a) Shoulder girdle with a deep (cleithral) furrow below large fleshy papilla	...	**Selar**
	(b) No cleithral furrow on lower part of gill-opening	...	12
12	(a) Teeth in a single series in each jaw (except cluster at tip of upper jaw), none enlarged; scutes prominent; breast scaled	...	**Alepes**

(b) Jaw teeth fine, villiform in bands in both jaws, outer row in one or both jaws may be slightly enlarged in large specimens; scutes often weakly developed; breast usually naked, rarely fully scaled	...	**Carangoides**
(c) Jaw teeth in a band in upper jaw, outer row enlarged; a single series in lower jaw, with 2 to 4 anterior canines; scutes prominent; breast rarely entirely naked	...	**Caranx**
13 (a) Second dorsal and anal fin-bases about equal in length	...	14
(b) Second dorsal-fin base much longer than anal-fin base	...	15
14 (a) Body slender; soft dorsal and anal fins not strongly falcate; scales elongate or needle-like	...	**Scomberoides**
(b) Body relatively deep; soft dorsal and anal fins strongly falcate; scales normal, oval-shaped	...	**Trachinotus**
15 (a) One finlet (of 2 rays) behind soft dorsal and anal fins	...	**Elagatis**
(b) No finlets behind dorsal and anal fins	...	16
16 (a) First dorsal-fin spines 4 or 5, not connected by membrane in adults; a well developed cutaneous keel laterally on caudal peduncle	...	**Naucrates**
(b) First dorsal-fin spines 5 to 7, connected by a membrane; no cutaneous keel on caudal peduncle	...	17
17 (a) Gill-rakers knob-like; snout less than twice eye-diameter	...	**Seriolina**
(b) Gilllrakers normal; snout twice eye-diameter	...	**Seriola***

* The genus *Seriola* Cuvier represented by *S. rivoliana* Cuvier in our region is of no fishery importance.

Genus **Alectis** Rafinesque

Alectis Rafinesque, 1815, *Analyse de la Nature* : 84 (type-species : *Gallus virescens* Lacepede).

Deep compressed body, its depth decreasing with age. Adipose eyelids feebly developed, form a rim around eye. Teeth in jaws feeble, becoming weaker with age; minute teeth on tongue, vomer and palatines. Body apparently naked, scales rudimentary, deeply embedded in skin and inconspicuous. Lateral line anteriorly with a strong, irregular arch, posterior part with very feeble armed scutes, mainly on caudal peduncle. First dorsal fin with 6 spines, not connected by a membrane and becoming embedded in skin with age; second dorsal and anal fin-bases about equal in length; the fins with anterior falcate lobes, the rays of which are produced and filamentous and reach beyond caudal fin; remaining fin rays short but much divided at tips; no finlets behind dorsal and anal fins. Pectoral fins long, sickle-shaped.

These fishes undergo considerable changes with growth. A few species of warm seas, two in our area.

KEY TO SPECIES

1 (a) Eye-diameter equal to or slightly less than suborbital depth (distance between eye and upper jaw); gill-rakers long and fairly strong, 18 to 22 on first arch ... *A. ciliaris*

(b) Eye-diameter 1.4 to 1.7 times in suborbital depth; gillrakers short and stout, 30 to 35 on first arch ... *A. indicus*

Alectis ciliaris (Bloch)

Zeus ciliaris Bloch, 1788, *Naturges. Ausland.* Fische, **6** : 29, pl. 191 (type-locality : East Indies).

Caranx ciliaris : Day, 1876. *Fishes of India* : 224; Day, 1889, *Fauna Br. India*, Fishes, **2** : 166.

Common Names :

Threadfinned trevally	...	English
Kat-bangada	...	Marathi
Agori	...	Lakshadweep Is.

Distinguishing Characters :

Body strongly compressed and deep, its depth about 1.7 times in standard length. Head strongly elevated, with a moderate occipital gibbosity. Eye-diameter 2.5 to 2.9 times in head length, about equal to suborbital depth. Upper jaw (maxilla) reaching to below vertical from front edge to middle of eye. Teeth in villiform bands in jaws. Two

dorsal fins; first fin with 6 minute spines (embedded in skin in large specimens), the second fin with 1 spine and 15 to 17 soft rays; soft dorsal and anal fins elongate anteriorly with filamentous rays, especially in juveniles. Anal fin with 2 detached spines (embedded in skin in adults), and 1 spine and 15 to 17 soft rays. Pectoral fins falcate; pelvic fins subfalcate. Skin smooth to tough; scales minute, embedded in skin and inconspicuous. Lateral line straight under 11th to 12th soft dorsal ray, armed with 8 to 10 feeble scutes.

Colour : body and head silvery-blue above, silvery below; a dark patch on upper edge of operculum in adults; pectoral fins outer edge dusky, the rest pale. Juveniles with 5 to 7 dark transverse bands on body.

Geographical Distribution : Worldwide in tropical marine waters. Inhabits shallow coastal waters.

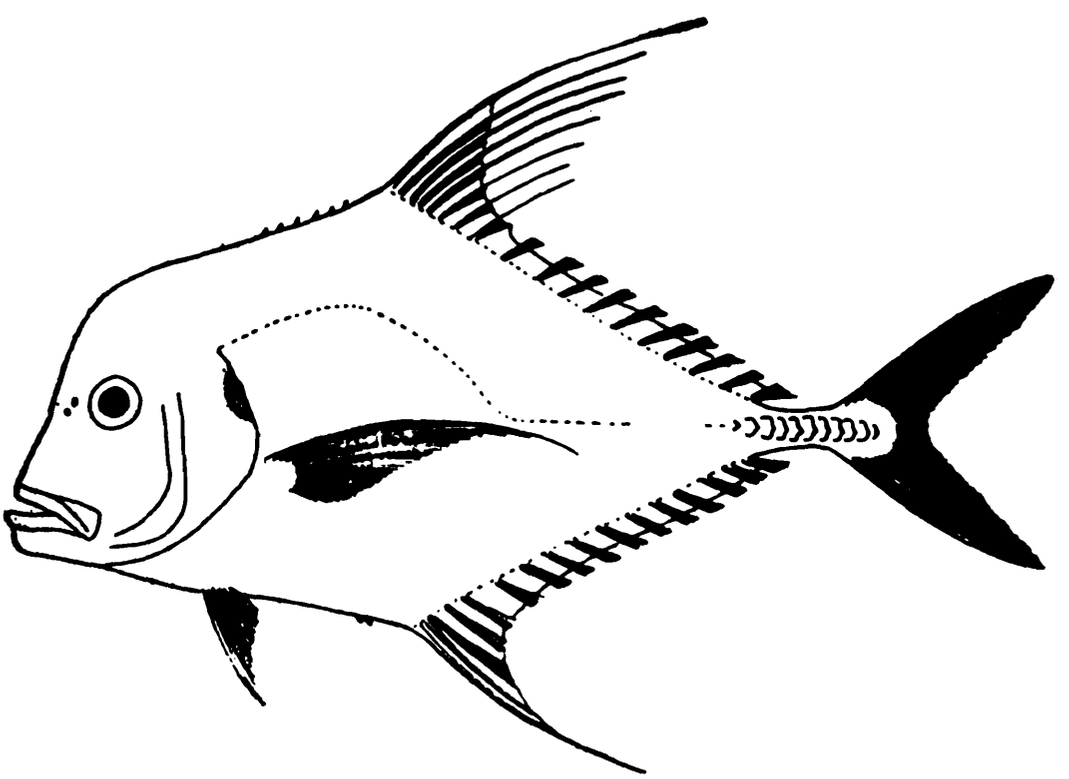
Fishery Information : Commercially not taken in large quantities in our region although it forms a fair proportion of the carangid catches.

Alectis indicus (Ruppell)

[Text-fig. 167]

Scyris indicus Ruppell, 1828, *Atlas Nordl. Afrika Fische Rothen Meeres* : 128, pl. 33, fig. 1 (type-locality : Djedda, Red Sea).

Carunx gallus (Bloch) : Day, 1876, *Fishes of India* : 224, pl. 51, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 166.



Text-fig. 167. *Alectis indicus* (Ruppell)

Common Names :

Indian threadfin trevally	...	English
Gurrah-parah	...	Telugu
Para	...	Malayalam
Bhagat	...	Marathi

Distinguishing Characters :

Body strongly compressed and deep, its depth 1.6 to 1.9 times in standard length. Head profile almost vertical, with a marked hump above eyes, its length 3.2 to 3.7 times in standard length. Eye-diamter 3.3 to 4.3 times in head length, 1.4 to 1.7 times in suborbital depth. Upper jaw (maxilla) reaching to below vertcal from front edge to middle of eye. Teeth in villiform bands in jaws. Two dorsal fins; first dorsal fin with 6 spines (embedded in skin in large specimens); second dorsal fin with 1 spine and 18 or 19 soft rays; soft dorsal and anal fins with anterior falcate lobes, with filamentous rays especially in juveniles. Anal fin with 2 detached spines (embedded in skin in adults) and 1 spine and 16 soft rays. Pectoral fins long and falcate; pelvic fins also falcate in large fishes. Skin smooth to touch; scales minute, embedded and inconspicuous. Lateral line strongly arched to below 9th to 12th soft dorsal ray, thence straight to caudal-fin base, armed with 5 to 12 weak scutes.

Colour : body pale to dark biue above, silvery white below; a dusky spot on upper edge of operculum in adults; dark cross-bars on sides in juveniles; fins pale in large adults: juveniles with elongate parts of dorsal, anal and pelvic fins with dusky tips.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow coastal waters.

Fishery Information : Commercially not taken in large quantities in our waters, although it probably forms a fair proportion of the carangid catch at Portonovo (Tamil Nadu). It grows to a length of over 60 cm.

Genus **Alepes** Swai

Alepes Swainson, 1839, *Nat. Hist. Animals*, 2 : 176. 248 (type-species : *Alepes melanoptera* Swainson).

Body oblong and moderately compressed, its dorsal and ventral profiles equally and evenly convex. Adipose eyelids well-developed, leaving anterior half of eye exposed. Gillrakers of normal size and shape, not extending into mouth ; no furrow on lower part of gill-opening. Single series of small teeth in both jaws, except in large specimens pleuriseriate, anteriorly in upper jaw forming a narrow band, none enlarged ; teeth present on tongue, vomer and palatines. Scales on body small but visible, breast scaled. Lateral line with a weak to moderate arch, its posterior straight part with strongly armed scutes. First dorsal fin with 8 spines connected by membrane ; second dorsal and anal fins slightly elevated anteriorly, their bases equal in length ; no detached finlets behind soft dorsal and anal fins.

Small carangid fishes of the Indo-Pacific, occuring in large schools.

KEY TO SPECIES

1 (a) Spinous dorsal-fin distinctly black	...	2
(b) Spinous dorsal-fin pale	...	3
2 (a) Straight part of lateral line below 1st to 2nd soft dorsal ray ; scutes 61 to 69 on lateral line	...	*A. vari*
(b) Straight part of lateral line below 2nd to 4th soft dorsal ray ; scutes 48 to 56 in lateral line		*A. melanoptera*
3 (a) Lateral line moderately arched anteriorly to below 4th to 6th soft dorsal ray ; ventral profile of body much more convex than its dorsal profile		*A. para*
(b) Lateral line strongly arched anteriorly to below 2nd to 4th soft dorsal ray ; dorsal and ventral profiles of body evenly convex		*A. djedaba*

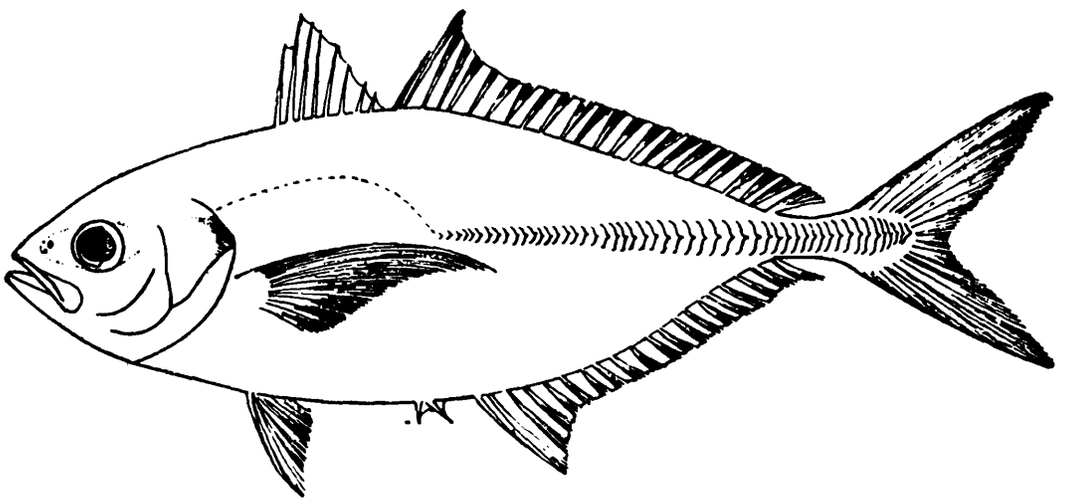
Alepes djedaba (Forsskal)

[Text-fig. 168]

Scomber djedaba Forsskal, 1775, *Descript. Animal.* : 56 (type-locality : Djedda, Red Sea).

Caranx djeddaba : Day, 1876, *Fishes of India* : 218, pl. 49, fig. 3.

Caranx djedaba : Day, 1889, *Fauna Br. India*, Fishes, **2** : 158.



Text-fig. 168. *Alepes djedaba* (Forsskal)

Common Name :

Djeddaba crevalle ... English

Distinguishing Characters :

Body compressed and oblong; dorsal and ventral profiles equally and evenly convex. Eye-diameter 3.5 to 4.0 times in length of head. Upper jaw (maxilla) reaching to below anterior third of eye. Teeth villiform, in a single series in jaws, with the exception that in some large specimens the teeth may be pleuriseriate anteriorly in upper jaw. Gill-rakers 27 to 31 on lower arm of first arch. Two dorsal fins; first dorsal fin with a procumbent (forward-pointing) spine (embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 23 to 25 soft rays. Anal and dorsal fin-bases nearly equal in length. Anal fin with 2 detached spines, followed by 1 spine and 18 to 20 soft rays. Pectoral fins falcate. Caudal fin forked. Scales on body moderate; lateral line strongly arched anteriorly to below 2nd to 4th soft dorsal ray; 33 to 51 scutes.

Colour : body bluish above, silvery below, with a distinct dusky spot on upper edge of operculam. Fins pale yellow, especially caudal fin.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coastal waters.

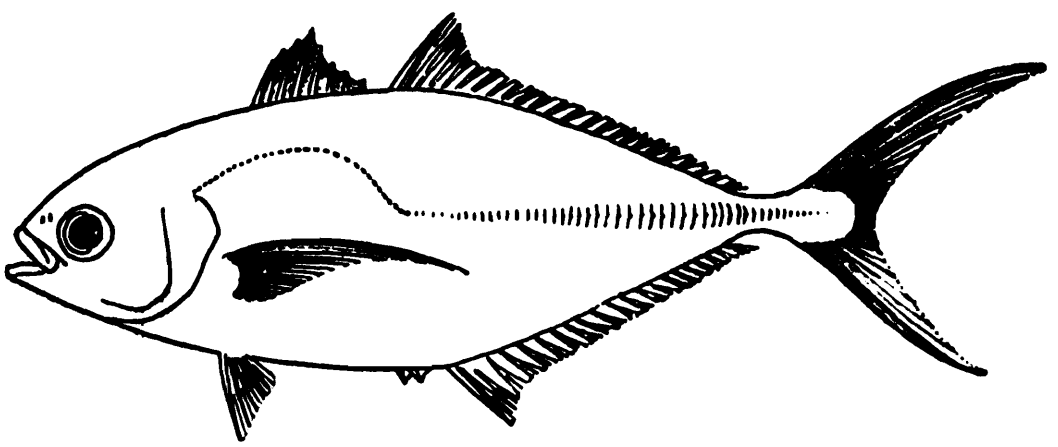
Fishery Information : Taken commercially in small quantities in our region and the best catches are from Madras. The presence of this horse mackerel at the surface of the sea is known to indicate the occurrence of the shoaling gaint catfish, *Arius thalassinus* in the deeper regions. Individuals of body length 16 cm are sexually mature and the spawning season is during the months of December and January on the Tamil Nadu coast.

Alepes melanoptera Swainson

[Text-fig. 169]

Alepes melanoptera Swainson, 1839, *Nat. Hist. Animals*, **2** : 176 (type-locality ; not known).

Caranx nigripinnis Day, 1876, *Fishes of India* : 225, pl. 51, fig. 5 (type-locality : Madras and Andamans) ; Day. 1889, *Fauna Br. India*, Fishes, **2** : 168.



Text-fig. 169. *Alepes melanoptera* Swainson

Common Name :

Blackfin crevalle ... **English**

Distinguishing Characters :

Body oblong and moderately compressed, the dorsal and ventral profiles equally and evenly convex. Eye-diameter 4.0 to 4.5 times in head length. Upper jaw (maxilla) reaching to below anterior part of eye. Teeth villiform, in a single series in jaws, with the exception that in larger specimens the teeth may be pleuriseriate anteriorly in upper

jaw. Two dorsal fins ; first dorsal fin with a procumbent spine (partially embedded in skin) and 8 normal spines ; second dorsal fin with 1 spine and 23 or 24 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 20 or 21 soft rays ; anal-fin base shorter than second dorsal-fin base. Pectoral fins falcate. Scales on body moderate ; lateral line strongly curved anteriorly to below 2nd to 4th soft dorsal rays, with 48 to 56 scutes present.

Colour : body blue-black above, silvery-yellow below. Spinous dorsal fin distinctly black, other fins pale yellow ; juveniles with a number of dusky bands from back to midline of body.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coastal waters.

Fishery Information : Taken commercially in small quantities, mostly at Madras and the Andamans.

Alepes para (Cuvier)

Caranx para Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 58 (type-locality : Malabar), *Caranx kalla* Day (*nec* Cuvier), 1876, *Fishes of India* : 219, pl. 49, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 160.

Common Names :

Goggle-eye scad	...	English
Kalla-parah	...	Tamil
Kala-bangada	...	Marathi

Distinguishing Characters :

Body oblong and moderately compressed, the ventral profile much more convex than dorsal profile. Eye-diameter 3.0 to 4.0 times in head length. Upper jaw (maxilla) extending to below anterior third of eye. Teeth villiform, in a single series in both jaws. Gill-rakers 28 to 30 on lower arm of first arch. Two dorsal fins ; first dorsal fin with a procumbent (forward-pointing) spine (embedded in skin) and 8 normal spines ; second dorsal fin with 1 spine and 23 or 24 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 18 to 20 soft rays. Pectoral fins falcate, much longer than head. Caudal fin deeply forked. Scales on body conspicuous ; lateral line moderately arched anteriorly to below 4th to 6th soft dorsal ray, with 40 to 46 scutes.

Colour : body greenish silvery with yellow reflections; a conspicuous black spot on operculum. Anterior dorsal-fin spines blackish; caudal fin yellow. Traces of cross-bars on body about lateral line which are conspicuous in juveniles.

Geographical Distribution : Widespread in the central Indo-Pacific.

Fishery Information : Taken commercially in small quantities from the coastal waters and the trawling grounds on the Malabar coast of India; the peak season of the catch is from August to January. Individuals of body length 12 cm are sexually mature and the spawning season is from October to December; caught both in gill nets and in boat seines in the inshore waters of the Kerala coast. Forms a good fishery on the Portonovo coast.

Alepes vari (Cuvier)

Caranx vari Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 48 (type-locality : Pondicherry).
Alepes macrurus (Bleeker) : Sreenivasan, 1974, *Indian J. Fish.*, **21**(1) : 21, fig. 1.

Common Name :

Duskyfin crevalle ... **English**

Distinguishing Characters :

Body oblong and moderately compressed, its dorsal and ventral profiles regularly and evenly convex. Eye-diameter about 4.0 times in head length. Upper jaw (maxilla) extending to below front edge of eye. Teeth villiform, in a single series in both jaws. Gill-rakers 22 to 24 on lower arm of first arch. Two dorsal fins; first dorsal fin with a procumbent (forward-pointing) spine (embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 25 to 27 soft rays; second dorsal-fin base conspicuously longer than anal fin base. Anal fin with 2 detached spines, followed by 1 spine and 21 to 23 soft rays. Pectoral fins falcate. Caudal fin deeply forked. Scales on body moderate; lateral line strongly arched anteriorly to below 1st or 2nd soft dorsal ray, with 61 to 69 scutes.

Colour : body bluish-green above, paler below. Spinous dorsal fin distinctly dusky; pectoral and pelvic fins pale. A black opercular spot present.

Geographical Distribution : South-west coast of India, the East Indies and the Philippines.

Fishery Information : Of minor commercial significance on the Kerala coast.

Genus **Atropus Oken**

Atropus Oken, 1817, *Isis* : 1182 (type species : *Brama atropus* Bloch).

Body highly compressed and deeply ovate ; profile of head above eye, strongly convex. Abdomen with a deep longitudinal groove between bases of anal and pelvic fins, accommodating pelvic fins, vent and anal-fin spines. Teeth feeble in both jaws ; vomer, palatines and tongue toothed. Adipose eyelid rudimentary. Lateral line strongly curved, weak scutes along hind part of lateral line, the latter much longer than anterior arched portion. First dorsal fin with 8 normal spines ; anal-fin base about equal in length to second dorsal-fin base. Pectoral fins falcate ; pelvic fins not shorter than head. Scales small, breast naked.

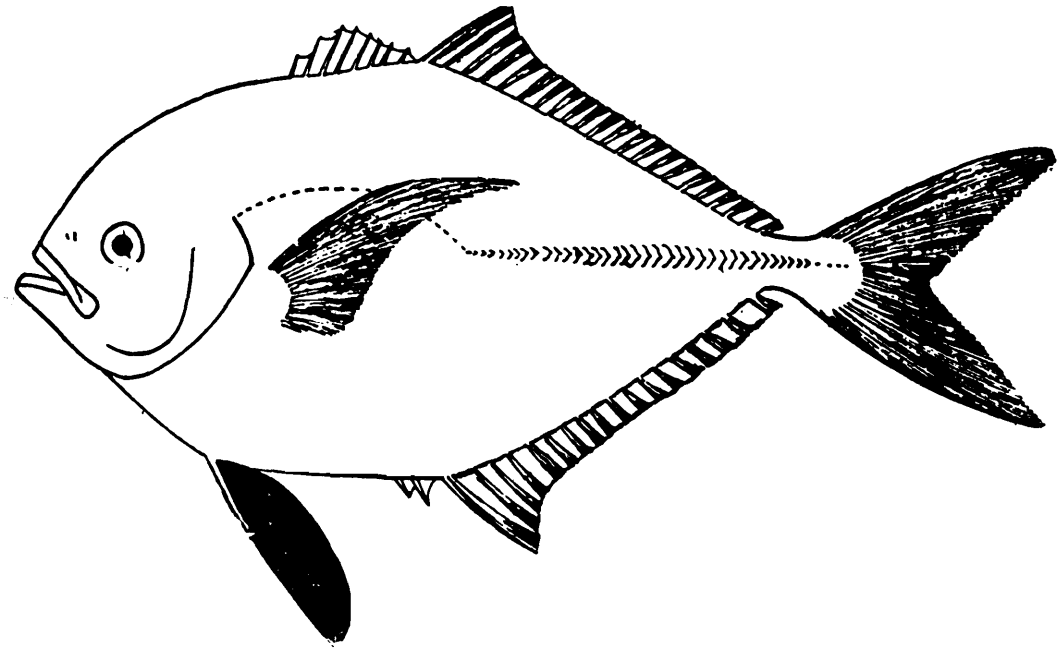
Monotypic.

Atropus atropus (Bloch)

[Text-fig. 170]

Brama atropus Bloch, 1801, *Syst. Ichth.* : 98 (type-locality : Tranquebar).

Caranx atropus : Day, 1876, *Fishes of India* : 221 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 162.



Text-fig. 170. *Atropus atropus* (Bloch)

Common Names :

Kuweh trevally	...	English
Kunni-parah	...	Tamil
Bangada	...	Gujarati
Kat-bangada	...	Marathi

Distinguishing Characters :

Body deeply ovate and strongly compressed, the profile of head above eyes strongly convex. Abdomen with a deep median groove between bases of anal and pelvic fins, accommodating pelvic fins, anus and anal-fin spines. Teeth in jaws in villiform bands, in lower jaw posteriorly reduced to a single row. Two dorsal fins; first dorsal fin with a forward-pointing (procumbent) spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 22 or 23 soft rays. Anal fin with 2 detached spines in abdominal groove, followed by 1 normal spine and 18 soft rays. Pectoral fins falcate; pelvic fins about as long as head length. Caudal fin forked. Scales small, the breast naked; lateral line strongly curved; 30 to 35 weak scutes along straight part of lateral line.

Colour : body bluish-green above, silvery below. Pelvic fins deep black, other fins pale or light yellow.

Geographical Distribution : Widespread in the Indo-Pacific.

Fishery Information : This species occurs in all Indian marine states but not in large quantities. The commercial catches vary in length from 8 to 25 cms.

Genus **Atule** Jordan & Jordan

Atule Jordan and Jordan, 1922, *Mem. Carneg. Mus.*, **10**(1) : 38 (type-species : *Caranx affinis* Ruppell = *Caranx mate* Cuvier).

Body oblong, subcylindrical to compressed, with no groove along belly. Adipose eyelids well developed, covering all but central slit. Gill-rakers of normal size and shape, not extending into mouth. Teeth in a single series in both jaws, except in large specimens pleuriseriate anteriorly; in upper jaw forming a narrow band; teeth present on vomer and palatines. Scales on body moderate; breast scaly; lateral line anteriorly with a moderate arch, posterior straight part with strongly armed scutes. First dorsal with 8 spines connected by a membrane; second dorsal and anal fins slightly elevated anteriorly, their bases equal in length; no detached finlets behind soft dorsal and anal fins. Pectoral fins falcate.

Small carangid fishes of the Indo-Pacific, occuring in large schools.

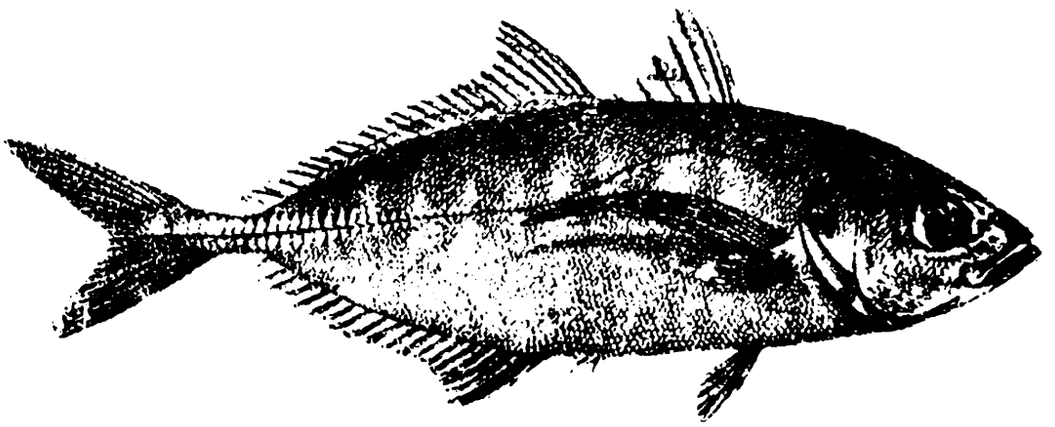
Atule mate (Cuvier)

[Text-fig. 171]

Caranx mate Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 54 (type-locality : Pondicherry; Seychelles; New Guinea; Anjer Strait).

Caranx affinis Ruppell : Day, 1876, *Fishes of India* : 219, pl. 49, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **2** : 158, fig. 56.

Alepes mate : Smith-Vaniz, Bouchot and Desoutter, 1979, *Bull. du Mus. natn. Hist. nat.*, (4) Sr. 1. A(2) : 14.



Text-fig. 171. *Atule mate* (Cuvier)

Common Names :

One-finlet scad	...	English
Warri-parah	...	Tamil

Distinguishing Characters :

An oblong and moderately compressed carangid. Adipose eyelids well developed, covering all but central slit. Teeth in both jaws in single series, small and conspicuous except that in large specimens upper jaw has 2 or 3 series anteriorly forming a narrow band. Two dorsal fins; first dorsal fin with 8 spines, second dorsal fin with 1 spine and 23 or 24 soft rays. Anal fin with 2 detached spines, followed by 1 normal spine and 19 or 20 soft rays; last dorsal and anal rays longer than the preceding and finlet-like, but not separate from rest of fin. Pectoral fins falcate, longer than head length. Lateral line anteriorly with a moderate arch undulating in places, joins lateral line straight under the 6th to 8th soft dorsal ray; scutes on lateral line straight 40 to 50, strong.

Colour body blue-green above, green-yellow in mid-line, silvery below, with 9 to 10 faint, dusky cross-bars; a black spot on gill cover. Dorsal fins dusky yellow, anal fin pale; pectoral and pelvic fins whitish, dark green axillary patch on pectoral fin. Caudal fin yellowish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal areas down to 80 m.

Fishery Information : Taken commercially on the Tamil Nadu and Kerala coasts, and also in the Andaman Sea from the trawling grounds.

Genus **Carangoides** Bleeker

Carangoides Bleeker, 1851, *Nat. Tijdschr Ned.-Indie*, **1** : 343, 352 (type-species : *Caranx praeustus* Bennett).

Body ovate to oblong, subcylindrical to strongly compressed. Adipose eyelids feebly developed, leaving anterior half of eye exposed. Gillrakers of normal shape and length, not reaching into mouth. Fine villiform teeth in bands in each jaw; teeth widest anteriorly, some of the outer row of teeth may be slightly enlarged; teeth on vomer and palatines. Scales small, not embedded in skin; breast scaly, or to a varying extent naked ventrally and laterally. Lateral line anteriorly with a feeble to moderate arch, posterior straight part with moderate armed scutes often weakly developed. First dorsal fin with 7 or 8 spines, connected by a membrane; second dorsal and anal fins anteriorly only slightly elevated or with low to moderate falcate lobes; no detached finlets behind dorsal and anal fins; anal-fin base about equal in length to soft dorsal-fin base. Pectoral fins long and sickle-shaped (falcate). No groove on abdomen or shoulder girdle.

Numerous species, 13 in our region.

KEY TO SPECIES

1 (a) Lower surface of breast entirely scaly (there may be a small naked area in front of pelvic fins at symphysis of cleithra)	...	2
(b) Lower surface of breast naked (there may be a small central patch or continuous band of scales before pelvic-fin base)	...	3
2 (a) Lateral line with 14 or 15 feeble scutes; anterior part of lateral line slightly arched which becomes straight below 20th soft dorsal ray	...	*C. plagiotaenia*
(b) Lateral line with 25 to 30 scutes; anterior part of lateral line moderately arched, becoming straight below 7th to 9th soft dorsal ray	...	*C. praeustus*

3 (a) Naked area scarcely extends up on sides of breast	...	*C. jordani**
(b) Naked area extends distinctly up on sides of breast, especially in front	...	4
4 (a) Naked area on breast low, more or less triangular, highest part in front, about halfway between isthmus and pectoral-fin base	...	*C. ferdau*
(b) Naked area on breast extends more than halfway between isthmus and pectoral-fin base	...	5
5 (a) Naked area on breast does not reach the naked pectoral-fin base	...	6
(b) Naked area on breast extends and joins the naked pectoral-fin base	...	8
6 (a) Lateral line with 37 to 45 strong scutes; straight part of lateral line as long as, or slightly longer than, curved part	...	*C. oblongus*
(b) Lateral line with less than 30 scutes; straight part of lateral line shorter than curved part	...	*C. dinema**
7 (a) Naked area of breast extending anteriorly above pectoral-fin base nearly to lateral line origin as a triangular area bordering pectoral-fin base and operculum; dorsal fin with 20 to 23 soft rays; anal fin with 17 or 18 soft rays	...	8
(b) Naked area of breast not extending anteriorly above pectoral-fin base	...	9
8 (a) Total gill-rakers 32 to 38 on first arch	...	*C. malabaricus*
(b) Total gill-rakers 26 to 31 on first arch	...	*C. talamparoides**
9 (a) Anal fin with 23 to 26 soft rays; dorsal fin with 27 to 30 soft rays	...	*C. gymnostethus*
(b) Anal fin with less than 23 soft rays; dorsal fin with 23 to 27 soft rays	...	10
10 (a) Dorsal fin lobe not distinctly longer than head, at most a trifle longer	...	11

* *Carangoides jordani* Nichols and *C. talamparoidos* Bleeker have been reported only recently from our waters and are no fishery importance; *C. dinema* Bleeker is known from Sri Lanka and is likely to occur in our waters also.

(b) Dorsal fin lobe distinctly longer than head	...	12
11 (a) Dorsal fin with 22 or 23 soft rays; anal fin with 18 or 19 soft rays	...	*C. caeruleopinnatus*
(b) Dorsal fin with 19 or 20 soft rays; anal fin with 15 or 16 soft rays	...	*C. chrysophrys*
12 (a) Total gill-rakers 20 to 27 on first arch	...	*C. hedlandensis*
(b) Total gill-rakers 30 to 37 on first arch	...	*C. armatus*

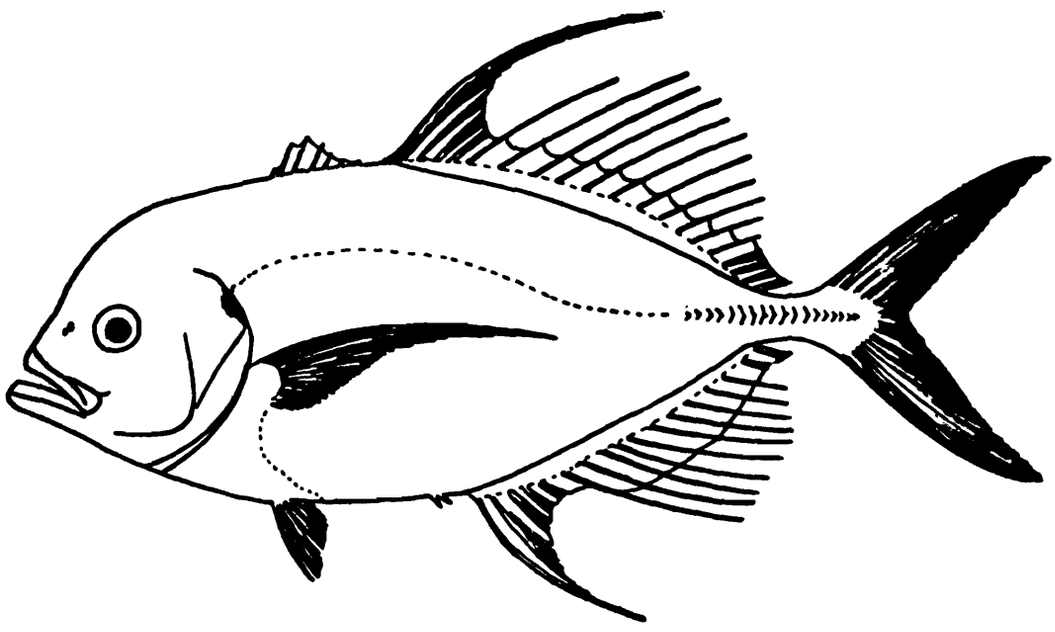
Carangoides armatus (Ruppell)

[Text-fig. 172]

Citula armata Ruppell, 1830, *Atlas Nordl. Afrika Fische Rothen Meeres* : 103 (type-locality : Red Sea).

Caranx armatus : Day, *Fishes of India* : 223, pl. 51, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, 2 : 165.

Carangoides armatus : Williams, Heemstra and Shameem, 1980, *Bull. Mar. Sci.*, 30(1) : 14. fig. 1a & b.



Text-fig. 172. *Carangoides armatus* (Ruppell)

Common Names :

Longfin cavalla	...	English
Tchawil-parah	...	Telugu
Tanga-parah	...	Tamil
Kalati-kavali, Kat-bangoda	...	Marathi

Distinguishing Characters :

Body strongly compressed and very deep; head profile very steep but relatively straight from nape to snout. Upper jaw (maxilla) reaching to below almost centre of eye. Teeth in jaws in villiform bands, widest anteriorly. Gill-rakers 10 to 15 + 20 to 24, total 31 to 37 on first arch. Two dorsal fins; first dorsal fin with 1 procumbent (forward-pointing) spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 19 to 22 soft rays; first dorsal ray produced into a long filament, 0.5 to 0.7 times in head length. Dorsal and anal fins with strong falcate lobes, which are produced into long filaments. Anal fin with 2 detached spines, followed by 1 spine and 16 to 18 soft rays. Pectoral fins long and falcate, subfalcate in juveniles. Scales small; breast naked (scaleless) in a large triangular area to behind pelvic fin and up the pectoral-fin base but not above it. Lateral line anteriorly with a moderate, regular arch, joins lateral-line straight below 13th soft dorsal ray; curved portion moderately arched, $\frac{1}{4}$ longer than straight portion; 11 to 24 feeble scutes on straight portion.

Colour : dusky or bluish above, silvery white below; black spot on operculum; occasionally darker bands across body in juveniles. Fins pale or yellow; pelvics of juveniles dark, becoming paler with growth.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters and coral and rocky reefs; juveniles occur in shallow inshore areas.

Fishery Information : Taken commercially in small quantities, mostly at Andamans, and on the Tamil Nadu and Kerala coasts.

Carangoides caeruleopinnatus (Ruppell)

Caranx caeruleopinnatus Ruppell, 1830, *Atlas Fische Nordl. Afrika Fische Rothen Meeres* : 100, pl. 13, fig. 2 (type-locality : Red Sea).

Carangoides coeruleopinnatus : Sreenivasan, 1975, *Indian J. Fish.*, 21(1) : 24, figs. 2-5.

Common Name :

Bluefin kingfish ... English

Distinguishing Characters :

Body strongly compressed, ovate in young becoming subovate in adults; nape becoming increasingly elevated with age. Upper jaw reaching to middle of eye. Teeth in jaws in villiform bands, the outer

row somewhat enlarged. Gill-rakers 17 or 18 on lower arm of first arch. Two dorsal fins; first dorsal with 1 procumbent (forward-pointing) spine and 8 normal spines; second dorsal fin falcate, with 1 spine and 22 or 23 soft rays; second dorsal-fin base conspicuously longer than anal-fin base. Anal fin with 2 detached spines, followed by 1 spine and 18 or 19 soft rays. Pectoral fins falcate. Scales on body small; breast naked in a triangular area from opposite inner ray of pelvic fins, when depressed, to base of pectoral fin. Lateral line anteriorly with a long, regular, low to moderate arch, joins lateral-line straight below 14th to 15th soft dorsal ray, but the join never very distinct; 16 to 23 feeble scutes on lateral line.

Colour : body bluish above, silvery below; 6 vertical dark bands present in young specimens but fade with age; a black spot on operculum. Tips of dorsal, anal and caudal fin-lobes dusky; pectoral fins pale; pelvic fins dusky in juveniles, pale in adults.

Geographical Distribution : East coast of Africa, the Red Sea, south-west coast of India and the Andaman Is.

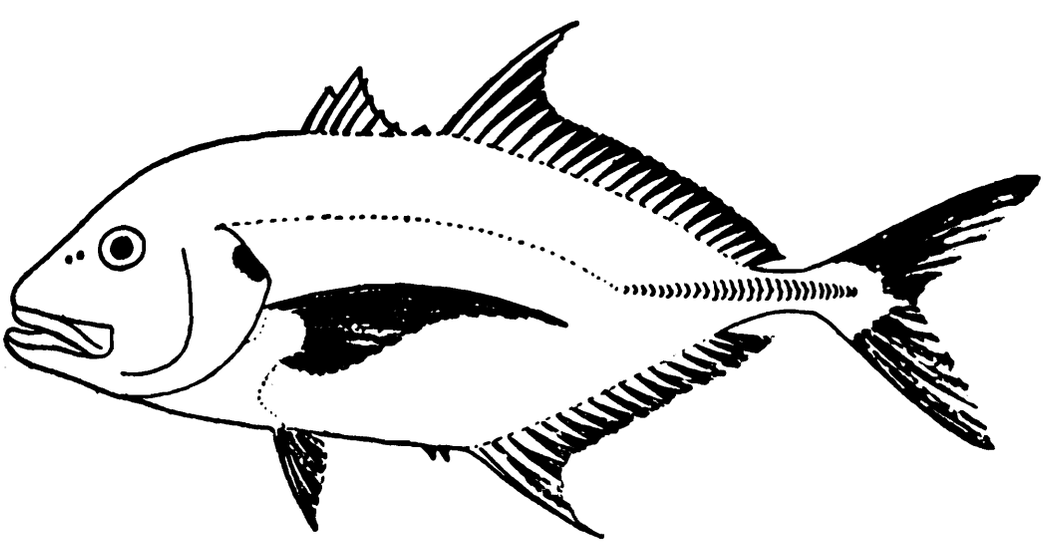
Fishery Information : Of minor commercial significance in our region.

Carangoides chrysophrys (Cuvier)

[Text-fig. 173]

Caranx chrysophrys Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 77, pl. 247 (type-locality : Seychelles).

Caranx nigrescens Day, 1867 : Day, 1876, *Fishes of India* : 223, pl. 50, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 164.



Text-fig. 173. *Carangoides chrysophrys* (Cuvier)

Common Names :

Longnose cavalla	...	English
Tanga-parah	...	Tamil

Distinguishing Characters :

Body ovoid and compressed; head profile smoothly convex at nape but straight anteriorly. Eye-diameter 4.5 to 5.0 times in head length and about 2 times in snout length. Upper jaw (maxilla) reaching to below first quarter of eye-diameter. Teeth in jaws in villiform bands, with a few outer teeth enlarged. Gill-rakers 15 to 17 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent (forward-pointing) spine and 8 normal spines; second dorsal fin with 1 spine and 18 to 20 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 15 to 17 soft rays; dorsal and anal fin-bases nearly equal. Pectoral fins falcate. Scales on body small; breast naked from anterior third of pelvic fin up to and including base of pectoral fin, and forward to isthmus. Lateral line with a long and low regular arch, joins lateral-line straight under 12th to 14th soft dorsal ray; 17 to 26 feeble scutes on lateral line.

Colour : body green-blue above, silvery white below; a black spot on operculum. Fins pale.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coastal waters down to 60m; juveniles occur in inshore areas.

Fishery Information : Taken commercially in small quantities, mostly at Madras. Attains a length of about 60 cm.

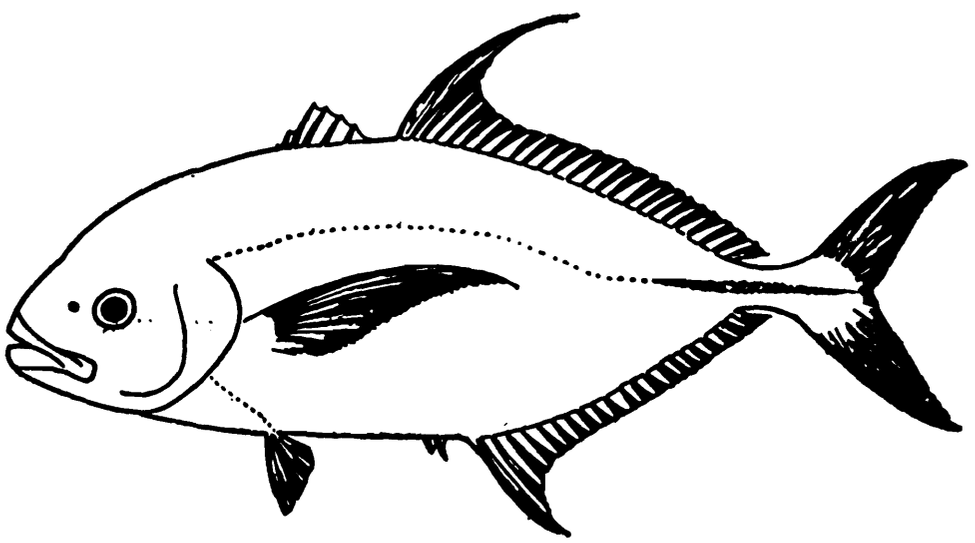
Carangoides ferdau (Forsskal)

[Text-fig. 174]

Scomber ferdau Forsskal, 1775, *Descript. Animal.* : 55 (type-locality : Djedda, Red Sea).

Caranx ferdau : Day, 1876, *Fishes of India* : 217; Day, 1889, *Fauna Br. India*, Fishes, **2** : 156.

Carangoides gilberti Sreenivasan (*nec* Jordan & Seale), 1978, *Indian J. Fish.*, **23** : 48, fig. 5.



Text-fig. 174. *Carangoides ferdau* (Forsskal)

Common Names :

Ferdau's cavalla	...	**English**
Fanihandi, Kuluvel	...	**Lakshadweep Is.**

Distinguishing Characters :

Body oblong and compressed ; head profile evenly convex ; eye low-set, at level of snout tip. Upper jaw (maxilla) reaching to front edge of eye or front edge of pupil. Teeth in jaws in villiform bands, outer teeth and especially those at symphysis enlarged. Gill-rakers 18 or 19 on first arch. Two dorsal fins ; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 7 normal spines ; second dorsal fin falcate, with 1 spine and 25 to 29 soft rays. Anal fin falcate, with 2 detached spines, followed by 1 spine and 21 to 23 soft rays. Pectoral fins falcate. Scales fine ; breast with a triangular naked area from about pelvic-fin origin to halfway between isthmus and pectoral-fin base. Lateral line anteriorly with a long and very low arch, which joins lateral-line straight under 16th to 18th soft dorsal fin ray ; 24 to 26 feeble scutes on lateral line.

Colour : body yellowish-green on back, silvery white on sides. Fins green or dusky purple, with a white edge to anal and caudal fins ; juveniles with darker vertical cross-bars.

Geographical Distribution : Western Indian Ocean, India and perhaps Indonesia.

Inhabits coral and rocky reefs down to 60 m.

Fishery Information : Commercially not taken in large quantities in our region, although it probably forms a fair proportion of the carangid catch.

Carangoides gymnostethus (Cuvier)

Caranx gymnostethus Cuvier, 1833, *Hist. nat. Poiss*, **9** : 73 (type-locality : Seychelles).

Caranx gymnostethoides (Bleeker) : Day, 1876, *Fishes of India* : 217, pl. 48, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 155.

Common Name :

Nakedbreast trevally ... English

Distinguishing Characters :

Body rather elongate and compressed. Eye-diameter 4.2 to 5.0 times in head length. Upper jaw (maxilla) reaching just beyond front edge of eye in young, but not to eye in adults. Teeth in villiform bands in both jaws. Gill-rakers 19 or 20 on first arch. Two dorsal fins ; first dorsal fin with 1 procumbent (forward-pointing) spine (partially embedded in skin) and 7 or 8 normal spines ; second dorsal fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 23 to 26 soft rays ; soft dorsal and anal fins with anterior falcate lobes. Pectoral fins long, falcate. Scales small ; breast naked ventrally and laterally in a triangular area from behind pelvic-fin origin to base of pectoral fin. Lateral line anteriorly with a long shallow and regular arch, joins lateral line straight under 14th soft dorsal ray ; scutes feeble, 15 to 20 on straight portion.

Colour : body greenish above, silvery below ; diffuse opercular spot present.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken by commercial fisherman rather infrequently in our region, though considered one of the best of carangids.

Carangoides hedlandensis (Whitley)

Olistus hedlandensis Whitley, 1934, *Rec. Austral. Mus.*, **24**(2) : 156, fig. 2 (type-locality : Port Hedland, Western Australia).

Carangoides uii Sreenivasan (*nec* Wakiya), 1978, *Indian J. Fish.*, **23** : 49, fig. 6.

Carangoides hedlandensis : Williams, Heemstra and Shameem, 1980, *Bull. Mar. Sci.*, **30**(1) : 17, figs. 3a & b.

Common Name :

Onion kingfish ... English

Distinguishing Characters :

Body strongly compressed and very deep; head profile extremely steep, with a distinct break in the profile in the interorbital region. Upper jaw (maxilia extending to below middle of eye. Teeth in jaws in narrow villiform bands. Gill-rakers on first arch 6 to 11 + 14 to 17 (total 20 to 27). Two dorsal fins; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 20 to 22 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 16 to 18 soft rays; anterior soft rays of dorsal and anal fins strongly elevated and produced. Pectoral fins falcate. Scales small; breast naked, the naked area extending upto the pectoral-fin base, but not above it, the hind margin area with a forward arch extending up to a little behind base of pelvic fin. Lateral line anteriorly with a moderate regular arch, joins lateral line straight below 13th or 14th soft dorsal ray; 17 to 29 feeble scutes on straight portion.

Colour : body bluish-green above, silvery white below; 6 vertical bands on body, conspicuous in young, obscure in adults. First dorsal fin dusky; filamentous soft rays black, rest of soft dorsal fin yellow; pectoral and anal fins silvery; caudal fin yellowish green, dusky at tips; pectoral-fin axil dusky. A black opercular spot present.

Geographical Distribution : Seychelles, south and east coast of India, Sri Lanka, northern Bay of Bengal, Gulf of Thailand, the Philippines, Taiwan, Japan, Australia and Samoa

Fishery Information : This species is fairly common in the boat seine, shore seine, and hook and line catches at Vizhingam and Colachel (Kerala State).

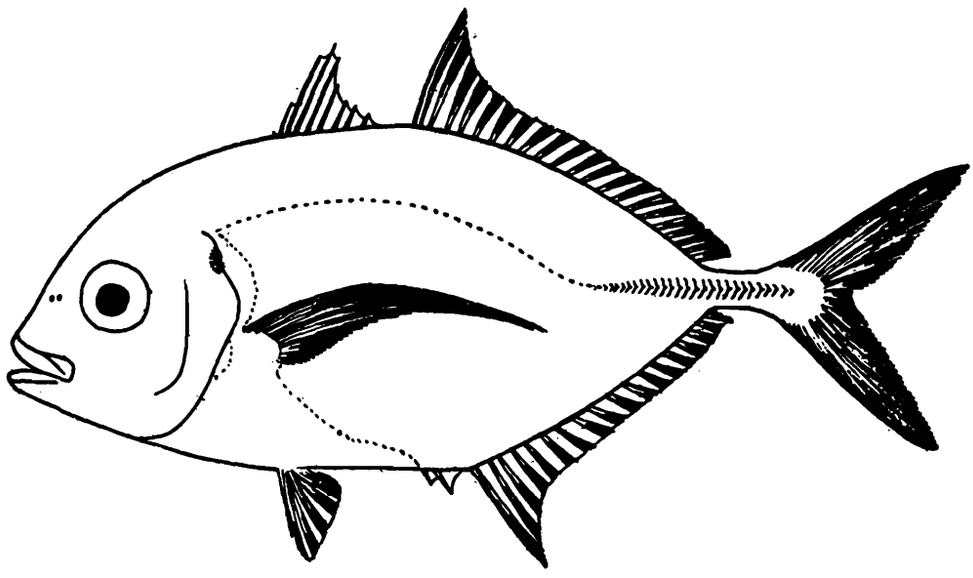
Carangoides malabaricus (Bloch)

[Text-fig. 175]

Scomber malabaricus Bloch, 1801, *Syst. Ichth.* : 31 (type-locality : Tranquebar).

Caranx malabaricus : Day, 1876, *Fishes of India* : 221, pl. 50, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 163.

Carangoides rhomboides Kotthaus, 1974, *'Meteor Forsch.-Ergebnisse*, **D** (17) : 40, fig. 316, 317 & 321 (type-locality : Bombay).



Text-fig. 175. *Carangoides malabaricus* (Bloch)

Common Names :

Malabar trevally	...	English
Para	...	Telugu
Tollam-parah	...	Tamil
Kat-bangada	...	Marathi
Capri, Bagada	...	Gujarati

Distinguishing Characters :

Body strongly compressed, ovate in young, becoming subovate in large adults. Head profile steep, forming a notch in front of eyes particularly when mouth is open. Eye diameter 2.4 to 4.0 times in head length, less than half length of snout. Upper jaw (maxilla) reaching to below front border of eye to front border of pupil. Teeth in jaws in villiform bands, the outer teeth somewhat enlarged. Gill-rakers 23 to 27 on first arch. Two dorsal fins; first dorsal fin with 1 procumbent (forward-pointing) spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 20 to 23 soft rays; first dorsal ray 0.8 to 1.8 times in head length. Dorsal and anal fin-bases equal. Anal fin with 2 detached spines, followed by 1 spine and 17 or 18 soft rays. Pectoral fins falcate. Scales small; breast naked in a triangular area, posteriorly to anal fin, anteriorly upto lateral line. Lateral line anteriorly forming a long low arch, twice as long as straight portion, the latter beginning under 12th to 14th soft dorsal rays; 25 to 28 feeble scutes on lateral line.

Colour : body green-blue above, silvery white below; a black blotch on operculum. Fins pale yellow.



Carangoides malabaricus (Bloch)

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Inhabits coastal waters in coral and rocky reefs; juveniles inhabit shallow inshore areas. Commercially not taken in large quantities in our region. This species is common along the coast of south India and especially so at Palk Bay. The commercial catches vary in length from 10 to 15 cms and individuals over 12 cm are sexually mature.

Carangoides oblongus (Cuvier)

Caranx oblongus Cuvier, 1833, *Hist. nat. Poiss.*, 9 : 128 (type-locality : Vanicolo) ; Day, 1876, *Fishes of India* : 222, pl. 51 fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 163.

Common Names :

Oblong trevally	...	English
Kat-bangada	...	Marathi
Re-thul-dah	...	Andaman Is

Distinguishing Characters :

Body oblong and compressed, the dorsal and ventral profiles almost equally convex. Upper jaw (maxilla) reaching nearly to middle of eye. Small villiform teeth in bands in both jaws, widest anteriorly where some outer teeth are slightly enlarged. Gill-rakers 17 to 19 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent (forward-pointing) spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 20 to 22 soft rays Anal fin with 2 detached spines, followed by 1 spine and 18 to 20 soft rays. Pectoral fins falcate. Scales moderate, conspicuous; breast naked ventrally and laterally in triangular area from pelvic-fin origin to a point $\frac{1}{2}$ to $\frac{3}{4}$ distance of pectoral-fin base. Lateral line anteriorly with a regular and moderate arch, joins lateral-line straight under 7th to 8th soft dorsal ray; 37 to 45 strong scutes, mainly on caudal peduncle.

Colour : body and head golden yellow, with faint dark cross-bands. Fins mainly yellow, with some dusky patches on dorsal and anal fins.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Of minor fishery value in our region.

Carangoides plagiotaenia Bleeker

Carangoides plagiotaenia Bleeker, 1857, *Acta. Soc. Indo-Neerl.*, **2** : 59 (type-locality : not known).

Caranx compressus Day, 1870 : Day, 1876, *Fishes of India* : 221, pl. 50, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 161.

Common Names :

Oblique-banded trevally	...	English
Kuluvel	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and strongly compressed ; nape somewhat elevated. Eye diameter 3.0 to 3.5 times in head length, equal to or slightly less than pointed snout. Upper jaw (maxilla) extending to or somewhat beyond front margin of eye. Teeth villiform, in bands in jaws. Two dorsal fins ; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 8 normal spines ; second dorsal fin with 1 spine and 22 to 24 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 18 to 20 soft rays ; anterior rays of soft dorsal and anal fins not elevated into a lobe, at most an indication of it in adults. Pectoral fins falcate. Scales minute and inconspicuous ; breast scaly. Lateral line evenly arched, becoming straight below 20th soft dorsal ray ; with 14 to 15 feeble scutes.

Colour : body bluish above, silvery below, with five more or less obsolete broad blackish crossbars ; minute spot on operculum. Dorsal and anal fins yellowish.

Geographical Distribution : East coast of Africa, Sri Lanka, the Andaman Is., the East Indies and Taiwan.

Fishery Information : Of minor commercial significance being taken only occassionally in the Andaman Sea in our area.

Carangoides praeustus (Bennett)

Caranx praeustus Bennett, 1830, *Cat. Fish. Sumatra* in : *Life of Raffles* : 689 (type-locality : Sumatra).

Caranx ire Cuvier : Day, 1876, *Fishes of India* : 220, pl. 49, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 160.

Common Names :

Brown-backed trevally	...	English
Tiran	...	Oriya
Iro-parah	...	Tamil
Oolimpara	...	Malayalam

Distinguishing Characters :

Body oblong and compressed, its dorsal profile more convex than ventral Head profile steep, with a shallow concavity before eyes. Eye-diameter 3.0 to 3.5 times in head length. Teeth in jaws in villiform bands, the outer row in upper jaw somewhat enlarged, in lower jaw posteriorly reduced to a single row. Two dorsal fins; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 8 normal weak spines; second dorsal fin with 1 spine and 23 or 24 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 19 or 20 soft rays. Pectoral fins falcate. Scales conspicuous; breast fully scaled. Lateral line moderately curved till below 7th to 9th soft dorsal ray, the straight part conspicuously shorter than the curved; with 25 to 30 scutes.

Colour : body brownish above, silvery below; no opercular spot. Fins yellow with dusky tips.

Geographical Distribution : India, Sri Lanka and the East Indies.

Fishery Information : Taken commercially in small quantities both along the Tamil Nadu and Kerala coasts during the cold months.

Genus **Caranx** Lacepede

Caranx Lacepede, 1801, *Hist. nat. Poiss.*, **3** : 57 (type-species : *Scomber carangus* Bloch).

Body oblong and compressed; no groove along belly. Adipose eyelids moderately to well developed, leaving anterior half of eye exposed. Gill-rakers of normal shape and size, not reaching into mouth. Teeth in a band in upper jaw, the outer row enlarged; a single row in lower jaw, with 2 to 4 anterior canines; teeth present on vomer and palatines. Scales on body moderate, the breast rarely entirely naked. Lateral line anteriorly with a moderate to strong arch, posterior straight part with well developed scutes. First dorsal fin with 7 or 8 spines, connected by a membrane, second dorsal and anal fins with falcate lobes anteriorly, the fin bases about equal in length;

no detached finlets behind soft dorsal and anal fins. Pectoral fins long and falcate.

Numerous species, 8 in our region.

KEY TO SPECIES

1 (a) Breast completely scaled	...	2
(b) Breast naked ventrally, with a small patch of scales immediately in front of pelvic fins	...	5
2 (a) Upper jaw (maxilla) extending to vertical from front margin of eye (front edge of pupil in juveniles); anal fin with 19 or 20 soft rays	...	*C. melampygus*
(b) Upper jaw (maxilla) extending to vertical from middle of eye or beyond to posterior edge of eye	...	3
3 (a) Gillrakers on lower arm of first arch 19 or 20; maxilla reaching under anterior half or to middle of eye	...	*C. lugubris**
(b) Gillrakers on lower arm of first arch 11 to 18; maxilla reaching to at least posterior edge of eye	...	4
4 (a) Gillrakers 11 to 15 on lower arm of first arch	...	*C. tille**
(b) Gillrakers 16 to 18 on lower arm of first arch	...	*C. sexfasciatus*
5 (a) Lateral line with 28 to 30 scutes; dorsal fin with 19 or 20 soft rays; anal fin with 11 to 16 soft rays; gillrakers 16 or 17 on lower arm of first arch	...	*C. ignobilis*
(b) Lateral line with 33 to 37 scutes	...	6
6 (a) Adults with scattered dark spots mostly along back; lateral-line curve 1.2 to 1.4 times in straight part	...	*C. celetus*
(b) No dark spots in adults	...	7
7 (a) Eye-diameter 5.5 to 6.3 (4.1 to 4.3 in juveniles) times in head length; cleft of mouth at about lower edge of eye	...	*C. sem*
(b) Eye-diameter 3.5 to 4.0 times in head length; cleft of mouth opposite lower third of eye	...	*C. carangus*

* *Caranx lugubris* Poey has been reported only once from the Laccadive Sea in our region; there is no positive record of *C. tille* Valenciennes in our region though mentioned in the literature.

Caranx carangus (Bloch)

Scomber carangus Blotch, 1793, *Naturges. ausland. Fische*, **7** : 69 (type-locality : Antilles, Atlantic Ocean).

Caranx carangus : Day, 1876, *Fishes of India* : 215, pl. 50, fig 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 153.

Common Names :

Blacktailed trevally	...	English
Konti	...	Oriya
Karivalam-para	...	Malayalam
Shitap	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth 2.3 to 2.7 times in standard length. Eye-diameter 3.5 to 4.0 times in head length. Upper jaw (maxilla) extending to below or behind middle of eye ; cleft of mouth commences opposite lower third of eye. Teeth in upper jaw in a narrow band, with an outer row of conical teeth ; in lower jaw in a single series intermixed with larger ones, 1 or 2 near symphysis canniform. Two dorsal fins ; first fin with 1 procumbent spine (partially embedded in skin) and 8 normal spines ; second fin with 1 spine and 20 to 22 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 15 to 18 soft rays ; soft dorsal and anal fins with moderate anterior falcate lobes. Pectoral fins falcate. Caudal fin forked. Triangular lateral area of breast towards pectoral fin partly scaled, ventrally naked except a small median patch of minute scales before pelvic fins. Anterior part of lateral line moderately arched, much shorter than straight part, which commences below 5th or 6th soft dorsal-fin rays ; with 33 to 37 strong scutes.

Colour : body silvery, darker above with a golden hue ; young with 4 to 5 dark cross-bars ; small opercular spot present. Fins hyaline ; entire margin of soft dorsal fin and upper lobe of caudal fin blackish.

Geographical Distribution : India, Sri Lanka, the East Indies, to China, Japan, the Philippines, Admiralty Islands and tropical Atlantic.

Fishery Information : This species is caught in fairly large quantities along the coast of South India ; the shoals are easily identified by the splashing of water with their tails, the sound of which resembles the rain drops falling on the surface of water. This species

grows to a length of 40 cm. The spawning season is during the months of August and September.

Caranx celetus Smith*

Caranx jarra Day (*nec* Valenciennes), 1876, *Fishes of India* : 215 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 152.

Caranx celetus Smith, 1968, *Occ. Pap. Dept. Ichthyol Rhodes Univ.*, (15) ; 182, pl. 39A. B. (type-locality : Zanzibar).

Common Names :

Green-back trevally	...	English
Jarra-dendree parah	...	Telugu
Korandilli	...	Tamil

Distinguishing Characters :

Body oblong and compressed, its depth 2.7 to 3.4 times in standard length ; dorsal profile more convex than ventral which is nearly straight till anal fin. Upper jaw (maxilla) reaching just to vertical from centre of eye. Upper jaw with an outer row of moderate to strong conical teeth and an inner band of villiform teeth ; lower jaw with a single row of moderate to strong conical teeth. Two dorsal fins ; first dorsal fin with 1 procumbent (forward-pointing) spine (partially embedded in skin) and 8 normal spines ; second dorsal fin with 1 spine and 21 to 23 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 18 or 19 soft rays ; soft dorsal and anal fins with moderate anterior falcate lobes. Pectoral fins falcate. Scales conspicuous ; breast naked ventrally with a short scaly patch in front of pelvic fins. Lateral line anteriorly with a strong and regular arch, joins lateral-line straight under 5th to 6th soft dorsal ray, straight part 1.2 to 1.4 times in length of curved part ; with 33 to 36 strong scutes.

Colour : body bright-yellow above, silvery below, with scattered black spots on back, more with age. First dorsal fin dusky ; leading edge of falcate lobe of second dorsal fin black, the rest bright yellow ; anal fin bright yellow ; pectoral and pelvic fins yellowish.

Geographical Distribution : East coast of Africa, India, Sri Lanka, the East Indies, to the Philippines and Rota (Guam).

Fishery Information : Taken commercially in small quantities, mostly along the Tamil Nadu and Kerala coasts.

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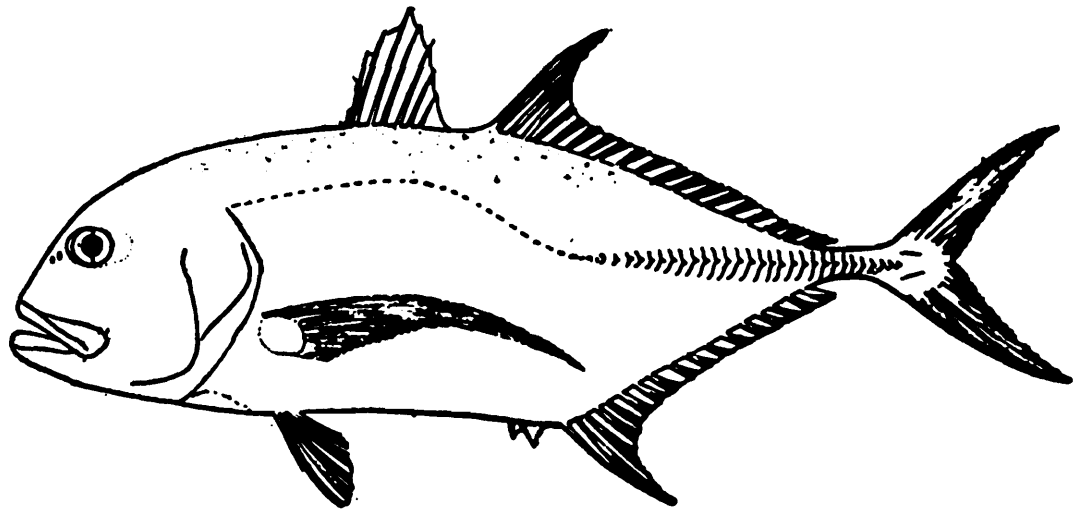
* Some recent workers consider *Caranx celetus* Smith identical with *C. regularis* Garman, 1903.

Caranx ignobilis (Forsskal)

[Text-fig. 176]

Scomber ignobilis Forsskal, 1775, *Descript. Animal.* : 55 (type-locality : Djedda and Lohaja, Red Sea).

Caranx sansun Day (*nec* Forsskal), 1876, *Fishes of India* : 216, pl. 50, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, 2 : 155.



Text-fig. 176. *Caranx ignobilis* (Forsskal)

Common Names :

Yellowfin jack	...	English
Jarradandree-parah	...	Telugu
Kuluvel	...	Lakshadweep Is.

Distinguishing Characters :

Body deep, slightly compressed and robust Head profile steep and strongly curved above eyes; body profile from lower jaw to anal-fin nearly straight. Eye-diameter 3.3 (10 cm fish) to 7.5 (115 cm fish) times in head length. Upper jaw (maxilla) reaching to below posterior edge of pupil or a little beyond. Upper jaw with an outer row of strong conical teeth (widely spaced in adults) and an inner band of small villiform teeth, widest at symphysis; lower jaw with a single row of strong conical teeth, widely spaced in adults. Gill-rakers 11 to 16 on lower arm of first arch. Two dorsal fins; first fin with 1 procumbent spine (partially embedded in skin) and 8 normal spines; second fin with 1 spine and 19 or 20 soft rays. Anal fin with 2 detached spines, follow by 1 spine and 15 to 17 soft rays; base of anal-fin shorter than dorsal fin-base. Pectoral fins falcate. Scales moderate, conspicuous; breast with a

small naked patch anterior to pelvic fins and another naked area at base of pectoral fins. Lateral line moderately arched anteriorly, joining straight portion below 6th to 7th soft dorsal-fin ray, straight portion somewhat shorter than arched portion; 28 to 30 scutes on straight portion of lateral line.

Colour : head and body bluish dusky above, silvery below; larger specimens with small, fine dots on body, head and operculum. Dorsal fins dusky with tip of first ray white, anal fin dusky or yellow with tip of first ray white; in large specimens males markedly darker than females.

Geographical Distribution : Tropical Indo-west Pacific.

Inhabits coral and rocky reefs.

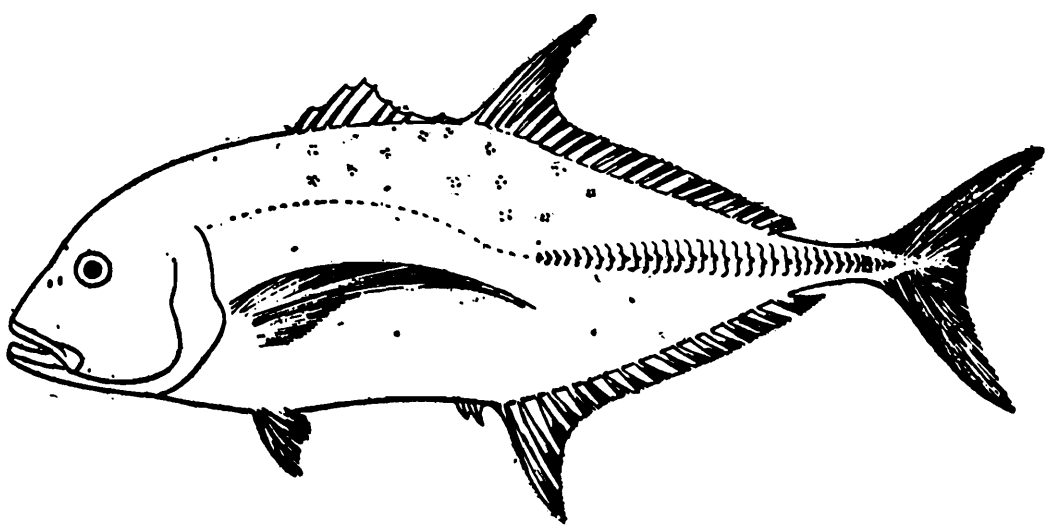
Fishery Information : Taken commercially in small quantities, mostly on the Kerala and Tamil Nadu coasts.

Caranx melampygus Cuvier

[Text-fig. 177]

Caranx melampygus Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 116 (type-locality : Waigiu; Rawak; Vanicolo; Baru and Isle de France); Day, 1876, *Fishes of India* : 214, pl. 50, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 152.

Caranx stellatus Eydourx and Souleyet : Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 281, fig. 238.



Text-fig. 177. *Caranx melampygus* Cuvier

Common Names :

Bluefin jack	...	English
Kuroogoo-parah	...	Telugu
Oyupara	...	Malayalam
Shitap	...	Marathi
Fanihandi, Kuluvel, Muha-handi, Muduthala	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and strongly compressed. Head profile fairly steep, sharply curved above eyes in adult, becoming straight on back ; ventral profile straight. Eye-diameter 4.0 to 8.3 times (decreasing with age), length of snout 2.3 to 3.2 times, both in length of head. Upper jaw (maxilla) reaching to below front edge of pupil in juveniles and to front edge of eye in adults. Upper jaw with an outer row of large conical teeth and inner band of villiform teeth, lower jaw with a single row of large conical teeth. Gill-rakers 17 to 21 on lower arm of first arch. Two dorsal fins ; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 8 normal spines ; second dorsal fin with 1 spine and 20 to 24 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 17 to 20 soft rays ; soft dorsal and anal fin-bases nearly equal. Pectoral fins falcate. Scales moderately conspicuous ; breast completely scaled. Lateral line moderately arched, joins lateral-line straight under 3rd soft dorsal ray ; curved part of lateral line somewhat shorter than straight part ; with 30 to 40 scutes, the largest 8 to 9 times in body depth.

Colour : body green-blue, darker above, silvery below. Tips of dorsal and anal fins white ; black spots on back and upper sides and on dorsal and anal fins.

Geographical Distribution : Indo-W. Pacific.

Inhabits coral and rocky reefs.

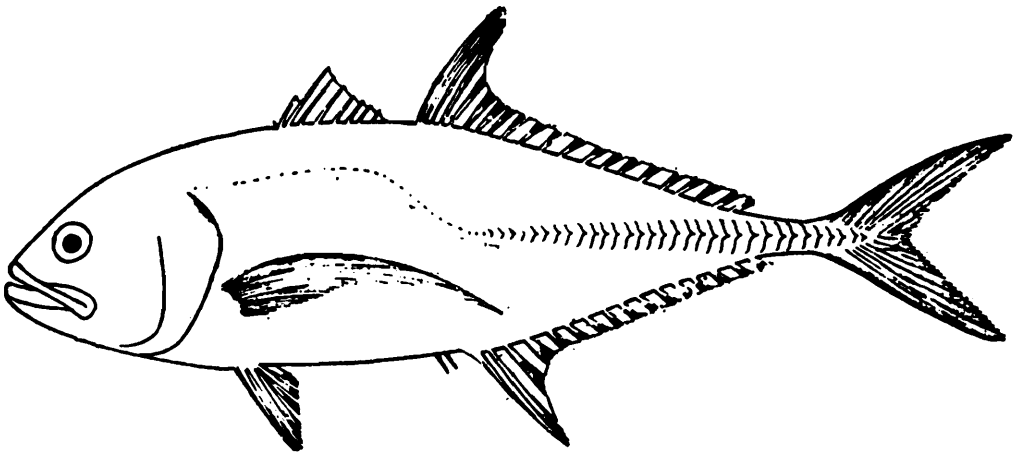
Fishery Information : This species is commercially taken in fairly large quantities along the Tamil Nadu and Kerala coasts. The catches vary in length from 10 cm to 20 cm and the spawning season of this species is during the months of October and November.

Caranx sexfasciatus Quoy & Gaimard

[Text-fig. 178]

Caranx sexfasciatus Quoy and Gaimard, 1824, *Voy. "Uranie", et. Physic.*, Zool. : 358, pl. 65, fig. 4 (type-locality : Iles des Papous., Indonesia).

Caranx hippos Day (*nec* Linnaeus), 1876, *Fishes of India* : 216; Day, 1889, *Fauna Br. India,* Fishes, **2** : 154.



Text-fig. 178. *Caranx sexfasciatus* Quoy and Gaimard

Common Names :

Tille jack	...	English
Varayan-para	...	Malayalam
Gondlu	...	Kannada
Bangada	...	Gujarati
Digupanihandu, Korakhali-kulvel	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and moderately compressed, its upper and lower profiles about equal; nape elevated, a slight but distinct break in head profile above eyes. Cleft of mouth well below level of eyes; upper jaw extends to posterior edge of pupil, or to posterior edge of eye. Eye-diameter 5.7 to 6.5 times in length of head. Teeth in upper jaw with an outer row of conical teeth and an inner band of fine teeth, lower jaw with a single row of conical teeth. Gill-rakers 16 to 18 on lower arm of first arch. Two dorsal fins; first dorsal fin with a procumbent spine (partially embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 18 to 21 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 14 to 16 soft rays. Pectoral fins falcate. Breast fully scaled. Lateral line strongly arched anteriorly, joining straight portion under 2nd to 5th soft dorsal rays; with 24 to 34 scutes.

Colour : body dusky grey above, silvery below; sometimes with a yellowish sheen especially on head. In adults, soft dorsal fin and anal fin dusky with white-tipped lobes, caudal fin dusky, other fins pale; small black spot on upper edge of operculum.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow waters of coral and rocky reefs.

Fishery Information : Taken commercially in small quantities, mostly on the Andhra, Tamil Nadu and Kerala coasts, and also in the Andaman Sea.

Caranx sem Cuvier

Caranx sem Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 105 (type-locality : Pondicherry).
Caranx williamsi Smith : Dutt and Shameem 1977, *Matsya*, (2) : 64, fig. 1.

Common Name :

Yellowtail kingfish ... English

Distinguishing Characters :

Body oblong and moderately compressed. Cleft of mouth about the level of lower edge of eye; maxilla extends to below middle of eye. Eye-diameter 5.5 to 6.3 times in head length. Upper jaw with an outer row of moderate conical teeth and an inner band of small fine teeth; lower jaw with a single row of conical teeth. Gill-rakers 15 to 23 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (partially embedded in skin) and 7 or 8 normal spines; second dorsal fin with 1 spine and 18 to 21 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 15 to 17 soft rays; soft dorsal and anal fins with moderate falcate lobes. Pectoral fins falcate. Scales moderately conspicuous; breast ventrally naked with a scaly patch (about on eye-diameter in length) in front of pelvic fins. Lateral line anteriorly with a strong and regular arch, joins lateral-line straight under 5th to 6th soft dorsal ray; with 32 to 36 scutes, strong.

Colour : body bright yellow-bronze above, silvery to yellow-green below; head dusky-bronze. First dorsal fin dusky; second dorsal

fin leading edge of falcate lobe black, rest bright yellow; anal fin bright yellow. Pectoral, pelvic and caudal fins yellowish. Scutes on lateral line dark.

Geographical Distribution : East coast of Africa and India.

Fishery Information : The juveniles of this species are caught along with other carangids, in the trawl catches landed at Visakhapatnam and Kakinada on the Andhra coast. This species is fairly common in the boat-seine, shore-seine and drift-net catches at Vizhingam and Colachel (Kerala State) and also at Portonovo (Tamil Nadu).

Genus **Decapterus** Bleeker

Decapterus Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **2** : 342, 352 (type-species : *Caranx kurra* Cuvier).

Body rather elongate and fusiform, moderately compressed. Adipose eyelids well developed. Shallow groove on pectoral girdle near isthmus. Gill-rakers of normal size and shape. Teeth in jaws feeble, in a single series, those of upper jaw confined to anterior end of jaw; teeth on palatines present or absent. Scales small; breast scaled. Lateral line only slightly arched anteriorly, posterior straight with weak to moderately armed scutes. Pectoral fins short, shorter than head. Second dorsal fin-base about equal in length to anal fin-base; a single detached finlet behind dorsal and anal. fins.

Fishes of this genus are cosmopolitan in warm seas but are particularly abundant in the central Indo-Pacific.

Numerous species, 3 in our area.

KEY TO SPECIES

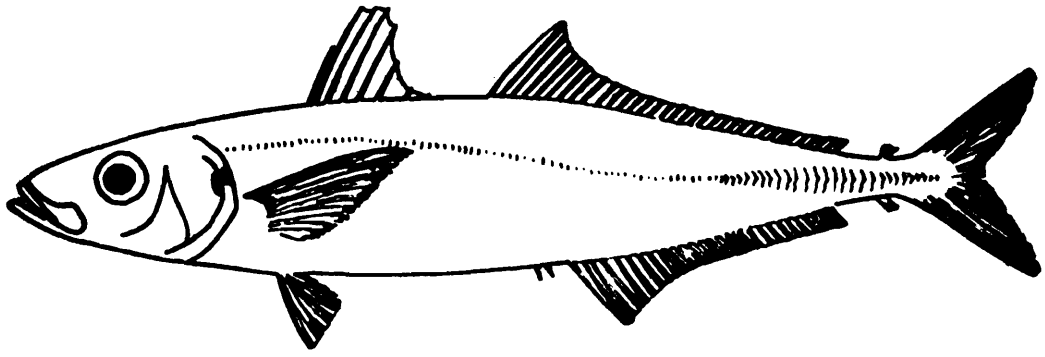
1 (a) Teeth on tongue obsolete, wholly absent or present as a mere small patch; anal fin with 24 to 26 soft rays	...	*D. russellii*
(b) Teeth on tongue in a band; anal fin with 26 or more soft rays.	...	2
2 (a) Palatines toothed	...	*D. macrosoma*
(b) No teeth on palatines	...	*D. macarellus**

* *Decapterus macarellus* (Cuvier) has been only recently recorded from our region but does not contribute to any fishery in our area.

Decapterus macrosoma Bleeker

[Text-fig. 179]

Decapterus macrosoma Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **1** : 358 (type-locality : Batavia, Java) ; Reuben. 1983, *Indian J. Fish.*, **23** (in press).



Text-fig. 179. *Decapterus macrosoma* Bleeker

Common Name :

Layang scad ... English

Distinguishing Characters :

An elongate, fusiform, moderately compressed carangid, its depth 5.5 to 6.0 times in standard length. Upper jaw (maxilla) extending to below anterior margin of eye. Teeth in jaws in a single series; teeth on tongue in a band; palatines toothed. Two dorsal fins; first dorsal fin with 8 spines; second dorsal fin with 1 spine and 34 or 35 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 28 to 30 soft rays; a single finlet behind dorsal and anal fins. Pectoral fins not falcate, its tips reaching to below posterior spines of first dorsal fin. Lateral line slightly arched, becoming straight below 15th soft dorsal ray, curved portion much longer than straight portion; with 25 to 30 small, weak scutes.

Colour : body blue-green above, silvery white below. Fins pale yellow.

Geographical Distribution : East coast of Africa, India, through the East Indies, to the Philippines and Japan.

Fishery Information : This species is fairly common in the commercial catches on the Andhra coast and at Vizhingam (Kerala State).

Decapterus russellii (Ruppell)

Caranx russellii Ruppell, 1828, *Atlas Reise Nordl. Africa, Fische Rothen Meeres* : 99 (type-locality : Red Sea).

Caranx kurra Day (*nec* Cuvier), 1876, *Fishes of India* : 214, pl. 48, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, **2** : 151.

Decapterus dayi Wakiya : Srinivasa-Rao, 1968, *J. mar. biol. Ass. India,* **8** : 350.

Dacapterus kiliche Cuvier : Nagabhushanam asd Rama-Rao, 1976, *Newsl. zool. Surv. India,* **2** (2) : 43.

Common Names :

Round-scad	...	English
Moondakun-kilichi	...	Tamil
Tedi, Shitap	...	Marathi
Murimas	...	Lakshadweep Is.

Distinguishing Characters :

An elongate, fusiform and moderately compressed carangid, its depth 4.2 to 4.7 times in standard length. Upper jaw (maxilla) reaching to below front margin of eye. Teeth in jaws in a single series; teeth on tongue obsolete. Two dorsal fins; first dorsal fin with 8 spines; second dorsal fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 28 to 30 soft rays. Pectoral fins subfalcate, shorter than head length. Caudal fin deeply forked. its lobes equal. Lateral line anteriorly with a low regular arch, joins lateral line straight under 11th to 13th soft dorsal ray; scutes 30 to 37 on lateral line straight, moderate.

Colour : body bluish-green dorsally and silvery on sides and ventrally. Dorsal, anal and caudal fins yellow-green; pectoral and pelvic fins pale, dark axillary patch on pectoral fin; distinct opercular spot above level of pectoral-fin base.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters.

Fishery Information : This species appears sporadically in large numbers along the east and west coast of India; the season for these fish in Bombay waters is from December to February, and at Trivandrum and Madras during October.

Genus **Elagatis** Bennett

Elagatis Bennett, 1840, *Narr. Whaling Voy.*, **2** : 283 (type-species : *E. bipinnulata* Bennett = *Seriola bipinnulata* Quoy & Gaimard).

Body greatly elongate, almost fusiform. Teeth in jaws in villiform bands; minute teeth on roof of mouth (vomer and palatines) and also on tongue. Two dorsal fins; one finlet (of 2 rays) behind dorsal and anal fins; anal fin comparatively short (its base 1.5 times in second dorsal-fin base). Pectoral fins short, about 2 times in head length. Lateral line with a slight anterior arch; no scutes present. Caudal peduncle rather wide, with a single low keel on each side.

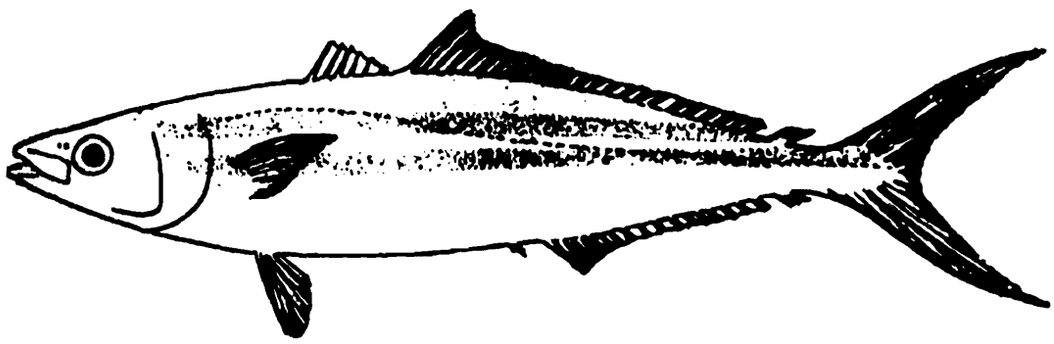
Monotypic.

Elagatis bipinnulatus (Quoy & Gaimard)

[Text-fig. 180]

Seriola bipinnulata Quoy and Gaimard, 1824, *Voy. "Uranie" et Physic, Zool.*, **1** : 363, pl. 61, fig. 3 (type-locality : Iles des Papoves, Indonesia).

Seriolichthys bipinnulatus : Day, 1876, *Fishes of India* : 228, pl. 51A, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **2** : 171, fig. 58.



Text-fig. 180. *Elagatis bipinnulatus* (Quoy and Gaimard)

Common Names

Rainbow runner	...	English
Kulkul	...	Tamil
Maniya, Poomeen, Chameen	...	Lakshadweep Is.

Distinguishing Characters :

Body cigar-shaped, with pointed head. Mouth small; teeth in jaws in villiform bands. First dorsal fin with 6 spines, second fin with 1 spine and 24 to 27 soft rays; anal-fin base much shorter than soft dorsal-fin base; one 2-rayed finlet behind dorsal and anal fins. Anal fin with 2 detached spines, followed by 1 spine and 15 to 17 soft rays. Pectoral fins not falcate, shorter than head. Scales small to moderate, covering breast. Lateral line slightly arched anteriorly; no scutes present. Caudal fin forked, its lobes equal.

Colour : body dark olive-blue on back, abdomen silvery; two narrow parallel blue bands along each side, with a yellow stripe between them. Fins dusky yellow. Fades rapidly on death and the three bands on sides soon disappear.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially in small quantities mostly on the Tamil Nadu and Kerala coasts: about 415 tonnes were landed in 1980 in our area.

Genus **Gnathanodon** Bleeker

Gnathanodon Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie,* **1** : 343, 352 (type-species : *Scomber speciosus* Forsskal).

Deep-bodied, compressed; caudal peduncle wider than high. Lips papillose. Upper jaw highly protrusible and, with lower, form a sub-horizontal tube of some length. Gill-rakers of normal size and shape. In specimens above 80 mm standard length the teeth normally absent on jaws and roof of mouth; tongue rough with fine denticles; below 80 mm minute, granular teeth present. Pectoral girdle without a cleithral groove. Scales very small, conspicuous; breast scaly. Lateral line moderately curved, posterior part with feeble bony scutes. Second dorsal-fin base about equal in length to anal-fin base; no detached finlets. Pectoral fins long and sickle-shaped (falcate).

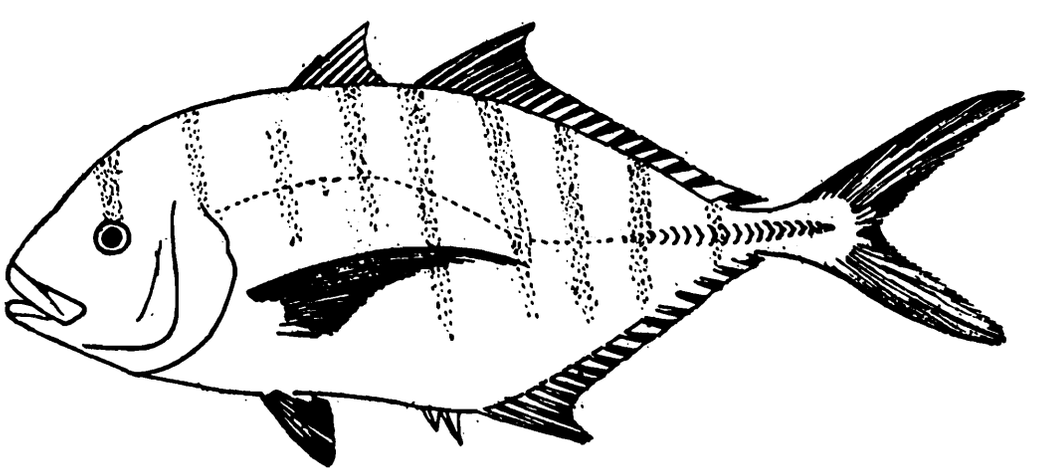
Probably monotypic.

Gnathanodon speciosus (Forsskal)

[Text-fig. 181]

Scomber rim speciosus Forsskal, 1775, *Descript. Animal.* : 54 (type-locality : Red Sea, Arabia).

Caranx speciosus : Day, 1876, *Fishes of India* : 226; Day, 1889, *Fauna Br. India,* Fishes. **2** : 168.



Text-fig. 181. *Gnathandon speciosus* (Forsskal)

Common Names :

Golden toothless trevally	...	English
Poloosoo-parah	...	Telugu
Pathi-parah, Pilli-parah	...	Tamil

Distinguishing Characters :

Body deep and compressed. Head profile steep, with slight indentation in front of eyes. Upper jaw (maxilla) reaching to below front edge of eye, or front margin of pupil in young. Lips papillose. No teeth in jaws in fish longer than 80 mm standard length. Gill-rakers about 20 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (not visible in adults) and 7 or 8 normal spines; second dorsal fin with 1 spine and 18 to 21 soft rays; anal and dorsal fin-bases about equal. Anal fin with 2 detached spines, followed by 1 spine and 16 soft rays. Pectoral fins falcate, longer than head. Caudal fin deeply forked, its lobes equal. Scales small, conspicuous; breast scaly. Lateral line moderately curved, becoming straight under 8th soft dorsal ray; with 17 to 25 feeble scutes.

Colour : fish of 300 mm length are bright yellow with 8 to 12 dark bands around the body, larger fish are paler with black patches and faint cross-bars on sides which fade with age; the very young of this species are golden in colour.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow coastal waters, and coral and rocky reefs.

Fishery Information : Taken commercially only occasionally in our region and specimens upto 90 cm are encountered in the catches.

Genus **Megalaspis** Bleeker

Megalaspis Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **2** : 213 (type-species : *Megalaspis rottleri* Bleeker).

Firm torpedo-shaped body, tapering markedly to a thin peduncle. Adipose eyelids well developed and extend onto pupil, leaving eye as a small slit. No groove on pectoral girdle near isthmus. Gillrakers of normal size and shape. Teeth feeble in jaws, in upper jaw in a band and in lower jaw in a single row. Scales small, breast naked. Lateral line with a short curve, straight part with 53 to 58 large scutes. 8 or 9 finlets behind dorsal and anal fins. Pectoral fins long and sickle-shaped (falcate).

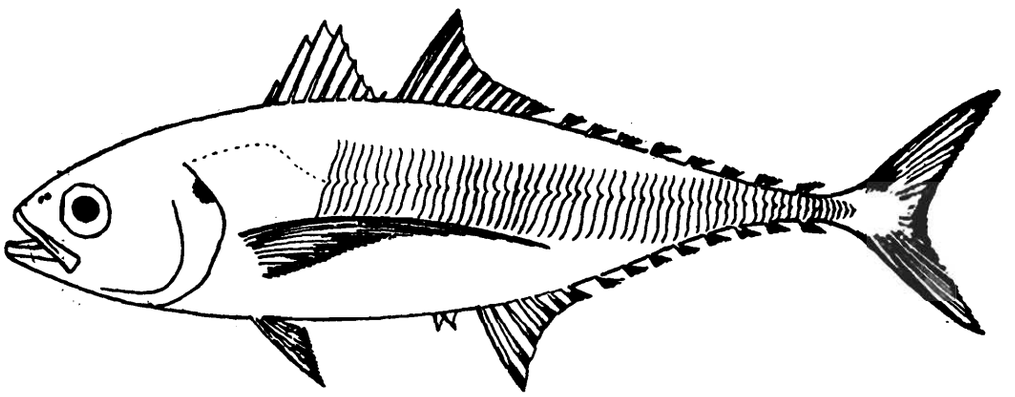
Monotypic.

Megalaspis cordyla (Linnaeus)

[Text-fig. 182a]

Scomber cordyla Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 298 (type-locality : America).

Caranx rottleri Cuvier : Day, 1876, *Fishes of India* : 213 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 150.



Text-fig. 182a. *Megalaspis cordyla* (Linnaeus)

Common Names :

Hardtail scad	...	English
Sora-parah	...	Telugu
Komara-parah	...	Tamil
Kana-meen	...	Malayalam
Gondiu	...	Kannada
Karkata, Bangada	...	Marathi
Chapri, Bangada	...	Gujarati

Distinguishing Characters :

Body elongate and fusiform, slightly compressed, its depth 3.8 to 4.0 times in standard length. Villiform teeth in jaws, in upper jaw in a band and in lower jaw in a single series. Two dorsal fins, separated by a narrow space ; first dorsal fin with 8 or 9 spines ; second dorsal fin with 1 spine and 10 soft rays, followed by 8 or 9 finlets. Anal fin with 2 detached spines, followed by 1 spine and 10 soft rays and 6 to 8 finlets. Caudal fin forked, its lobes equal. Scales small ; breast naked. Lateral line strongly curved anteriorly, becoming straight under 6th to 7th dorsal spine, armed with 53 to 58 well developed, strong, pungent keeled scutes, the height of largest scute about twice eye-diameter.

Colour : body bluish-green above, silvery white below; a prominent black spot on posterior edge of operculum. Dorsal, pectoral and caudal fins yellowish.

Geographical Distribution : Widespread in the tropical Indo-W. Pacific.

Inhabits coastal waters, down to 60 m.

Fishery Information: The Horse-mackerels which include mainly this species and few other carangids, occur all along the Indian coast forming annually about 2% of the total marine fish landings. Attains 150 mm in length.

Genus **Naucrates** Rafinesque

Naucrates Rafinesque, 1810, *Carrat. Alcuni Nuovi generi* : 43 (type-species : *Naucrates fanfarus* Rafinesque = *Gasterosteus ductor* L.).

Body elongate and barely compressed, with nearly equal upper and lower profiles. Teeth minute, in a band in upper and lower jaws. Dorsal fin with 4 or 5 spines (first spine may be minute), not connected by membrane. Anal fin with 2 spines separated from rest of fin (first spine may be reduced and skin covered), followed by 1 spine and 16 to 18 soft rays anal-fin base short, 1.6 to 1.9 times in second dorsal-fin base; no finlets in dorsal and anal fins. Scales very small, ctenoid; no scutes. Caudal peduncle with a well developed lateral, fleshy keel on each side, and dorsal and ventral peduncle grooves.

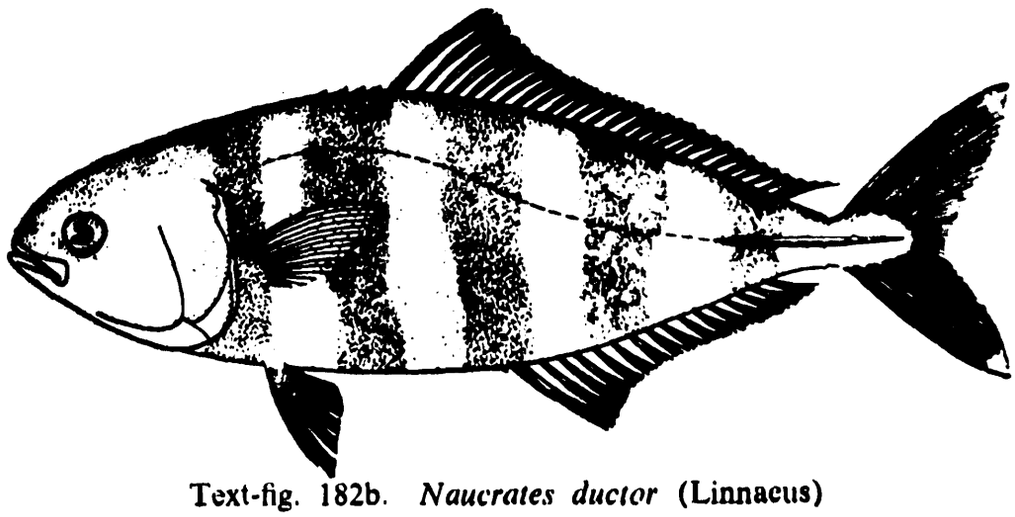
Monotypic.

Naucrates ductor (Linnaeus)

[Text-fig. 182b]

Gasterosteus ductor Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 295 (type-locality : "in Pelago = pelagic).

Naucrates ductor : Day, 1876, *Fishes of India* : 229, pl. 51A, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 172, fig. 59.



Text-fig. 182b. *Naucrates ductor* (Linnaeus)

Common Name :

Pilotfish ... English

Distinguishing Characters :

Body elongate and subcylindrical, with nearly equal upper and lower profiles. Teeth minute and feeble, in a band in upper and lower jaws. Two dorsal fins; first dorsal fin with 3 to 5 short spines; second fin with 1 spine and 26 to 28 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 16 to 18 soft rays, the spines lost with age. Scales very small, ctenoid. Caudal peduncle with a well developed lateral, fleshy keel on each side.

Colour : body bluish, with 6 to 7 dark cross-bands, less conspicuous with age against a silvery background. Pectoral and pelvic fins yellow, tail dusky with white tips.

Geographical Distribution : A pelagic species in all tropical and subtropical seas.

Fishery Information : Of minor fishery significance in our region. Adults generally associated with large sharks and tunas.

Genus **Scomberoides** Lacepede

Scomberoides Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 50 (type-species : *Scomberoides commersonianus* Lacepede).

Elongate compressed body of characteristic shape. Teeth in villiform bands in jaws; teeth on vomer, palatines and tongue, diminish with age, replaced by larger teeth externally in jaws. First dorsal fin with an antrorse spine in front, hidden with age, followed by 6 or 7 spines; second dorsal fin with 1 spine and 19 to 21 soft rays, posterior 8 to 10 rays finlet-like but connected. Anal fin of 2 detached spines, followed by 1 spine and 16 to 20 soft rays, exactly like second dorsal fin; soft dorsal and anal-fin bases about equal in length. Caudal fin forked. Body (except head) covered with embedded scales, broadly lanceolate to needlelike; lateral line scales not developed into scutes.

Speedy fishes of warm seas, contains 4 species, all in our area During 1978, about 3416 tonnes were landed in our region.

KEY TO SPECIES

1 (a) Total gillrakers 8 to 15; dorsal fin lobe uniformly pigmented ... 2

(b) Total gillrakers 21 to 27; distal half of dorsal fin lobe abruptly and heavily pigmented ... 3

2 (a) Large oval patches above or touching lateral line; upper jaw extends well beyond posterior margin of eye, especially in adults; snout 21 to 26% of head length ... *S. commersonianus*

(b) Vertical elongate blotches intersecting lateral line; upper jaw extends slightly beyond posterior margin of eye; snout 26 to 30% of head length ... *S. tala*

3 (a) Double series of 6 to 8 dusky, roundish blotches above and below lateral line, occasionally connected by narrow isthmus; scales lanceolate ... *S. lysan*

(b) Oval or vertically oblong blotches, the first 4 or 5 interseting lateral line; scales slender, needle-like ... *S. tol**

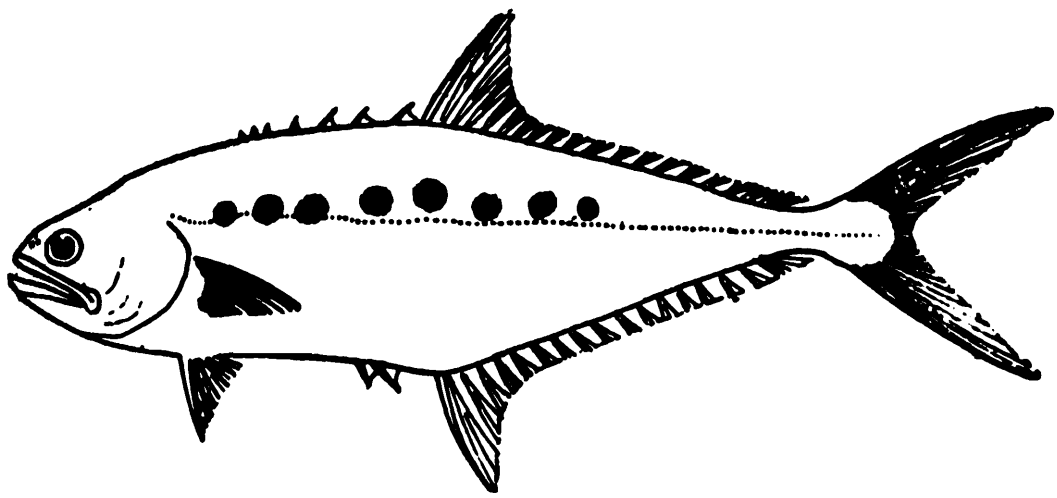
Scomberoides commersonianus Lacepede

[Text-fig. 183]

Scomberoides commersonien Lacepede, 1802, *Hist. nat. Poiss.*, **2** : 50 (type-locality : Madagascar).

Chorinemus lysan Day (*nec* Forsskal), 1876, *Fishes of India* : 231 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 175.

Scomberoides commersonianus : Smith-Vaniz and Staiger, 1973, *Proc. Calif. Acad. Sci.*, **39**(13) : 194, fig. 1A.



Text-fig. 183. *Scomberoides commersonianus* Lacepede

* *Scomberoides tol* (Cuvier) does not contribute any fishery in our area.

Common Names :

Talang queenfish	...	English
Pasupara	...	Telugu
Toal-parah	...	Tamil
Palameen	...	Malayalam
Palaimeenu	...	Kannada
Dagol	...	Marathi
Sag	...	Gujarati

Distinguishing Characters :

A compressed and elongate carangid, with a blunt snout and depression over eyes. Eye-diameter 4.5 to 6.0 times in head length, about equal to snout length. Upper jaw (maxilla) extending well beyond posterior border of eye, especially in adults. Upper jaw with an outer row of small conical teeth and inner band of villiform teeth; lower jaw with two rows of small conical teeth separated by a groove. Gill-rakers on first arch 0 to 3 + 7 to 12, total 8 to 15. Two dorsal fins; first dorsal fin with 1 procumbent spine (becoming embedded with age) and 6 or 7 normal spines; second dorsal fin with 1 spine and 19 to 21 soft rays. Dorsal and anal fin-bases about equal in length; dorsal and anal fins with 7 or 8 rays finlet-like but not fully separated. Anal fin with 2 detached spines, followed by 1 spine and 16 to 19 soft rays. Pectoral fins short, not falcate. Scales on body small and broadly lanceolate, partly embedded. Lateral line slightly wavy anteriorly, straight over most of its length; no scutes present.

Colour : body dusky green above, silvery or golden yellow below; sides with 5 to 8 large oval blotches above or touching lateral line, first two may intersect lateral line. Soft dorsal fin evenly dusky, not abruptly pigmented dorsally. Pectoral fins pale, with dusky blotch ventrally; pelvic fins white.

Geographical Ditribution : East coast of Africa, Red Sea, India, Sri Lanka, and the Indo-Australian archipelago.

Restricted to neritic waters near continental shelf.

Fishery Information : Taken commercially in small quantities, mostly along the Andhra, Tamil Nadu and Kerala coasts.

Scomberoides lysan (Forsskal)

Scomber lysan Forsskal, 1775, *Descript. Animal.* : 54 (type-locality : Djedda and Lohaja, Red Sea).

Chorinemus sancti-petri Cuvier : Day, 1876, *Fishes of India* : 230; Day, 1889, *Fauna Br. India.*, Fishes, 2 : 174.

Scomberoides lysan : Smith-Vaniz and Staiger, 1973, *Proc. Calif. Acad. Sci.*, 39(13) : 205, fig. 1C.

Common Names :

Doubledotted queenfish	...	English
Kalta	...	Tamil
Diana	...	Kannada
Dagol	...	Marathi
Karivali, Phunudi	...	Lakshadweep Is.

Distinguishing Characters :

A compressed and elongate carangid. with a pointed snout and a slight depression over eyes. Eye-diameter 4.1 to 5.7 times in head length and nearly as long as snout. Upper jaw (maxilla) extending to or slightly beyond posterior edge of eye. Upper jaw with a single row of small conical teeth and anteriorly an inner band of villiform teeth; lower jaw with two rows of small conical teeth separated by a groove. Gill-rakers 3 to 8 + 15 to 20, total 21 to 27 on first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (becoming embedded with age) and 6 or 7 normal spines; second dorsal fin with 1 spine and 19 to 21 soft rays; dorsal and anal fin-bases about equal in length; dorsal and anal fins with 8 to 10 soft rays finlet-like but not fully separated, the last rays elongate. Anal fin with 2 detached spines, followed by 1 spine and 17 to 19 soft rays. Pectoral fins short, not falcate. Scales lanceolate, conspicuous in large specimens, but not easily seen in small specimens. Lateral line with gentle undulate curve over pectoral fin.

Colour : body grey-green above, silvery white below; sides of adults with a double series of 6 to 8 dusky roundish blotches above and below lateral line, occasionally joined above and below across the lateral line. Tip of second dorsal fin abruptly and heavily pigmented; anal fin lobe white or pale yellow.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Restricted to neritic waters near continental shelf.

Fishery Information : This species supports a seasonal fishery of considerable importance on the Rameswaram Island; the season extends from February to July with peak catches in March and April, and is commonly caught in drift nets called "Vali-valai operated from Tuticorin type of boats. The major quantity of the catch is pit-cured with salt. The species also constitutes a small fishery along the Andhra coast.

Scomberoides tala (Cuvier)

Chorinemus tala Cuvier, 1831, *Hist. nat. Poiss.*, **8** : 377 (type- locality : Malabar) ; Day, 1876, *Fishes of India* : 231 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 176.

Chorinemus toloo Cuvier : Day, 1876, *Fishes of India* : 232, pl. 51A, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 176.

Scomberoides tala : Smith-Vaniz and Staiger, 1973, *Proc. Calif. Acad. Sci.*, **39**(13) : 199, fig. 1b.

Common Names :

Deep queenfish	...	English
Toloo-parah	...	Telugu
Toal-para	...	Tamil
Falai, Dagol	...	Marathi
Sag	...	Gujarati

Distinguishing Characters :

A compressed and elongate carangid, with a concave frontal profile and a pointed snout. Eye-diameter 4.5 to 5.0 times in head length, equal to or less than snout length. Upper jaw (maxilla) extends slightly beyond posterior margin of pupil in adults. Teeth in upper jaw in a single row and in two rows in lower jaw ; the anterior teeth in upper jaw somewhat enlarged and canine-like in young specimens. Gill-rakers 1 to 3 + 7 to 11, total 11 to 15 on first arch. Two dorsal fins ; first dorsal fin with 1 procumbent spine (becoming embedded with age) and 6 or 7 normal spines ; second dorsal fin with 1 spine and 19 to 21 soft rays ; dorsal and anal fin-bases about equal in length ; dorsal and anal fins with 7 to 8 soft rays finlet-like but not fully separated. Anal fin with 2 detached spines, followed by 1 spine and 17 to 19 soft rays. Pectoral fins short, not falcate. Scales lanceolate. Lateral line indistinct, almost straight, with a slight angular elevation above last third of pectoral fin.

Colour : body silvery, the flanks with 4 to 8 vertically elongate blotches, most of them intersecting lateral line. Dorsal and anal fins uniformly pigmented.

Geographical Distribution : Widely distributed throughout the Indo-Australian Archipelago, and the Bay of Bengal in the Indian Ocean.

Fishery Information : Of minor fishery significance on the West Bengal-Orissa coast. The fish is cured in West Bengal. Taken commercially also in small quantities along the entire coast of India and at Port Blair in the Andaman Sea.

Genus **Selar** Bleeker

Selar Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, 1 : 343, 352 (type-species : *Caranx hasselti* Bleeker).

Body fairly elongate and moderately compressed. Eyes very large, with well developed adipose eyelids. Teeth small and recurved in both jaws; teeth on roof of mouth (vomer and palatines). Gill-rakers of normal shape and size, not reaching into mouth. Shoulder girdle margin with a deep (cleithral) furrow below a large fleshy papilla. Dorsal fin with 7 or 8 spines, followed by 1 spine and 24 to 27 soft rays; no finlet behind dorsal and anal fins. Pectoral fins falcate, shorter than head length. Scales moderately small and cycloid; posterior straight part of lateral line with enlarged hardened scutes.

Two species, both in our area.

KEY TO SPECIES

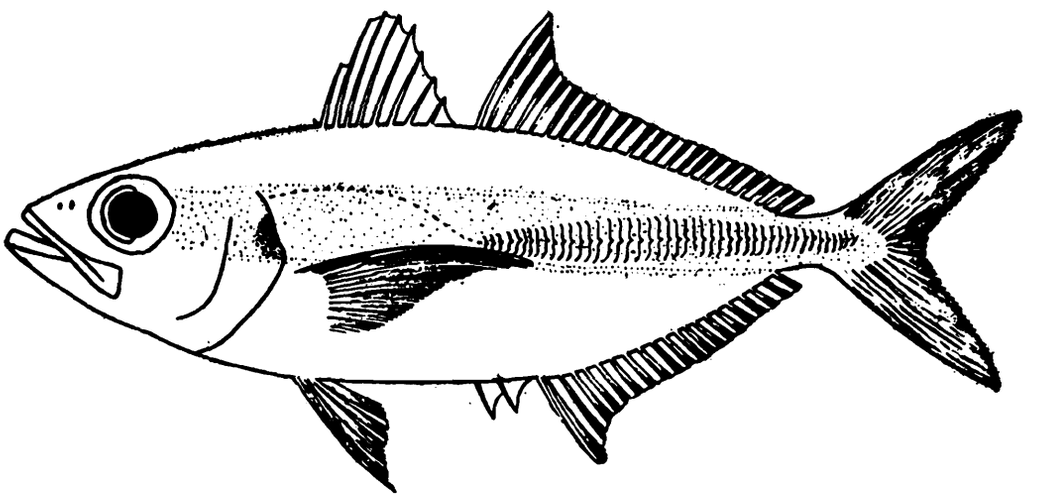
1 (a) Lateral line becoming straight below middle of soft dorsal fin, with 32 to 38 scutes; largest scute 9 to 10 times in body depth ... *S. crumenophthalmus*

(b) Lateral line becoming straight below origin of soft dorsal fin, with 44 to 46 scutes; largest scute about 4 times in body depth .. *S. boops*

Selar boops (Cuvier)

[Text-fig. 184]

Caranx boops Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 46 (type-locality ; **Ambiona ;** Vanicolo) ; Day, 1876, *Fishes of India* : 218, pl. 49, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 157.



Text-fig. 184. *Selar boops* (Cuvier)

Common Names :

Oxeye scad	..	English
Shitap	...	Marathi

Distinguishing Characters :

Body oblong and moderately compressed. Eyes large, its diameter 2.7 to 3.0 times in head length ; upper jaw (maxilla) reaches to midorbit. Adipose eyelids well developed and reach on to pupil leaving the eye as a narrow slit. A deep furrow on lower margin of gill-opening. Teeth fine, in a single series in both jaws, preceded by a band anteriorly. Gill-rakers about 23 on lower arm of first arch. Two dorsal fins ; first dorsal fin with 1 procumbent spine (not always visible) and 8 normal spines ; second dorsal fin with 1 spine and 24 or 25 soft rays ; dorsal and anal fin-bases equal. Anal fin with 2 detached spines, followed by 1 spine and 20 or 21 soft rays. Pectoral fins short and falcate Lateral line moderately curved anteriorly, becoming straight before soft dorsal fin ; with 44 to 46 scutes, beginning below origin of soft dorsal fin, largest scute about 4 times in body depth.

Colour : body dark blue above with a broad golden band, silvery or golden yellow below ; a dusky spot on edge of operculum. Dorsal, anal and caudal fins with a dusky fringe, and white tips anteriorly to dorsal and anal fins.

Geographical Distribution : Pakistan, India, the Andamans, through the East Indies, to the Philippines and northern Australia.

Inhabits coastal areas and coral and rocky reefs.

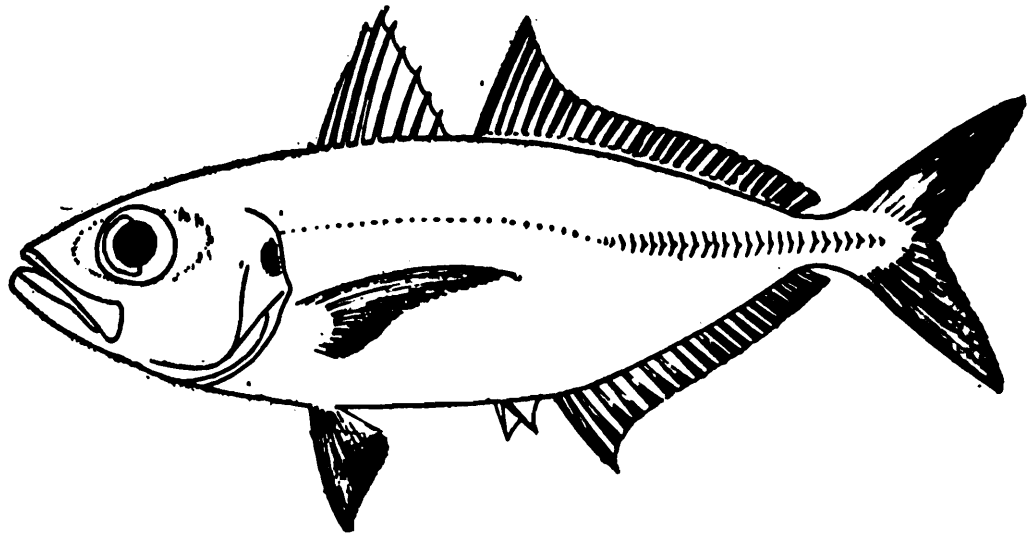
Fishery Information Taken commercially in small quantities, mostly on the Tamil Nadu and Kerala coasts where it is sold in the fresh condition. Also taken in small quantities at Port Blair in the Andaman Sea.

Selar crumenophthalmus (Bloch)

[Text-fig. 185]

Scomber crumenophthalmus Bloch, 1793, *Naturges. ausland. Fische*, **7** : 77, pl. 343 (type-locality : Acara Bay, Guinea).

Caranx crumenophthalmus : Day, 1876, *Fishes of India* : 217, pl. 49, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 156.



Text-fig. 185. *Selar crumenophthalmus* (Bloch)

Common Names :

Bigeye scad	...	English
Karkata-bangada	...	Marathi
Murimas, Bangada	...	Lakshadweep Is

Distinguishing Characters :

Body oblong and moderately compressed. Eyes large, 2.7 to 3.0 in head length ; upper jaw (maxilla) reaches to front edge of pupil. Adipose eyelids well developed and reach on to pupil leaving the eye as a narrow slit. A deep furrow on lower margin of gill-opening. Teeth fine, in both jaws in a single series, except that in large specimens the

upper jaw has 2 or 3 series anteriorly forming a narrow band. Gill-rakers 23 to 27 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (not always visible) and 8 normal spines; second dorsal fin with 1 spine and 24 to 26 soft rays; dorsal and anal fin-bases equal. Anal fin with 2 detached spines, followed by 1 spine and 21 to 23 soft rays. Pectoral fins short and falcate. Lateral line slightly curved anteriorly, becoming straight below middle of soft dorsal fin; with 32 to 38 scutes, largest scute 9 to 10 times in body depth.

Colour : body green-blue on back, silvery white below; operculum with a dark brown spot; fins pale green, tips of caudal fin dusky.

Geographical Distribution : Tropical and subtropical Indo-Pecific and Atlantic.

Inhabits coastal areas down to 80 m.

Fishery Information : This species is the most important horse-mackerel of the west coast of India. The commercial catches vary in length from 10 to 12 cms. The catch is either marketed in the fresh state or salted.

Genus **Selaroides** Bleeker

Selaroides Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **1** : 343, 352 (type-species : *Caranx leptolepis* Cuvier).

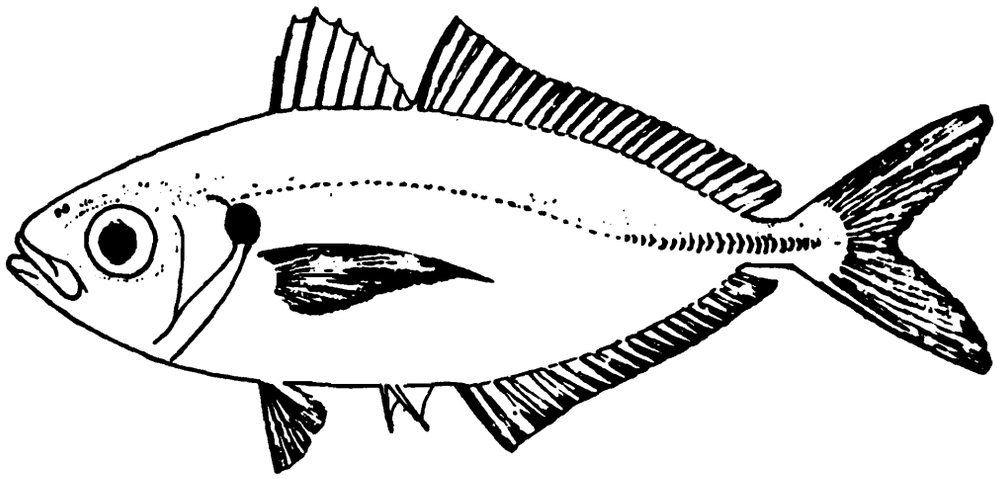
Body oblong and compressed. No teeth on upper jaw or on vomer and palatines, minute teeth in a single series in lower jaw and some rudimentary teeth on tongue. Gill-rakers of normal shape and size, not reaching into mouth. First dorsal fin with 8 spines, connected by membrane; anal-fin base about equal in length to soft dorsal-fin base. Pectoral fins long and falcate. Body with small scales, not embedded in skin; breast with small, conspicuous scales. Lateral line scarcely arched, with 25 to 34 weak scutes.

Monotypic.

Selaroides leptolepis (Cuvier)

[Text-fig. 186]

Caranx leptolepis Cuvier, 1833. *Hist. nat. Poiss.*, **9** 63 (type-locality : Java) ; Day, 1876, *Fishes of India* : 225, pl. 51, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 167.



Text-fig. 186. *Selaroides leptolepis* (Cuvier)

Common Names :

Yellowstripe trevally	...	English
Chooparai	...	Tamil
Bangada	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and compressed, with upper and lower profiles equally convex. Eye large, its diameter 3.2 to 3.5 times in head length. Upper jaw (maxilla) reaching to below front border of eye. Eyes with a broad posterior and a narrower anterior adipose eyelid, the former reaching on pupil. Minute teeth in a single series in lower jaw and some rudimentary teeth on tongue, no teeth on upper jaw or on vomer and palatines. Two dorsal fins; first dorsal fin with 8 spines; second dorsal fin with 1 spine and 25 soft rays; dorsal and anal fin-bases nearly equal. Anal fin with 2 detached spines, followed by 1 spine and 20 soft rays. Pectoral fins falcate. Body with small scales; breast with small but conspicuous scales. Lateral line scarcely arched, with 25 to 34 weak scutes.

Colour : back dark blue-green, lower sides silvery; a golden yellow lateral band from eye to caudal fin; a distinct dusky spot on operculum. Fins yellowish.

Geographical Distribution : Muscat, India, Sri Lanka, through the East Indies, to the Philippines, Taiwan and northern Australia.

Inhabits shallow coastal waters.

Fishery Information : This species contributes a good fishery in the Palk Bay and Gulf of Mannar during the months February to May and August to October, the peak months being February and September.

Genus **Seriolina** Wakiya

Seriolina Wakiya, 1924, *Ann. Carneg. Mus.*, **15** : 222, 230 (type-species : Seriola *intermedia* Temminck & Schlegel = *Nomeus nigrofasciata* Ruppell).

Body fairly elongate and moderately compressed, with blunt snout. Adipose eyelids feebly developed, form a rim around eye. Gill-rakers few in number, short and knob-like. Bands of villiform teeth in jaws, widest anteriorly; minute teeth in patch on vomer and tongue, and bands on palatines and pterygoids. Dorsal-fin spines very small, usually one procumbent (not always visible). Anal fin-base about half length of second dorsal-fin base; no finlets. Pectoral fins shorter than length of head, not falcate. Scales small, only conspicuous posteriorly; breast scaled. Lateral line straight except for slight elevation over pectoral fin; no scutes present in adults.

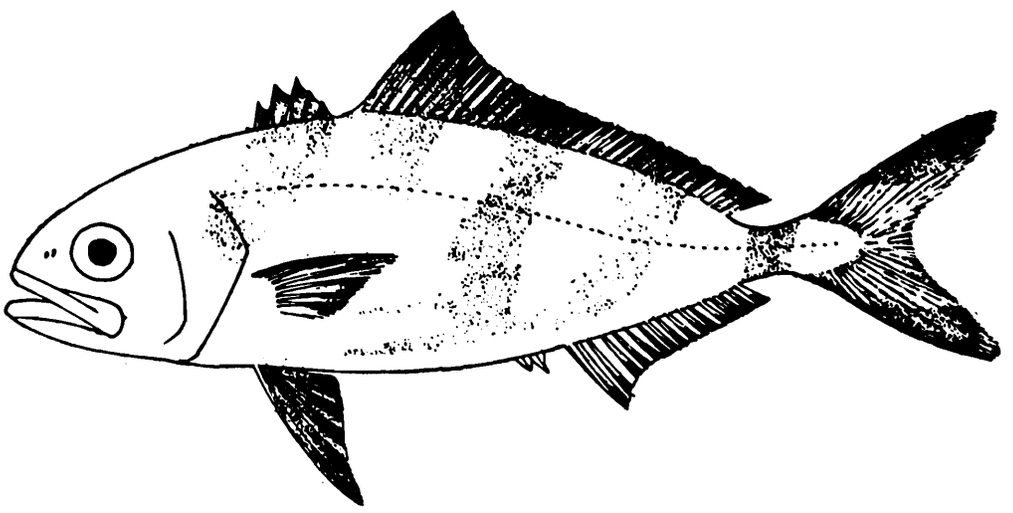
Probably monotypic.

Seriolina nigrofasciata (Ruppell)

[Text-fig. 187]

Nomeus nigrofasciatus Ruppell, 1828, *Atlas Nordl. Afrika Fische Rothen Meeres* : 92, pl. 24, fig. 2 (type-locality : Massaua, Red Sea).

Seriola nigrofasciata : Day, 1876, *Fishes of India* : 227, pl. 51, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 170, fig. 57.



Text-fig. 187. *Seriolina nigrofasciata* (Ruppell)

Common Name :

Black-banded trevally ... **English**

Distinguishing Characters :

Body oblong and moderately compressed; head profile steep in front of eye, becoming convex above eyes. Eye-diameter about 4 times in head length (smaller in adults), about equal to snout length. Upper jaw (maxilla) extends beyond vertical from posterior third of eye. Teeth in villiform bands in jaws. Gill-rakers not normal, reduced to small knobs, 5 knobs on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (not always visible) and 5 to 7 normal spines; second dorsal fin with 1 spine and 31 to 34 soft rays. Anal-fin base about half length of dorsal-fin base. Anal fin with 2 detached spines, followed by 1 spine and about 16 soft rays. Pectoral fins shorter than length of head, not falcate. Scales small, breast scaled. Lateral line straight except for slight elevation above pectoral fin; no scutes in adults.

Colour : body dusky olive brown above, silvery grey below; 5 to 6 dusky black oblique bands inclining forward on body and head, disappearing with age; fins brown, tips of dorsal and anal fins white.

Geographical Distribution : Widespread in the tropical and sub-tropical Indo-Pacific, as far east as Hawaiian Islands.

Inhabits coastal areas.

Fishery Information : Taken commercially only occasionally in the country. One of the finest eating fishes of the tropics.

Genus **Trachinotus** Lacepede

Trachinotus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 78 (type-species *Labrus falcatus* Linnaeus) (Also spelt as *Trachynotus* by authors).

Body deep and compressed. Teeth in jaws small, conical and recurved, absent in adults; villiform teeth on roof of mouth (vomer and palatines). Dorsal fin with 6 or 7 spines, short (first spine very small and rudimentary in some fish); second dorsal and anal fins strongly falcate; bases of anal and second dorsal fins about equal in length; no finlets in dorsal and anal fins. Pectoral fins short, shorter than head length, not falcate. Scales small, oval-shaped, cycloid and partially embedded. Lateral line slightly arched to below middle of second dorsal fin and straight thereafter; no scutes in lateral line (only pored scales, not enlarged). No caudal peduncle grooves.

Several species known, four in our area, all easily distinguished.

KEY TO SPECIES

1 (a) No lateral spots on body	...	2
(b) Spots/blotches present on sides of body	...	3
2 (a) Teeth on tongue absent (except 2 or 3 slender teeth rarely in small specimens) ; anal-fin lobe dark	...	*T blochii*
(b) Teeth on tongue present, in band (persistent to 500 mm standard length) ; anal-fin lobe relatively clear	...	*T mookalee**
3 (a) Spots on body, 1 to 6 all smaller than eye ; vomer tooth patch chevron-shaped	...	*T baillonii*
(b) Spots on body, usually 5 or 6, at least two of which are larger than eye ; vomer tooth patch small and oval	...	*T botla*

Trachinotus baillonii (Lacepede)

Caesiomorus baillani Lacepede, 1802, *Hist. nat. Poiss*, **3** : 92, pl. 3, fig. 1 (type-locality : Madagascar).

Trachynotus baillonii : Day, 1876, *Fishes of India* : 233, pl. 51A, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 178.

Common Names :

Baillon's Dart	...	English
Mookalee	...	Tamil
Valla-oodoo, Parruvu	...	Malayalam
Ladagoo	...	Marathi
Veli, Anjupulli	...	Lakshadweep Is.

Distinguishing Characters :

Body subovate and strongly compressed, its depth 2.2 to 2.7 times in standard length. Snout blunt, the profile from inter-orbital to second dorsal-fin origin convex. Eye-diameter 3.4 to 4.2 times in head length. Upper jaw (maxilla) reaching to front edge of pupil or nearly so. Small villiform teeth in band in jaws ; no teeth on tongue ; teeth on vomer and palatines ; vomer tooth patch chevron-shaped. Gill-rakers 15 to 19 on lower arm of first arch. Two dorsal fins ; first dorsal fin with 1 procumbent spine (almost embedded in skin) and 5 or 6 normal, small spines ; second dorsal fin with 1 spine

* *Trachinotus mookalee* Cuvier does not contribute to any fishery in our region.

and 21 to 25 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 20 to 24 soft rays. Pectoral fins short, not falcate ; pelvic fins short. Scales small, rounded and conspicuous. Lateral line slightly curved anteriorly.

Colour : greyish green above with 1 to 6 spots on body, usually second and third spots largest (smaller than eye) with about one half of spot below lateral line ; spots developing on specimens at about 60 mm standard length ; belly silvery. Dorsal and anal fin lobes dark.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

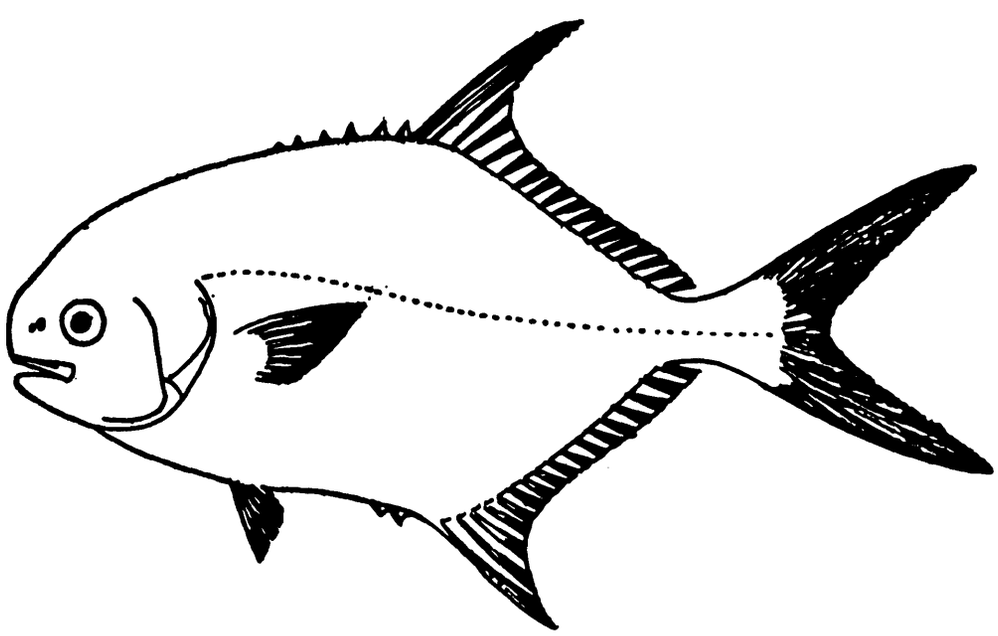
Fishery Information : Common in the commercial catches of our region, especially the Kerala and Tamil Nadu coast.

Trachinotus blochii (Lacepede)

[Text-fig. 188]

Caesiomorus blochii Lacepede, 1801, *Hist. nat. Poiss.*, **3** : 92, 95, pl. 3, fig. 2 (type-locality : Madagascar)

Trachynotus ovatus Day (*nec* Linnaeus), 1876, *Fishes of India* : 234, pl. 51B, fig. 2 ; Day, 1889, *Fauna Br India*, Fishes, **2** : 179.



Text-fig. 188. *Trachinotus blochii* (Lacepede)

Common Names :

Snubnose pampano	...	English
Kootili	...	Tamil
Katattitaka, Ladagoo	...	Marathi
Fathivali, Peeyada	...	Lakshadweep Is.

Distinguishing Characters :

A deep-bodied and compressed carangid, its depth about 2.0 times in standard length. Head profile smoothly rounded; snout blunt. Eye-diameter 3.2 to 4.0 times in head length. Upper jaw (maxilla) reaches to front edge of eye or little beyond. Teeth in jaws small, absent in adults above 200 mm standard length; no teeth on tongue; teeth on vomer and palatines absent in adults. Gill-rakers 6 to 12 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine (not visible in adults) and 6 normal, small spines; second dorsal fin with 1 spine and 18 to 20 soft rays; soft dorsal and anal fin-bases about equal. Anal fin with 2 detached spines, followed by 1 spine and 16 to 18 soft rays. Dorsal, anal and caudal fins becoming increasing falcate with age. Pectoral fins short, not falcate, less than length of head. Head almost naked except a few scales behind eyes. Lateral line straight except for slight curve above pectoral fin.

Colour : body blue-grey above, silvery blue below, the two colours separated by a vague stripe of orange. Dorsal fin lobe and base of fin dark, the rest yellow; anal fin yellow, its lobe dark.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow coastal areas in coral and rocky reefs.

Fishery Information : Taken commercially in small quantities on the Tamil Nadu coast.

Trachinotus botla (Shaw)

Scomber botla Shaw, 1803, *General Zoology*, **4** : 591 (type-locality : Vizagapatnam).

Trachynotus russellii Cuvier : Day, 1876, *Fishes of India* : 233, pl. 51B, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 178, fig. 61.

Common Names :

Largespot pampano	...	English
Ladagoo	...	Marathi

Distinguishing Characters :

Body ovate and strongly compressed, its dorsal and ventral profiles nearly convex. Snout blunt; upper jaw (maxilla) reaches almost to front edge of pupil. Jaws with small, villiform teeth in bands;

vomer and palatines with teeth at all sizes; no teeth on tongue; vomer tooth patch small and oval. Gill-rakers 11 to 15 on lower arm of first arch. Two dorsal fins; first dorsal fin with 1 procumbent spine and 6 normal spines, very short and almost embedded in skin; second dorsal fin with 1 spine and 22 or 23 soft rays. Anal fin with 2 detached spines, followed by 1 spine and 20 or 21 soft rays; second dorsal and anal fins with anterior falcate lobes. Pectoral fins rounded, as long as head without snout. Scales on body small anteriorly, larger and more conspicuous posteriorly. Lateral line nearly straight.

Colour : body blue-back above, silvery below with a tinge of yellow; 5 to 6 spots in longitudinal row on sides of body (above 200 mm standard length), with only anterior 3 or 4 spots present at 100-200 mm, the anterior 3 spots large, larger than eye. Dorsal and anal fin-lobes dark.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially in small quantities along both the east and west coast of India.

Genus **Ulua** Jordan & Snyder

Ulua Jordan and Snyder, 1908, *Mem. Carneg. Mus.*, **4** (2) : 39 (type-species : *Ulua richardsoni* Jordan & Snyder = *Caranx mentalis* Cuvier).

Body deep and strongly compressed. Adipose eyelids feebly developed, form a rim around eye. Pectoral girdle without any groove near the isthmus. Gill-rakers numerous, long and feathery, visible in mouth Single row of minute teeth in jaws; fine teeth on vomer and palatines, none on tongue. Scales on body small; breast naked. Lateral line moderately arched, posterior straight part with moderate armed scutes. Anal-fin base about equal in length to soft dorsal-fin base; soft dorsal and anal fin-rays forming falcate lobes; no detached finlets. Pectoral fins long and falcate.

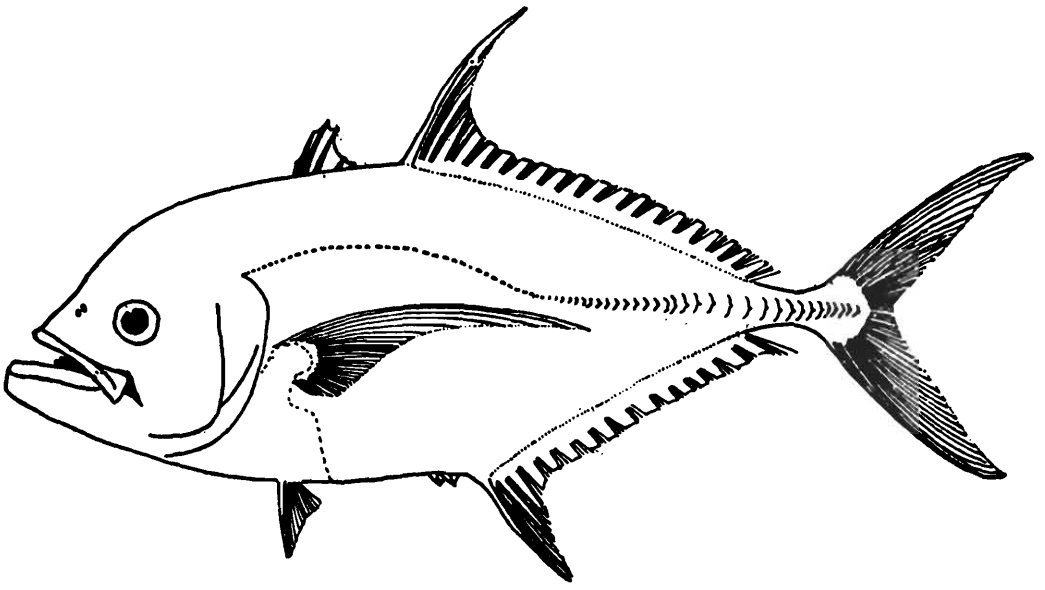
Monotypic.

Ulua mentalis (Cuvier)

[Text-fig. 189]

Carasx mentalis Cuvier, 1833, *Hist. nat. Poiss.*, **9** : 124 (type-locality : not known).

Ulua mandibularis (Macleay) : Luther, 1971, *Indian J. Fish.*, **15** : 181, pl. 1



Text-fig. 189. *Ulua mentalis* (Cuvier)

Common Name :

Cale-cale trevally ... English

Distinguishing Characters :

A deep-bodied, oval and strongly compressed carangid. Head profile strongly arched above eyes, especially in large adults Jaws highly protrusible, lower jaw much longer than upper, increasingly projecting beyond upper jaw in larger fishes and forms a prominent "chin ; maxilla reaching to below middle of eye, sometimes only to pupil. Single row of minute teeth in jaws. Gill-rakers numerous, extremely long and feathery, projecting into mouth alongside tongue ; 50 to 59 gill-rakers on lower arm of first arch. Two dorsal fins ; first dorsal fin with 6 to 8 spines, second dorsal fin with 1 spine and 20 or 21 soft rays. Dorsal-fin base slightly longer than anal-fin base ; soft dorsal and anal fins elevated anteriorly. Anal fin with 2 detached spines, followed by 1 spine and 17 or 18 soft rays. Pectoral fins falcate, extending to middle of anal fin base. Breast naked from behind base of pelvic fins to pectoral fins. Lateral line moderately arched, joins lateral line straight under 8th to 11th soft dorsal rays, curved anterior part slightly shorter than straight portion ; 29 to 33 scutes present.

Colour : body olive green above, silvery white below ; dusky patch behind corner of mouth ; lower jaw white. First dorsal fin hyaline, other fins greenish with darker anterior margins.

Geographical Distribution : East coast of Africa, the Andamans, tropical and subtropical Indo-Pacific as far east as the Hawaiian Islands.

Inhabits shallow coastal waters.

Fishery Information : Of minor fishery significance in our region; taken occasionally at Port Blair in the Andaman Sea, and the Palk Bay and Gulf of Mannar.

Genus **Uraspis** Bleeker

Uraspis Bleeker, 1855, *Nat. Tijdschr Ned.-Indie*, 8 : 417 (type-species : *Uraspis carangoides* Bleeker).

Body elongate-ovoid and moderately compressed. Eye with a weak adipose eyelid. Gill-rakers of normal shape and size, not reaching into mouth. Teeth in jaws small, in one to four irregular rows; no teeth on roof of mouth. Dorsal fin with 8 spines (normally), followed by 1 spine and 25 to 32 soft rays; anal fin with 2 spines (reabsorbed and apparently absent in adults). Pectoral fins falcate only in larger fish, longer than head. Scales small and cycloid, breast naked; lateral line with a moderate arch, its posterior straight part with armed scutes throughout its length. Colour of mouth distinctive, roof and floor of mouth white, contrasting sharply with the rest of the mouth mainly blue black.

Three species in our area, rather difficult to distinguish. Drs. F. Williams and F. Berry are presently revising these fishes and a definite key shall have to await their findings.

KEY TO SPECIES

1 (a) Naked area of breast extends uninterrupted to naked area of pectoral fins	...	*U. uraspis**
(b) Naked area of breast interrupted by scaly patch to naked area of pectoral fins	...	*U. helvolus* *U. secunda**

* *Uraspis uraspis* (Gunther) and *U. secunda* (Poey) do not contribute to any fishery in our area.

Uraspis helvolus (Forster)

Scomber helvolus Forster, 1775, *Descript. Animal.* : 414 (type-locality : Ascension Island, Pacific Ocean).

Caranx guptae Chaudhuri, 1909, *Rec. Indian Mus.*, **3** : 14, fig. 1 (type-locality : Off Elephant Point, Bay of Bengal).

Uraspis helvola : Reuben, 1967, *J. mar. biol. Ass. India*, **9** (1) : 188.

Common Name :

White-mouth crenalle ... English

Distinguishing Characters :

Body oblong and compressed, its depth 2.1 to 2.4 times in standard length. Eyes with feebly developed adipose lids. Teeth in both jaws numerous, conspicuous, acute and curved, in 2 or 3 rows in juveniles and uniserial in adults; tongue and palate covered with thick membranes. Two dorsal fins; first dorsal fin with 1 procumbent spine (completely embedded in skin) and 8 normal spines; second dorsal fin with 1 spine and 25 to 29 soft rays; first dorsal fin low, second dorsal fin high. Anal fin with 2 detached spines, followed by 1 spine and 19 to 21 soft rays, anal-fin spines almost embedded in skin. Pectoral fins short in young, in adults long and falcate, reaching beyond join of curved and straight lateral-lines. Lateral line with a low regular arch anteriorly, becoming straight below about middle of second dorsal fin; normal or retrorse scutes present on straight lateral line. Scales small, breast naked, naked area interrupted by a scaly patch to the naked area of pectoral fins.

Colour : brownish with 7 dark brown crossbands on body, which are wider than the interspaces, carried across on to the dorsal and anal fins in juveniles; in adults brown bands or blotches on body; colour of mouth distinctive.

Geographical Distribution : The Red Sea, Gulf of Oman, India, through the East Indies, to New Zealand.

Fishery Information : This species is quite common in the trawl catches in the Bay of Bengal, off the Andhra and Orissa coasts.

FAMILY : CORYPHAENIDAE

[Dolphinfishes]

Elongate compressed fishes with small cycloid (smooth) scales, and with a rather massive head. Frontal part of head with bony crest making the forehead blunt which is more prominent in males. Mouth rather large, with many fine teeth in bands in jaws. Lateral line curved upward above pectoral fin. Dorsal and anal fins very long, continuing almost to caudal fin, without sharp spines; dorsal fin originating on nape. Pelvic fins thoracic, fitting into a groove on body; no spiny rays. Caudal fin deeply forked.

Large oceanic fish and a fast swimmer, occurring singly or in shoals. Flesh excellent to eat.

Only one genus *Coryphaena* with 2 species; large and beautifully coloured, which range over all warm seas. Spectacular sporting fish of great speed.

Genus **Coryphaena** Linnaeus

Coryphaena Linnaeus, 1758, *Systema Naturae*, ed. 10 : 261 (type-species : *Coryphaena hippurus* L.) ; Gibbs and Collette, 1959, ***Bull. mar. Sci. Gulf Caribb.***, **9** (2) : 4 (Review).

For characters of the only genus, see those of family.

KEY TO SPECIES

1 (a) Dorsal-fin rays 48 to 55; a broad and square tooth patch on tongue; greatest body-depth more than 25% of standard length ... *C. equisetis**

(b) Dorsal-fin rays 55 to 65; an oval tooth patch on tongue; greatest body depth less than 25% of standard length ... *C. hippurus*

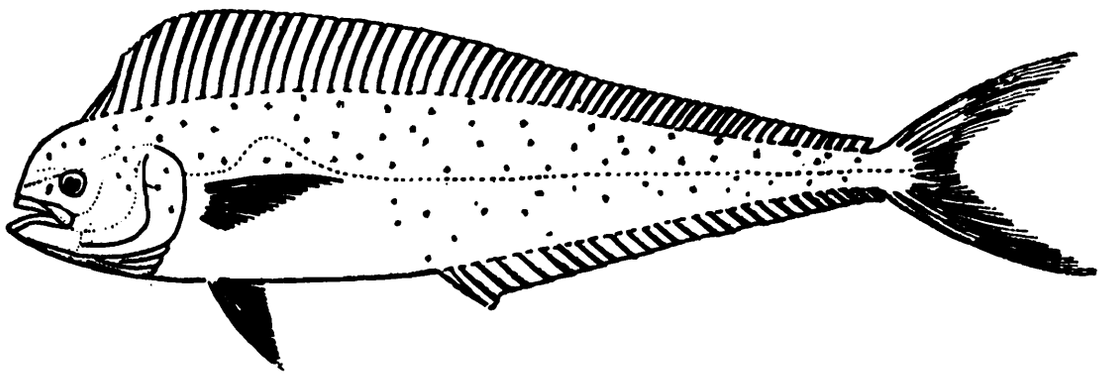
Coryphaena hippurus Linnaeus

[Text-fig. 190]

Coryphaena hippurus Linnaeus, 1758, *Systema Naturae, ed.* 10 : 261 (type-locality : open seas) ; Day, 1876, *Fishes of India* : 248, pl. 53, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 201, fig. 69.

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* There is no positive record of *Coryphaena equisetis* Linnaeus in India though the species is widespread in the Indo-Pacific; the specific name is often mispelt *equiselis* in the literature.



Text-fig. 190. *Coryphaena hippurus* Linnaeus

Common Names :

Common dolphin-fish		English
Badahlan, Vanna, Koppurai-kula	...	Tamil
Abanoos	...	Marathi
Fiyala, Affunose	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and compressed, its greatest depth in adults less than 25% of standard length; young fish (up to 30 cm) have slender, elongate body with head profile slightly convex; in larger fishes (30 to 200 cm) head profile becomes vertical with development of bony crest, more pronounced in males. Cleft of mouth wide, oblique. Bands of teeth on jaws, vomer and palatines; tooth patch on tongue small and oval. Dorsal fin extending from above eyes almost to caudal-fin, with 55 to 65 soft rays; concave anal fin from vent almost to caudal fin. Pectoral fin more than half of head length. Caudal fin deeply forked. Body with minute cycloid scales.

Colour : back brilliant metallic blue-green, flanks silvery with golden sheen, and a row of dark spots or golden blotches running besides dorsal fin, and 1, 2 or more rows on and below lateral line. Dorsal and anal fins black, the latter with a white edge; pectoral fins pale; caudal fin silvery with golden sheen.

Geographical Distribution : Tropical and subtropical seas of the world.

Fishery Information : Taken commercially in small quantities mostly on the Tamil Nadu coast, followed by Andhra Pradesh and Kerala.

FAMILY : APOLECTIDAE
[Black Pomfrets]

Body deep and compressed, rather ovate. Mouth fairly small, with a protruding lower jaw; teeth in each jaw in a single series, minute, disappearing with age. Gill membranes not united to isthmus; gill-openings wide, extending to underside of head. Dorsal fin with 2 to 6 rudimentary spines and 42 to 46 soft rays; anal fin with 2 rudimentary spines and 35 to 40 soft rays. Pectoral fins falcate; pelvic fins small, absent in adults. Caudal fin forked; caudal peduncle keeled, with few scute-like scales. Scales small, cycloid, easily shed, covering vertical fins.

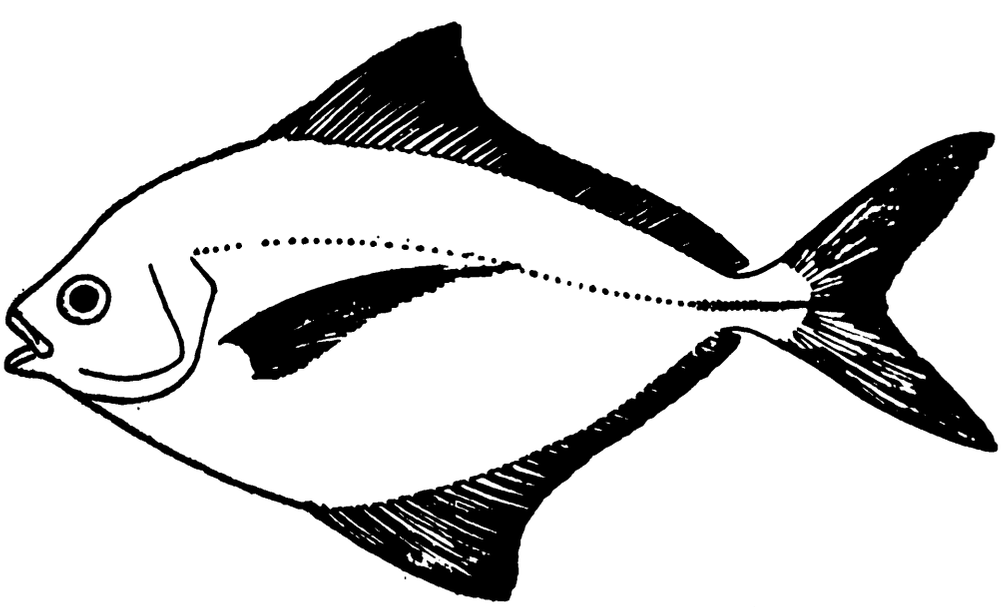
Only a single monotypic genus.

Genus **Apolectus** Cuvier

Apolectus Cuvier, 1831, *Hist nat. Poiss.*, **19** : 438 (type-species : *Stromateus niger* Bloch) ; Witzell, 1978, *Matsya*, (3) : 72 (Revision).

Apolectus niger (Bloch)
[Text-fig. 191]

Stromateus niger Bloch, 1795, *Naturges. ausland. Fische*, **9** : 93, pl. 422 (type-locality : "Malaisch" = Malaya) ; Day, 1876, *Fishes of India* : 237, pl. 53, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 199.



Text-fig. 191. *Apolectus niger* (Bloch)

Common Names :

Black pomfret	...	English
Pomfret	...	Bengali
Baal	...	Oriya
Chanduva, Thellachanduva, Nallachanduva	...	Telugu
Vavval, Vellaivaval, Karuvaval	...	Tamil
Avoli, Vellavoli, Karuvoli	...	Malayalam
Thondrotte		Kannada
Halwa	...	Marathi
Halwa, Adadio	..	Gujarati

Distinguishing Characters :

Body diamond-shaped, fairly deep and compressed. Teeth small, in a single row in jaws, deciduous. Dorsal and anal fins long, spines present only in young specimens. Pectoral fins long, falcate; pelvic fins absent in adults. Caudal fin forked. Scales of lateral line scute-like on caudal peduncle.

Colour : body grey-brown, with a blue/grey tinge; lower portion of head and body lighter; fins brownish with darker edges. Young individuals with dorsal and anal fins black; caudal fin yellowish with 3 brown cross-bars.

Geographical Distribution : Indo-west Pacific.

Inhabits midwaters near coast over the continental shelf, down to 100 m.

Fishery Information : The fishing grounds in India are the coastal waters and trawling grounds. This species along with the Silver and Chinese pomfrets, constitute about 2.64% of marine fishes of India.

Family : Menidae
[Moonfishes]

Body disc-like, with sharp breast; dorsal contour nearly horizontal. Mouth protrudes upwards; teeth minute. Dorsal fin with 43 to 45

soft rays. no spines. Anal fin with 30 to 33 soft rays, no spines. First pelvic-fin ray in adult prolonged. Minute scales, barely visible.

Only one monotypic genus.

Genus **Mene** Lacepede

Mene Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 479 (type-species : *Mene annacorolinq* Lacepede = *Zeus maculatus* Bloch).

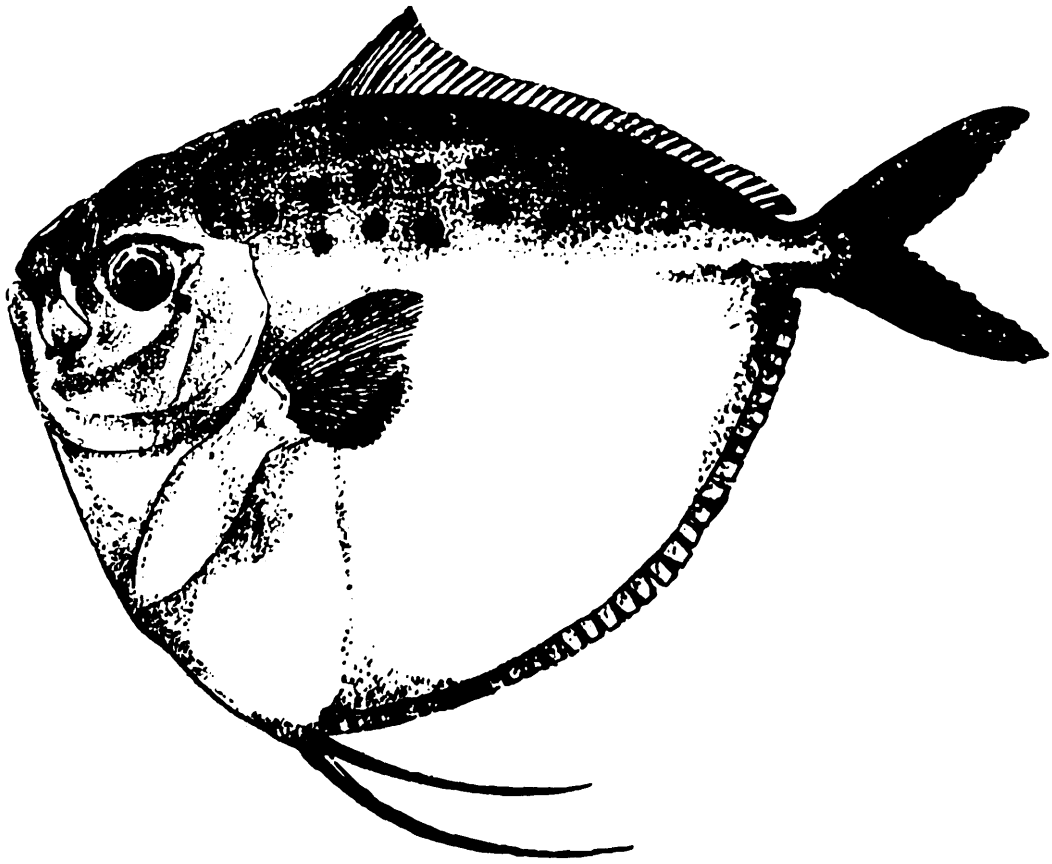
For characters of genus, see those of family.

Mene maculata (Bloch)

[Text-fig. 192]

Zeus maculatus Bloch, 1801, *Syst. Ichth.* : 95, pl. 22 (type-locality : Tranquebar).

Mene maculata : Day, 1876, *Fishes of India* : 249, pl. 53, fig 5 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 201, fig. 70.



Text-fig. 192. *Mene maculata* (Bloch)

Common Names :

Moonfish	...	**English**
Ambutan-parah, Amattikatti	...	**Tamil**
Ambattan-para	...	**Malayalam**
Hakkimeen	...	**Kannada**
Vaniani	...	**Gujarati**

Distinguishing Characters :

Body highly compressed and disc-like, with sharp breast. Mouth protrudes upwards, with minute teeth. Dorsal fin with 43 to 45 soft rays. Anal fin with 30 to 33 soft rays. Pelvic fin with 1 small spine and 5 long soft rays. Scales small, barely visible.

Colour : body bluish above, sides and belly silvery; 2 to 4 irregular series of lead coloured round spots above and below lateral line. Dorsal and caudal fins dusky as also the pelvic fin filaments; other fins hyaline.

Geographical Distribution : Widespread in the central tropical Indo-Pacific.

Fishery Information : Nowhere abundant. it frequents deep reefs, sometimes enters estuaries. Of minor commercial significance in our area.

Family : Leiognathidae
[Ponyfishes, Slipmouths]

Body deep, greatly compressed and slimy, with small scales; head usually naked, the upper surface with bony ridges ending in a nuchal spine on nape. Gill membranes united with isthmus. Mouth small and extremely protrusible which form a tube when extended. Teeth usually small in jaws, sometimes large canines, none on roof of mouth. Dorsal fin with 8 or 9 spines and 15 to 17 soft rays. Anal fin with 3 spines and 13 to 15 soft rays. Colour silvery, often with characteristic colour markings on body and fins.

These are small Indo-Pacific fishes, chiefly marine in habitat but sometimes living in brackish and fresh water. When these fishes are handled, they secrete a slimy mucus from glands on the body. They are not particularly good to eat, but they are tremendously abundant and form a palatable food when dried. They are very important in

the food economy of our region, since each fish provides a small amount of low-cost protein. In recent years the catches of ponyfishes from the seas around India have shown a steep rise from 15,274 tonnes to 46,996 tonnes in 1976 at present forming about 5% of the total annual marine fish production of India. While they are caught all along the Indian coast, a significant fishery exists only in the southern states of India. It is essentially a round the year coastal fishery, its range not exceeding 30 m. in depth. Several years ago these fishes were mainly caught in India by indigenous craft and gears like catamarans and bag nets. In recent years, the catches have been substantially increased by modern methods of harvesting, employing mechanised boats and trawl nets. The ponyfish catches are the poorest in Gujarat of all the maritime States of India. While these occur only as stray specimens in the Lakshadweep Islands, small quantities of the order of 117 tonnes are landed in the Andaman and Nicobar Islands. The fishes form good raw material for the fish-meal plants, fish protein concentrate and other fish products.

KEY TO GENERA

1 (a) Distinct canine teeth in jaws; protracted mouth points forward	...	*Gazza*
(b) No canine teeth in jaws	...	2
2 (a) Mouth when protracted forming a tube directed upwards	...	*Secutor*
(b) Mouth when protracted forming a tube directed forward or downwards	...	3
3 (a) Head entirely naked	...	*Leiognathus*
(b) Head naked but cheeks with small scales	...	*Macilentichthys**

Genus Gazza Ruppell

Gazza Ruppell, 1835, *Neue Wirbelt., Fische Rothen Meeres*, (4) : 3 (type-species : *Gazza equulaeformis* Ruppell).

Body oval and somewhat compressed. Mouth highly protrusible, protracted mouth tubular and points forward. Teeth conical, in a single row in jaws, distinct canine teeth at tip in both jaws. Dorsal

* The fishes of the genus *Macilentichthys* Whitley represented by *M. elongatus* (Gunther) and *M. indicus* (Rani Singh & Talwar) in our area, are of no fishery importance.

fin with 8 spines and 16 soft rays. Anal with 3 spines and 14 soft rays. Scales very small, barely visible ; no scales on breast and head.

Small marine coastal fishes, entering brackish and fresh water. Two species, both in our area.

KEY TO SPECIES

1 (a) Body completely scaly ; eye-diameter nearly equal to interorbital width ... *G. minuta*

(b) Body naked on back before soft dorsal fin ; eye-diameter about twice interorbital width .. *G. achlamys**

Gazza minuta (Bloch)

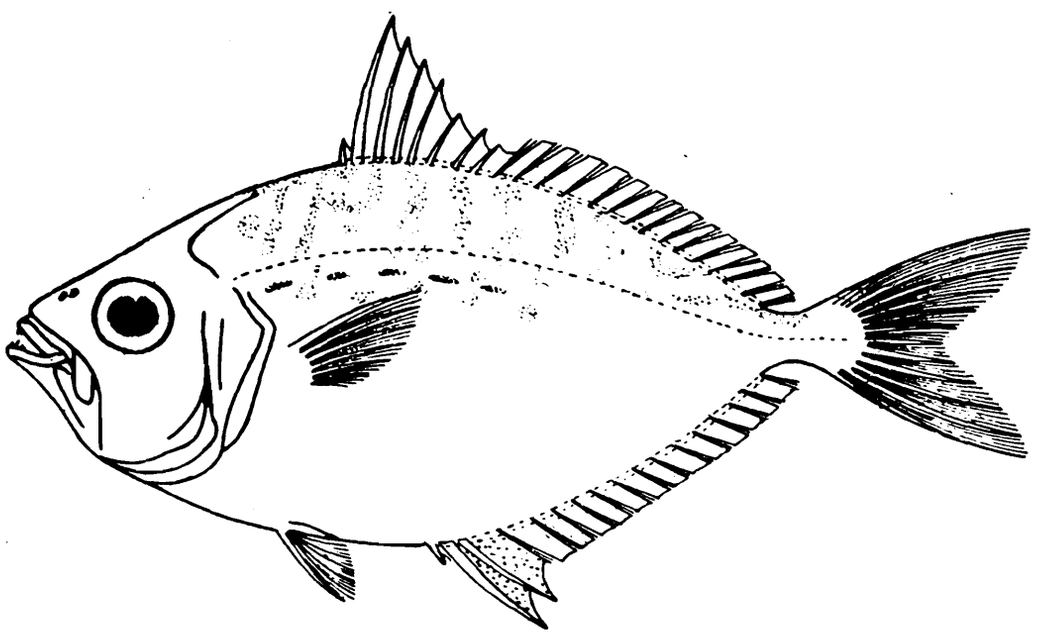
[Text-fig. 193]

Scomber minutus Bloch, 1797, *Ichthyologie* : 110, pl. 429, fig. 2 (type-locality : Malabar).

Gazza minuta : Day, 1876, *Fishes of India* : 224, pl. 53, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes. **2** : 194.

Gazza equulaeformis Ruppell ; Day, 1876, *Fishes of India* : 244 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 194.

Gazza argentaria (Bloch & Schneider) : Day, 1888, *Fishes of India Suppl.* : 790 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 195.



Text-fig. 193. *Gazza minuta* (Bloch)

* *Gazza achlamys* Jordan & Starks has been reported only once in our area.

Common Names :

Toothed ponyfish	..	English
Komah-karah	...	Telugu
Kotoo-kara, Pasni-pare	...	Tamil
Karal	...	Malayalam
Kap	...	Marathi

Distinguishing Characters :

Body oval and somewhat compressed, its dorsal and ventral profiles equally convex. Mouth small, protracted mouth points forward. Two large canines in middle of upper jaw fitting between two similar canines in lower jaw when mouth closed. Eye-diameter about equal to interorbital width. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays Scales on body very small, no scales on head and breast.

Colour : body silvery, with brownish wavy lines on upper half and red and blue marks above pectoral fin; pectoral axil black (covered by fin); sometimes black band across snout, front part of anal fin yellow; dorsal, pectoral and pelvic fins hyaline.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Inhabits coastal waters down to depths of about 40 m., predominantly near the bottom; usually found in schools; enters estuaries.

Fishery Information : *Gazza minuta* does not form a fishery by itself or dominate the catch at any particular locality in our region. It contributes, however, substantially to the ponyfish catches along both the coasts of the country. The maximum size recorded is 14 cm. total length. Mature specimens have been reported in January, March and April, and juveniles in May, November and December.

Genus **Leiognathus** Lacepede

Leiognathus Lacepede, 1803, *Hist. nat. Poiss.*, **4** : 448 (type-species : *Leiognathus argenteus* Lacepede).

Body compressed. Mouth small, highly protrusible, protracted mouth points forward or downward. Teeth small, in a single row in both jaws, no canine teeth. Dorsal fin with 8 spines and 16 soft rays. Anal

fin with 3 spines and 14 soft rays; soft dorsal and anal fins with a basal scaly sheath. Scales on body small and cycloid, head naked, breast naked or scaly.

Small carnivorous fishes, not attaining more than 18 cm. in length.

KEY TO SPECIES

1 (a) Ventral profile of body distinctly more convex than its dorsal profile	...	*L. bindus*
(b) Dorsal profile of body equally or more convex than its ventral profile	...	2
2 (a) Cleft of mouth at or below lower edge of eye	...	3
(b) Cleft of mouth opposite lower third of eye	...	9
3 (a) Dark saddle-shaped blotch on nape (very distinct in fresh specimens)	...	*L. brevirostris*
(b) No saddle-like blotch on nape	...	4
4 (a) Breast naked (without scales); second dorsal and second anal spines greatly elongated and filiform	...	*L. longispinis*
(b) Breast scaly (very thin scales in some species giving the breast a naked appearance); second anal spine usually not elongated	...	5
5 (a) Second dorsal spine distinctly elongated and filiform	...	*L. fasciatus*
(b) Second dorsal spine not elongated	...	6
6 (a) No dusky blotch on spinous dorsal fin; pelvic fins reaching to anal-fin origin or nearly so	...	7
(b) Dusky blotch on upper third of spinous dorsal fin; pelvic fins not reaching to anal-fin	...	8
7 (a) Mandibular profile strongly concave; scales on breast very thin and diaphanous giving the breast a naked appearance	...	*L. equulus*
(b) Mandibular profile straight or slightly concave; breast conspicuously covered by normal scales	...	*L. dussumieri*

8 (a)	Ridge on lower arm of preoperculum distinctly denticulated; dorsal-fin spines rather strong	...	*L. splendens*
(b)	Ridge on lower arm of preoperculum smooth; dorsal-fin spines rather weak	...	*L. jonesi*
9 (a)	Breast naked	...	*L. daura*
(b)	Breast scaly	...	10
10 (a)	Dark saddle-shaped blotch on nape; black blotch on upper half of spinous dorsal fin	...	*L. blochii*
(b)	No saddle-shaped blotch on nape; no black blotch on spinous dorsal fin	...	11
11 (a)	Second dorsal spine greatly elongated, exceeding body depth; second anal spine slightly elongated	...	*L. leuciscus*
(b)	Second dorsal and second anal spines not elongated, less than half body depth	...	*L. berbis*

Leiognathus berbis (Valenciennes)

Equula berbis Valenciennes. 1835, *Hist. nat. Poiss.*, **10** : 85 (type-locality : Red Sea).

Equula oblonga Valenciennes : Day, 1876, *Fishes of India* : 243; Day, 1889, *Fauna Br. India*, Fishes, **2** : 193.

Leiognathus berbis : James, 1978, *J. mar. biol. Ass. India*, **17** (1) : 161.

Leiognathus lineolatus (*nec* Valenciennes) James, 1978, *J. mar. biol. Ass. India*, **17** (1) : 163.

Common Name :

Lined ponyfish ... **English**

Distinguishing Characters :

Body rather slender and compressed, its depth 2.6 to 3.0 times in standard length; dorsal and ventral profiles equally convex. Mouth small, pointing downward when protracted; cleft of mouth opposite lower third of eye. Teeth small, in a single row in both jaws. Dorsal fin with 8 slender spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Head naked; scales conspicuous on body and breast.

Colour : body silvery, with greenish vermicular pattern on back.

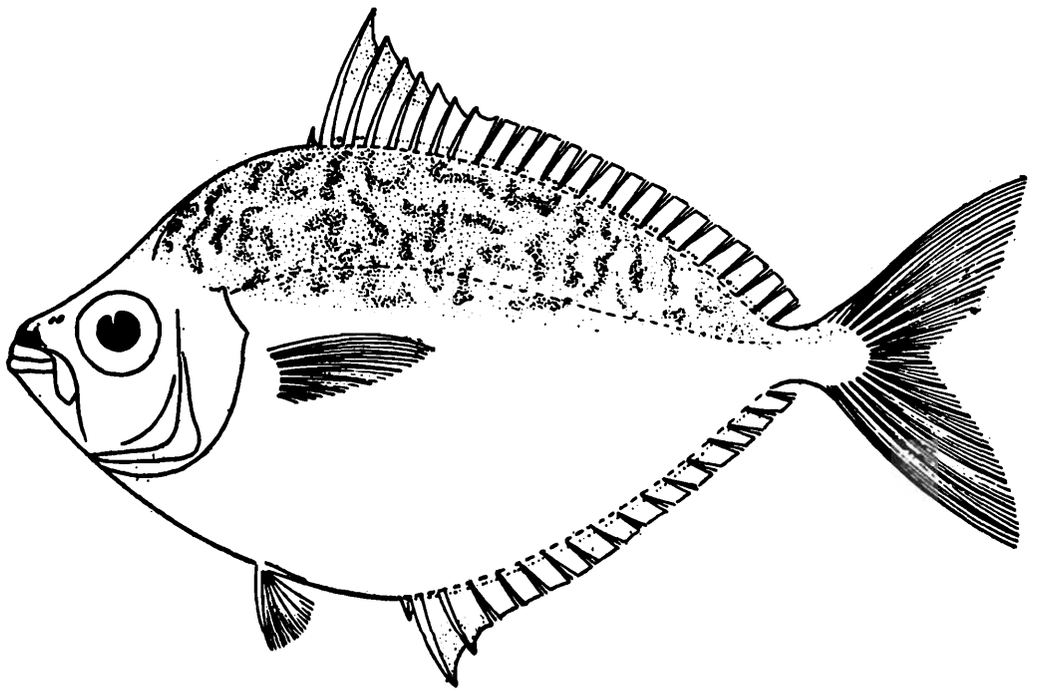
Geographical Distribution : Madagascar, India, Sri Lanka, through the East Indies, to Japan and Queensland (Australia).

Fishery Information : Fairly common in the commercial catches in the Gulf of Mannar and Palk Bay.

Leiognathus bindus (Valenciennes)

[Text-fig. 194]

Equula bindus Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 78 (on *Bindoo-karah* of Russell, 1803, *Fishes of Coromandel*, **1** : 50, pl. 64-*ex* Vizagapatnam) ; Day, 1876, *Fishes of India* : 240 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 189.



Text-fig. 194. *Leiognathus bindus* (Valenciennes)

Common Names :

Orangefin ponyfish	...	English
Bindoo-karah	...	Telugu
Tatnam-kare	...	Tamil
Nalla-mullen	...	Malayalam
Kap	...	Marathi

Distinguishing Characters :

Body deep and strongly compressed, its depth about 2.0 times in standard length ; ventral profile of body markedly more convex than the dorsal profile. Mouth small, pointing forward when protracted ;

cleft of mouth commences opposite lower third of eye; mandibular profile almost straight. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Head naked, scales on body small but conspicuous, small scales on breast.

Colour : body silvery, with dark grey irregular vermiculate marks on back; snout dusky. Tips of dorsal and anal fins orange; pectoral axil with dark spot (covered by fin).

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

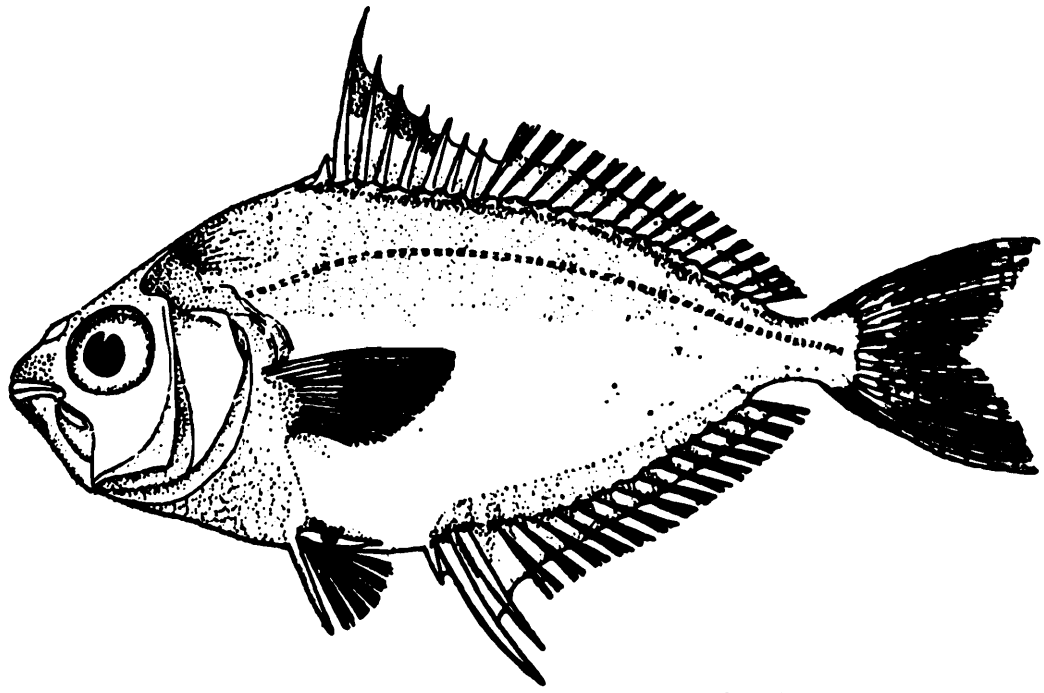
Inhabits shallow waters down to depths of 35 m, predominantly near the bottom.

Fishery Information : This species is an important element in the ponyfish catches of our area. It is particularly abundant in the Calicut area (Kerala) where large quantities are caught in bag-nets during April to December.

Leiognathus blochii (Valenciennes)

[Text-fig. 195]

Equula blochii Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 84 (type-locality : Malabar) ; Day, 1876, *Fishes of India* : 241, pl. 52, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 189.



Text-fig. 195. *Leiognathus blochii* (Valenciennes)

Common Names :

Bloch's ponyfish	...	English
Kap	..	Marathi

Distinguishing Characters :

Bodf oval and compressed ; dorsal profile of body more or less as convex as the ventral profile. Snout rather pointed (not truncated). Mouth small, pointing downwards when protracted ; cleft of mouth opposite lower third of eye ; mandibular profile strongly concave. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Pelvic fin reaching about $\frac{3}{4}$ to origin of anal fin. Head naked, minute scales on body, breast scaly.

Colour : body silvery, with a dark saddle-shaped blotch on nape, and vertical zig-zag yellow stripes on back and sides of body. A jet black blotch in upper half of spinous dorsal fin from the 3rd to 6th spines ; pectoral and pelvic fins hyaline.

Geographical Distribution : India, the Andaman Is., Gulf of Thailand, Borneo and the Philippines.

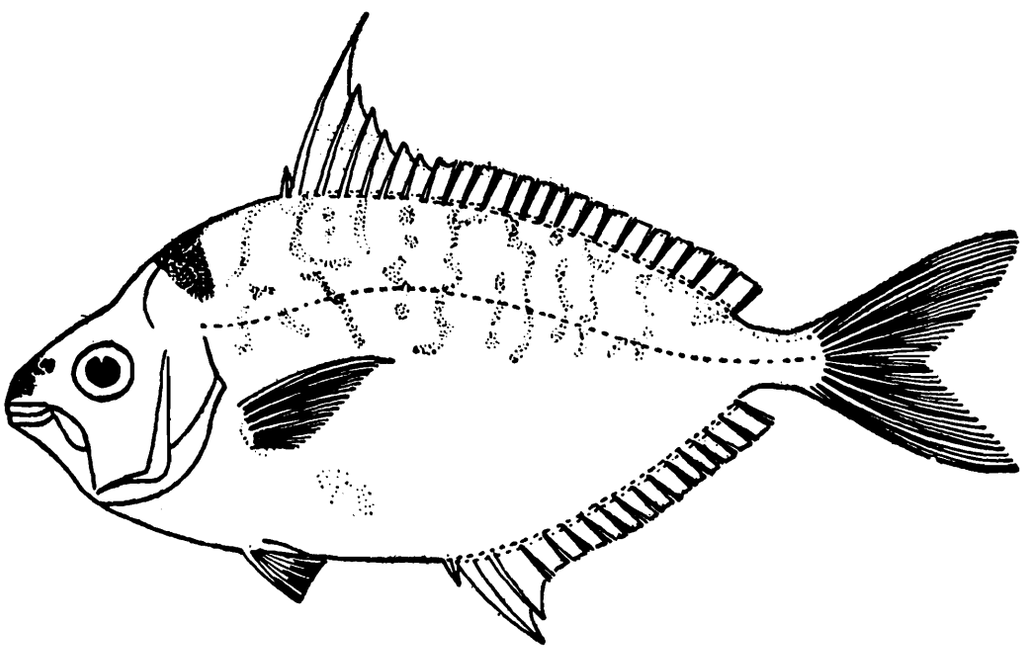
Inhabits very shallow waters, predominantly near the bottom.

Fishery Information : Fairly common in the commercial catches along the West Bengal-Orissa coast.

Leiognathus brevirostris (Valenciennes)

[Text-fig. 196]

Equula brevirostris Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 83 (type-locality : Malabar) ; Day, 1876, *Fishes of India* : 241 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 190.



Text-fig. 196. *Leiognathus brevirostris* (Valenciennes)

Common Names :

Shortnose ponyfish	...	English
Kap	...	Marathi

Distinguishing Characters :

Body oval and compressed, its depth about 2.1 times in standard length, the dorsal and ventral profiles more or less equally convex. Mouth small, pointing downwards when protracted; cleft of mouth opposite lower border of eye; mandibular profile strongly cnncave. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Scales small, all over body except breast, head naked.

Colour : body silvery, with brownish vertical irregular markings on back and a dark brown saddle-shaped blotch on nape; a yellow narrow stripe along lateral line. Spinous dorsal fin golden at midheight; pectoral axil with dark dots and a yellow blotch, a second conspicuous yellow blotch on abdomen below pectoral fin.

Geographical Distribution : Seas of India, Sri Lanka, through the East Indies, to China and the Philippines.

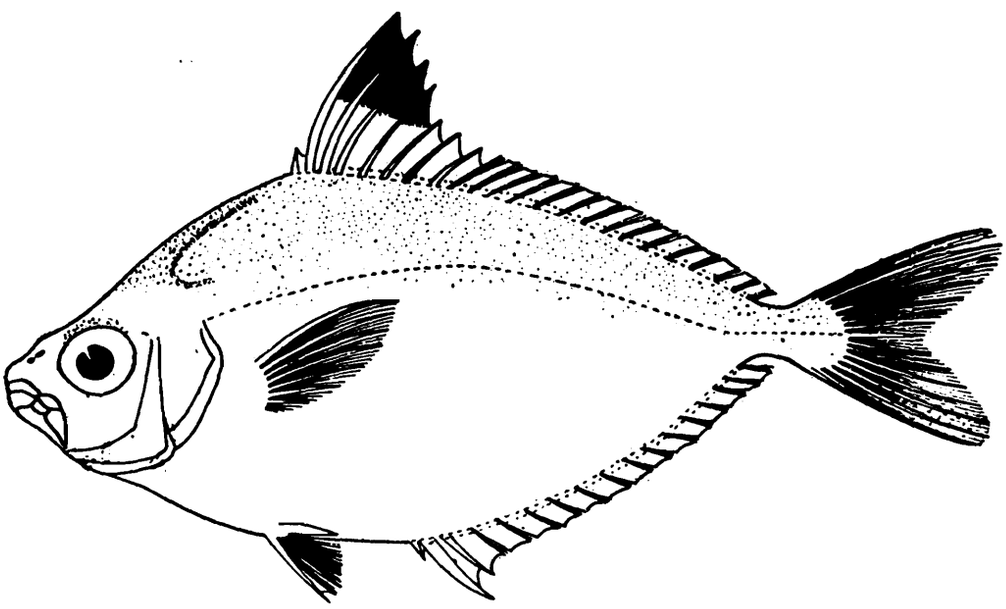
Inhabits very shallow water, predominantly near the bottom; often enters brackish waters.

Fishery Information : This species forms an important component in the ponyfish fishery in the Gulf Mannar and Palk Bay. It occurs abundantly in the coastal waters up to about 12 m. in the Palk Bay and 25 m. in the Gulf of Mannar. The commercial catches comprise of specimens of the dominant size-range 65 to 105 mm.

Leiognathus daura (Cuvier)

[Text-fig. 197]

Equula daura Cuvier, 1829, *Regne Animal*, ed. 2, **2** : 212 (on *Dacer-kurah* of Russell, 1803, *Fishes of Coromandel*, **1** : 51, pl. 65-*ex* Vizagapatnam) ; Day, 1876, *Fishes of India* : 240, pl. 52, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 188.



Text-fig. 197. *Leiognathus daura* (Cuvier)

Common Names :

Goldstriped ponyfish	...	English
Dacer-karah	...	Telugu
Rama-kare	...	Tamil

Distinguishing Characters :

Body rhomboid and compressed, its depth about 2.2 times in standard length ; dorsal profile of body equally or slightly more convex than its ventral profile. Mouth small, pointing downwards when protracted ; cleft of mouth opposite lower third of eye ; mandibular profile slightly concave. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Scales small, all over the body but absent on breast ; head naked.

Colour : body silvery, back greenish with irregular gray streaks/ blotches (disappearing with age) ; a yellow band along lateral line. Upper half of spinous dorsal fin with a black blotch between 2nd and 6th spines ; tip of lower caudal fin lobe yellow ; pectoral axil black (covered by fin).

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow waters down to depths of 15 m., predominantly near the bottom over muddy grounds.

Fishery Information : Fairly common in the commercial catches on the east coast of India and also in the Andaman Sea in our area.

Leiognathus dussumieri (Valenciennes)

Equula dussumieri Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 77, pl. 283 (type-locality : Coromandel) ; Day, 1876, *Fishes of India* : 239, pl. 52, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 187.

Equula lineolata (*nec* Valenciennes) Day, 1876, *Fishes of India* : 239, pl. 51 c, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 190.

Common Names :

Dussumier's ponyfish	..	English
Veri-kare	...	Tamil

Distinguishing Characters :

Body oblong and moderately compressed, its depth 2.0 to 2.3 times in standard length; dorsal and ventral profiles of body equally convex. Mouth small, pointing slightly downwards when protracted; cleft of mouth opposite lower edge of eye; mandibular profile slightly concave or straight. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Pelvic fins reaching to anal-fin or nearly so. Scales small, all over the body including breast, head naked.

Colour : body silvery, with faint wavy vertical lines on back. Fins yellowish ; anal fin with orange tinge ; dorsal fin hyaline.

Geographical Distribution : Madagascar, Pakistan, India, Sri Lanka, Celebes, Singapore and the Philippines.

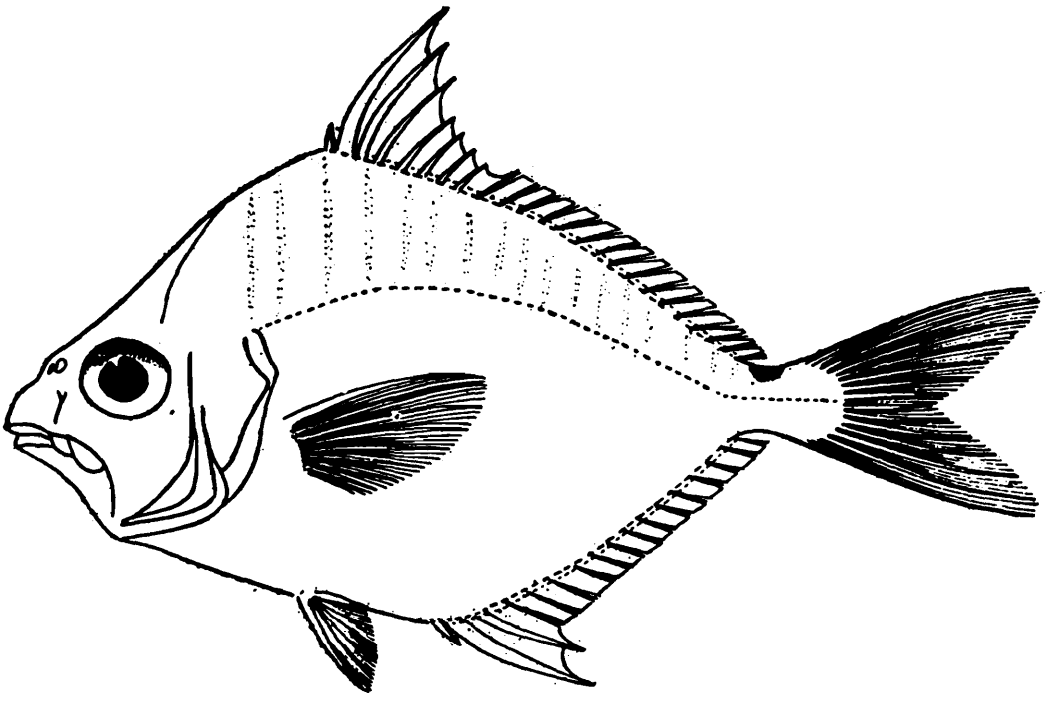
Inhabits coral-sandy bottom areas, at depths of 12 to 26 m

Fishery Information : This species is considered the next important species to *Leiognathus splendens* on an all-India basis. Apart from other localities, it is the dominant species in the Gulf of Mannar off Mandapam and Tuticorin (Tamil Nadu) where the catch rates are high. The total size-range is 19 to 145 mm total length, the 75—100 mm fork length being the commercial size.

Leiognathus equulus (Forsskal)

[Text-fig. 198]

Scomber equula Forsskal, 1775, *Descript. Animal.* : 75 (type-locality : Red Sea).
Equula edentula (Bloch) : Day, 1876, *Fishes of India* : 238, pl. 52, fig. 1 ; Day, 1889. *Fauna Br. India,* Fishes, **2** : 186.



198. *Leiognathus equulus* (Forsskal)

Common Names :

Common ponyfish	...	English
Tanka-chandee	...	Oriya
Soorokoo-nam-kare	...	Tamil

Distinguishing Characters :

Body deep and compressed, its depth 1.7 to 1.9 times in standard length ; dorsal profile of body strongly arched (almost angular), distinctly more convex than its ventral profile. Mouth small, pointing downwards when protracted ; cleft of mouth below lower edge of eye ; mandibular profile strongly concave. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Pelvic fin reaching to anal-fin origin or nearly so. Head naked ; small scales on body, breast with diaphanous, thin scales giving the impression often of a naked breast.

Colour : body silvery with faint, narrow, vertical stripes on back; a small brown saddle-shaped blotch on caudal peduncle usually present. Dorsal fin hyaline; anal fin yellowish; pectoral axil dusky.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow waters down to depths of about 30 m., predominantly near the bottom; enters brackish waters.

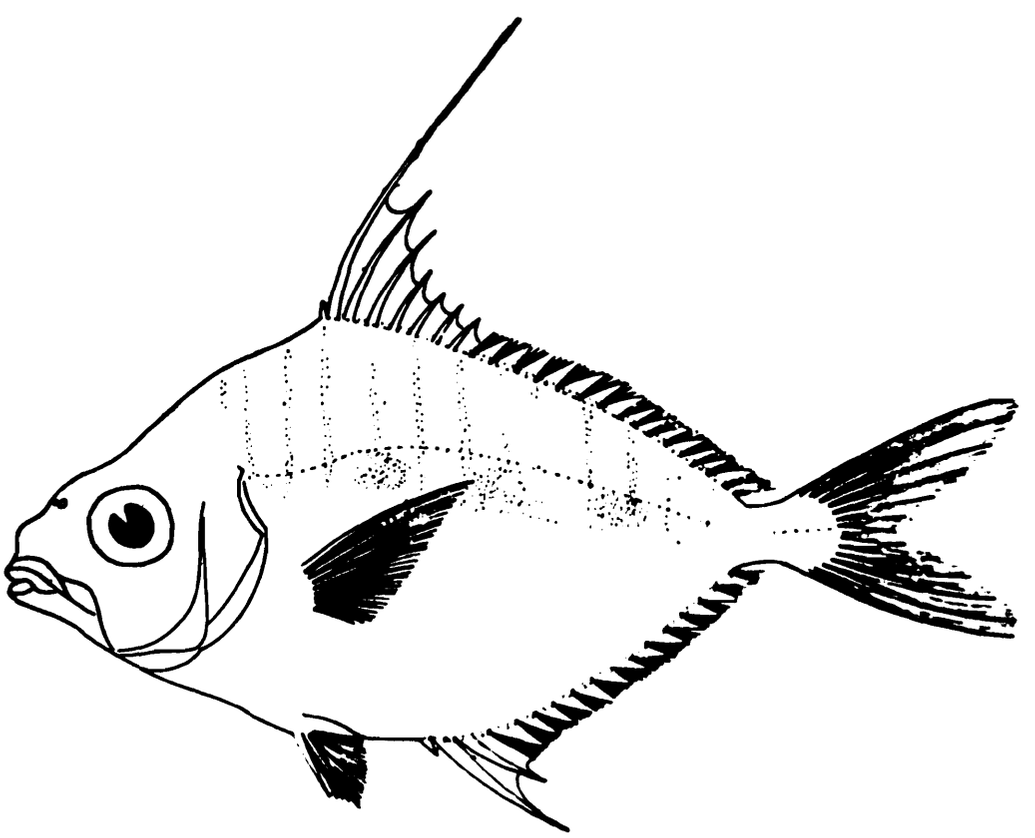
Fishery Information : This species attains the largest size in the group. Only stray specimens are caught in the trawl nets in our area but better catches are obtained in drift gill-nets during April-May when it is known to appear in shoals in surface waters at depth ranging from 8 to 10 m.

Leiognathus fasciatus (Lacepede)

[Text-fig. 199]

Clupea fasciata Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 460, 463 (type-locality : Mauritius).

Equula fasciata : Day, 1876, *Fishes of India* : 243, pl. 51 C, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 192.



Text-fig. 199. *Leiognathus fasciatus* (Lacepede)

Common Names :

Striped ponyfish	...	English
Chandee	...	Oriya
Karah	...	Telugu
Karabi, Kap	...	Marathi
Mullan	.	Lakshadweep Is.

Distinguishing Characters :

Body compressed and rather deep, its depth 1.7 to 2.0 times in standard length ; dorsal profile of body more convex than its ventral profile. Mouth small, pointing downward when protracted ; cleft of mouth below lower edge of eye ; mandibular profile strongly concave. Supraorbital rim smooth. Teeth small, in a single row in upper jaw, in 2 or 3 rows in lower jaw. Dorsal fin with 8 spines and 16 soft rays, the second spine greatly elongated and filiform. Anal fin with 3 spines and 14 soft rays, the second spine slightly elongated. Head naked ; scales on body minute, very thin scales on breast (not clearly discernible).

Colour : body silvery, with dark irregular vertical stripes on back ; some greenish-yellow and some dark spots below lateral line ; a small dark saddle-shaped blotch on caudal peduncle usually present. Pectoral-fin axil yellowish ; pectoral, pelvic and anal fins hyaline.

Geographical Distribution : Indo-west Pacific.

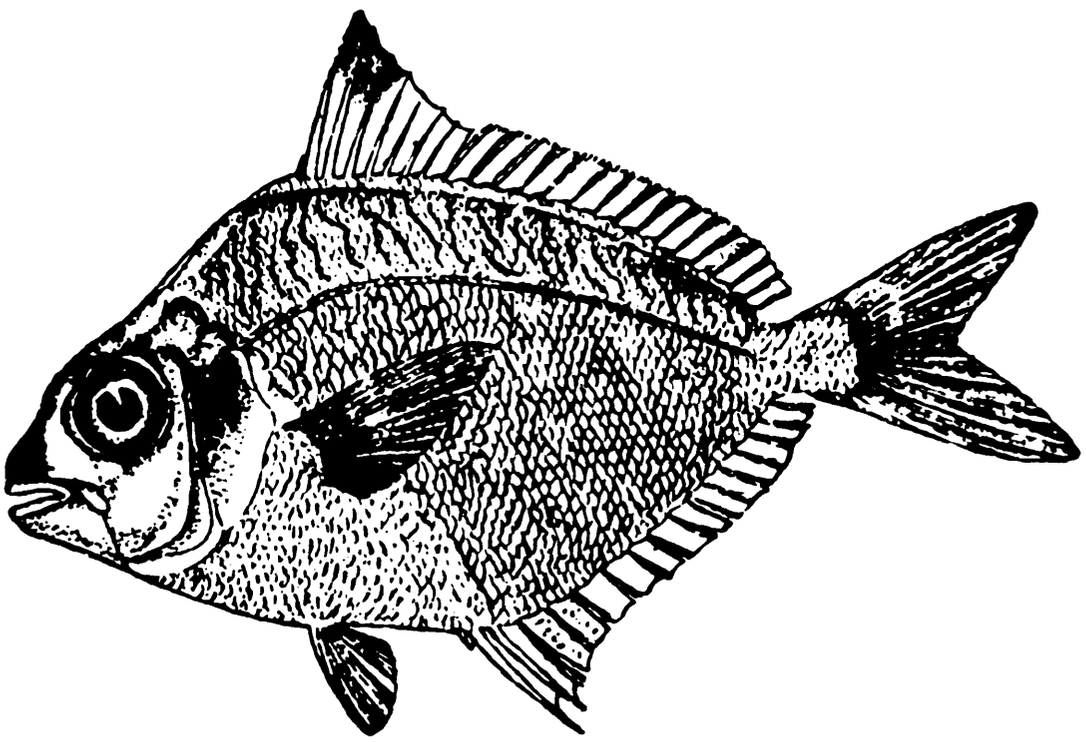
Inhabits shallow waters down to depths of 25 m, predominantly near the bottom.

Fishery Information : This species is fairly abundant in the Andaman Sea in our area and also fairly common in the commercial catches on the east coast of India, the bulk of the catches being in trawls.

Leiognathus jonesi James

[Text-fig. 200]

Leiognathus jonesi James. 1971, *J. mar. biol. Ass. India*, **11** : 316, fig. 1 (type-locality ; Mandapam, Palk Bay).



Text-fig. 200. *Leiognathus jonesi* James

Common Names :

Jones' ponyfish	...	English
Karal	...	Tamil

Distinguishing Characters :

Body compressed and rather deep, its depth 1.7 to 2.0 times in standard length : dorsal profile of body slightly more convex than ventral profile. Mouth small, pointing downwards when protracted ; cleft of mouth below lower edge of eye ; mandibular profile almost straight or slightly concave. Preoperculum with an obtuse angle its lower limb finely serrate but its ridge smooth. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays, the spines rather weak. Anal fin with 3 spines and 14 soft rays. Pelvic fins not reaching to anal-fin. Scales small on body and breast, head naked.

Colour : body silvery, with close-set, brownish zigzag lines on back ; snout tip dusky ; a black blotch on upper half of spinous dorsal fin.

Geographical Distribution : Palk Bay and Gulf of Mannar, and the Andaman Islands.

Inhabits shallow areas of the coast, usually between 12 to 20 m. depth with muddy or sandy bottom.

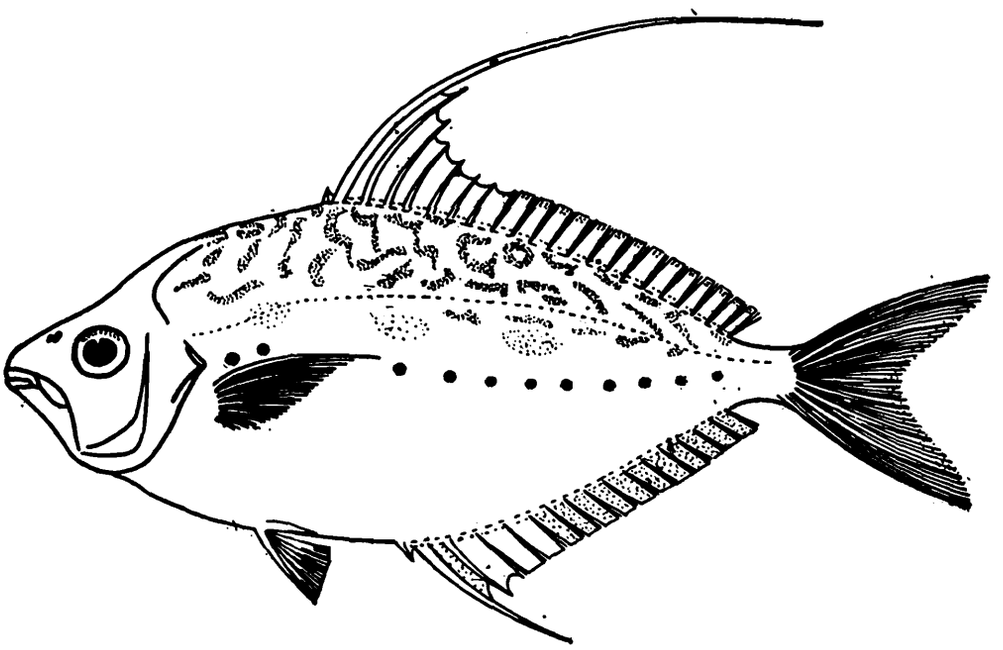
Fishery Information : This species forms about 90% of the landings of ponyfishes in the Palk Bay and the Gulf of Mannar especially off Mandapam in the Palk Bay, upto about 20 m. depth. The fishery in the Palk Bay extends from February-March to October-November and in the Gulf of Mannar from November to March. The commercial catches includes fish in the size-range 26-100 mm fork length, with the 40-75 mm size group dominant.

Leiognathus leuciscus (Gunther)

[Text-fig 201]

Equula leuciscus Gunther, 1860, *Cat. Fishes Br. Mus.*, **2** : 503 (type-locality : Amboyna).

Leiognathus leuciscus : James, 1978, *J. mar. biol. Ass. India*, **17** (1) : 156, pl. 2c.



Text-fig. 201. *Leiognathus leuciscus* (Gunther)

Common Name :

Whipfin ponyfish ... English

Distinguishing Characters :

Body compressed and rather elongate, its depth 2.3 to 2.9 times in standard length ; dorsal profile of body equally convex to its ventral profile. Mouth small, pointing downwards when protracted ; cleft of mouth opposite lower third of eye ; mandibular profile slightly concave. Teeth small, in a single row in both jaws Dorsal fin with 8 spines

and 16 soft rays, the second spine greatly elongated and filiform. Anal fin with 3 spines and 14 soft rays, the second spine slightly elongated. Head naked; scales on body small, breast with scales.

Colour : body silvery, with greenish vermicular pattern on back; eyes greenish; large specimens have yellow spots below lateral line and sometimes a line of small black dots below. Soft dorsal fin with fine yellow margin; anal fin yellow; pectoral axil with minute dark dots; hind margin of caudal fin yellow; males have a triangular bluish patch on side of belly.

Geographical Distribution : Bay of Bengal, Gulf of Thailand, Taiwan, the Philippines and Australia.

Inhabits shallow waters down to depth of 20 m., predominantly near the bottom.

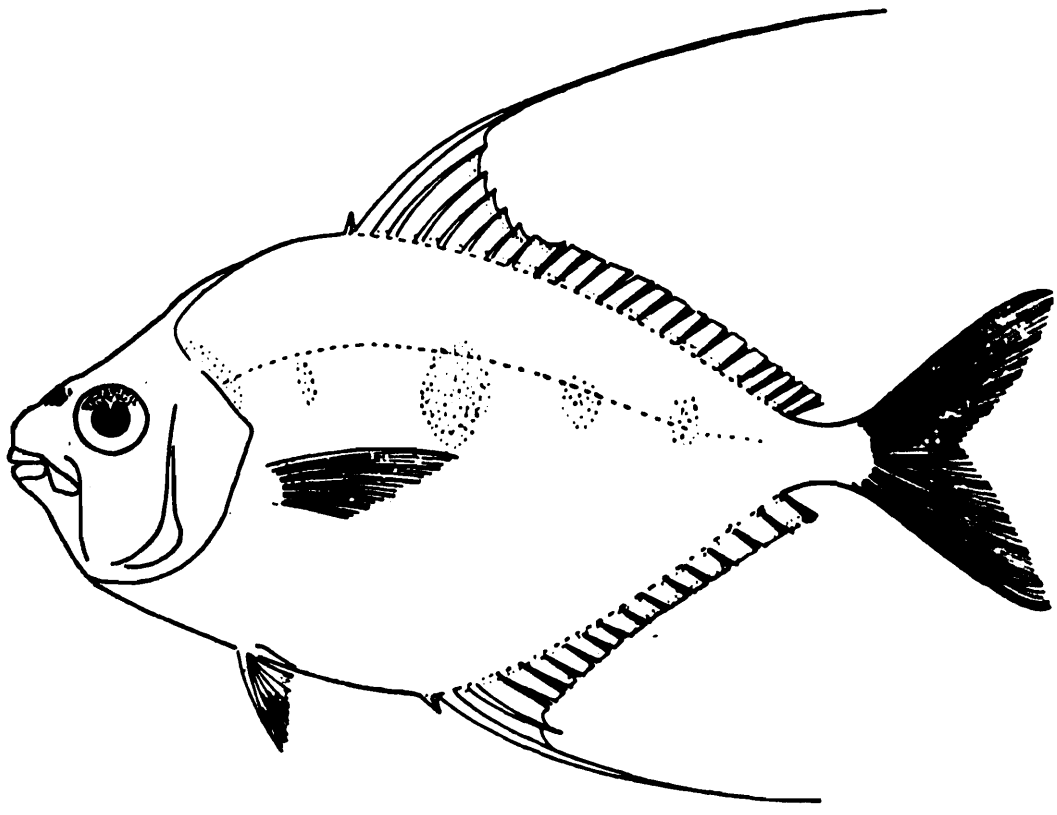
Fishery Information : Fairly common in the commercial catches in the Gulf of Mannar and Palk Bay.

Leiognathus longispinis (Valenciennes)

[Text-fig. 202]

Equula longispinis Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 94 (type-locality : Waigiu; Manila, Philippines).

Leiognathus smithursti (Ramsay and Ogilby) : James, 1969, *J. mar. biol. Ass.* India, **9** (2) : 301, pl. 1, fig. 2.



Text-fig. 202. *Leiognathus longispinis* (Valenciennes)

Common Name :

Smithurst's ponyfish ... English

Distinguishing Characters :

Body oval and compressed, its depth 1.8 to 1.9 times in standard length; dorsal profile of body more convex than its ventral profile. Mouth small, pointing slightly downwards when protracted; cleft of mouth below lower edge of eye; mandibular profile slightly concave. Teeth small, in a single row in both jaws. Dorsal fin with 8 weak spines and 16 soft rays; the second spine greatly elongated and sometimes extending to base of caudal fin. Anal fin with 3 spines and 14 soft rays, the second spine elongated and filiform. Head naked, small scales on body but no scales on breast.

Colour : body silvery, with 3 greenish yellow spots below lateral line. Pectoral axil yellow (partly covered by fin).

Geographical Distribution : India, the Andaman Is., New Guinea, the Philippines and Australia.

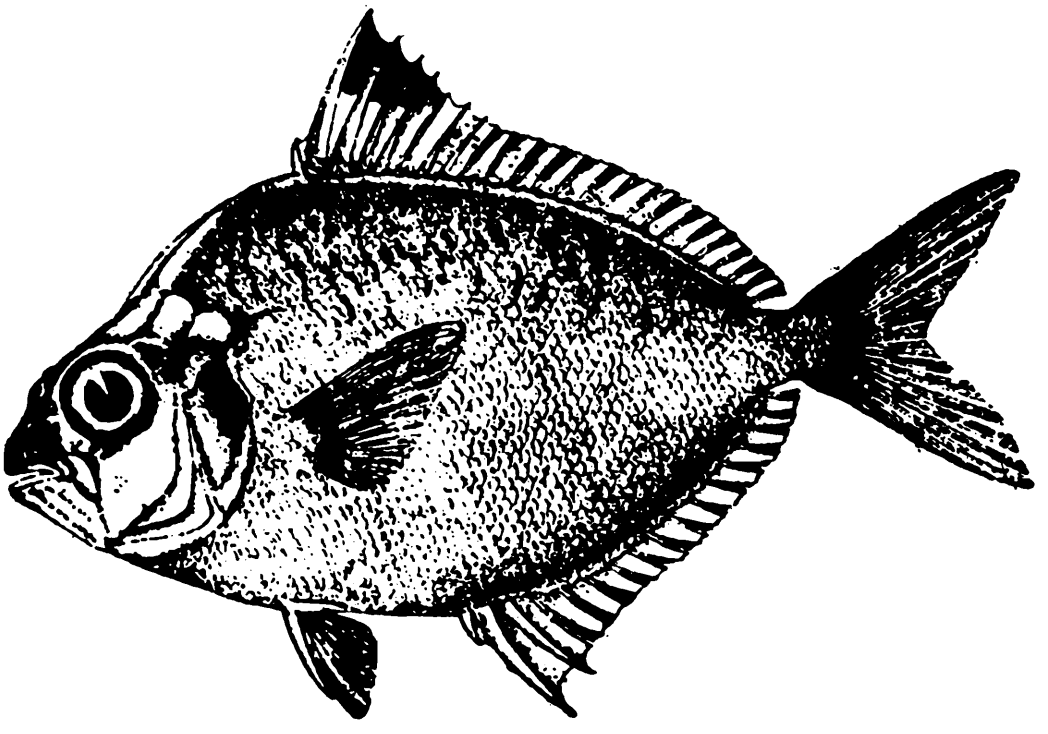
Inhabits shallow waters down to depths of 25 m, predominantly near the bottom.

Fishery Information : This species is fairly common in the commercial catches on the Orissa coast.

Leiognathus splendens (Cuvier)

[Text-fig. 203]

Equula splendens Cuvier, 1829, *Regne Animal,* (ed. 2), **2** : 212 (type-locality : ? India) ; Day, 1876, *Fishes of India* : 239, pl. 52, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 188.



Text-fig. 203. *Leiognathus splendens* (Cuvier)

Common Names :

Splendid ponyfish	...	English
Tunka-chandee	...	Oriya
Goomorah-korah	...	Telugu
Kulli-kare, Kaaral	...	Tamil
Thali-mullan	...	Malayalam
Kapi	...	Kannada
Kurichy, Kap	...	Marathi
Kutali	...	Gujarati

Distinguishing Characters :

Body compressed and rather deep, its depth 1.7 to 2.0 times in standard length ; profile of body slightly more convex than its ventral profile. Mouth small, pointing downwards when protracted ; cleft of mouth below lower edge of eye ; mandibular profile slightly concave. Preoperculum with its lower arm and ridge distinctly serrated. Teeth small, in a single row in both jaws. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Pelvic fins not reaching to anal-fin in adults. Small scales on body, scales on breast distinct ; head naked.

Colour : body silvery, with close-set brownish zig-zag stripes on back ; snout tip dusky ; scales of lateral line, bases of pectoral fins, margins of dorsal and anal fins bright yellow ; a jet black blotch on upper third of spinous dorsal fin.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow waters down to depths of 20 m., predominantly near the bottom ; usually found in schools.

Fishery Information : The most widely distributed species along the Indian coast. It contributes to the fishery along with other species, especially along the west coast of India. Commercial catches generally include fish between 50 to 100 mm total length. It attains a maximum size of about 150 mm total length.

Genus **Secutor** Gistel

Secutor Gistel, 1848, *Nat. Thierr.* : ix (type-species : *Zeus insidiator* Bloch).

Body deep and compressed. Mouth small, highly protrusible, when fully protracted tubular and pointing upward. Teeth minute,

in a single row in both jaws; no canine teeth. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Scales on body small, head naked.

Three species known, 2 in our area.

KEY TO SPECIES

1 (a) Body deep, its depth 1.5 to 1.8 times in standard length; maxilla tip reaching to about level of lower margin of eye ... *S. ruconius*

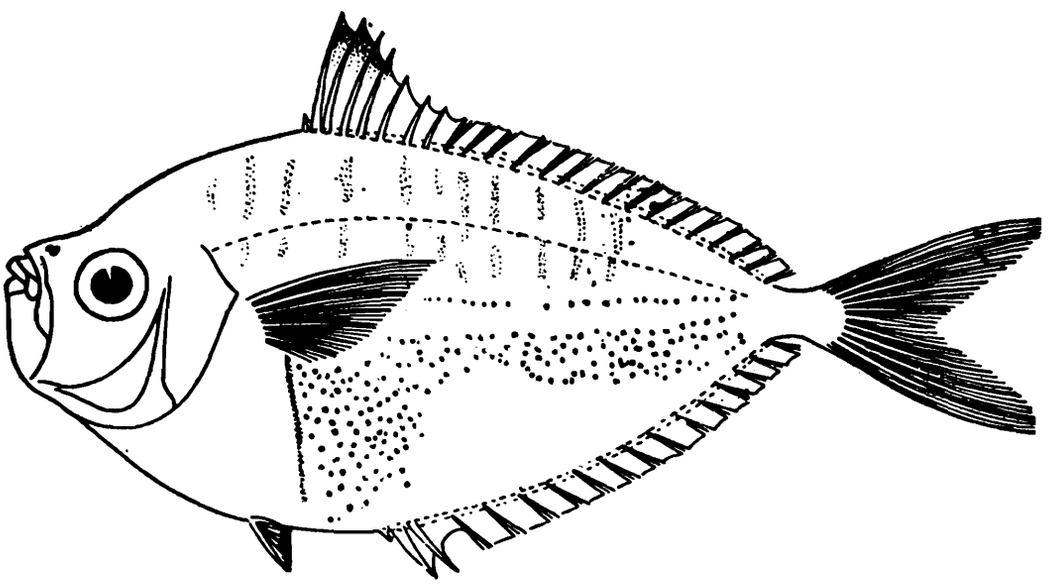
(b) Body more slender, its depth 2.0 to 2.3 times in standard length; maxilla tip reaching well below level of lower margin of eye ... *S. insidiator*

Secutor insidiator (Bloch)

[Text-fig. 204]

Zeus insidiator Bloch, 1787, *Naturges. ausland. Fische,* **3** : 41, pl. 192, figs. 2 & 3 (type-locality : Surat).

Equula insidiatrix : Day, 1876, *Fishes of India* : 242, pl. 51C, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, **2** : 191.



Text-fig. 204. *Secutor insidiator* (Bloch)

Common Names :

Pugnose ponyfish	...	English
Chandee	...	Oriya
Karal	...	Tamil
Paarl-coorchee	...	Malayalam
Kap	...	Marathi

Distinguishing Characters :

Body oval and compressed, its depth 2.0 to 2.3 times in standard length. Mouth small, pointing upward when protracted; maxilla tip reaching well below level of lower margin of eye. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Scales rather small; lateral line ending slightly before end of dorsal fin

Colour : body silvery, with blue spots on back forming vertical bands; lower flanks silvery, often with minute dots. Tip of dorsal fin black, with yellow band below; pectoral axil yellowish, with dark dots, sometimes appearing black (covered by fin).

Geographical Distribution : Tropical Indo-west Pacific.

Inhabits shallow waters down to depth of 15m, predominantly near the bottom; usually found in schools.

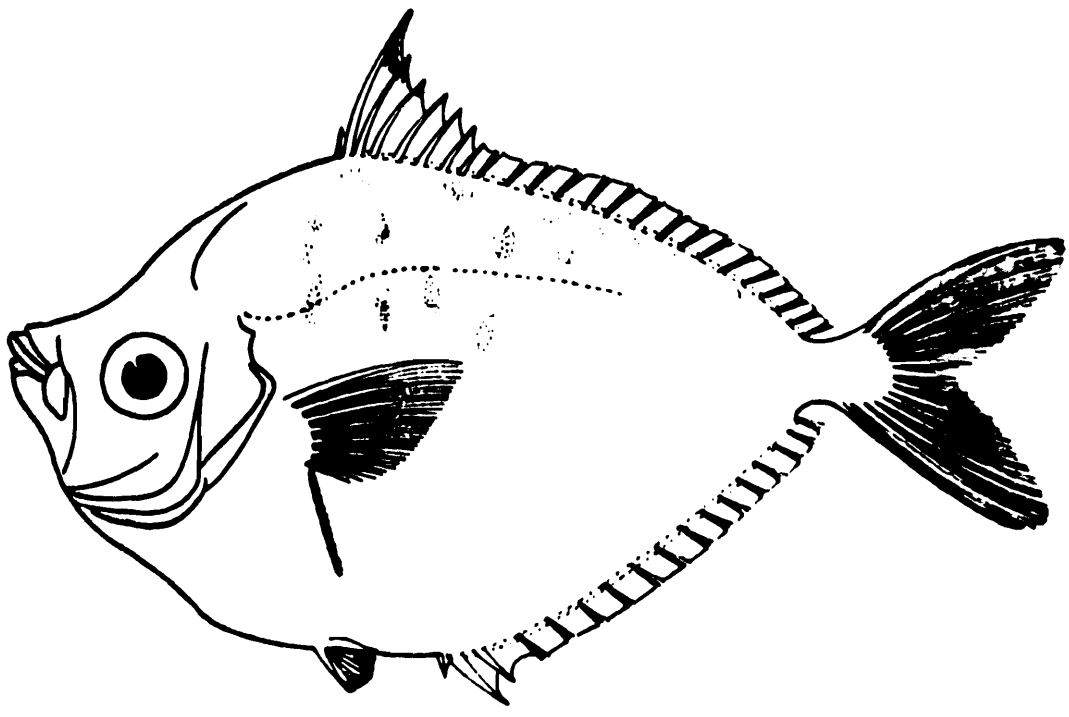
Fishery Information : This is the dominant species in the pony-fish catches on the Tamil Nadu coast and also at Vizhingam (Kerala).

Secutor ruconius (Hamilton-Buchanan)

[Text-fig. 205]

Chanda ruconius Hamilton-Buchanan, 1822, *Fishes of Ganges* : 106, 371, pl. 12, fig. 35 (type-locality : estuaries of Ganges R.).

Equula ruconius : Day, 1876, *Fishes of India* : 242, pl. 51C, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **2** : 192.



Text-fig. 205. *Secutor ruconius* (Hamilton-Buchanan)

Common Names :

Deep pugnose ponyfish	...	English
Karal	...	Tamil
Thakara-mullan	...	Malayalam
Jitaka, Kap	...	Marathi

Distinguishing Characters :

Body strongly compressed and deep, its depth 1.5 to 1.8 times in standard length. Mouth small, pointing upward when protracted; maxilla tip reaching to about level of lower margin of eye. Dorsal fin with 8 spines and 16 soft rays. Anal fin with 3 spines and 14 soft rays. Scales small; lateral line ending below about middle of soft dorsal fin.

Colour : body silvery, with blue spots on upper half (forming about 12 vertical bands in young specimens) ; belly usually uniform silvery, often spotted with black spots; a distinct black line from orbit to chin. Tip of dorsal fin black, with a yellow band below; pectoral axil black (covered by fin).

Geographical Distribution : Tropical Indo-west Pacific.

Inhabits shallow waters down to depths of 15 m, predominantly near the bottom, often enters brackish waters.

Fishery Information : This species is fairly common in the commercial catches on the east coast of India and is the most important species of ponyfish at Vizhingam (Kerala).

Family : Lutjanidae
[Snappers]

Typical perch-like fishes, moderately oblong to deep bodied, moderately compressed and covered with moderate or small ctenoid scales; no scales on anterior part of head, some rows of scales on preoperculum and on gill cover. Lateral line complete, straight or gently curved. Mouth terminal, moderate to large; maxilla slips beneath preorbital when mouth closed. Preopercle usually serrate, often finely. Jaw teeth usually in a few rows, conical and sharp, most with enlarged teeth on jaws; teeth usually present on roof of mouth (vomer and palatines). Dorsal fin continuous or with a shallow notch, with 10 to 12 spines and 10 to 17 soft rays; anal fin with 3 spines and 7 to 11 soft rays; pelvic fin with 1 spine and 5

soft rays, below or slightly behind pectoral-fin base. Usually 24 vertebrae.

Snappers are important food fishes in our region. With the exception of the caesios, which in their habits are very similar to sardines, the snappers are shallow-water inshore species. This family is noted for the diversity of its species rather than for the abundance of any of them. They are nearly all inhabitants of rocky and coral reefs where they are caught usually on hand-lines and traps.

KEY TO GENERA

1	(a)	Soft dorsal and soft anal fins scaleless; pectoral fin with 16 or 17 soft rays; caudal fin deeply forked or with extended lobes	... 2
	(b)	Soft dorsal and soft anal fins scaled, or with a low basal scaly sheath	... 7
2	(a)	Interorbital space flat	... 3
	(b)	Interorbital space convex, not flat	... 12
3	(a)	Pectoral fin short, about equal to length of snout; a deep groove in front of eye	... **Aprion***
	(b)	Pectoral fin long, considerably longer than length of snout; no groove in front of eye	... 4
4	(a)	No teeth on roof of mouth; teeth in jaws small, disappearing with age	... 5
	(b)	Vomer and palatines toothed; teeth in jaws always present; gill filaments red	... 6
5	(a)	Pectoral fins moderate, not falcate; teeth in lower jaw only; dorsal fin with 10 spines, the first inconspicuous	... **Gymnocaesio***
	(b)	Pectoral fins long, falcate; teeth in both jaws, minute; dorsal fin with 10 or 11 conspicuous spines	... **Aphareus***
6	(a)	Upper lip with a median fleshy knob in adults; last dorsal and anal fins soft rays not produced, shorter than penultimate rays	... **Lipocheilus**
	(b)	Upper lip with a median fleshy protuberance; last soft ray of dorsal and anal fins extended, conspicuously longer than preceding rays	... **Pristipomoides**

7	(a)	Caudal fin strongly forked, the lobes usually slender	... 8
	(b)	Caudal fin slightly forked, often truncate, emarginate or lunate; pectoral fin with 15 to 17 soft rays	... 9
8	(a)	Lower jaw with a median knob at tip; pectoral fin with 16 soft rays	... **Symphysanodon***
	(b)	Lower jaw without median knob; pectoral fin with 20 to 22 soft rays	... **Caesio**
9	(a)	Soft dorsal and soft anal fins with only a low scaly sheath not attached to fins; spinous dorsal fin conspicuously lower than soft dorsal fin	... **Glabrilutjanus***
	(b)	Soft dorsal and soft anal fins with scales on their bases	... 10
10	(a)	Caudal fin slightly forked, with shallow but broadly rounded lobes; soft dorsal and anal fins forming long, pointed lobes	... **Macolor**
	(b)	Caudal fin truncate, emarginate or lunate; soft dorsal and anal fins not forming long, pointed lobes	... 11
11	(a)	Mouth rather small, somewhat upturned; no caniniform teeth in jaws	... **Pinjalo**
	(b)	Mouth larger, not upturned; some caniniform teeth in jaws	... **Lutjanus**
12	(a)	Last soft ray of dorsal and anal fins shorter than preceding rays, so that posterior profile of fins are rounded; pectoral fins long	... **Paracaesio***
	(b)	Last soft ray of dorsal and anal fins distinctly longer than preceding rays; pectoral fins short	... **Apsilus***

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* The fishes of the genus *Apsilus* Valenciennes represented by *A. fuscus* Valenciennes, the genus *Aphareus* Cuvier represented by *A. furcatus* (Lacepede) and *A. rutilans* Cuvier, the genus *Gymnocaesio* Bleeker represented by *G. gymnopterus* Bleeker, the monotypic genus *Apion* Valenciennes, the genus *Symphysanodon* Bleeker represented by *S. andersoni* Kotthaus, and the genus *Paracaesio* Bleeker represented by *P. xanthurus* (Bleeker) and *P. sordidus* Abe & Shinohara, have been reported only in recent years in our area and are of no fishery value; the occurrence of the monotypic genus *Glabrilutjanus* Fowler in our area is not very definite.

Genus **Caesio** Lacepede

Caesio Lacepede, 1802, *Hist. nat. Poiss.*, 3 : 85 (type-species : *Caesio caerulaureus* Lacepede).

Body rather elongate, with moderate scales. Preoperculum entire. Mouth rather small, lips very thin ; teeth in jaws fine, in one or more rows. Lower jaw normal, without symphasial knob. Dorsal fin with 9 to 11 slender spines and 13 to 17 soft rays. Anal fin with 3 feeble spines and 11 to 14 soft rays. Caudal fin strongly forked, the lobes usually slender. Scales finely ctenoid; scales beginning on upper part of head above eyes; soft parts of dorsal and anal fins scaled.

Numerous species, 7 in our area.

KEY TO SPECIES

1 (a) Premaxillary with a single postmaxillary process on side in addition to median ascending process; vomer usually with fine teeth ; moderately deep-bodied, its depth usually 2.2 to 3.4 times in standard length (subgenus *Caesio*)	...	2
(b) Premaxillary with two postmaxillary processes on each side in addition to median ascending process ; vomer toothless ; body slender, its depth usually greater than 3.4 times in standard length (subgenus *Pterocaesio* Bleeker)	...	5
2 (a) Teeth in upper jaw in a single row or nearly so ; palate usually edentulous ; caudal fin with a black longitudinal band on lobe	...	*C. caerulaureus**
(b) Teeth in upper jaw in several rows, the outer row enlarged ; teeth on vomer and sometimes on palatines	...	3
3 (a) Depth of body 2.9 to 3.2 times in standard length ; caudal fin reddish yellow	...	*C. xanthonotus**
(b) Depth of body 2.3 to 2.4 times in standard length	...	4
4 (a) Supratemporal bands of scales continuous ; caudal fin uniformly yellow	...	*C. erythrogaster*

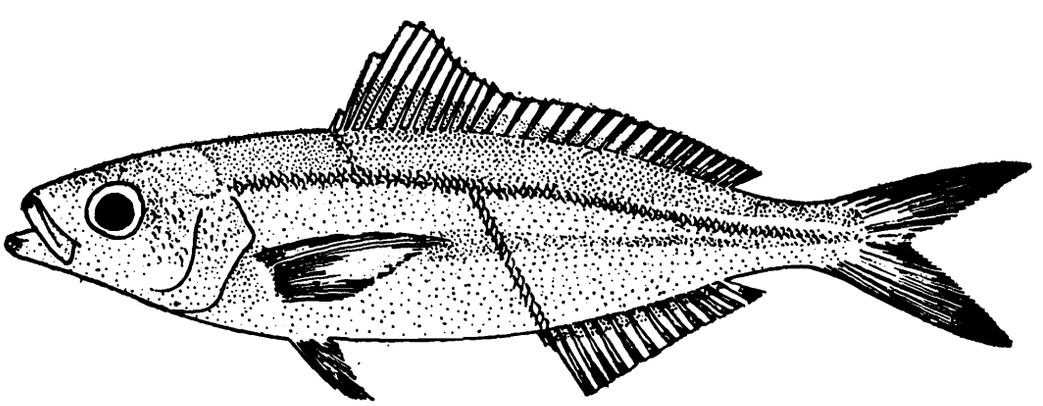
(b) Supratemporal bands of scales generally separated in the middle; caudal fin with dark tips	...	*C. lunaris**
5 (a) Dorsal fin with 11 or 12 spines and 18 to 21 soft rays	...	*C. tile**
(b) Dorsal fin with 10 spines and 14 or 15 soft rays	...	6
6 (a) Body with a yellow (golden) band along lateral line; depth of body 3.4 to 3.7 times in standard length	...	*C. chrysozona*
(b) Body with no median yellow band; depth of body 4.0 to 4.5 times in standard length	...	*C. pisang*

Caesio chrysozona Cuvier

[Text-fig. 206]

Caesio chrysozona Cuvier, 1830, *Hist. nat. Poiss.*, **6** : 440 (type-locality : East Indies).

Caesio chrysozona : Day, 1875, *Fishes of India* : 95, pl. 24, fig. 5 (var. *auroli-neatus*) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 533.



Text-fig. 206. *Caesio chrysozona* Cuvier

Common Names :

Golden-band fusilier	...	English
Peroom-kilche	...	Tamil
Mugurang, Furrua	...	Lakshadweep Is.

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* *Caesio tile* Cuvier, *C. xanthonotus* Bleeker, *C. caerulaureus* Lacepede and *C. lunaris* Cuvier are of no fishery value in our region.

Distinguishing Characters :

Body fusiform and compressed, its depth 3.4 to 3.7 times in standard length. Eyes moderately large, its diameter greater than snout length, its lower margin close to upper jaw; horizontal axis from tip of snout to middle of caudal-fin passing through middle of eye. Teeth minute, in 1 row in upper jaw and 1 to 3 rows in lower jaw; palate edentulous. Dorsal fin with 10 slender, weak spines and 14 or 15 soft rays; no marked distinction between spines and soft rays. Anal fin with 3 slender, weak spines and 11 or 12 soft rays. Caudal fin deeply forked, with slender pointed lobes. Scales thin, 67 to 77 in lateral line; scale-rows above and below lateral line running horizontally; dorsal and anal fins half covered with scales.

Colour : bluish on upper part of body and head, bright silvery below, with a yellowish (golden) band along lateral line. Fins silvery-yellow or pinkish-red; dorsal fins with a narrow black margin, caudal fin with black tipped lobes.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow waters, rocky and coral reef areas.

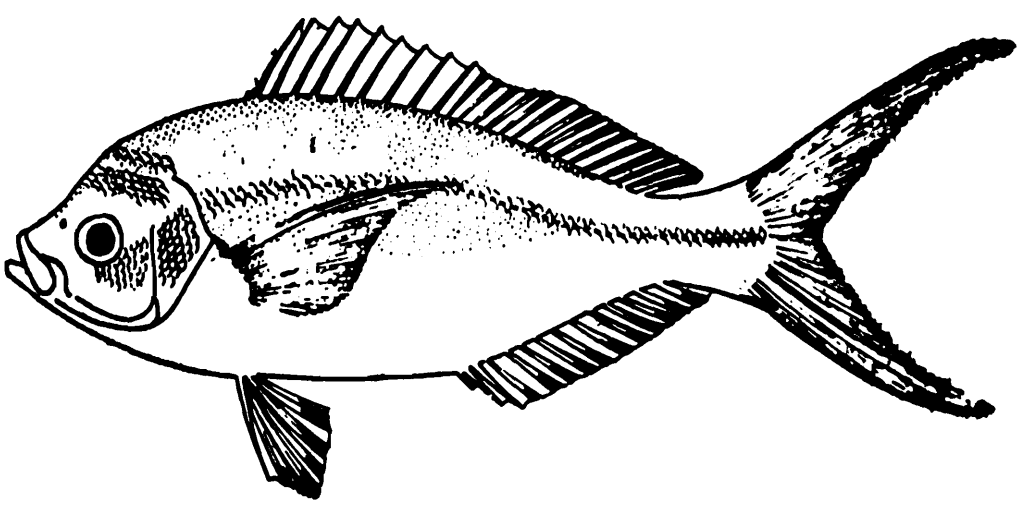
Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea.

Caesio erythrogaster Cuvier

[Text-fig. 207]

Caesio erythrogaster Cuvier, 1830, *Hist. nat. Poiss.*, **6** : 442 (type-locality : Java).

Caesio cuning Day (*nec* Bloch), 1875, *Fishes of India* : 95; Day, 1889, *Fauna Br. India*, Fishes, **1** : 532.



Text-fig. 207. *Caesio erythrogaster* Cuvier

Common Names :

Yellowtail fusilier	...	English
Cul-kilichi	...	Tamil

Distinguishing Characters :

Body moderately deep and compressed, with the dorsal profile concave in front of eyes. Mouth small, oblique. Eyes moderately large, its diameter greater than snout length, its lower margin close to upper jaw; horizontal axis from tip of snout to middle of caudal fin passing through centre of eye. Teeth minute, pointed, in a few rows in jaws, with two canines at symphysis of lower jaw; row of minute teeth on vomer and palatines. Dorsal fin with 10 slender, weak spines and 15 soft rays; no marked distinction between spines and soft rays. Anal fin with 3 slender, weak spines and 11 soft rays. Caudal fin deeply forked, with pointed lobes. Scales thin, 52 to 58 in lateral line; scale-rows above and below lateral line run horizontal; scales on head beginning over eyes, none on snout and around eyes; basal halves of dorsal and anal fins scaled.

Colour : upper part of head and front part of back metallic blue, yellowish-green posteriorly; lower part of body silvery. Caudal fin yellow, other fins silvery-yellow to pinkish-red; dorsal fin narrowly edged with black; axil of pectoral fins black.

Geographical Distribution : India, the East Indies, the Philippines, Ryukyu Islands, Solomon Islands and Queensland (Australia).

Inhabits coastal waters and coral and rocky reefs.

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea.

Caesio pisang Bleeker

Caesio pisang Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie*, **4** : 113 (type-locality : Amboina ; Batavia) ; Jones and Kumaran, 1964, *J. mar. biol. Ass. India*, **6** (2) : 294, fig. 11.

Common Names :

Bleeker's fusilier	...	English
Hudenmugurang, Churaichala	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and fusiform, its depth 3.8 to 4.2 times in standard length. Eye-diameter equal to or slightly less than interorbital width. Teeth in jaws conical, in a single series; no teeth on vomer and palatines. Dorsal fin with 10 slender, weak spines and 15 soft rays; no marked distinction between spines and soft rays. Anal fin with 3 spines and 11 or 12 soft rays. Scales thin; lateral line with 67 to 74 scales.

Colour : body generally pink or reddish grading to whitish on ventral region; fins reddish, caudal lobes with black tips.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in the Laccadive Sea.

Genus **Lipocheilus** Anderson, Talwar & Johnson

Lipocheilus Anderson, Talwar and Johnson, 1977, *Proc. biol. Soc. Wash.*, **89** (44) : 510 (type-species : *Tangia carnolabrum* Chan).

Mouth nearly horizontal and terminal, jaws almost equal. Anterior end of upper lip of adults with thick, fleshy protrusion (knob). Maxilla scaleless and without series of ridges. Interorbital region transversely somewhat flattened to slightly convex. Preopercle notch absent to slightly developed in adults. Teeth in jaws villiform, with an outer enlarged series; vomer and palatines with teeth; no teeth on tongue or pterygoids; no molariform teeth. Dorsal fin with 10 spines and 10 soft rays, continuous and not notched at junction of spinous and soft parts; dorsal and anal fins essentially scaleless; anterior soft rays of dorsal and anal fins not elongated, last dorsal and anal soft rays not produced and shorter than penultimate rays. Pectoral fins long. Caudal fin forked, the lobes not produced into filaments. Scales ctenoid.

Monotypic.

Lipocheilus carnolabrum (Chan)

Tangia carnolabrum Chan, 1970, *Hong Kong Fish. Bull.*, (1) : 20. pl. 1, figs. 1-9c (type-locality : southeast of Hong Kong, South China Sea).

Lipocheilus carnolabrum : Anderson, Talwar and Johnson, 1977, *Proc. biol. Soc. Wash.*, **89** (44) : 510, fig.

Common Names :

Tang's snapper ... English

Distinguishing Characters :

Body compressed, fairly deep. Fleshy protrusion (knob) at anterior end of upper lip well developed in adults, apparently developing in juveniles. Teeth in jaws villiform, with an outer series of conical teeth, a few of these at anterior end of jaw enlarged as canines; symphysis toothless. Preopercle notch absent to slightly developed in adults. Dorsal fin with 10 spines and 10 soft rays. Anal fin with 3 spines and 8 soft rays. Pectoral fins long, falcate in adults. Scales on head beginning over posterior part of orbit. Longitudinal rows of scales above and below lateral line parallel to it.

Colour : body and fins yellow, with tinge of brown on dorsum of head and anterior part of lips; silvery sheen on lower sides of body; juveniles with 5 dark vertical bars on body.

Geographical Distribution : South-west coast of India, Andaman Sea, South China Sea and the Phillippines; in depths of 94 to 300 m.

Fishery Information : This species is a fairly common constituent of the trawl fishery on the continental shelf off the Kerala coast.

Genus **Lutjanus** Bloch

Lutjanus Bloch, 1790, *Naturges ausland. Fische*, **4** . 105 (type-species : *Lutjanus lutjanus* Bloch) (often spelt *Lutianus* by several workers).

Body oblong or somewhat elongate, rather compressed, covered with moderate ctenoid scales, arranged in horizontal rows or those above the lateral-line (and sometimes also below it) oblique. Mouth moderately large; teeth villiform with an outer row of caniniform teeth; fine teeth on roof of mouth (vomer and palatines). Preoperculum serrate, its hind border with a shallow or deep notch to fit a knob of the interoperculum. Dorsal fin continuous, with 10 to 12 spines and 11 to 16 soft rays. Anal fin with 3 spines and 8 to 11 soft rays; soft parts of dorsal and anal fins not forming long pointed lobes. Pectoral fin long and pointed, with 15 to 17 soft rays. Caudal fin truncate, emarginate or slightly forked. Soft parts of dorsal and anal fins with scaly bases; scales on upper side of head beginning either between posterior part of eyes or further back.

Littoral voracious fishes of all subtropical and tropical seas, almost all valued as food. Numerous species, 26 in our area.

KEY TO SPECIES

1 (a) Longitudinal rows of scales above lateral line parallel to it anteriorly, but sometimes appearing to rise obliquely somewhat below posterior part of spinous or soft dorsal fin	...	2
(b) Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those in front of and below anterior part of spinous dorsal fin sometimes parallel to lateral line	...	3
2 (a) Scale-rows above lateral line appear to rise obliquely under posterior part of spinous dorsal fin; scales on head beginning behind eyes; colour deep red, with a silvery spot sometimes in centre of each scale	...	*L. argentimaculatus*
(b) Scale-rows above lateral line parallel to it under posterior part of spinous dorsal fin, ascending somewhat only below posterior part of soft dorsal fin	...	*L. johni*
3 (a) Scales on head beginning above middle of eyes or nearly so; temporal region scaly	..	4
(b) Scales on head beginning behind eyes: temporal region naked or nearly so	..	11
4 (a) Preopercular notch well developed and deep; vomerine teeth in a triangular or inverted V-shaped patch	...	5
(b) Preopercular notch slightly developed; vomerine teeth in a triangular or arrow-shaped patch	...	7
5 (a) No longitudinal bands on body; body yellowish red; pectoral fin with a dark axillary spot	...	*L. fulvus*
(b) Longitudinal bands present on body	...	6

6 (a)	Body yellow or golden, with longitudinal light blue bands, bordered by brown lines (not seen in preserved specimens)	...	*L. kashmira*
(b)	Body rosy, with golden oblique light bands above lateral line and broader horizontal bands below lateral line	...	*L. rufolineatus**
7 (a)	Dorsal fin with 11 spines; 5 rows of scales between lateral line and median dorsal spines	...	8
(b)	Dorsal fin with 10 spines (rarely 9 or 11); 6 or more rows of scales between lateral line and median dorsal spines	...	9
8 (a)	Lower preopercular limb scaly; depth of body 2.9 to 3.2 times in standard length	...	*L. lineolatus*
(b)	Lower preopercular limb naked; depth of body 3.5 to 3.8 times in standard length; a dark band from snout to caudal fin	...	*L. biguttatus*
9 (a)	A dark lateral band from eye to caudal fin; 6 or 7 rows of scales between lateral line and median dorsal spines	...	*L. vitta*
(b)	No dark lateral band from eye to caudal fin	...	10
10 (a)	Scale-rows 6 between lateral line and median dorsal spines; preorbital and suborbital bones rugose	...	*L. lutjanus*
(b)	Scale-rows $9\frac{1}{2}$ to 11 between lateral line and median dorsal spines; axil of pectoral fin with black spot	...	*L. chrysotaenia*
11 (a)	Longitudinal rows of scales below lateral line appear to rise obliquely to dorsal profile, sometimes horizontal anteriorly	...	12
(b)	All longitudinal rows of scales below lateral line horizontal (i.e. parallel to axis of body)	...	16
12 (a)	Anal fin with 10 or 11 soft rays; dorsal fin with 11 spines and 15 or 16 soft rays; 3 dark red transverse bands on head and body	...	*L. sebae*

(b) Anal fin with 8 or 9 soft rays; no dark transverse bands, or a band on head only	...	13
13 (a) Dorsal fin with 10 spines; preopercular notch deep and narrow, with a long interopercular knob fitting into it	...	*L. gibbus*
(b) Dorsal fin with 11 or 12 spines; preopercular notch shallow or inconspicuous	...	14
14 (a) Dorsal fin with 12 spines and 13 soft rays; preopercular notch shallow	...	*L. dodecacanthoides**
(b) Dorsal fin with 11 spines	...	15
15 (a) Interorbital width 4.4 to 5.0 times in head length in adults; head profile straight or concave; preopercular notch almost absent	...	*L. sanguineus*
(b) Interorbital width broader, 3.0 to 3.7 times in head length; head profile convex in adults; preopercular notch shallow	...	*L. malabaricus*
16 (a) Vomerine teeth in a triangular-shaped patch with a posterior prolongation, or in a diamond-shaped patch	...	17
(b) Vomerine teeth in a triangular-shaped patch without posterior prolongation, or in a inverted V- or crescentric-shaped patch	...	19
17 (a) A large black blotch on lateral line below junction of soft and spinous parts of dorsal fin	...	18
(b) No black blotch on lateral line	...	*L. rangus**
18 (a) Dorsal fin with 12 or 13 soft rays; dorsal head profile convex; interorbital space flat; longitudinal golden lines (when present) run horizontally only; greater part of blotch below lateral line	...	*L. fulviflammus*
(b) Dorsal fin with 14 or 15 soft rays; head profile straight or concave; interorbital space convex; golden lines on upper part of body running obliquely upward to dorsal profile; greater part of blotch above lateral line	...	*L. russelli*

19 (a) Preopercular notch well developed (except in young specimens) ; caudal fin more or less totally dark with a distinct white margin ; dorsal fin with 14 or 15 soft rays	...	*L. vaigiensis*
(b) Preopercular notch shallow	...	20
20 (a) Dorsal fin with 15 soft rays ; a chalk-white blotch in lateral line above anterior part of soft dorsal fin, preceded by a dark brown blotch	...	*L. rivulatus*
(b) Dorsal fin with 13 or 14 soft rays	...	21
21 (a) Vomerine teeth in a triangular-shaped patch ; 2 large margarita-ceous blotches on back of body	...	*L. bohar*
(b) Vomerine teeth in a inverted V- or crescentric-shaped patch	...	22
22 (a) Body with transverse blackish bands ; 5 dusky longitudinal bands on body ; caudal fin with large rounded black blotch	...	*L. decussatus*
(b) Body without dark transverse bands	...	23
23 (a) Body with 2 longitudinal bands, one through eye to caudal, the other below it	...	*L. lemniscatus**
(b) Body wtihout dark longitudinal bands	...	24
24 (a) Large black blotch below front of soft dorsal fin ; 6 to $6\frac{1}{2}$ rows of scales between lateral line and median dorsal spines	...	*L. monostigma*
(b) No black blotch on body	...	25
25 (a) Caudal fin with a semilunar dark vertical band	...	*L. lunulatus*
(b) Caudal fin dark brown, without any vertical band	...	*L. lemniscarus**

* *Lutjanus rufolineatus* (Valenciennes), *L. dodecacanthoides* (Bleeker), *L. rangus* (Cuvier), *L. lemniscatus* (Valenciennes) and *L. lemniscarus* (Valenciennes) do not contribute to any fishery in our region.

Lutjanus argentimaculatus (Forsskal)

[Text-fig. 208]

Sciaena argentimaculata Forsskal, 1775, *Descript. Animal.* : 47 (type-locality : Arabia).

Lutianus roseus Day, 1875, *Fishes of India* : 38, pl. 11, fig. 6 (type-locality : Madras).

Lutianus argentimaculatus : Day, 1875, *Fishes of India* : 37, pl. 11, fig. 5.

Lutianus sillaoo Day, 1875, *Fishes of India* : 39, pl. 12, fig. 2 (type-locality : Seas of India).

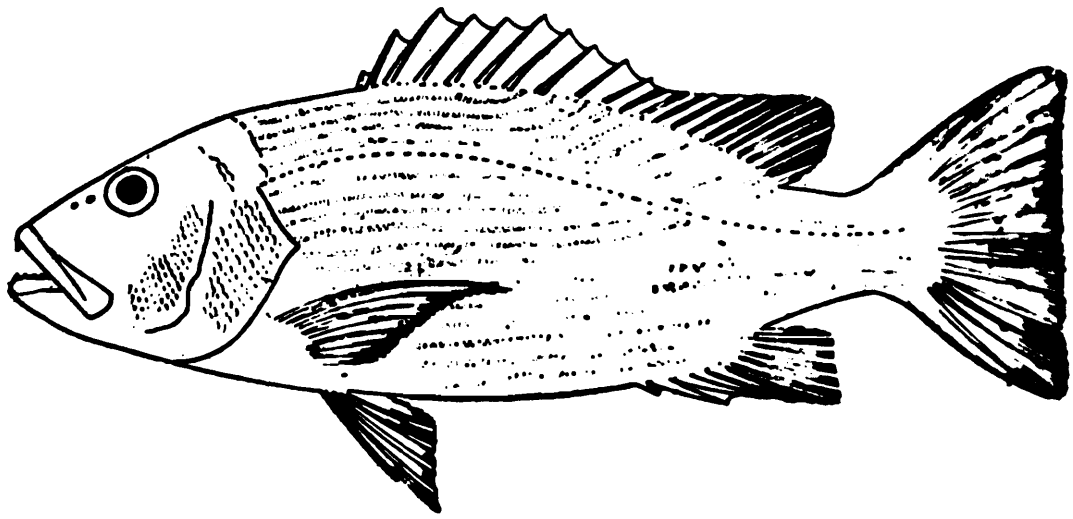
Lutianus jahngarah Day, 1875, *Fishes of India* : 40 (type-locality : Seas of India).

Lutjanus roseus : Day, 1889, *Fauna Br. India, Fishes*, **1** : 472.

Lutjanus argentimaculatus : Day, 1889, *Fauna Br. India*, Fishes, **1** : 472.

Lutjanus sillaoo : Day, 1889, *Fauna Br. India*, Fishes, **1** : 473.

Lutjanus jahngarah : Day, 1889, *Fauna Br. India*, Fishes, **1** : 474.



Text-fig. 208. *Lutjanus argentimaculatus* (Forsskal)

Common Names :

Mangrove red-snapper	...	English
Rangoo	...	Telugu
Tamb	...	Marathi
Tamb	...	Gujarati
Togoredah	...	Andaman Is.
Banda	...	Lakshadweep Is.

Distinguishing Characters :

Head profile straight or slightly convex ; preoperculum without a notch, or at most with a slight notch ; interoperculum with no distinct notch ; vertical and horizontal margins of preoperculum finely

serrated. Teeth sharp and pointed, in bands in both jaws, with a stong outer row; upper jaw with a pair of strong canines; vomerine teeth in Λ—shaped band, or in a triangular patch with a short posterior prolongation. Dorsal fin with 10 slender spines and 13 to 15 soft rays, the soft rays slightly higher than spines. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin truncate or slightly emarginate. Longitudinal rows of scales above lateral-line parallel to dorsal profile anteriorly, but appearing to rise obliquely under soft part of dorsal fin or under posterior part of spinous dorsal fin; scale-rows below lateral line horizontal (parallel to axis of body). Scales on top of head beginning behind eyes; temporal region mostly naked but a few scales in a band across it; 7 or 8 transverse rows of scales on preoperculum; lateral line with 40 to 48 scales.

Colour : body deep red, somewhat paler on belly; each scale on sides of body usually with a conspicuous silvery spot in the centre, these spots forming silvery lines along scale-rows.

Geographical Distribution : Tropical Indo-west Pacific.

Fishery Information : Taken commercially in small quantities, mostly at Port Blair in the Andaman Sea. This species is also abundant along the Maharashtra coast.

Lutjanus biguttatus (Valenciennes)

Serranus biguttatus Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 507 (type-locality : Trincomalee, Sri Lanka).

Lutianus biguttatus : Day, 1875, *Fishes of India* : 34, pl. 10, fig. 6.

Lutjanus biguttatus : Day, 1889, *Fauna Br. India,* Fishes, **1** : 469.

Common Name :

Twospot banded-snapper ... English

Distinguishing Characters :

A small, very slender snapper, the depth of body 3.5 to 3.8 times in standard length. Preopercular notch slightly developed. Band of villiform teeth in each jaw, the outer row enlarged, with a pair of canines in front of each : villiform teeth on vomer in a triangular patch, with a short median posterior prolongation. Dorsal fin with 11 slender spines and 12 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin slightly emarginate. Scales on head beginning above middle of eyes; temporal region scaly. Longitudinal rows of scales above lateral-line appear to rise obliquely to dorsal profile, those

below lateral-line parallel to axis of body; 5 rows of scales between lateral-line and median dorsal spines; lateral line with 51 to 53 scales.

Colour : body olive, whitish on belly; a dark brown band from eye to caudal-fin base; two pearly spots above lateral line, one below middle of spinous dorsal-fin and other below middle of soft dorsal-fin. Fins pale brown; deep brown spot in pectoral-fin axil.

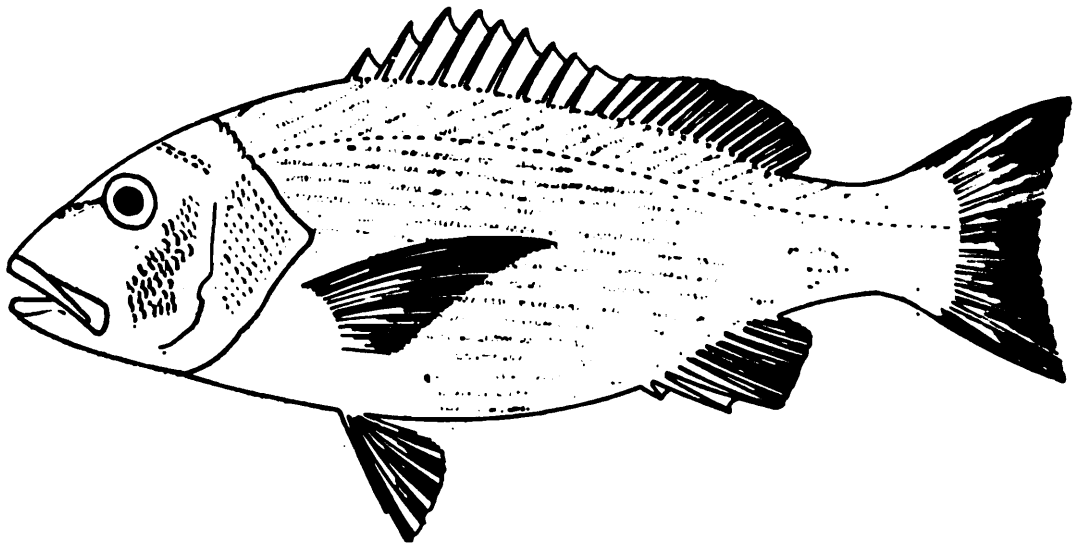
Geographical Distribution : Sri Lanka, Andaman Sea, through the East Indies, to the Philippines.

Fishery Information : Taken commercially in small quantities, mostly at Port Blair in the Andaman Sea.

Lutjanus bohar (Forsskal)

[Text-fig 209]

Sciaena bohar Forsskal, 1775, *Descript. Animal.* : 46 (type-locality : Red Sea).
Lutianus bohar : Day. 1875, *Fishes of India* : 44, pl. 13, fig. 4.
Lutjanus bohar : Day, 1889, *Fauna Br. India*, Fishes, 1 : 477.



Text-fig. 209. *Lutjanus bohar* (Forsskal)

Common Names :

Two-spot snapper	...	English
Rymas, Pulariam	...	Lakshadweep Is.

Distinguishing Characters :

Head profile slightly convex; preopercular margin with a distinct shallow notch and an interopercular knob; vertical and horizontal

borders of preoperculum finely denticulate. Small teeth in rather narrow bands in jaws, with on outer series of enlarged ones, those on sides of lower jaw and especially two teeth in front part of upper jaw distinct canines. Dorsal fin with 10 (rarely 11) spines and 14 soft rays. Anal fin with 3 spines and 8 soft rays Caudal fin slightly forked. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile and those below run horizontally. Soft parts of dorsal and anal fins with a scaly sheath.

Colour : body red or purplish red; juveniles and some adults with two distinct silvery spots on body between lateral line and dorsal profile; usually, centre of each scale silvery.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially in small quantities, mostly at Port Blair in the Andaman Sea.

Lutjanus chrysotaenia (Bleeker)

Mesoprion chrysotaenia Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie,* **2** : 170 (type-locality : Batavia, Java).

Lutianus chrysotaenia : Day, 1875, *Fishes of India* : 36, pl. 11, fig. 3.

Lutjanus chrysotaenia : Day, 1889, *Fauna Br. India,* Fishes, **1** : 470.

Common Names :

Golden-banded snapper	..	English
Tamb	...	Marathi

Distinguishing Characters :

Depth of body 2.5 to 2.8 times in standard length; preopercular notch shallow, the hind and lower margins of preoperculum denticulate. Teeth in narrow villiform bands in jaws, with an outer series of distant canines or caninoids, two of which in anterior part of upper jaw fang-like; a triangular or arrow-shaped patch of small teeth on vomer. Dorsal fin with 10 spines and 14 to 16 soft rays. Anal fin with 3 spines and 9 or 10 soft rays. Caudal fin slightly emarginate. Scales on head beginning above middle of eyes; temporal region scaly. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, parallel to axis of body below it. Lateral line with 67 to 72 scales; $9\frac{1}{2}$ to 11 rows of scales between lateral line and median dorsal spines.

Colour : body olive brown generally, paler to writish on belly, with 7 golden longitudinal bands, more conspicuous on back and upper part of the sides than lower down, the interspaces between these bands silvery. Fins pale ; pectoral-fin axil above with neutral dusky to blackish blotch.

Geographical Distribution : India, the Nicobar Islands, the East Indies, the Philippines and Queensland (Australia).

Fishery Information : Of minor fishery significance in our region.

Lutjanus decussatus (Cuvier)

Mesoprion decussatus Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 487 (type-locality : Java).

Lutianus decussatus : Day, 1875, *Fishes of India* : 47, pl. 14, fig. 4.

Lutjanus decussatus : Day, 1889, *Fauna Br. India*, Fishes, **1** : 481.

Common Name :

Crossbanded snapper ... English

Distinguishing Characters :

Moderately deep-bodied ; preoperculum with a very shallow notch. posterior margin of preoperculum rugose. Small teeth in narrow bands in jaws, with an outer series of enlarged ones, upper jaw with a large canine on each side ; teeth on vomer in angular band. Dorsal fin with 10 spines and 13 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin slightly emarginate. Longitudinal rows of scales above lateral-line oblique, ascending to dorsal profile, below lateral line parallel to axis of body ; lateral line with 49 to 52 scales.

Colour : silvery with 5 broad black longitudinal bands across body from head to caudal peduncle, the 3rd band extending forward through eye to end of snout, the 5th band extending forward through pectoral-fin base to upper jaw ; 6 or 7 narrower transverse bands from dorsal profile downward, not quite meeting the 3rd longitudinal band Large black blotch on caudal-fin base. Fins yellowish ; dorsal and caudal fins more or less dusky.

Geographical Distribution : India, Sri Lanka, the Andaman Islands. the East Indies, to the Philippines.

Notes : This species is readily distinguished by the pattern of black longitudinal and transverse bands on silvery head and body.

Fishery Information : One of the most important of the snappers in the Andaman Islands.

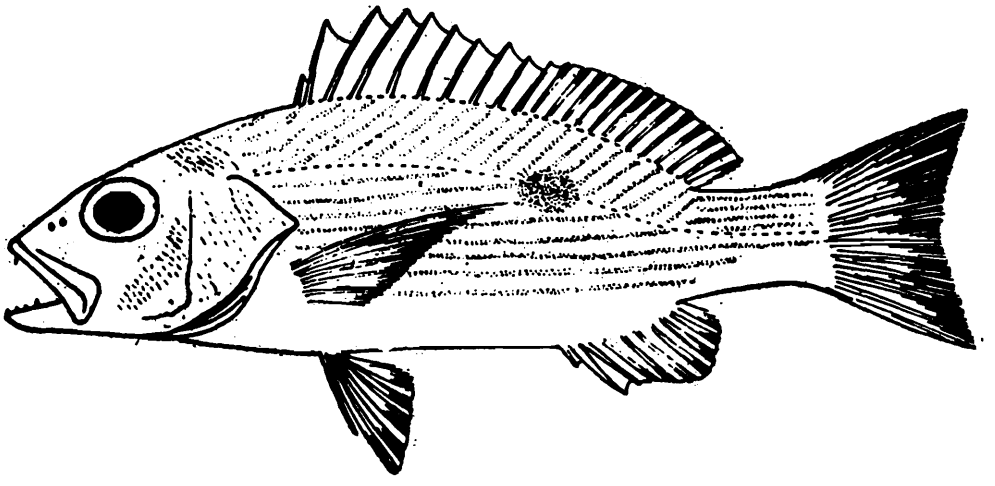
Lutjanus fulviflammus (Forsskal)

[Text-fig. 210]

Sciaena fulviflamma Forsskal, 1775, *Descript. Animal.* : 45 (type-locality : Arabia).

Lutianus fulviflamma : Day (partim), 1875, *Fishes of India* : 41, pl. 12, fig. 5 & 6.

Lutjanus fulviflamma : Day, 1889, *Fauna Br. India,* Fishes, **1** : 475.



Text-fig. 210. *Lutjanus fulviflammus* (Forsskal)

Common Names :

Blackspot snapper	...	English
Luggambanda, Chutton, Chuttommetti	...	Lakshadweep Is.

Distinguishing Characters :

A small, robust snapper with head profile convex and interorbital space broad and flat ; a slight preopercular notch and an indistinct interopercular knob ; vertical and horizontal preopercular edges finely serrated. Teeth small, in narrow bands in jaws, with an outer series of distinct caninoids, anterior teeth in upper jaw and sides of lower jaw larger and fang-like ; small teeth on vomer and palatines, the vomerine teeth in an arrowhead-shaped patch with a long prolongation posteriorly. Dorsal fin with 10 spines and 12 or 13 soft rays. Anal fin with 3 spines and 7 or 8 soft rays. Caudal fin slightly emarginate.

Scales on head beginning behind eyes; soft parts of dorsal and anal fins with a scaly sheath. Longitudinal scale-rows above lateral line nearly parallel to dorsal profile from head to below anterior part of spinous dorsal fin, and then appearing to rise steeply to dorsal profile; those below lateral line parallel to dorsal profile. Lateral line with 46 to 50 scales.

Colour : body yellow or yellowish-green above, silvery pink below, sometimes with many longitudinal yellow stripes; a black blotch on lateral line below anterior part of soft dorsal fin, most of this blotch below lateral line. Fins yellowish.

Geographical Distribution : Tropical Indo-W. Pacific.

Inhabits shallow waters, muddy and rocky foreshores and coral reefs.

Fishery Information : Commercially not taken in large quantities in our region.

Lutjanus fulvus (Schneider)

Holocentrus fulvus Schneider, 1801, *Syst. Ichth. Bloch.* : 318 (type-locality : Tahiti).

Lutianus fulvus : Day, 1875, *Fishes of India* : 34, pl. 10, fig. 5.

Lutjanus fulvus : Day, 1889, *Fauna Br. India*, Fishes, 1 : 468.

Common Name :

Flame-coloured snapper ... English

Distinguishing Characters :

Medium-sized, robust snapper with preopercular notch; posterior margin of preoperculum serrated. Narrow band of small teeth in jaws, with an outer series of canine like curved teeth; villiform teeth in narrow Λ—shaped patch on vomer. Dorsal fin with 10 spines and 14 soft rays, the spines rather strong. Anal fin with 3 spines and 8 soft rays. Caudal fin emarginate. Scales on head beginning above middle of eyes or nearly so; temporal region scaly. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those below run horizontally.

Colour : body uniform yellowish-red, with a dark spot in pectoral axil. Fins yellow; upper third of dorsal fin black, with a white margin; a black mark across middle of first third of anal fin.

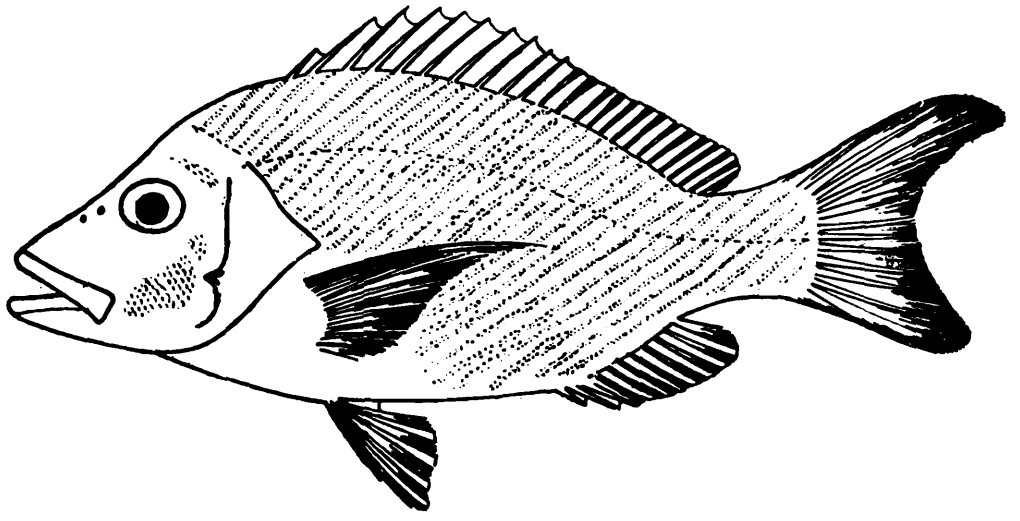
Geographical Distribution : Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in the Andaman Sea in our region.

Lutjanus gibbus (Forsskal)

[Text-fig. 211]

Sciaena gibba Forsskal, 1775, *Descript. Animal.* : 46 (type-locality : Arabia).
Lutianus gibbus : Day, 1875, *Fishes of India* : 43, pl. 13, figs. 2 & 3.
Lutjanus gibbus : Day, 1889, *Fauna Br. India,* Fishes, **1** : 477.



Text-fig. 211. *Lutjanus gibbus* (Forsskal)

Common Names :

Humpback red snapper	...	English
Grinimas, Chemmali	...	Lakshadweep Is.

Distinguishing Characters :

A small, deep-bodied snapper, its depth 2.2 to 2.5 times in standard length. Preopercular notch deep and narrow, with a long interopercular knob fitting into it; vertical and horizontal edges of preoperculum denticulate, almost obsolete in large adults. Teeth small, in narrow bands in jaws, with an outer series of distant caninoids; small teeth on vomer and palatines, the vomerine patch Λ-shaped. Dorsal fin with 10 spines and 13 to 15 soft rays. Anal fin with 3 spines and 8 or 9 soft rays, the second spine longer and stronger than third spine. Caudal fin becoming deeply forked with age. Scales on head beginning behind eyes; soft parts of dorsal and anal fins with a scaly sheath; longitudinal rows of scales above lateral line appear to rise obliquely

upward to dorsal profile, the rows below also apparently running obliquely upward; lateral line with 52 to 62 scales.

Colour : body deep red; juveniles with posterior part of caudal peduncle and caudal fin dark brown; pectoral fins light yellowish.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow waters in rocky and coral reef areas; also on rocky bottoms at depths of 60 m.

Fishery Information : Taken commercially in small quantities, mostly at Port Blair in the Andaman Sea.

Lutjanus johni (Bloch)

[Text-fig. 212]

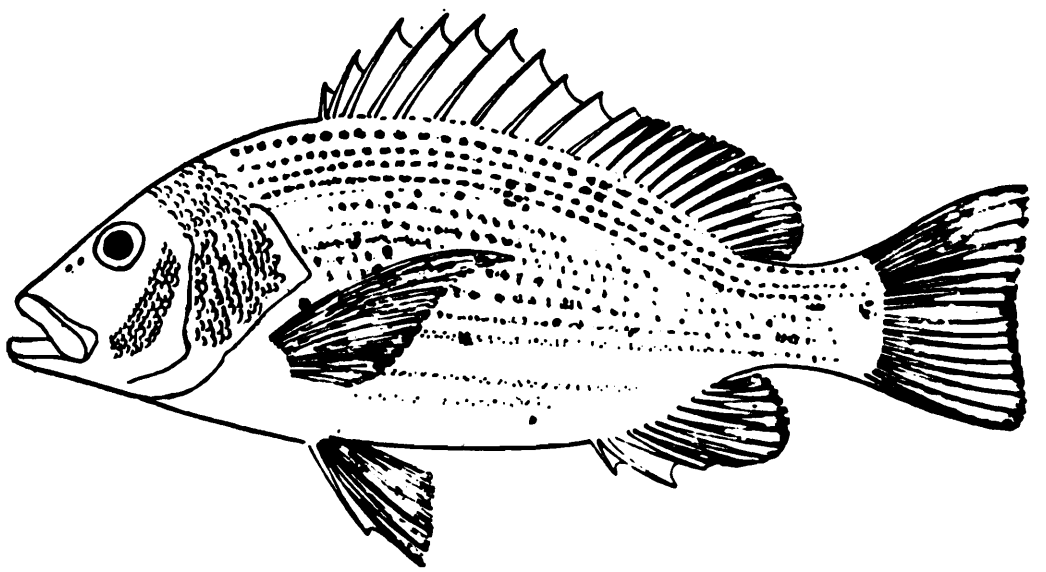
Anthias johni Bloch, 1792, *Naturges. ausland.* Fische, **6** : 113, 318 (type-locality : Surat).

Lutianus johnii : Day, 1875, *Fishes of India* : 42, pl. 13, fig. 1.

Lutianus yapilli (Cuvier) : Day, 1875, *Fishes of India* : 45, pl. 13, fig. 6.

Lutjanus johnii : Day, 1889, *Fauna Br. India*, Fishes, **1** : 476.

Lutjanus yapilli : Day, 1889, *Fauna Br. India*, Fishes, **1** : 479.



Text-fig. 212. *Lutjanus johni* (Bloch)

Common Names :

John's snapper	...	English
Rangu	...	Telugu
Parithi	...	Tamil
Chembolay	...	Malayalam
Chavri-tamb	...	Marathi
Tamb	...	Gujarati

Distinguishing Characters :

Moderately deep-bodied, with head profile straight or slightly convex ; a very slight preopercular notch and no interopercular knob. Teeth small in narrow bands in jaws, with an outer row of enlarged ones, with some moderate canines in upper jaw ; teeth on vomer small, in a Λ or Δ-shaped patch. Dorsal fin with 10 strong spines and 13 or 14 soft rays. Anal fin with 3 spines and 8 soft rays, the second and third spines strong and about same length. Caudal fin very slightly concave. Scales fairly large ; scales on head beginning above middle of eyes ; soft parts of dorsal and anal fins with a scaly sheath ; longitudinal scale-rows above lateral line parallel to it and those below lateral line horizontal ; lateral line with 48 to 50 scales.

Colour : body silvery green or bronze-red, with a distinct dark spot on each scale, appearing as longitudinal brown lines along each scale-row ; a large black blotch usually present above lateral line at junction of spinous and soft dorsal fins. Dorsal, anal and caudal fins dusky ; pectoral and pelvic fins hyaline.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow waters, also found down to depths of 80 m.

Fishery Information : Of minor fishery value in our area.

Lutjanus kasmira (Forsskal)

Sciaena kasmira Forsskal, 1775, *Descript. Animal.* : 46 (type-locality : Red Sea).
? *Lutianus bengalensis* (Bloch) : Day, 1875, *Fishes of India* : 33, pl. 10, fig. 4.
Lutjanus quinquelineatus (Bloch) : Day, 1875, *Fishes of India* : 40, pl. 12, fig. 3.
Lutianus quinquelinearis (Bloch) : Day, 1875, *Fishes of India* : 46, pl. 14, fig. 1.
Lutjanus kasmira : Day, 1889, *Fauna Br. India,* Fishes, **1** : 468.
Lutjanus caeruleolineatus (Ruppell) : Day, 1889, *Fauna Br. India,* Fishes, **1** : 474.
Lutjanus quinquelinearis : Day, 1889, *Fauna Br. India,* Fishes, **1** : 479.

Common Names :

Blue-banded snapper	...	English
Veri-keechan	...	Tamil
Reendumas, Manhan	...	Lakshadweep Is.

Distinguishing Characters :

A small, robust snapper with prominent preopercular notch, receiving the well-developed interopercular knob ; hind and lower margin of preoperculum strongly denticulate. Teeth in jaws villi-



Lutjanus johni (Bloch)

form, in narrow bands, with an outer series of distant enlarged ones; teeth on vomer in a narrow Λ-shaped patch. Dorsal fin with 10 spines and 14 or 15 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin emarginate. Longitudinal rows of scales above lateral line obliquely ascending to dorsal profile; scale-rows below lateral line parallel to axis of body; lateral line with 50 to 58 scales.

Colour : generally bright canary yellow, darker on upper part of body, with vivid cobalt blue longitudinal stripes usually bordered by brown lines. Large dark blotch below beginning of soft dorsal fin between 2nd and 3rd longitudinal bands. Fins yellow, upper pectoral rays slightly dusky.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This species is fairly common in the commercial catches of the Andaman Sea where the sea-perches form a major fishery contributing to about 20 to 30% of the total fish landed every year.

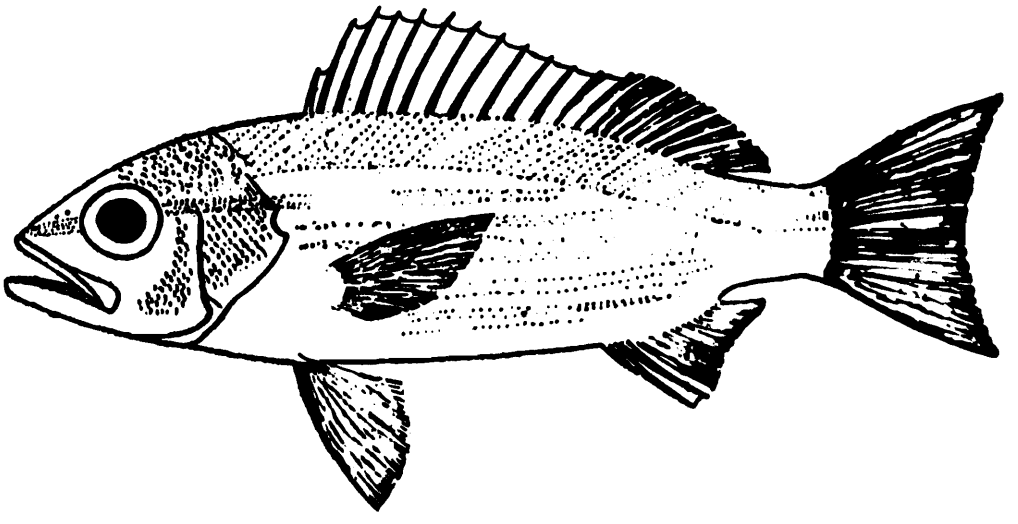
Lutjanus lineolatus (Ruppell)

[Text-fig. 213]

Diacope lineolatus Ruppell, 1828, *Altas Reise Nordl.* Afrika, *Fische. Rothen Meeres* : 76, pl. 19, fig. 3 (type-locality : Massaua, Red Sea).

Lutianus lineolatus : Day, 1875, *Fishes of India* : 35, pl. 11, figs. 1 & 2

Lutjanus lineolatus : Day, 1889, *Fauna Br. India*, Fishes, 1 : 469.



Text-fig. 213. *Lutjanus lineolatus* (Ruppell)

Common Names :

Bigeye snapper	...	English
Nooleni	...	Tamil

Distinguishing Characters :

Body elongate, with head profile moderately convex. Eyes large, 3.7 to 4.0 times in head length; interorbital space flat or slightly convex; distance from eye to upper jaw about 1/3 eye diameter. Teeth in jaws in bands with a weak outer row of conical teeth and an enlarged pair of canines in upper jaw, and 2 or 3 enlarged canines half-way along lower jaw; small teeth on vomer and palatines, vomerine teeth in a triangular-shaped patch with a posterior prolongation Dorsal fin with 11 spines and 11 or 12 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin slightly forked. Scales on head usually above middle of eyes; soft parts of dorsal and anal fins with a scaly sheath. Longitudinal rows of scales above lateral-line appear to rise upward to dorsal profile, scales below lateral-line running horizontally but curving slightly upward at base of caudal fin; lateral line with 45 to 51 scales.

Colour : yellowish or pale brown, with narrow orange-brown lines longitudinally along scale-rows on sides of body, these lines oblique on back and sides; a prominent dark yellow line along sides from tip of snout through eye to caudal fin.

Geographical Distribution : Indo-west Pacific.

Inhabits both shallow coral reef areas and down to depths of 80 m.

Fishery Information : Abundant along the Tamil Nadu coast, the peak fishing season is during the months of June and July.

Lutjanus lutjanus Bloch

Lutjanus lutjanus Bloch, 1790, *Naturges. ausland. Fische,* **4** : 107 (type-locality : Japan).

Lutjanus madras (Cuvier) : Day, 1875, *Fishes of India* : 47, pl. 14, fig. 3.

Lutjanus madras : Day, 1889, *Fauna Br. India,* Fishes, **1** : 480.

Common Name :

Rosy snapper	...	English

Distinguishing Characters :

A small, moderately elongate, compressed snapper with preopercular notch indistinct. Preorbital and suborbital rugose. Villiform teeth in narrow bands in jaws, with the outer series enlarged of which upper pair of wide-set canines and 2 or 3 laterals below; vomerine teeth in a triangular-shaped patch with a long median posterior prolongation. Dorsal fin with 10 spines and 13 or 14 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin slightly emarginate. Scales on head beginning above middle of eyes; temporal region scaly. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, hose below lateral line parallel to axis of body, somewhat ascending on caudal fin; lateral line with 48 to 52 scales; 6 rows of scales between lateral line and median dorsal-fin spines.

Colour : overall pale grey to yellowish with yellow mid-lateral stripe from eye to caudal-fin base; narrow dotted line of yellow or brown running along each horizontal scale-row; fins pale yellow.

Geographical Distribution : Coast of India, Sri Lanka and the Andaman Sea.

Fishery Information : Of minor fishery significance in our region.

Lutjanus lunulatus (Mungo Park)

Perca lunulata Mungo Park, 1797, *Trans Linn. Soc. Lond.*, **3** : 35, *pl.* (type-locality : Sumatra).

Lutianus lunulatus : Day, 1875, *Fishes of India* : 41, pl. 12, fig. 4.

Lutjanus lunulatus : Day, 1889, *Fauna Br. India*, Fishes, **1** : 475.

Common Name :

Crescent snapper ... English

Distinguishing Characters :

Depth of body about 2.7 times in standard length. Preopercular notch very shallow, hind and lower margin of preoperculum denticulate. Narrow bands of villiform teeth in jaws, with an outer enlarged series of which 2 are canines in front part of upper jaw; villiform teeth in a A-shaped patch on vomer. Dorsal fin with 10 spines and 13 or 14 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin emarginate. Scales on head beginning behind eyes, temporal region naked or nearly so. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those below lateral line parallel to axis of body; lateral line with 47 to 51 scales.

Colour : body brown generally, whitish below. Caudal fin with a broad semilunar (crescent) dusky vertical band.

Geographical Distribution : Pakistan, the Andaman Islands, the East Indies and the Philippines.

Fishery Information : Taken commercially only occasionally in the Andaman Sea in our region.

Lutjanus malabaricus (Bloch & Schneider)

[Text-fig. 214]

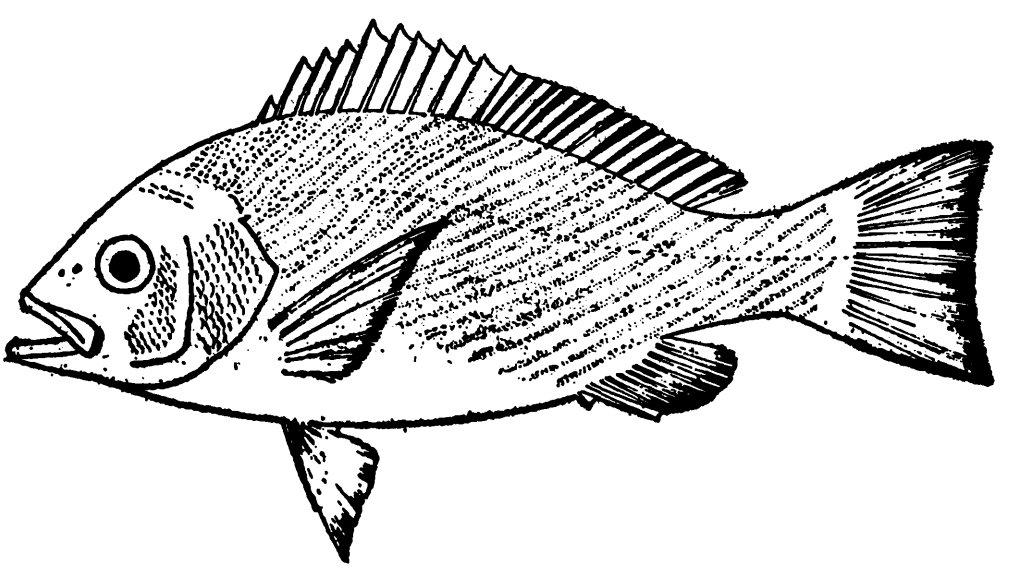
Sparus malabaricus Bloch and Schneider, 1801, *Syst. Ichth.* : 278 (type-locality : "in mari Indico").

Lutianus malabaricus : Day, 1875, *Fishes of India* : 31, pl. 9, fig. 4.

Lutianus dodecacanthus (Bleeker) : Day, 1875, *Fishes of India* : 33, pl. 10, fig. 3.

Lutjanus dodecacanthus : Day, 1889, *Fauna Br. India,* Fishes, **1** : 467.

Lutjanus malabaricus : Day, 1889, *Fauna Br. India,* Fishes, **1** : 466.



Text-fig. 214. *Lutjanus malabaricus* (Bloch & Schneider)

Common Names :

Malabar red-snapper	...	English
Tamb	...	Marathi

Distinguishing Characters :

Body deep, its depth 2.2 to 2.3 times in standard length, with head profile convex in adults; interorbital space strongly convex, 3.0 to 3.7 times in head length; edges of preoperculum finely serrated,

with a shallow notch; no conspicuous interopercular knob. Teeth small, in bands in jaws, with an outer row of caninoids and 2 or 4 moderate canines in front of upper jaw. Dorsal fin with 11 stout spines and 14 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin truncate or slightly emarginate. Scales beginning on head behind eyes; soft dorsal and anal fins with a scaly sheath Longitudinal rows of scales above and below lateral-line appear to rise obliquely to dorsal profile; lateral line with 57 to 60 scales.

Colour : body crimson red, silvery below, with dark stripes following the longitudinal rows of scales; a saddle-like blotch sometimes on caudal peduncle.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits shallow to moderately deep coastal waters, down to depths of at least 60 m.

Fishery Information : Commercially not taken in large quantities, although it probably forms a fair proportion of the snapper catch in our region.

Lutjanus monostigma (Cuvier)

Mesoprion monostigma Cuvier, 1828, *Hist. nat. Poiss*, **2** : 446 (type-locality : Seychelles).

Lutianus lioglossus Bleeker : Day, 1875, *Fishes of India* : 39, pl. 12, fig. 1.

Lutjanus lioglossus : Day, 1889, *Fauna Br. India*, Fishes, **1** : 473.

Common Name :

Onespot snapper ... English

Distinguishing Characters :

Body moderately elongate. Preopercular notch shallow and and indistinct : posterior margin of preoperculum finely denticulate. Mouth large, terminal; narrow bands of small teeth in jaws, with an outer series of large ones, with a pair of long canines near front of upper jaw; vomerine teeth in a narrow A-shaped band. Dorsal fin with 10 spines and 13 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin somewhat emarginate. Longitudinal rows of scales above lateral line obliquely ascending to dorsal profile scale-rows below lateral line parallel to axis of body; lateral line with 46 to 54 scales.

Colour : reddish-brown with purplish-blue tints, especially on head and upper part of body; dark grey blotch on lateral line below origin of soft dorsal fin, the blotch usually prominent in juveniles, smaller and lesser distinct in old specimens. Dorsal, anal, pelvic and and caudal fins orange.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor commercial significance in our region.

Lutjanus rivulatus (Cuvier)

Diacope rivulata Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 414, pl. 38 (type-locality : Coromandal asd Malabar coasts, and Pondicherry; Java; Red Sea).
Lutianus rivulatus : Day, 1875, *Fishes of India* : 37, pl. 11, fig. 4.
Lutjanus rivulatus : Day, 1889, *Fauna Br. India*, Fishes, **1** : 471.

Common Names :

Bluelined snapper	...	English
Cuttu-pirium	...	Tamil

Distinguishing Characters :

A large-size, deep-bodied snapper, its depth 2.0 to 2.2 times in standard length. Preopercular notch shallow in young specimens, narrower in adults; interopercular knob distinct; hind and lower preopercle edge denticulate. Villiform teeth in narrow bands in jaws, with outer series enlarged, the anterior of which in upper jaw moderate canines; vomerine teeth in a narrow Λ-shaped patch. Dorsal fin with 10 robust spines and 15 or 16 soft rays. Anal fin with 3 spines and 8 soft rays. Caudal fin slightly emarginate. Scales on head beginning behind eyes; temporal region nearly naked. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those below lateral line horizontal; lateral line with 46 to 47 scales.

Colour : generally olive-brown on back, paler to silvery on belly; head with numerous wavy white or bluish bands across cheeks; pearly blotch with black edge on lateral line below anterior part of soft dorsal fin; body scales each with white or bluish dot. Fins largely yellowish with shading of dusky brown; sometmes a dark brown cross-bar at level of pectoral-fin base.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in our region.

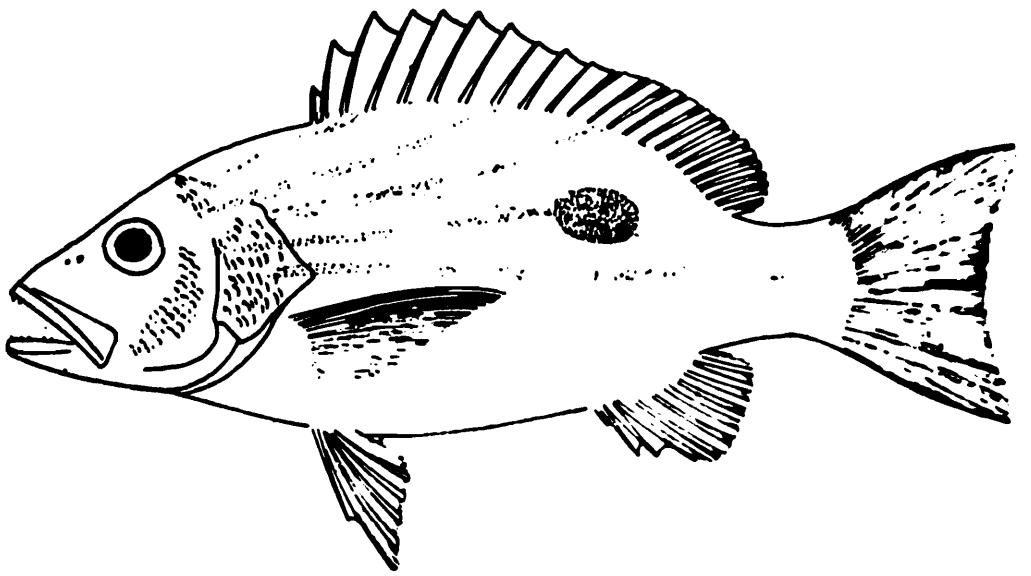
Lutjanus russelli (Bleeker)

[Text-fig 215]

Mesoprion russelli Bleeker, 1849, *Verh. Batav. Gen.*, **22**, Percoiden : 41 (type-locality : not known).

Lutianus fulviflamma Day (*nec* Forsskal) (*partim*), 1875, *Fishes of India* : 41, pl. 12, fig. 6.

Lutjanus fulviflamma : Day, 1889, *Fauna Br. India*, Fishes, **1** : 475.



Text-fig. 215. *Lutjanus russelli* (Bleeker)

Common Names :

Russell's snapper	...	English
Luggambanda, Chutton, Chottommetti	...	Lakshadweep Is.

Distinguishing Characters :

Body moderately deep, its depth 2.7 to 2.9 times in standard length, with head profile slightly concave. Preopercular notch shallow; vertical and horizontal edges of preoperculum finely serrated. Teeth small, in narrow bands in jaws, with an outer series of enlarged ones, a few near symphysis of upper jaw slender canines; small teeth on vomer in a triangular patch with a posterior projection. Dorsal fin with 10 spines and 14 or 15 soft rays. Anal fin with 3 spines and 8 or 9 soft rays; 2nd anal spine distinctly shorter than 3rd anal spine. Scales on head beginning behind eyes; soft parts of dorsal and anal

fins with a scaly sheath. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those below lateral-line horizontal; lateral line with 48 to 52 scales.

Colour : body reddish-brown or silvery, with a dark brown blotch on sides above lateral line below junction of spinous and soft dorsal fins; about 8 golden or light brown lines on body, lower ones horizontal and upper ones rising obliquely to dorsal profile. Margin of spinous dorsal fin black; pelvic and anal fins yellow.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow waters in rocky and coral reef areas.

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea, and the Gulf of Mannar in our region.

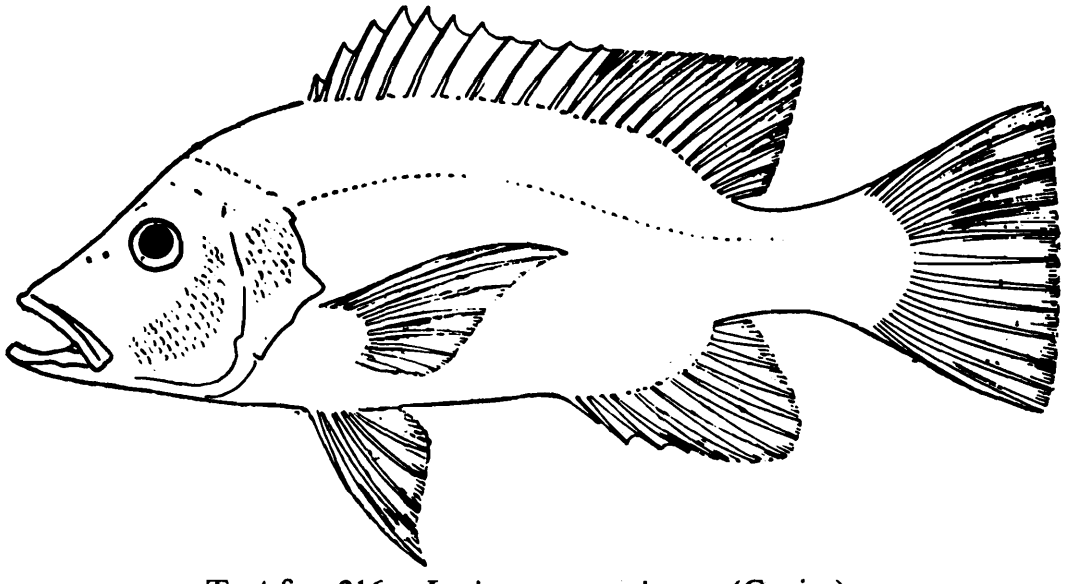
Lutjanus sanguineus (Cuvier)

[Text-fig. 216]

Diacope sanguinea Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 437 (type-locality : Massaua, Red Sea).

? *Lutianus erythropterus* Bloch : Day, 1875, *Fishes of India* : 32, pl. 10. figs. 1 & 2.

Lutjanus annularis (Cuvier) : Day, 1889, *Fauna Br. India*, Fishes, **1** : 466, fig. 147.



Text-fig. 216. *Lutjanus sanguineus* (Cuvier)

Common Names :

Bloodred snapper	...	English
Soosta	...	Oriya

Distinguishing Characters :

Body deep, its depth 2.2 to 2.4 times in standard length; head profile straight or concave; interorbital width 4.4 to 5.1 times in head

length. Preopercular notch shallow; interopercular knob inconspicuous; ventral and horizontal edges of preoperculum finely serrated. Teeth small, in a few rows in jaws, with an outer series of distant moderate caninoids; teeth on vomer in a Λ- shaped patch, palatine teeth in a narrow band. Dorsal fin with 11 spines and 14 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin slightly emarginate. Scales on head beginning behind eyes; soft parts of dorsal and anal fins with a scaly sheath. Longitudinal rows of scales above lateral line appear to rise obliquely to dorsal profile, those below lateral line horizontal anteriorly but some turning obliquely upward posteriorly; lateral line with 55 to 66 scales.

Colour : body deep red in adults; juveniles reddish-brown above, silvery below, with dark longitudinal stripes on body following scale-rows; a large saddle shaped blotch on caudal peduncle bordered by a silvery band; young specimens with broad dark band from eye to dorsal-fin origin, fades in older specimens.

Geographical Information : Tropical Indian Ocean to the East Indies, the Philippines, China, Japan and tropical coast of Australia.

Usually found in coastal waters down to depths of 100 m.

Fishery Information : Taken commercially in small quantities, mostly at Madras.

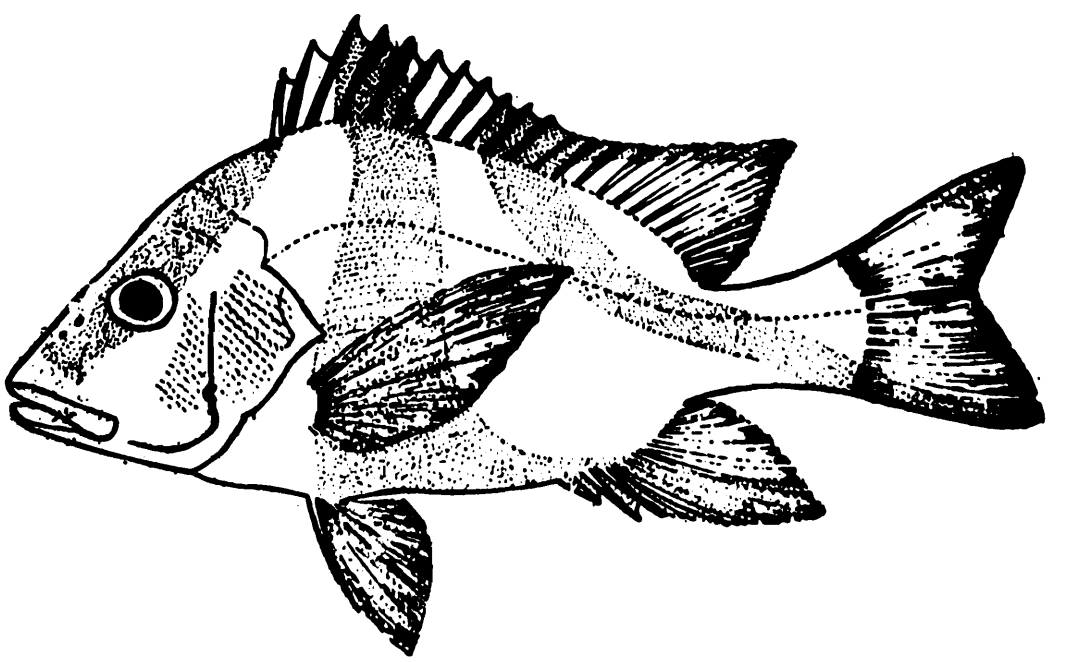
Lutjanus sebae (Cuvier)

[Text-fig. 217]

Diacope sebae Cuvier, 1828, *Hist. nat. Poiss.*, **2** : 411 (type-locality : Waigui; Java; Pondicherry).

Lutianus sebae : Day, 1875, *Fishes of India* : 30, pl. 9, fig. 3.

Lutjanus sebae : Day, 1889, *Fauna Br. India*, Fishes, **1** : 465.



Text-fig. 217. *Lutjanus sebae* (Cuvier)

Common Names :

Emperor red-snapper	...	English
Nai-kerruchi	...	Tamil

Distinguishing Characters :

Deep-bodied, its depth about 2 2 times in standard length; head profile straight or convex. Preopercular notch distinct and deep; interopercular knob marked, increasing with age until it becomes a short spike in large adults; vertical and horizontal edges of preoperculum finely serrated. Mouth terminal and large, with small teeth in narrow bands in jaws, with an outer series of more distant caninoids; small teeth on vomer in a triangular-shaped patch and on palatines in a very narrow band. Dorsal fin with 11 spines and 15 or 16 soft rays. Anal fin with 3 spines and 10 or 11 soft rays; soft parts of dorsal and anal fins pointed. Caudal fin somewhat emarginate. Scales on head beginning behind eyes; soft parts of dorsal and anal fins with a scaly sheath. Longitudinal scale-rows above lateral line appear to rise obliquely to dorsal profile, those below more or less horizontal anteriorly but appearing to rise obliquely posteriorly; lateral line with 45 to 57 scales.

Colour : body deep red in adults; juveniles and smaller adults pink with a dark red band from snout through eye to dorsal-fin origin, a 2nd dark band from middle of spinous dorsal-fin to pelvic fin, and a 3rd band running from base of last dorsal-fin spines obliquely downward across caudal peduncle and along lower rays of caudal fin; margin of soft dorsal fin, upper margin of caudal, and anterior rays of anal fins dark.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially only occasionally on the Tamil Nadu coast in our region. The Red-emperor is an excellent, edible fish of fine flavour and texture.

Lutjanus vaigiensis (Quoy & Gaimard)

Diacope vaigiensis Quoy and Gaimard, 1824, *Voyage Uranie, Zoologie* : 307 (type-locality : Waigui).

Lutianus marginatus (Cuvier) : Day, 1875, *Fishes of India* 44, pl. 13, fig. 5.

Lutjanus marginatus : Day, 1889, *Fauna Br. India,* Fishes, 1 : 478.

Common Names :

Waigeu snapper	...	English
Sungarah	...	Tamil
Tamb	...	Marathi

Distinguishing Characters :

Depth of body 2.2 to 2.6 times in standard length. Preopercular notch well developed, except in young specimens; hind and lower margins of preoperculum denticulate. Narrow bands of villiform teeth in jaws, with an outer series of enlarged ones, some of which are canines; crescentic band of villiform teeth on vomer. Dorsal fin with 10 spines, moderately strong, and 14 or 15 soft rays. Anal fin with 3 spines and 8 or 9 soft rays. Caudal fin emarginate. Scales on head beginning behind eyes, temporal region naked, sometimes with a few scales. Longitudinal rows of scales above lateral-line appear to rise obliquely to dorsal profile, those below lateral-line parallel to axis of body; lateral line with 47 to 50 scales.

Colour : body brown, paler and silvery below, sides with indistinct longitudinal bands. Caudal fin blackish, bordered by white; anal, pectoral and pelvic fins yellowish.

Geographical Distribution : Widespread in the tropical Indo-Pacific region.

Fishery Information : Commercially not taken in large quantities in our region, although it probably forms a fair proportion of the snapper catches on the Tamil Nadu and Kerala coasts.

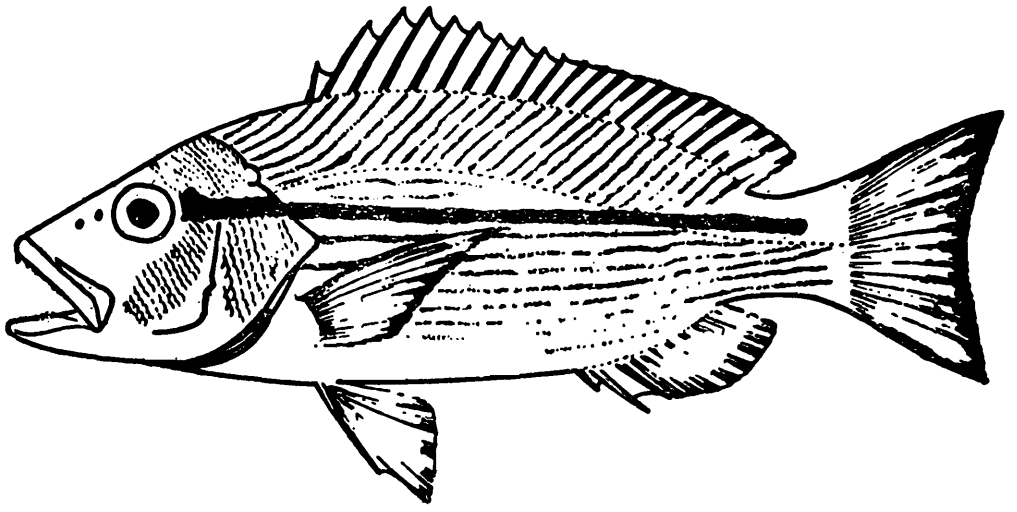
Lutjanus vittus (Quoy & Gaimard)

[Text-fig. 218]

Serranus vitta Quoy and Gaimard, 1824, *Voyage Uranie, Zoologie* : 315, pl. 58, fig. 3 (type-locality : Waigui).

Lutianus vitta : Day, 1875, *Fishes of India* : 46, pl. 14, fig. 2.

Lutjanus vitta : Day, 1889, *Fauna Br. India*, Fishes, 1 : 480.



Text-fig. 218 *Lutjanus vittus* (Quoy & Gaimard)

Common Name :

Brownstripe red-snapper ... English

Distinguishing Characters :

A small snapper with a broad space between eye and upper jaw, equal to eye-diameter in adults; eye-diameter about 1.2 times in snout length; preopercular notch distinct but shallow; vertical and horizontal edges of preoperculum finely serrated. Teeth small, in narrow bands in jaws, with an outer series of distant caninoids or canines; teeth on vomer in a triangular-shaped patch, sometimes with posterior prolongation. Dorsal fin with 10 spines and 13 soft rays. Anal fin with 3 spines and 7 or 8 soft rays. Caudal fin slightly emarginate or truncate. Scales on head beginning above middle of eyes; soft parts of dorsal and anal fins with a scaly sheath. Scale-rows above lateral-line appear to rise obliquely to dorsal profile, those below lateral-line horizontal; transverse scale-rows on body 6 or 7 above and 16 to 18 below lateral line.

Colour : upper part of body pale reddish yellow, with numerous oblique dark brown lines following scale-rows; lower part of body silvery, with horizontal light brown lines. A distinct broad black band from eye along sides of body to upper base of caudal fin; fins yellowish.

Geographical Distribution : India, Sri Lanka, through the East Indies, to the Philippines, China, Japan, tropical coast of Australia to Tahiti.

Inhabits moderately shallow waters in rocky and coral reef areas.

Fishery Information : Commercially not taken in large quantities, although it probably forms a fair proportion of the snapper catch in our area.

Genus **Macolor** Bleeker

Macolor Bleeker, 1860, *Acta Soc. Sci. Indo-Neerl.*, **8** : 25 (type-species : *Macolor typus* Bleeker = *Macolor niger* (Forsskal)).

Body deep and well compressed, with a markedly convex head profile. Preopercular notch deep and narrow, receiving the elongate interopercular knob. Gillrakers quite long and slender, more than 50 on lower arm of first arch. Teeth small, in narrow bands in jaws, with the outer row enlarged, those of the sides of lower jaw directed more or less obliquely forward ; vomer and palatines with narrow band of fine teeth. Dorsal fin with 10 spines; anal fin with 3 spines; soft parts of dorsal and anal fins forming long, pointed lobes. Pectoral fin long, with 15 or 16 soft rays. Caudal fin slightly forked, with shallow but broadly rounded lobes. Scales finely ctenoid; soft parts of dorsal and anal fins with a scaly basal sheath.

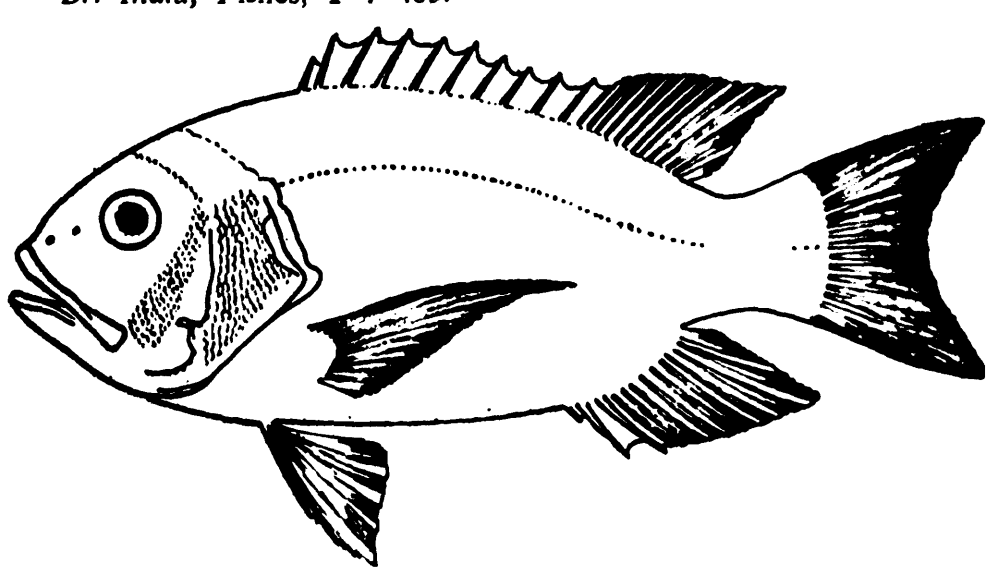
Monotypic.

Macolor niger (Forsskal)

[Text-fig. 219]

Sciaena nigra Forsskal, 1775, *Descript. Animal.* : 47 (type-locality : Djedda, Red Sea).

Lutjanus niger : Day, 1888, *Fishes of India*, Suppl. : 783; Day, 1889, *Fauna Br. India*, Fishes, **1** : 465.



Text-fig. 219. *Macolor niger* (Forsskal)

Common Name :

Black-and-white snapper ... English

Distinguishing Characters :

Body deep, with a markedly convex head profile. Teeth small, in narrow bands in jaws, with the outer row enlarged; fine teeth on vomer and palatines. Gillrakers quite long, numerous. Dorsal fin with 10 spines and 13 or 14 soft rays. Anal fin with 3 spines and 11 soft rays; soft parts of dorsal and anal fins pointed. Pectoral fins falciform, longer than head. Caudal fin truncate or slightly emarginate. Scales on head beginning above or behind eyes; scale-rows above lateral-line appear to rise obliquely to dorsal profile, those below lateral line horizontal; lateral line with 51 to 53 scales.

Colour : black and white round spots on back and 2 white horizontal bands, the first from operculum to middle of caudal fin, and the second along sides of belly; white also on nape, in front of eyes and in front of pectoral and pelvic fins. Posterior dorsal-fin spines, last soft rays of dorsal and pelvic fins, and tips of caudal fin also white. Adults may become completely black.

Geographical Distribution : Tropical Indo-west Pacific.

Fishery Information : Of minor fishery signifiance in our region.

Genus **Pinjalo** Bleeker

Pinjalo Bleeker, 1845, *Nat. Geneesk. Arch. Ned.-Indie*, **2** : 521 (type-species : *Caesio pinjalo* Bleeker).

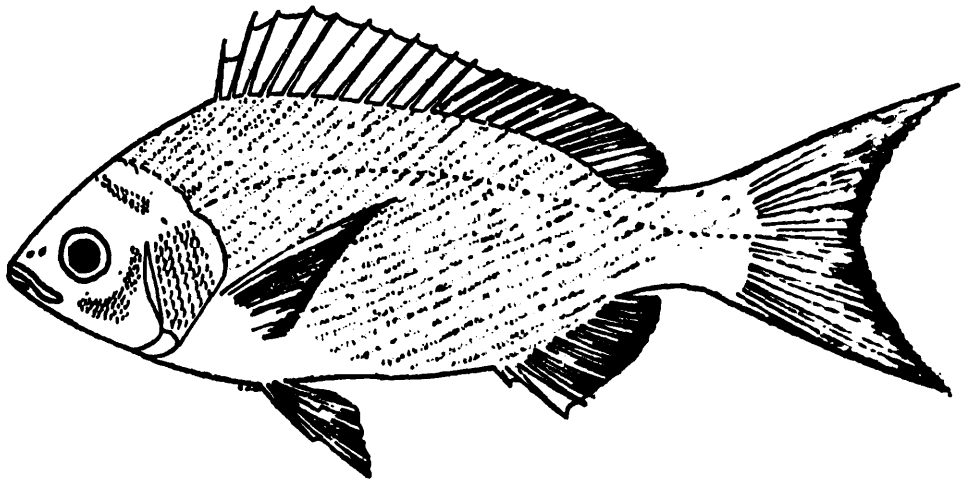
Body oblong and rather compressed, covered with small ctenoid scales; scale-rows both above and below lateral line appear to rise obliquely toward dorsal profile. Eye with an adipose eyelid; eye situated at mid-level of head behind tip of snout i e. horizontal axis from snout tip to middle of caudal fin cuts through the pupil of eye. Mouth rather small, somewhat upturned, no caniniform teeth in jaws. Dorsal fin with 11 moderately strong spines and 14 soft rays. Anal fin with 3 spines and 10 soft rays. Caudal fin lunate. Soft dorsal and anal fins with scales on their bases.

Monotypic.

Pinjalo pinjalo (Bleeker)

[Text-fig. 220]

Caesio pinjalo Bleeker, 1850, *Verh. Bat. Gen.*, 23, Macnioden : 10 (type-locality : Batavia) ; Day, 1875, *Fishes of India* : 94, pl. 24, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 532, fig. 160.



Text-fig. 220. *Pinjalo pinjalo* (Bleeker)

Common Names :

Pinjalo snapper	...	English
Polei-oolavai, Mette-mirrei	...	Tamil

Distinguishing Characters :

Body rather compressed, deep-bodied ; dorsal profile of head high and convex. Mouth rather small and oblique. Teeth in jaws in a few rows, the outer series slightly enlarged and pointed ; minute teeth on vomer and palatines. Dorsal fin with 11 spines and 14 soft rays. Anal fin with 3 spines and 10 soft rays. Caudal fin deeply lunate. Scales fine, beginning on head above middle of eyes ; scale-rows both above and below lateral line appear to rise obliquely towards dorsal profile ; lateral line with 65 to 68 scales.

Colour : body pink or red ; scales of body with a longitudinal dark stripe, forming ascending dark lines. Dorsal fin with a dusky margin ; pelvic and anal fins yellow to pink.

Geographical Distribution : East coast of India, through the East Indies, to the Philippines and China ; probably occurs in tropical Australia also.

Inhabits moderately shallow waters down to depths of 60 m.

Fishery Information : Taken in small quantities, mostly along the Tamil Nadu coast.

Genus **Pristipomoides** Bleeker

Pristipomoides Bleeker, 1852, *Nat. Tijdschr. Ned.-Indie,* **3** : 575 (type-species : *Pristipomoides typus* Bleeker).

Body elongate and moderately compressed. Head compressed; interorbital space flat and naked. Mouth moderate; tip of upper jaw normal. Canines large or small in jaws; villiform teeth on vomer and palatines, sometimes on tongue. Preopercle finely and feebly serrate, with broad flange. Dorsal fin continuous; last soft ray of dorsal and anal fins extended, conspicuously longer than preceding rays. Pectoral fins falcate, considerably longer than length of snout, with 16 or 17 soft rays. Caudal fin deeply forked. Scales moderate; jaws and front of head naked; soft dorsal and soft anal fins scaleless.

Fourteen species, 3 in our area.

KEY TO SPECIES

1 (a) No spots on dorsal fin, which is pale brown; body red/brown	...	*P. filamentosus**
(b) Dorsal fin with pale spots or a rosy reticulate pattern; body rosy	...	2
2 (a) Two golden bands edged with dark blue on snout and cheek, transverse vermiculations in interorbital region; suborbital wide, 7.0 times in head length at 15.0 cm standard length, 4.0 at 40 cm.	...	*P. multidens*
(b) No golden band on snout and cheek, longitudinal vermiculations in interorbital region; suborbital narrow, 8.4 times in head length at 15 cm standard length, and 5.8 to 7.3 times at 40 cm	...	*P. typus*

Pristipomoides multidens (Day)

Mesoprion multidens Day, 1870, *Proc. zool. Soc. Lond.* : 680 (type-locality : Andamans).

Anthias multidens : Day, 1875, *Fishes of India* : 27, pl. 7, fig. 4.

Aprion pristipoma Day (*nec* Bleeker), 1889, *Fauna Br. India,* Fishes, **1** : 533, fig. 161.

Common Name :

Day's jobfish ... English

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* *Pristipomoides filamentosus* (Valenciennes) reported recently from our region, is of no fishery importance.

Distinguishing Characters :

Body rather elongate and robust ; interorbital space flat ; suborbital wide, 4.0 to 5.5 times in standard length in adults. Teeth villiform bands in both jaws, with an outer row of distinct canines ; villiform teeth on vomer and palatines, no teeth on tongue. Dorsal fin with 10 spines and 11 soft rays. Anal fin with 3 spines and 8 soft rays ; last soft rays of dorsal and anal fins extended into short filaments. Pectoral fins long, equal to head length. Caudal fin deeply forked. Scales on head beginning behind eyes ; no scales on dorsal and anal fins.

Colour : body yellowish ; 2 golden bands edged with dark blue on snout and cheek, transverse vermiculations in interorbital region ; about 6 longitudinal yellow bands along the body.

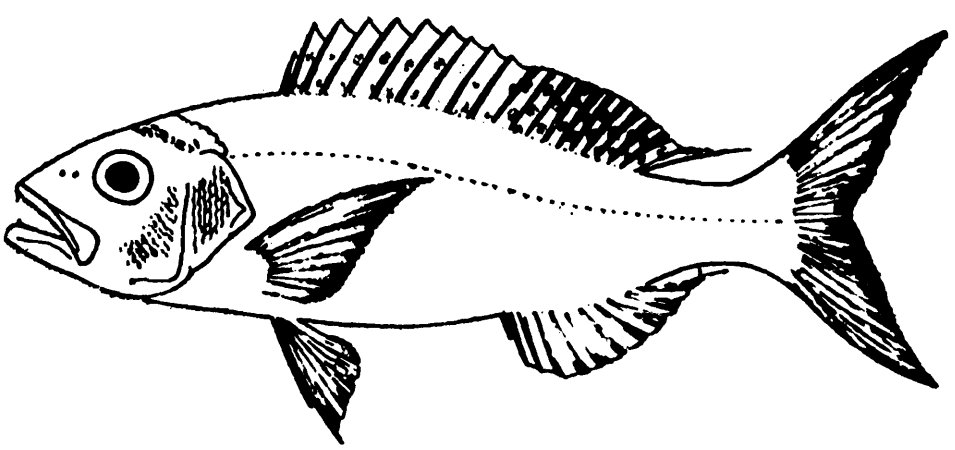
Geographical Distribution : East coast of Africa, the Andaman Islands and Japan.

Fishery Information : Taken commercially occasionally at Port Blair in the Andaman Sea.

Pristipomoides typus Bleeker

[Text-fig. 221]

Pristipomoides typus Bleeker, 1852, *Nat. Tijdschr. Ned.-Indie*, **3** : 515 (type-locality : Sibogha, Western Sumatra).



Text-fig. 221. *Pristipomoides typus* Bleeker

Common Name :

Sharptooth snapper ... English

Distinguishing Characters :

Body rather elongate and robust. Interorbital space flat. Teeth in jaws in bands, with an outer row of distinct canines. Dorsal fin with 10 spines and 11 soft rays. Anal fin with 3 spines and 8 soft rays; last soft rays of dorsal and anal fins extended into short filaments. Pectoral fins long, equal to head length. Caudal fin deeply forked. Scales on head beginning behind eyes; no scales on dorsal and anal fins.

Colour : body rosy-pink; longitudinal vermiculations in interorbital region. Fins with a yellow tinge; dorsal fin with pale spots or a rosy reticulate pattern.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Found in coastal areas in moderately deep water (40 to 80m.).

Fishery Information : This is one of the commonest species taken on trawling grounds in our region.

Family : Nemipteridae

[Threadfin Breams, Coral Breams]

Small to moderate sized, slightly compressed fishes. Mouth terminal, small to moderate; teeth in jaws conical, canines present in *Nemipterus* species in front of upper jaw (sometimes also in lower jaw); palatines and vomer toothless. Dorsal fin continuous, with 10 spines and 8 to 11 soft rays; anal fin with 3 spines and 5 to 8 soft rays. Pelvic fin with 1 spine and 5 soft rays; a medium-sized axillary scale present above each pelvic fin. Caudal fin forked or emarginate, the upper lobe often with a filament. Front of head naked (without scales), scales beginning above eyes and on cheek; cheek with 3 or more rows of scales; scales on body large, ctenoid, deciduous.

Nemipterids are snapper-like marine fishes of shallow coastal waters of the tropical Indo-Pacific; most brightly coloured.

Two genera, both in our area.

KEY TO GENERA

1 (a) Canine teeth present at least in upper jaw; no spine below eye..... ... **Nemipterus**

(b) No canine teeth in jaws; a backward-pointing spine below eye distinct, feeble or rarely absent..... ... **Scolopsis**

Genus **Nemipterus** Swainson

Nemipterus Swainson, 1839, *Nat. Hist. Animals,* **2**, Fishes : 223 (type-species : *Dentex filamentosus* Cuvier) ; Wongratana, 1973, *Proc. 3rd CSK Symposium, Bangkok* : 1 (Review).

Body rather elongate and moderately compressed, covered by fairly large scales, easily shed. Suborbital without a spine. Mouth moderate ; teeth small and conical, canine teeth present at least in upper jaw. Dorsal fin with 10 spines and 9 soft rays ; anal fin with 3 spines and 7 soft rays. Caudal fin forked. Scales on preopercle and opercle cycloid, on body ctenoid ; preopercle with 3 oblique rows of scales, its flange naked.

All species are bright rosy in colour, usually with yellow or greenish yellow stripes on body and vertical fins. They are remarkably uniform in external anatomy. They are essentially bottom dwellers and abound in open waters or in the vicinity of coral reefs.

Several species in the Indo-Pacific, 8 in our area. The species can be very readily separated by their colour patterns.

KEY TO SPECIES

1 (a) Upper lobe of caudal fin prolonged into a filament	...	2
(b) Upper lobe of caudal fin normal, with no filamentous prolongation	...	5
2 (a) First and second spines of dorsal fin close together and forming a single long filament	...	*N. luteus*
(b) Dorsal spines normal	...	3
3 (a) Canines anteriorly in both jaws ; dorsal-fin base and shoulder without vivid markings ; anal fin with or without median longitudinal yellow spots	...	*N. metopias**
(b) Canines anteriorly in upper jaw only, the lower jaw with uniform villiform teeth ; dorsal-fin base with a longitudinal yellow band ; anal fin with two or several yellow streaks ; a brilliant spot on shoulder	...	4

4 (a) Anal fin with several irrigular or wavy longitudinal yellow streaks; shoulder spot and caudal filament yellow; first spine of dorsal fin little longer than suborbital depth, or more than vertical diameter of eye	...	*N. japonicus*
(b) Anal fin with two yellow streaks; shoulder spot and caudal filament rosy red; first spine of dorsal fin somewhat shorter than eye-diameter or suborbital depth	...	*N. mesoprion*
5 (a) Dorsal-fin spines much longer than its soft rays, very slender; inter-spinous membrane of dorsal fin distinctly and deeply notched	...	*N. tolu*
(b) Dorsal-fin spines more or less sub-equal with its soft rays; inter-spinous dorsal-fin membrane entire or only slightly emarginate	...	*6*
6 (a) Five to seven distinctly or slightly curved greenish-yellow longitudinal streaks below lateral line; anal fin with three longitudinal yellow streaks; tip of upper caudal fin lobe pale rosy	...	*N. delagoae**
(b) Two to eight straight lateral yellow bands or streaks on sides of body; base of anal fin with or without a single yellow streak; tip of upper upper caudal-fin lobe yellow or sulphur yellow	...	*7*
7 (a) Two principal longitudinal bands on flanks of body (other less distinct streaks may also be present); anal fin milky white	...	*N. bleekeri*
(b) Five to seven yellow streaks along back and sides or below; dorsal and anal fins each with a basal yellow streak	...	*N. hexodon*

* *Nemipterus metopias* (Bleeker) recently reported from Madras in our area, and *Nemipterus delagoae* Smith are of no fishery value in our area.

Nemipterus bleekeri (Day)

Synagris bleekeri Day, 1875, *Fishes of India* : 92, pl. 24, fig. 1 (type-locality : Madras) ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 528

Common Name :

Bleeker's threadfin-bream ... English

Distinguishing Characters :

Body slightly compressed, its depth 3 1 to 3.4 times in standard length. Suborbital depth 1.6 to nearly equal in eye-diameter with growth. A broad band of villiform teeth in jaws, the outer row slightly enlarged with a few canines in front of both jaws. Dorsal fin with 10 spines and 9 soft rays ; anal fin with 3 spines and 7 soft rays ; no filaments in fins. Pelvic fin with the outer ray slightly prolonged. Scales fairly large ; scales in lateral series 47 to 49.

Colour : body reddish above, silvery with bright yellow bands on sides and beneath ; a blue spot on opercle. Fins reddish ; dorsal-fin margin orange, with a golden streak along its base.

Geographical Distribution : India, Sri Lanka, through the Straits of Malacca, Gulf of Thailand and Vietnam.

Bottom living at depths of 30 to 100 m.

Fishery Information : This species constitutes a minor fishery at Kakinada (Andhra Pradesh) and on the Tamil Nadu Coast

Nemipterus hexodon (Quoy & Gaimard)

Dentex hexodon Quoy and Gaimard, 1824, *Voy. Uranie, Zoologie* : 301 (type-locality : Timor).

Synagris notatus (Day, 1870) : Day, 1875, *Fishes of India* : 93, pl. 24, fig. 3.

Synagris taeniopterus Day (*nec* Valenciennes), 1889, *Fauna Br. India*, Fishes, **1** : 529.

Nemipterus furcosus Munro (*nec* Valenciennes), 1955, *Marine and Freshwater Fishes Ceylon* : 141, pl. 26, fig. 405.

Common Name :

Red-spot threadfin-bream English

Distinguishing Characters :

Body slightly compressed, its depth 2.9 to 3.1 times in standard length, deeper than the head. Suborbital rectangular, its depth about

equal to vertical eye-diameter. A broad band of villiform teeth in front of both jaws, the outer row enlarged with 4 to 6 conspicuous canines at front of upper jaw and 6 large canines at front of lower jaw. Dorsal fin with 10 spines and 9 soft rays; anal fin with 3 spines and 7 soft rays. No filaments in fins; upper lobe of caudal fin pointed in young, blunt in older fish. Scales moderately large; lateral line with 45 to 50 scales.

Colour : body with 6 or 7 yellow longitudinal stripes along flanks, the stripe below lateral line broadest; a brilliant spot (upper part red, lower part yellow-green) below origin of lateral line. Dorsal fin rosy. with a yellow margin and a well-defined green/yellow band, paralleled above and below by translucent blue bands from base of first spine to upper half of last soft ray. Pectoral fins pale rosy, its inner side of base golden yellow; pelvic fins hyaline, with second and third rays pinkish. Anal fin milky white, with yellow line from base of first spine to tip of last soft ray. Caudal fin usually with white lower margin and yellow tip on upper lobe.

Geographical Distribution : Indo-west Pacific.

Bottom living, to depths of at least 120 m.

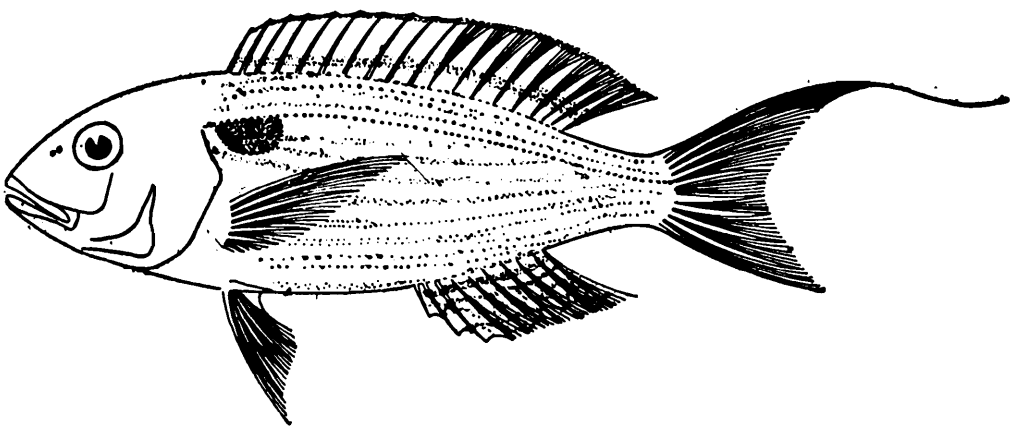
Fishery Information : Of minor fishery value in our area.

Nemipterus japonicus (Bloch)

[Text-fig. 222]

Sparus japonicus Bloch, 1791, *Naturges Ausland. Fische*, **5** : 110, pl. 277, fig. 1 (type-locality : ? Japan).

Synagris japonicus : Day, 1875, *Fishes of India* : 92, pl. 24, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **1** : 527.



Text-fig. 222. *Nemipterus japonicus* (Bloch)

Common Names :

Japanese threadfin-bream	...	English
Sallenganti	...	Telugu
Changarah, Thullunkendai	...	Tamil
Puthiyappalla-kora	...	Malayalam
Madumagala, Madmal	...	Kannada
Bammi	...	Marathi

Distinguishing Characters :

Body slightly compressed, its depth 2.6 to 3.3 times in standard length, as deep or deeper than head. Suborbital depth about equals vertical eye-diameter. Teeth in lower jaw very fine, numerous, the outer row slightly enlarged but no canines; those on upper jaw similar but with 6 to 12 canines in front. Dorsal fin with 10 spines and 9 soft rays; anal fin with 3 spines and 7 soft rays. Caudal fin forked, its upper lobe prolonged into a distinctive filament; no filaments in other fins. Scales fairly large; lateral line with 43 to 48 scales.

Colour : upper part of body rosy, below silvery; a brownish saddle on top on head; 1 to 3 longitudinal yellow streaks above lateral line, 7 to 9 below, and a yellow band along belly; a bright orange/red blotch near origin of lateral line. Dorsal fin rosy, with yellow/orange margin and a broad yellow band along bases; anal fin milky white or pale blue with faint, wavy, yellow lines which may form a reticulate pattern in large fish. Caudal fin rosy, its upper lobe and filament bright yellow.

Geographical Distribution : Mediterranean and the Indo-west Pacific.

Fishery Information : *Nemipterus japonicus* is the most common nemipterid in the catches both from the west and east coasts of India. Along the Andhra-Orissa coast, this species forms an important resource in the area contributing as high as 13.8% of the 'All Fish' catches or about 23% when considered as part of the 'Miscellaneous-Small fish' catches; the peak months of abundance of this species are generally from January to April, and occasionally the months of October to December and May-June are also marked with good catch rates in this region. The fishery along the Andhra-Orissa coast is supported by fish which have completed one year; November marks the commencement of spawning and this species spawns for the first time

at 160-170 mm and for a second time at 220 mm. Further, it has been reported that in the depth zone 75-100 m off the Kerala coast *N. japonicus* predominated in exploratory and experimental fishing operations often forming 75% of the trawl catch. At Porto Novo (Tamil Nadu) the species occurs in abundance from October to February and is generally caught in 'Thoori-valai' or bag nets operated from catamarans. The fish also occurs in shoals off Tuticorin (Tamil Nadu) during August and September.

Nemipterus luteus (Schneider)

Coryphaena lutea Schneider, 1801, *Syst. Ichth. Bloch* : 297, pl. 58 (type-locality : Tranquebar).

Synagris striatus (Valenciennes) : Day, 1875, *Fishes of India* : 90 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 526.

Synagris luteus : Day, 1875, *Fishes of India* : pl. 8, fig. 5.

Nemipterus nematophorus (Bleeker) : Indra, 1982, *Indian J. Fish.*, **28** : 290.

Common Names :

Doublewhip threadfin-bream	...	English
Kandal-meen	...	Tamil

Distinguishing Characters :

Body slender, slightly compressed, its depth 3.2 to 3.4 times in standard length. Teeth in villiform bands in jaws, the outer row slightly enlarged, with 4 to 8 canine teeth in front of upper jaw. Dorsal fin with 10 spines and 9 soft rays, the first and second spines very close together and forming a single long filament ; anal fin with 3 spines and 7 soft rays. Caudal fin forked, its upper lobe prolonged into a filament.

Colour : body rosy above, silvery below, with longitudinal yellow stripes along flanks below lateral line ; belly with a yellow stripe on each side of silvery midline ; a yellow spot below origin of lateral line. Pectoral and pelvic fins light pink. Caudal fin rosy.

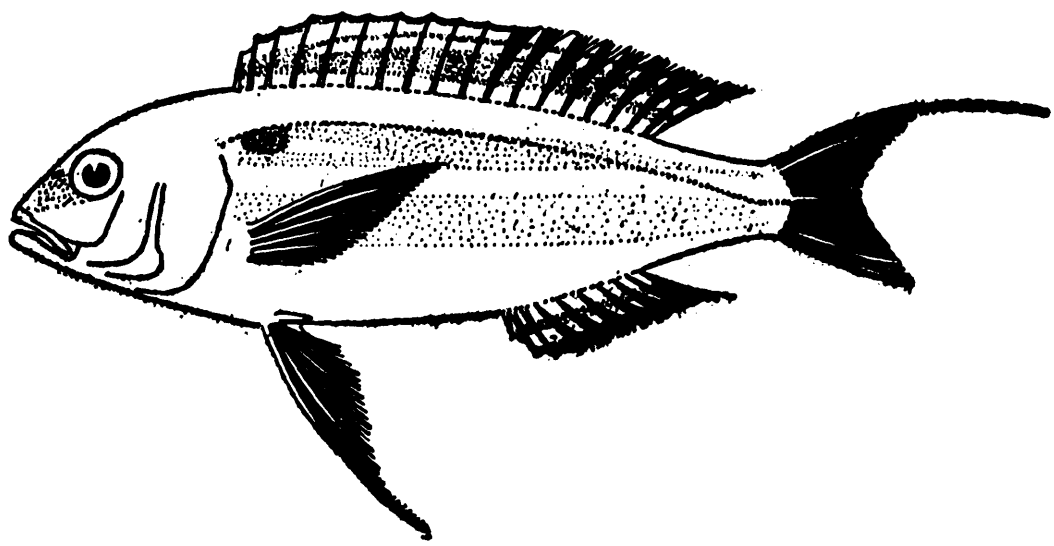
Geographical Distribution : East coast of India, the East Indies and the Philippines (as *Nemipterus nematophorus*).

Fishery Information : This species is frequent tn the trawl catches off Kakinada (Andhra Pradesh) in fair quantities at depths over 55 m., the peak period of abundance being January-March ; also fairly common at Madras.

Nemipterus mesoprion (Bleeker)

[Text-fig. 223]

Dentex mesoprion Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie*, 4 : 255 (type-locality : Priaman, Sumatra).



Text-fig. 223. *Nemipterus mesoprion* (Bleeker)

Common Name :

Redfilament threadfin-bream ... English

Distinguishing Characters :

Body slender, its depth 3.2 to 3.5 times in standard length, usually deeper than head. Suborbital depth about half of vertical eye-diameter. Teeth villiform tn jaws, the outer row slightly enlarged and conical, 4 to 10 slender canine teeth in front of upper jaw, none on lower jaw. Dorsal fin with 10 spines and 9 soft rays ; anal fin with 3 spines and 7 soft rays ; no filaments in these fins. Caudal fin forked, its upper lobe prolonged into a fine short filament. Scales fairly large ; lateral line with 45 to 47 scales.

Colour : upper half of head and body rosy, below silvery ; head with yellow streaks from eye to below nostrils and from eye to middle of upper jaw ; two broad pale yellow streaks along flanks, but other pale yellow lines may also be vtsible ; a red spot below origin of lateral line. Dorsal fin with a yellow margin and a broad yellow median longitudinal band which subdivides towards the caudal fin into three yellow bands separated by blue lines ; anal fin chalky pinkish with two pale yellow longitudinal steaks ; pelvic fins pink with elongated first rays deep red, and axillary scales yellow ; caudal fin reddish, median rays yellowish.

Geographical Distribution : Andhra coast of India, Andaman Sea, through the Straits of Malacca, and Gulf of Thailand.

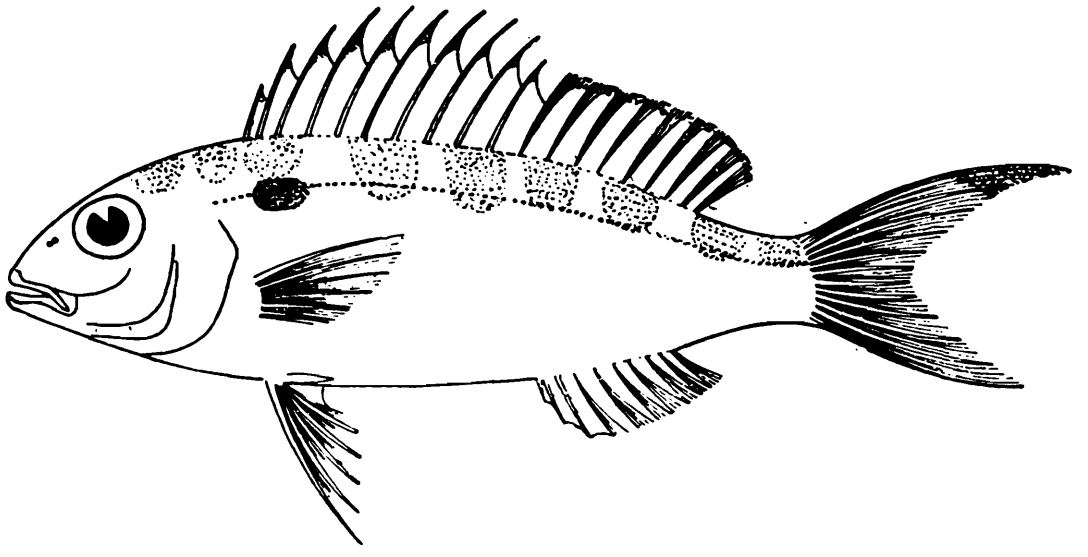
Fishery Information : This species is fairly common in the trawl catches at Kakinada (Andhra Pradesh) (Murthy—in press).

Nemipterus tolu (Valenciennes)

[Text-fig. 224]

Denter tolu Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 249 (type-locality : Pondicherry ; New Guinea).

Synagris tolu : Day, 1875, *Fishes of India* : 91, pl. 23, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 528, fig. 159.



Text-fig. 224. *Nemipterus tolu* (Valenciennes)

Common Names :

Notched threadfin-bream	...	English
Cundil, Lomia	...	Tamil
Kadakela	...	Marathi

Distinguishing Characters :

Body slender, its depth 3 to 3.6 times in standard length, slightly greater than or equal to depth of head. Suborbital depth 0.5 to 0.7 times in vertical eye-diameter. Teeth in villiform bands in front of both jaws, narrowing laterally to a single row of larger pointed teeth, outer row enlarged with 6 or 7 canine teeth in front of upper jaw and 6 to 8 conical teeth in front of lower jaw. Dorsal fin with 10 slender spines and 9 soft rays, its spines much longer than the soft rays ; interspinous membrane of dorsal fin distinctly and deeply notched ;

anal fin with 3 spines and 7 soft rays. Pectoral fins comparatively short; no filaments in fins. Scales fairly large; lateral line with 47 to 50 scales.

Colour : body rosy, with several faint yellow streaks along flanks; upper part of body with 8 or 9 indistinct, large saddle-like blotches; a large reddish brown spot at anterior end of lateral line; head reddish with a yellow streak from end of jaws to edge of operculum. Caudal fin rosy.

Geographical Distribution : Indo-west Pacific.

Bottom-living. usually in waters shallower than 60 m., but sometimes at greater depths.

Fishery Information : Fairly common in the commercial catches of the Tamil Nadu coast during August and September.

Genus **Scolopsis** Cuvier

Scolopsis Cuvier, 1817, *Regne Animal*, **2** : 280 (type-species : *Scolopsides kurita* Cuvier) ; Manikyala-Rao and Srinivasa-Rao, 1981, *Proc. K. ned. Akad. Wet.*, (Sr. C), **84**(1) : 131 (Review).

Body oblong and moderately compressed, covered with ctenoid scales. Eyes rather large; suborbital spine distinct, feeble or totally absent. Preoperculum margin serrated. Mouth moderate; teeth in jaws small and slender. Dorsal fin weakly notched, with 10 spines and 9 to 11 soft rays; anal fin with 3 spines and 7 or 8 soft rays. Scales on head extending to between eyes, or somewhat further.

Numerous species known, 17 in our area.

KEY TO SPECIES

1 (a)	Spine below eye feeble or absent (subgenus *Parascolopsis*)	...	2
(b)	Suborbital spine distinct (subgenus *Scolopsis*)	...	7
2 (a)	Suborbital spine totally absent	...	3
(b)	Suborbital spine feeble	...	4
3 (a)	Posterior margin of suborbital serrated	...	*S. boesemani**
(b)	Posterior margin of suborbital smooth	...	*S. aspinosa**

4 (a) Gill-rakers on first arch moderately long, close-set; lower gill-rakers 11 or 12	...	*S. eriomma**
(b) Gill-rakers on first arch short and tubercular; lower gill-rakers 5 to 7	...	5
5 (a) Dorsal fin with a low dusky bloten from eighth or ninth spine to first ray	...	*S. jonesi**
(b) Dorsal fin uniformly pale, with no dusky blotch	...	6
6 (a) Interorbital width equal to eye-diameter; body uniform reddish, with a rather distinct silvery lateral stripe	...	*S. townsendi**
(b) Interorbital width 1.2 to 1.4 times in eye-diameter; body with 5 or 6 red ill-defined transverse bands on back	...	*S. inermis**
7 (a) Scales 36 to 40 along lateral line	...	8
(b) Scales 42 or more along lateral line	...	9
8 (a) Scales on head beginning somewhat before frontborder of eyes; no bands on body, scales with silvery spots	...	*S. margaritifer**
(b) Scales on head beginning between eyes, two longitudinal bands on body	...	*S. leucotaenia**
9 (a) Maxillary with its upper posterior edge denticulated; silvery stripe on back below dorsal fin	...	*S. ciliatus*
(b) Maxillary smooth, without denticulate ridge	...	10
10 (a) Scales $4\frac{1}{2}$ to 5 rows between lateral line and median dorsal spines	...	11
(b) Scales $3\frac{1}{2}$ rows between lateral line and median dorsal spines	...	12
11 (a) A more or less distinct broad lateral band on body	...	*S. dubiosus*
(b) A silvery streak from muzzle across preorbital to eye, continued on preoperculum and generally also on operculum; a light longitudinal band on back, close below dorsal fin	...	*S. phaeops*

12 (a) Scales on head beginning between anterior part of eyes, at some distance behind nostrils	...	13
(b) Scales on head beginning before eyes, just behind nostrils	...	15
13 (a) Scales 49 to 51 along lateral line; upper part of pectoral-fin base with red spot; body with faint, oblique, blue and yellow vertical lines	...	*S. taeniopterus**
(b) Scales 44 to 46 along lateral line	...	14
14 (a) Scales on flanks of body with a basal black spot; 4 longitudinal light bands on body	...	*S. ghanam**
(b) No scales on flanks with basal black spot; 1 to 3 white or yellowish parallel bands, variably connected behind by short pale bars	...	*S. cancellatus**
15 (a) Depth of body 2.1 to 2.3 times in standard length; second anal spine much stronger and distinctly longer than the third; scales about 42 in lateral line	...	*S. vosmeri*
(b) Depth of body 2.6 to 2.8 times in standard length; second anal spine not much longer than the third; scales 44 to 46 in lateral line	...	16
16 (a) Eye-diameter more than snout length or interorbital width; upper caudal lobe not prolonged into a filament	...	*S. frenatus**
(b) Eye-diameter equal to snout length or interorbital width; upper caudal lobe prolonged into a filament	...	*S. bilineatus**

* *Scolopsis boesemani* Manikyala-Rao & Srinivasa-Rao, *S. aspinosa* Manikyala-Rao & Srinivasa-Rao, *S. jonesi* (Talwar) and *S. townsendi* (Boulenger) have been described in recent years from our region and are of no fishery importance; *Scolopsis leucotaenia* (Bleeker), *S. margaritifer* (Valenciennes), *S. phaeops* (Bennett), *S. taeniopterus* (Valenciennes) and *S. ghanam* (Forsskal) are rather uncommon in the commercial catches of our area; *Scolopsis frenatus* (Cuvier) has been reported only once from the Laccadive Sea in our region; *Scolopsis cancellatus* (Valenciennes) and *S. bilineatus* (Bloch) known only from the Andaman Sea and both these species are uncommon in the commercial catches; *S. ariomma* Jordan & Richardson is known from Sri Lanka and is likely to occur in our area; the occurrence of *S. hermis* (Schlegel) in our area is most uncertain.

Scolopsis ciliatus (Lacepede)

Holocentrus ciliatus Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 333, 367 (type-locality : not known).

Scolopsis ciliatus : Day, 1875, *Fishes of India* : 89, pl. 23, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 525.

Common Name :

Monocle bream ... **English**

Distinguishing Characters :

Body moderately elongate, its depth 2.8 to 3.0 times in standard length. A short but stout backward-pointing spine just below eye, one to three small spines inferior to it. Eyes moderately large, its diameter greater than snout length. Maxillary with its upper posterior edge denticulated. Teeth numerous, small and pointed, in narrow bands in both jaws, the outer series enlarged. Dorsal fin with 10 spines and 9 soft rays, the spines and soft rays of equal height. Anal fin with 3 spines and 7 soft rays. Pelvic fin with the first soft ray produced into a short thread-like filament. Caudal fin moderately forked. Scales quite large, covering body and most of head ; scales on head extending to a line joining anterior nostrils ; preoperculum with 4 rows of transverse scales and 2 rows of scales on margin ; lateral line complete, with 40 to 45 scales.

Colour : brown on upper parts of head and body, silvery on sides and belly ; a broad silvery band beneath posterior part of spinous dorsal fin, narrowing anteriorly and posteriorly ; tip of upper jaw and snout black ; about 6 longitudinal rows of pale yellow spots along scale-rows in middle of side of body. Fins dusky grey, except pelvic fins which are hyaline ; dark brown blotch in axil of pectoral fin.

Geographical Distribution : Mauritius, India, the Andamans, through the East Indies, to the Philippines and Soloman Islands.

Remarks : *Scolopsis ciliatus* is the only species of this family with the upper posterior edge of the upper jaw (maxilla) serrated. When fresh, the bright silvery band below the dorssl fin is distinctive.

Fishery Information : This species is fairly common in the commercial catches at Port Blair (Andamans).

Scolopsis dubiosus Weber

Scolopsis bimaculatus Day (*nec* Ruppell), 1875, *Fishes of India* : 85, pl. 22, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 521.

?*Scolopsis monogramma* Day (*nec* Valenciennes), 1875, *Fishes of India* : 86, pl. 22, fig. 5.

Scolopsis dubiosus Weber, 1913, *Siboga Exped.*, 57 (Fische) : 382 (type-locality : Makassar, Celebes).

Common Names :

Two-spot monocle bream	...	English
Kundul	...	Tamil

Distinguishing Characters :

Body moderately deep, its profile steeply curved between upper jaw and dorsal-fin ; body depth 2.7 to 3.2 times in standard length. Eyes fairly large, with a strong, backward pointing spine below it, and with or without small spines below suborbital spine. Narrow bands of slender and pointed teeth in both jaws, outer series enlarged. Dorsal fin with 10 spines and 9 soft rays, the spines and soft rays of equal height. Anal fin with 3 spines and 6 or 7 soft rays. Pelvic fin with the first soft ray produced into slender filament. Caudal fin shallowly forked, its upper lobe longer than lower, and produced into filament in larger adults. Scales moderately large, on head beginning between eyes far behind a line joining the anterior nostrils ; snout and suborbital naked ; $4\frac{1}{2}$ to 5 rows of scales between lateral-line and median dorsal-fin spines.

Colour : body silvery, somewhat darker on upper surface, with a broad dark grey band along side just below lateral line ; vivid orange and blue band between the eyes just behind nostrils. Dorsal fin tinged with yellowish orange ; caudal fin yellowish orange, blue along posterior margin and lower edge ; other fins hyaline.

Geographical Distribution : India, Sri Lanka, the East Indies, the Philippines and Western Australia.

Remarks : The lateral band is a good distinguishing character in fresh specimens of this species. Other distinctive features include the rather long snout with upper jaw longer than lower jaw, and the soft dorsal fin about same height as spinous dorsal fin.

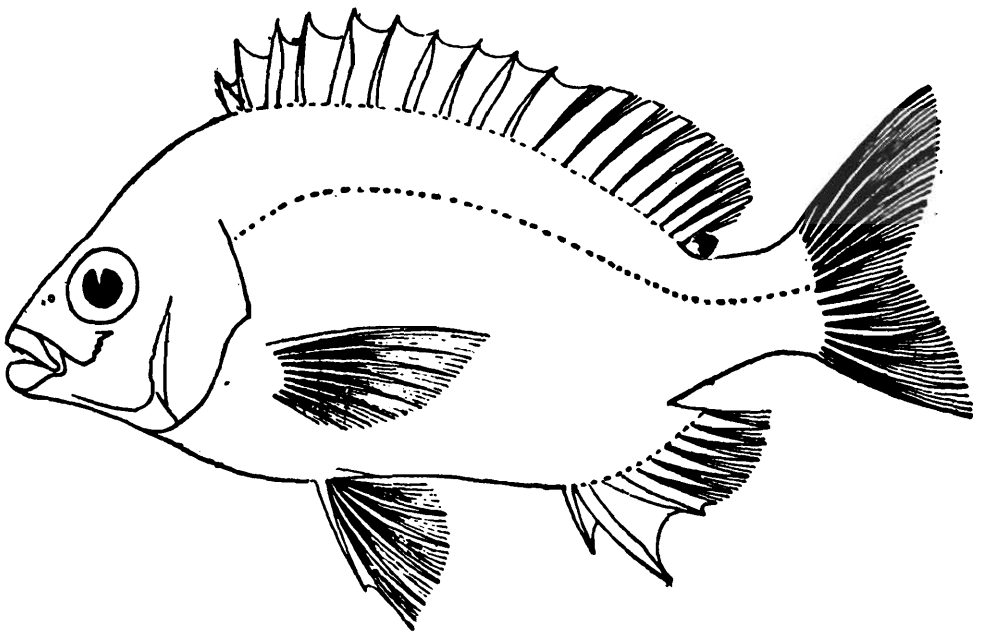
Fishery Information : Of minor commercial significance in our area.

Scolopsis vosmeri (Bloch)

[Text-fig. 225]

Anthias vosmeri Bloch, 1792, *Naturges. Ausland. Fische,* **6** : 120, pl. 321 (type-locality : Japan Sea).

Scolopsis vosmeri : Day, 1875, *Fishes of India* : 87, pl. 23, figs. 1-3; Day, 1889, *Fauna Br. India, Fishes,* **1** : 524.



Text-fig. 225. *Scolopsis vosmeri* (Bloch)

Common Names :

Whitecheek monocle bream	...	English
Kundul, Pompton	...	Tamil

Distinguishing Characters :

Deep-bodied and compressed, its dorsal profile very convex; body depth 2.1 to 2.3 times in standard length. Mouth terminal; jaws with numerous villiform teeth. Eyes large, a stout flat backward pointing spine below it. Posterior edge of preoperculum only slightly indented, and with small feeble serrations. Dorsal fin with 10 spines and 9 or 10 soft rays; the fin spines stout and about same height as soft rays. Anal fin with 3 stout spines, the second very broad and longer than the third, and with 7 or 8 soft rays. Pelvic fin with its first soft ray sometimes elongated into a short, thread-like filament. Caudal fin slightly forked. Scales large, those on top of head beginning in front of anterior nostrils, snout and suborbital naked; on preoperculum 5 or 6 transverse rows of scales and 1 or 2 rows on margin; lateral-line with about 42 scales; scale-rows $3\frac{1}{2}$ between lateral-line and mid-dorsal fin spines.

Colour : body colour variable, usually dark with reddish purple tinge; a broad and bright silvery vertical silvery band across operculum from top of head; sometimes a silvery horizontal band immediately below lateral-line from operculum to below middle of dorsal fin. Scales on sides of body with dark spots. Fins grayish, tinged red.

Geographical Distribution : Tropical Indian Ocean, through the East Indies, to Japan, China and the Philippines.

Inhabits inshore waters, mostly around islands and reefs.

Fishery Information : Of minor commercial significance on the Tamil Nadu coast.

FAMILY : LOBOTIDAE
[Tripletails]

Body oblong, slightly compressed, covered with weakly ctenoid scales of moderate size. Preoperculum serrated with small spines. Teeth in jaws villiform, in narrow bands, outer series slightly enlarged; no teeth on roof of mouth. Single dorsal fin, without notch, with 12 strong spines and 13 to 17 soft rays. Anal fin with 3 strong spines. Dorsal and anal fins rounded and symmetrical so that with the tail they appear to be a single three-lobed fin. Caudal fin rounded.

The lobotids inhabit inshore salt water as well as brackish and freshwater. Two genera known, both in our region.

KEY TO GENERA

1 (a) Preoperculum coarsely serrated; eye located in anterior third of head; second anal spine shorter than third ... **Lobotes**

(b) Preoperculum finely serrated; eye located in anterior half of head; second anal spine either as long as or longer than third ... **Datnioides***

* The genus *Datnioides* Bleeker represented by *D. quadrifasciatus* (Sevastianov) in our country, is a freshwater species and is known from the estuaries of the Ganges and also the Chilka Lake (Orissa). Dr. P. C. Heemstra is convinced that this species is not a lobotid.

Genus **Lobotes** Cuvier

Lobotes Cuvier, 1829, *Regne Animal,* ed. 2, **2** : 177 (type-species : *Holocentrus surinamensis* Bloch).

Head dish-shaped, interorbital space narrow, and its upper profile concave; no subocular shelf visible externally. Eyes relatively small, in anterior third of head. Mouth large, its gape reaching to below posterior border of eye. Preoperculum margin strongly denticulate.

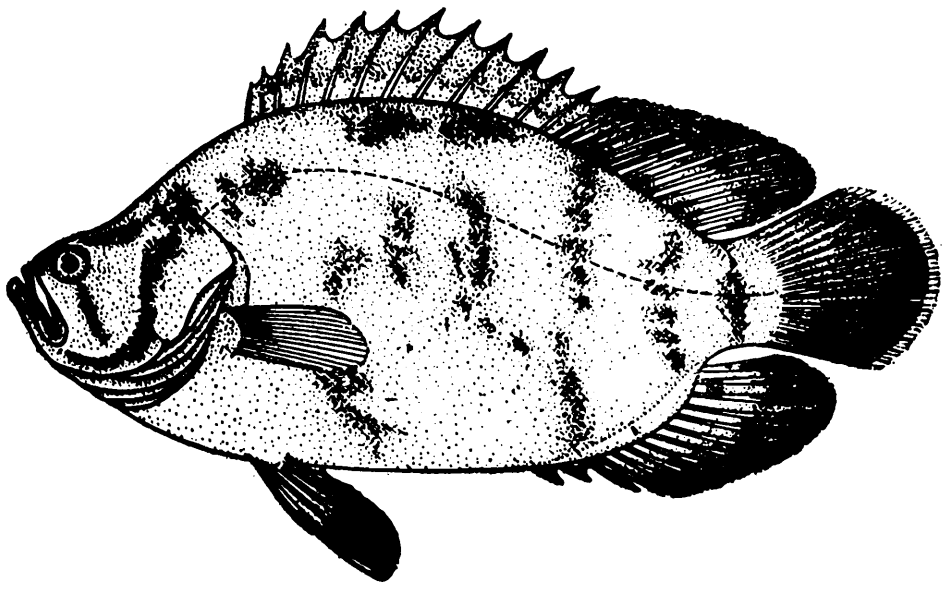
Monotypic.

Lobotes surinamensis (Bloch)

[Text-fig. 226]

Holocentrus surinamensis Bloch, 1790, *Naturges. Ausland. Fische,* **4** : 98, pl. 243 (type-locality : Surinam).

Lobotes surinamensis : Day, 1875, *Fishes of India* : 84, pl. 21, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, 1 : 519, fig. 157.



Text-fig. 226. *Lobotes surinamensis* (Bloch)

Common Names :

Brown Tripletail	...	English
Chota bekkut	...	Oriya
Musalli	...	Tamil
Parrandee	...	Malayalam
Naharidathimas	...	Lakshadweep Is.

Distinguishing Characters :

A compressed, deep-bodied perch-like fish. Head dish-shaped, its upper profile concave. Mouth moderate, obliquely pointing upward. Eyes relatively very small, located at anterior third of head, its diameter 6.0 to 7.5 times in head length. Teeth villiform, in narrow bands in jaws, the outer series of longer, curved conical ones; no teeth on roof of mouth. Dorsal fin with 12 rather strong spines and 15 or 16 soft rays; soft dorsal and anal fins rounded and symmetrical. Anal fin with 3 spines and 11 soft rays, the second spine shorter than third. Scales large; lateral line with 42 to 44 scales.

Colour : dark olive or dark brown on back, lighter below with a silvery tint; body sometimes with pale blotches and dark streaks. Edges of pectoral and caudal fins yellowish.

Geographical Distribution : A cosmopolitan species in all warm seas.

Fishery Information : This fish which attains about 76 cm in length, is rated highly as food and it brings a moderately high price in Bengal and Orissa.

FAMILY : GERREIDAE
[Mojarras]

Small to medium-sized fishes; body rather compressed and oblong. Mouth small, strongly protrusible, pointing downward when protracted. Gill membranes free from isthmus. Teeth small, villiform in both jaws; no teeth on roof of mouth. Dorsal fin long, with spines and soft rays; dorsal and anal fin-bases with rather high scaly sheath into which the fin can be folded. Pectoral fins long and pointed; pelvic-fin origin below or somewhat behind pectoral-fin base and bearing a long, scaly axillary process. Caudal fin deeply forked. Body with conspicuous shiny scales; head scaly, upper surface smooth.

Colour silvery, often with faint markings such as spots or lines.

These fishes live in coastal waters of all warm seas and valued as food fish. Found predominantly in shallow waters, some species entering estuaries or even freshwater. Eight genera, 3 in our area.

KEY TO GENERA

1 (a) Anal fin with 5 spines and 12 or 13 soft rays; anal-fin base longer than soft dorsal-fin base	...	**Pentaprion**
(b) Anal fin with 3 spines and 7 soft rays	...	2
2 (a) Dorsal fin spines 10	...	**Gerreomorpha**
(b) Dorsal fin spines 9	...	**Gerres**

Genus **Gerres** Cuvier

Gerres Cuvier, 1824, in Quoy and Gaimard, *Voy. Uranie et Physic., Zool.* : 293 (type-species : *Gerres vaigiensis* Quoy & Gaimard).

Body oblong and slightly compressed. Mouth small, highly protrusible; fine teeth in jaws. Dorsal fin with 9 spines and 9 or 10 soft rays. Anal fin with 3 spines and 7 soft rays, its base shorter than soft part of dorsal-fin base. Scales moderate, cycloid or finely ctenoid.

Numerous species, 7 in our area, are very much alike in general appearance.

KEY TO SUBGENERA/SPECIES

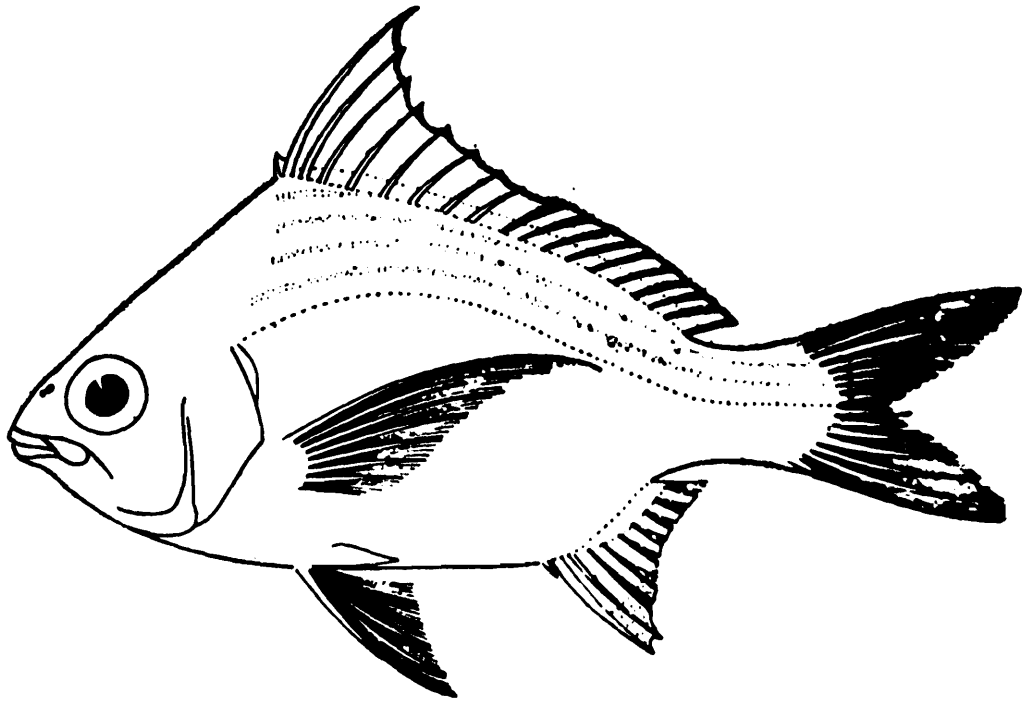
1 (a) Secosd dorsal spine greatly elongated, longer than head (Subgenus *Pertica* Fowler)	...	2
(b) Second dorsal spine not forming a long filament, usually much less than head length (Subgenus *Gerres*)	...	3
2 (a) Predorsal distance equal to or less than body depth; a series of vertical or horizontal rows of dusky blotches on back and sides of body	...	*G. filamentosus*
(b) Predorsal distance distinctly greater than body depth; a series of vertical bars on back and sides of body	...	*G. macracanthus*
3 (a) Body elongate, its depth at least 3 times in standard length	...	*G. oblongus*
(b) Body relatively deep, its depth 2.0 to 2.8 times in standard length	...	4

4 (a) Scales 4 rows between lateral line and dorsal-fin origin	...	*G. limbatus*
(b) Scales 5 to 7 rows between lateral line and dorsal-fin origin	...	5
5 (a) Body deep, its depth 2.0 to 2.3 times in standard length, forming a sharp angle at dorsal-fin origin	...	*G. abbreviatus*
(b) Body oblong, its depth 2.5 to 3.0 times in standard length	...	6
6 (a) Pectoral fins long, extending beyond anal-fin origin; dorsal and anal spines rather slender	...	*G. oyena*
(b) Pectoral fins not reaching anal-fin origin; dorsal and anal spines very strong and broad	...	*G. poeti*

Gerres abbreviatus Bleeker

[Text-fig. 227]

Gerres abbreviatus Bleeker, 1850, *Nat. Tijdschr. Ned.-Indie*, **1** : 103 (type-locality : Batavia) ; Day, 1875, *Fishes of India* : 99, pl. 25, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 538.



Text-fig. 227. *Gerres abbreviatus* Bleeker

Common Names :

Deepbody-mojarra	...	English
Paiya	...	Kannada
Pranjin	...	Malayalam
Oodan	...	Tamil
Charbat	...	Marathi

Distinguishing Characters :

Body deep, its depth 2.0 to 2.3 times in standard length, forming a sharp angle at dorsal-fin origin. Mouth small; strongly protractile; fine teeth in jaws. Dorsal fin with 9 spines and 10 soft rays; the second spine longer than third but not elongated, almost equal to head. Anal fin with 3 spines and 7 soft rays. Pectoral fins long, reaching at least to anal fin. Head and body completely covered with scales which are firmly attached; lateral line with 38 to 41 scales; 6 scale-rows between lateral line and origin of dorsal fin.

Colour : body silvery, with indistinct longitudinal lines along the scale-rows on dorsal part of body. Dorsal fin with thin black margin; pelvic fins sometimes yellowish; tips of anal fin and lower caudal-fin lobe white.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters down to depths of about 40 m, near the bottom usually found in small schools.

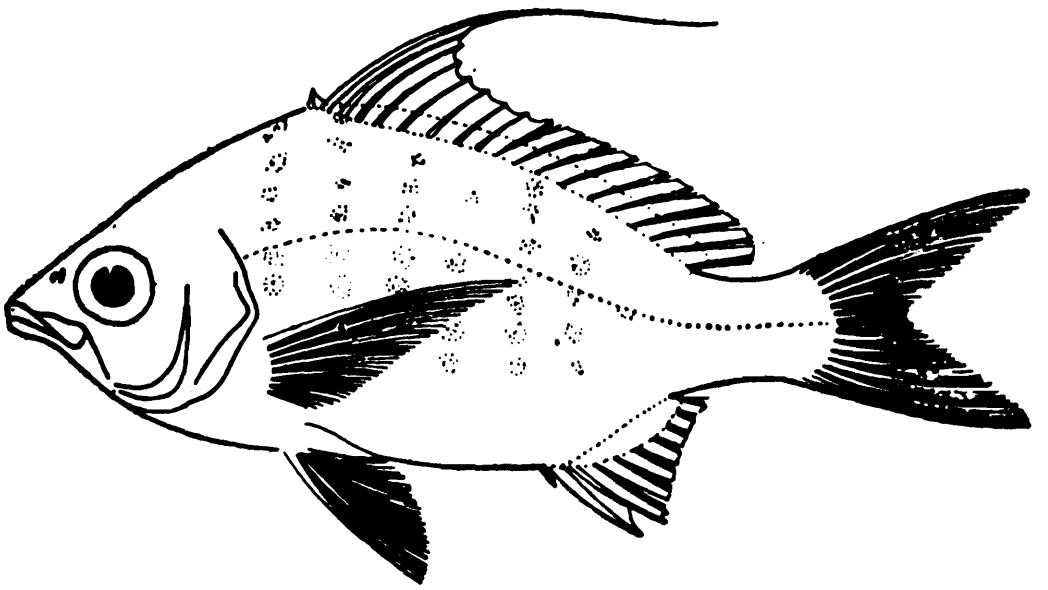
Fishery Information : Grows to a fairly big size and forms a fishery at Tuticorin (Tamil Nadu). They are caught throughout the year.

Gerres filamentosus Cuvier

[Text-fig. 228]

Gerres filamentosus Cuvier, 1829, *Regne Animal,* (ed. 2), **2** : 188 (on "Wodo-wahah" Russell, 1803, *Fishes of Coromandel,* **1** : 52, fig. 67—*ex* Vizagapatnam) ; Day, 1875, *Fishes of India* : 98, pl 25, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, **1** : 537, fig. 163.

Gerres punctatus Chaudhuri (*nec* Cuvier), 1923, *Mem. Indian Mus.*, **5** : 729.



Text-fig. 228. *Gerres filamentosus* Cuvier

Common Names :

Whipfin mojorra	...	English
Jagili	...	Oriya
Jaggari	...	Telugu
Oodaan, Udagam	...	Tamil
Holebaige	...	Kannada
Pranjin	...	Malayalam
Charbit	...	Marathi
Kotto	...	Gujarati

Distinguishing Characters :

Body oblong, moderately compressed and deep, its depth 2 to 2.5 times in standard length. Predorsal distance equal to or less than body depth. Mouth small, strongly protrusible; fine teeth in jaws. Dorsal fin with 9 spines and 10 or 11 soft rays, the second spine greatly elongated into a filament and longer than head. Anal fin with 3 spines and 7 soft rays. Head and body completely covered with scales which are firmly attached; lateral line with 44 to 47 scales.

Colour : body silvery, with 6 to 8 vertical or horizontal rows of dusky blotches on back and sides of body.

Geographical Distribution : Widespread in the Indo-west Pacific.

Inhabits shallow waters, down to depths of 30 m, near the bottom; usually found in shoals.

Fishery Information : The species contributes an important fishery on the Rameswaram Island, the peak season being the months of June and July. They are caught by boat-seines ('Mada-valai') which is generally operated from a pair of catamarans.

Gerres limbatus Cuvier

Gerres limbatus Cuvier, 1830, *Hist. nat. Poiss.*, **6** : 476 (type-locality : Malabar & Pondicherry) ; Day, 1875, *Fishes of India* : 100; Day, 1889, *Fauna Br. India*, Fishes, **1** : 539.

Gerres kapas Herre (*nec* Bleeker), 1939, *Rec. Indian Mus.*, **41** : 336.

Common Name :

Black-tipped mojarra ... English

Distinguishing Characters :

Body oblong, slightly compressed, its depth 2.3 to 2.7 times in standard length. Mouth small, strongly protractile; fine teeth in both jaws. Dorsal fin with 9 spines and 10 soft rays, the third spine longest but much shorter than head. Anal fin with 3 spines and 7 soft rays. Pectoral fins long, extending to or beyond anal-fin origin. Head and body completely covered with scales which are firmly attached; lateral line with 33 to 39 scales; 4 scale-rows between dorsal-fin origin and lateral line.

Colour : body silvery, with 3 faint grey vertical bands below dorsal fin. Fins yellowish, dorsal fin margin dusky.

Geographical Distribution : Seas of India.

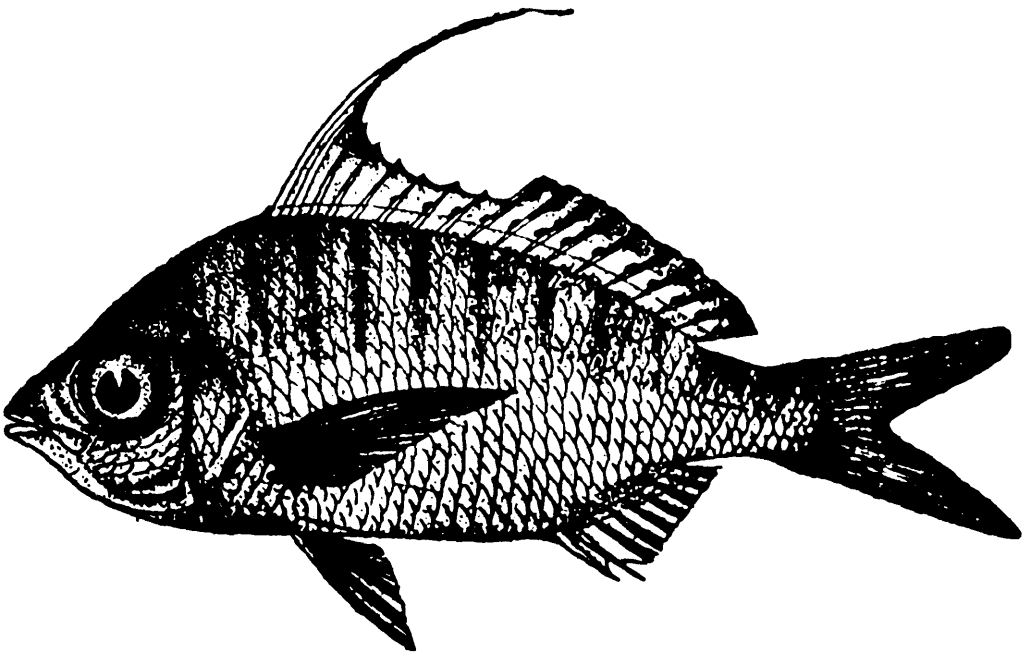
Fishery Information : Of minor fishery significance in our region.

Gerres macracanthus Bleeker

[Text-fig. 229]

? *Gerres punctatus* Cuvier, 1830, *Hist. nat. Poiss.*, **6** : 480 (type-locality : Pondicherry).

Gerres macracanthus Bleeker, 1854, *Nat. Tijdschr. Ned.-Indie*, **6** : 195 (type-locality : Batavia, Java) ; Venkataraman and Badrudden, 1977, *Indian J. Fish.*, **22** : 241, fig. 1; Talwar and Mukherjee, 1983, *Bull. zool. Surv. India* (in press) (Status discussed).



Text-fig. 229. *Gerres macracanthus* Bleeker

Common Names :

Long-rayed mojarra	...	English
Oodan	...	Tamil
Charbat	...	Marathi

Distinguishing Characters :

Body oblong, moderately compressed and deep, its depth 2.3 to 2.4 times in standard length. Predorsal distance distinctly greater than body depth. Mouth small, highly protrusible; fine teeth in jaws. Dorsal fin with 9 spines and 10 soft rays, the second spine greatly prolonged into a filament, longer than head. Anal fin with 3 spines and 7 soft rays. Head and body completely covered with scales which are firmly attached; lateral line with 42 to 44 scales.

Colour : body silvery, with 5 to 10 brown diffuse vertical bars on flanks. Fins hyaline with yellowish tinge.

Geographical Distribution : India, the East Indies, New Guinea and the Philippines.

Fishery Information : This species is fairly abundant in the trawl, shore-seine and gillnet catches in Palk Bay and Gulf of Mannar; also quite common in the catches at Ratnagiri (Maharashtra).

Gerres oblongus Cuvier

Gerres oblongus Cuvier, 1830, *Hist. nat. Poiss.*, **6** : 479 (type-locality : Ceylon) ; Day, 1875, *Fishes of India* : 98, pl. 25. fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 536.

Common Names :

Oblong-mojarra	...	English
Paiya	...	Kannada
Charbat	...	Marathi
Sala, Purachi	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate, slightly compressed, its depth 3 to 3.5 times in standard length. Mouth small, strongly protrusible ; fine teeth in jaws. Dorsal fin with 9 slender spines and 10 soft rays, the second spine shorter than head. Anal fin with 3 spines and 7 soft rays. Head and body completely covered with scales which are firmly attached ; lateral line with 44 to 48 scales.

Colour : body silvery ; young with indistinct cross-bars on body. Dorsal fin with faint dark margin.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters down to depths of 30 m. near the bottom.

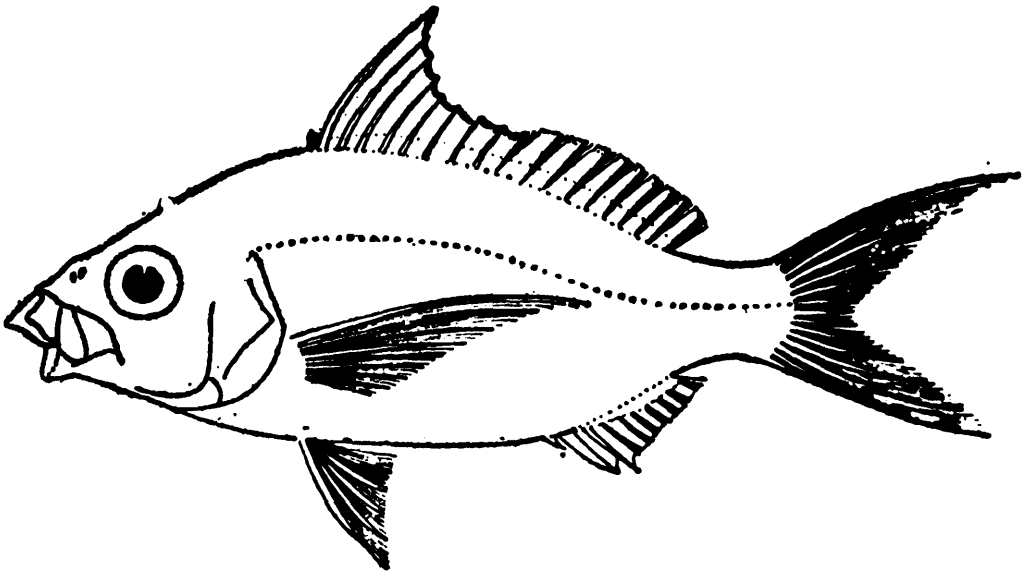
Fishery Information : Of minor fishery significance in our area.

Gerres oyena (Forsskal)

[Text-fig. 230]

Labrus oyena Forsskal, 1775, *Descript. Animal.* : 35 (type-locality : Djedda, Red Sea).

Gerres oyena : Day, 1875, *Fishes of India* : 99, pl. 25, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 538.



Text-fig. 230. *Gerres oyena* (Forsskal)

Common Names

Common mojarra	...	English
Oodan	...	Tamil
Paiya	...	Kannada
Uniyamas, Purachi	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong, slightly compressed, its depth 2.5 to 3.0 times in standard length. Mouth strongly protractile; fine teeth in jaws. Dorsal fin with 9 slender spines and 10 soft rays, the second spine shorter than head. Anal fin with 3 slender spines and 7 soft rays. Pectoral fins long, extending beyond anal fin origin. Head and body completely covered with scales which are thin and deciduous; lateral-line with 35 to 41 scales; scale rows 5 to 7 in transverse series above lateral line to spinous dorsal-fin.

Colour : back greenish, with dots forming faint longitudinal lines along scale-rows; belly silvery. Spinous part of dorsal fin with blackish margin and brown spots on base which are concealed by a scaly sheath; pectoral fins hyaline; caudal fin dusky.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow waters down to depths of 30 m, near the bottom; usually found in schools.

Gerres poeti Cuvier

Gerres poeti Cuvier, 1829, *Regne Animal,* ed. 2, **2** : 188 (type-locality : Moluccas) ; Day, 1875, *Fishes of India* : 100, pl. 26, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 538.

Gerres lucidus Cuvier : Day, 1875, *Fishes of India* : 99, pl. 25, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 539.

Common Names :

Silvery-mojarra	...	**English**
Oodan	...	**Tamil**
Charbat	...	**Marathi**

Distinguishing Characters :

Body oblong, moderately compressed, its depth 2.2 to 2.6 times in standard length. Mouth small, strongly protrusible ; fine teeth in jaws. Dorsal fin with 9 spines and 10 soft rays, the second spine shorter than head. Anal fin with 3 spines and 7 soft rays ; dorsal and anal spines very strong and broad. Pectoral fins scarcely longer than head, not extending to anal-fin origin. Scales covering head and body ; lateral line with 34 to 38 scales, 6 or 7 scale-rows above lateral line to dorsal-fin origin.

Colour : body silvery, darker on dorsal surface. Dorsal fin with a dusky margin, other fins pale.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery significance in our area.

Genus **Gerreomorpha** Alleyne & Macleay

Gerreomorpha Alleyne and Macleay, 1877, *Proc. Linn. Soc. N. S. Wales,* 1 : 274 (type-species : *Gerreomorpha rostrata* Alleyne & Macleay).

Allied to the genus *Gerres,* but with 10 dorsal spines.

Probably three species, one in our area.

Gerreomorpha setifer (Hamilton-Buchanan)

Chanda setifer Hamilton-Buchanan, 1822, *Fishes of Ganges* : 105, 370 (type-locality : Ganges estuaries).

Gerres setifer : Day, 1875, *Fishes of India* : 97, text-fig. & pl. 25, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 536.

Common Names :

Black-tipped mojarra	...	English
Paiya, Bainge	...	Kannada
Pranjin	...	Malayalam
Oodaan	...	Tamil
Charbat	...	Marathi

Distinguishing Characters :

Body oblong, slightly compressed. Mouth small, strongly protractile; teeth in villiform bands in both jaws, no canines. Dorsal fin with 10 spines and 9 or 10 soft rays. Anal fin with 3 spines and 7 soft rays. Pectoral fins long, reaching to almost anal-fin origin. Head and body completely covered with scales: lateral line with 32 to 38 scales.

Colour : upper half of flanks greenish, silvery below. Spinous dorsal fin dark edged and a brown spot on each dorsal soft ray just about the scaly sheath. Pectoral, pelvic and anal fins yellowish.

Geographical Distribution : East coast of India and Sri Lanka.

Fishery Information : This fish is common in the commercial catches in the Hooghly estuary at Calcutta.

Genus **Pentaprion** Bleeker

Pentaprion Bleeker, 1850, *Verh. Bat. Gen.*, 23 : 13 (type-species : *Pentaprion gerroides* Bleeker = *Equula longimana* Cantor).

Body elongate and fairly compressed. Mouth small, strongly protractile; teeth in jaws small and acute, in many rows; none on palate. Dorsal fin with 10 spines and 15 soft rays. Anal fin with 5 spines and 12 or 13 soft rays, its base longer than soft dorsal-fin base. Head and body completely covered with scales which are easily shed.

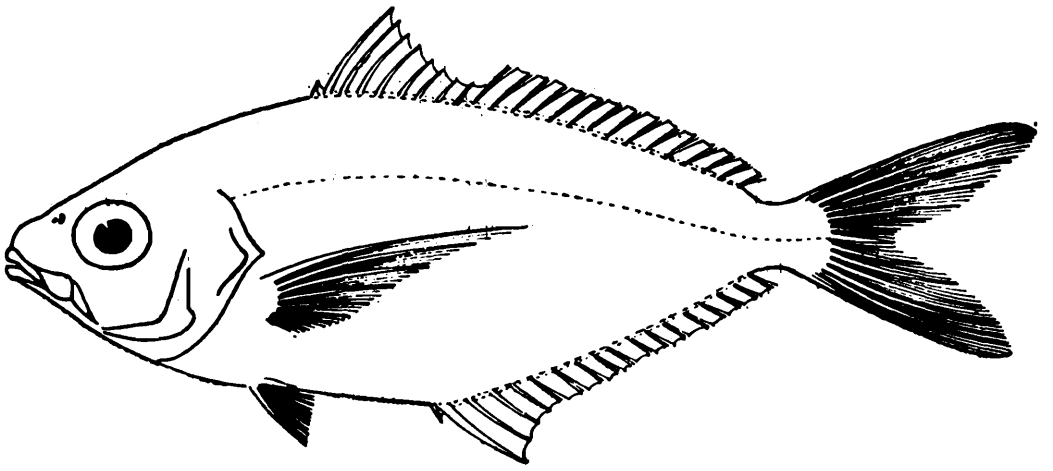
Monotypic.

Pentaprion longimanus (Cantor)

[Text-fig. 231]

Equula longimana Cantor, 1850, *J. Asiat. Soc. Bengal*, **18** : 1134 (type-locality : Malayan Peninsula; Malacca Straits).

Pentaprion longimanus : Day, 1876, *Fishes of India* : 101, pl. 52, fig. 6; Day, 1889, *Fauna Br. India, Fishes*, **1** : 540, fig. 164.



Text-fig. 231. *Pentaprion longimanus* (Cantor)

Common Names :

Longfin-mojarra	...	English
Neersuthumbu	...	Tamil

Distinguishing Characters :

A small and elongate species. Mouth small, strongly protractile; small acute teeth in jaws, none on palate. Dorsl fin with 10 spines and 15 soft rays. Anal fin with 5 spines and 12 or 13 soft rays, its base longer than soft part of dorsal fin. Pectoral fins long and pointed, extending beyond origin of anal fin. Head and body completely covered with cycloid scales which are easily shed (market specimens have usually lost their scales and appear pale and shabby).

Colour : body silvery, with a silvery stripe from eye to caudal fin.

Geographical Distribution : India, Sri Lanka, through the East Indies, to the Philippines and Taiwan.

Inhabits coastal waters down to depths of 30 m, near the bottom.

Fishery Information : The species usually occurs in large shoals at depths between 10 m and 30 m, and is fairly common in the Gulf Mannar and at Madras.

FAMILY : POMADASYIDAE*
[Grunts, Sweetlips]

Oblong, compressed, perch-like fishes. Head profile strongly convex. Mouth terminal, small or moderate; chin with 2 pores

* Family name has been reverted to Haemulidae by Johnson (1981).

anteriorly and a median groove, or 6 pores and no median groove. Teeth in jaws cardiform, in bands, the outer row often enlarged but no canines; no teeth on roof of mouth. Dorsal fin continuous, with 9 to 14 strong spines and 12 to 26 soft rays. Anal fin with 3 spines, the second often strong and robust, and 7 to 9 soft rays. Caudal fin truncate or emarginate (rounded in juveniles). Scales ctenoid, small or moderate, extending onto head (except front of snout, lips and chin); soft dorsal and anal fins naked or scaly, basal scaly sheat usually present.

Externally, the grunts look much like the snappers, but they differ from them primarily in the dentition, having very feeble jaw teeth. They are mostly tropical marine species. The Indo-Australian gruntlike fishes, called sweetlips, are sometimes included in the Pomadasyidae and sometimes classed as a separate family, the Plectorhynchidae. Grunts make sounds, as their common name suggests, by grinding their pharyngeal teeth. The sound is amplified by the adjacent swimbladder.

Seventeen genera, 4 in our area.

KEY TO SUBFAMILIES/GENERA

1 (a) Chin with 2 pores and a longitudinal median groove at symphysis of lower jaw; fin spines strong (Subfamily Pomadasyinae)	...	2
(b) Chin with 6 pores and anc. no median groove or pit; fin spines often weak (Subfamily Plectorhynchinae)	...	3
2 (a) Distinct dark longitudinal stripes along flanks of body	...	**Rhonciscus**
(b) At most, faint grey longitudinal stripes along flanks of body	..	**Pomadasys**
3 (a) Dorsal fin with 9 or 10 spines, the second longest, abruptly longer than first; soft dorsal-fin base markedly longer than that of spinous part	...	**Diagramma**

(b) Dorsal fin with 12 to 14 spines, the second not longest; soft dorsal-fin base subequal with or usually shorter to much shorter than spinous part; usually with distinctive bars or stripes ... **Plectorhynchus**

Subfamily : Plectorhynchinae

Moderate size fishes, occurring primarily around coral reefs in the tropical Indo-west Pacific, in the eastern Atlantic and the Mediterranean; typically brightly coloured, undergoing striking ontogenetic colour changes; lips typically thick and fleshy in adults. Dorsal fin with 9 to 14 spines and 17 to 26 soft rays; anal fin with 3 spines and 6 to 8 soft rays; lateral line opening on chin through a row of 4 to 6 enlarged pores; no median longitudinal groove or pit; vertebrae 11+16.

Genus **Diagramma** Oken

Diagramma Oken, 1817, *Isis* : 782 (type-species : *Anthias diagramma* Bloch = *Perca picta* Thunberg).

Body fairly oblong and compressed. Mouth small, lips thick; 6 pores on chin behind lower lip, but no central groove. Teeth small, in bands in both jaws, the outer row of enlarged teeth but no canines; no teeth on roof of mouth. Dorsal fin barely notched, with 10 (rarely 9) spines, the first shortest, the second abruptly longer than first; soft dorsal fin with 22 to 26 rays, its base longer than rest of fin. Anal fin with 3 spines, the second spine shorter than third. Scales very small, adherent; preorbital scaly. Markings, colour and shape change continuously with age.

Monotypic.

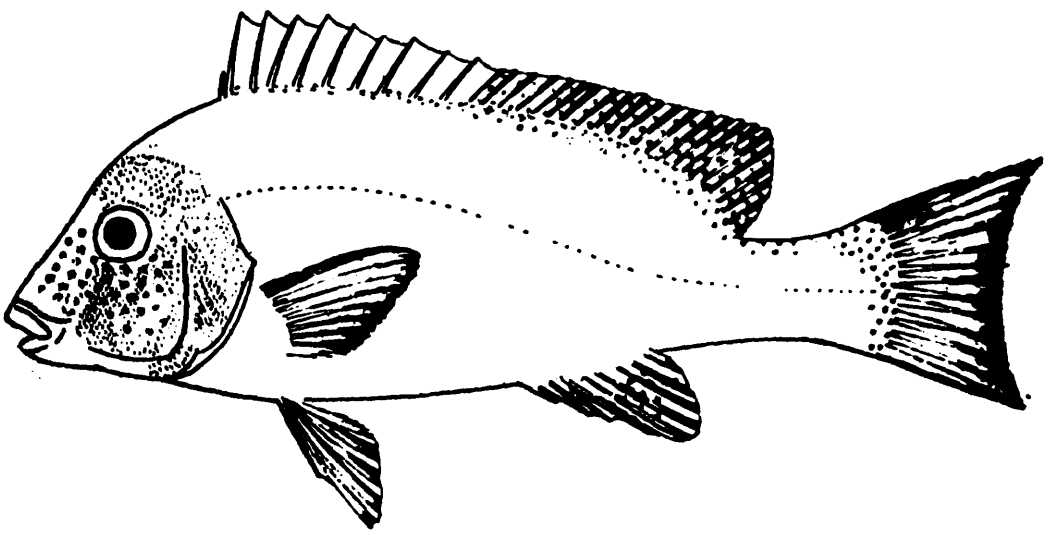
Diagramma pictum (Thunberg)

[Text-fig. 232]

Perca picta Thunberg, 1792, *Kongl. Vet. Akad. Nya Handl.*, **13** : 143 (type-locality : Japan).

Diagramma pictum : Day, 1875, *Fishes of India* : 81, pl. 21, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 518.

Diagramma punctatum Ruppell : Day, 1875, *Fishes of India* : 83, pl. 21, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 518.



Text-fig. 232. *Diagramma pictum* (Thunberg)

Common Names :

Pointed-sweetlip	...	English
Hotya, Harvil	...	Marathi

Distinguishing Characters :

Body oblong, compressed ; head covered with scales except the snout, scales covering preoperculum to its edge, which is finely serrated. Mouth small, lips fleshy ; 6 pores on chin behind lower lip. Band of villiform teeth in jaws, in 4 or 5 rows, with an outer row of enlarged teeth but no canines. Dorsal fin with 9 or 10 spines, the first abruptly short, and 21 to 26 soft rays. Anal fin with 3 spines and 6 to 8 soft rays. Caudal fin emarginate in adults, truncate or rounded in young specimens. Scales small, ctenoid, 82 to 117 in lateral series.

Colour : juveniles greyish-white with about 8 longitudinal brown bands, extending onto head where they converge toward snout, spots in adults ; in large specimens the spots my become small or indistinct, sometimes faint yelllow spots on head.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This species constitutes an important element in the trap fishery in the Gulf of Mannar.

Genus **Plectorhynchus** Lacepede

Plectorhynchus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 134 (type-species : *Plectorhinchus chaetodonoides* Lacepede) (Often spelt *Plectorhinchus* by workers).

Body fairly compressed, not markedly deep. Chin with 6 pores behind lower lip, but no central longitudinal groove. Feeble teeth in bands in jaws, the outer row enlarged and conical ; no teeth on roof of mouth. Lips thick, with age some develop enormous almost grotesque lips. Single dorsal fin, with 12 to 14 spines of moderate strength, sometimes deeply notched before soft part which consists of 15 to 23 soft rays ; its base normally shorter than that of rest of fin. Anal fin with 3 spines and 7 or 8 soft rays, the second spine usually longest and strongest. Scales moderate. Markings and colour often change in amazing degree with growth.

Shallow-water species of the tropical Indo-Pacific, mostly variable in markings and colour. Numerous species, 9 in our area.

KEY TO SPECIES

1	(a) Dorsal fin with 14 spines	...	2
	(b) Dorsal fin with 12 or 13 spines	...	4
2	(a) Dorsal fin with 15 or 16 soft rays ; body uniformly dark, no crossbars	...	*P. nigrus*
	(b) Dorsal fin with 19 or 20 soft rays	...	3
3	(a) Body uniformly dark ; dorsal fin with 19 soft rays	...	*P. ceylonensis**
	(b) Body with horizontal cross stripes ; dorsal fin with 20 soft rays	...	*P. rayi**
4	(a) Body uniformly grey or dusky, no contrasted bars, spots or blotches ; dorsal fin with 12 spines	...	5
	(b) Body with longitudinal bands or many dark spots about pupil size or larger	...	6
5	(a) Dorsal fin with 17 to 20 soft rays ; snout profile convex	...	*P. schotaf*

	(b) Dorsal fin with 21 to 23 soft rays; snout profile concave	...	*P. griseus**
6	(a) Body with numerous dark spots; dorsal fin with 12 spines and 15 to 16 soft rays	...	*P. pictus**
	(b) Body with regular dark stripes	...	7
7	(a) Body with 3 or 4 longitudinal bands; dorsal fin with 13 spines	...	*P. orientalis**
	(b) Body with 6 or 7 dark longitudinal bands; dorsal fin with 12 or 13 spines	...	8
8	(a) Pectoral fin with large black median blotch; caudal fin striped	...	*P. lineatus**
	(b) Pectoral fin without median blotch; caudal fin spotted	...	*P. diagrammus**

Plectorhynchus nigrus (Cuvier)

Pristipoma nigrum Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 258 (type-locality : Manila, Philippines).

Diagramma crassispinum Ruppell : Day, 1875, *Fishes of India* : 78, pl. 20, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 514.

Common Names :

Black sweetlip	...	English
Harvil	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth about 2 times in standard length. Jaws subequal, lips chiefly upper greatly swollen with age. Dorsal fin with 14 spines and 15 or 16 soft rays, the spines strong; base of spinous dorsal fin about 1.8 times in soft fin. Anal fin with 3 spines and 7 soft rays, the second spine thicker and much longer than third. Caudal fin truncate with age. Scales moderate, predorsal scales not to nostrils.

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* *Plectorhynchus ceylonensis* (Smith) known only from Sri Lanka is also likely to occur in our area; *P. rayi* (Menon & Talwar) is rare in the Andaman Sea; *P. griseus* (Cuvier) is uncommon in the commercial catches; *P. pictus* (Tortonese, 1935) is known from Pakistan and Sri Lanka and is likely to be found in our area also; *P. orientalis* (Bloch), *P. lineatus* (Linnaeus) and *P. diagrammus* (Linnaeus) do not contribute to any fishery in our region.

Colour : body uniform dark brown, often with reddish tinge; occasionally with a few coppery spots on body; pectoral fins white or pale; pelvic fins dark brown or blackish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : The species constitutes an important component in the trap fishery for perches in the Mandapam area (Gulf of Mannar); also obtained in the fisheries of the Bombay coast where specimens up to 61 cm. in length are caught. The fish is considered to be a good food fish.

Plectorhynchus schotaf (Forsskal)

Sciaena abu-mgaterin schotaf Forsskal, 1775, *Descript. Animal.* : 51 (type-locality : Arabia).

Diagramma griseum (*nec* Cuvier) Day, 1875, *Fishes of India* : 81, pl. 21, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **1** : 517, fig. 156.

Common Names :

Grey sweetlip	...	English
Harvil	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth 2.5 to 3.0 times in standard length; snout profile convex. Lips thin in young, somewhat swollen with age; lower jaw shorter. Dorsal fin with 12 spines and 17 to 20 soft rays, the spines moderate; base of soft dorsal fin usually slightly exceeds that of spinous fin. Anal fin with 3 spines and 7 soft rays, the second spine stronger and usually little longer than third. Caudal fin truncate in young, slightly emarginate with age. Scales small; predorsal scales to nostrils, front of preorbital naked.

Colour : body dusky grey to almost silvery grey, usually darker with age, the young sometimes with faint blue lines below eye and along body; hind edge of preopercle, sometimes opercle, with red line. Pectoral fins dusky; pelvic fins dusky with its spine whitish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Very common in the Gulf of Mannar; of minor fishery value in our area.

Subfamily : Pomadasyinae

Percoid fishes of moderate size, occurring in all tropical and subtropical shallow coastal waters; living on or over reefs or on soft bottoms. Dorsal fin with 11 to 14 spines and 11 to 18 soft rays; anal fin with 3 spines and 7 to 12 soft rays; lateral line opening on chin through a median longitudinal groove or pit, or 2 enlarged pores behind symphysis, or both; vertebrae 10 + 16.

Genus **Pomadasys** Lacepede

Pomadasys Lacepede, 1803, *Hist. nat. Poiss.*, **4** : 515 (type-species : *Sciaena argentea* Forsskal).

Body oblong and slightly compressed, covered with moderate ctenoid scales. Mouth small; lips rather thick. Teeth in jaws in villiform bands, no canines; no teeth on roof of mouth. Lower jaw with median, deep longitudinal groove and 2 small pores at chin. Preopercle margin serrate, its posterior margin more or less concave. Single dorsal fin, with 11 to 14 strong spines and 12 to 18 soft rays. Anal fin with 3 spines, the first minute, the second generally strong and enlarged, and 7 to 12 soft rays. Caudal fin truncate or slightly emarginate. Body silvery, with at most faint grey longitudinal stripes along flanks.

Shore fishes in all tropical and subtropical seas; marine, but some entering estuaries. Numerous species, 5 in our area.

KEY TO SPECIES

1 (a) Second anal spine nearly as long as third spine; dorsal fin without spots, body silvery	...	*P. olivaceus*
(b) Second anal spine conspicuously longer than third spine	...	2
2 (a) Back and flanks of body with numerous small dark brown spots that extend also onto dorsal fin	...	*P. opercularis*
(b) Back and flanks of body with at most faint spots (sometimes forming longitudinal lines) or large blotches	...	3
3 (a) Black blotches present on nape and back (one on nape most conspicuous), and a large black blotch on spinous portion of dorsal fin	...	*P. maculatus*

	(b) No black blotches on flanks of body	...	4
4	(a) Dorsal fin spotted, with 2 or 3 longitudinal rows of brown spots or transverse bands on flanks; body silvery-grey	...	*P. hasta*
	(b) Dorsal fin without spots; body silvery	...	*P. guoraca*

Pomadasys guoraca (Russell)

Pristipoma guoraca Russell, 1803, *Fishes of Vizagapatnam*, **2** : 24, pl. 132 (type-locality : Vizagapatnam).

Pristipoma guoraka : Day, 1875, *Fishes of India* : 75, pl. 20, fig. 1.

Pristipoma guoraca : Day, 1889, *Fauna Br. India*, Fishes, **1** : 512.

Common Names :

Silver-grunt	...	English
Guoraca	...	Telugu

Distinguishing Characters :

Body elongate and compressed, its depth about 2.7 to 2.8 times in standard length. Mouth small, lips fairly thick; maxilla (upper jaw) reaching to front edge of eye. Teeth in villiform bands, the outer series slightly enlarged. Dorsal fin with 12 spines and 13 or 14 soft rays. Anal fin with 3 spines and 7 or 8 soft rays, the second spine conspicuously longer than third spine. Scales moderate, ctenoid.

Colour : body silvery, slightly darker on back. Fins yellowish brown. Young with large dusky blotch on operculum.

Geographical Distribution : East coast of Africa, India, Sri Lanka and the Malay Archipelago

Fishery Information : Of minor commercial significance in our area.

Pomadasys hasta (Bloch)

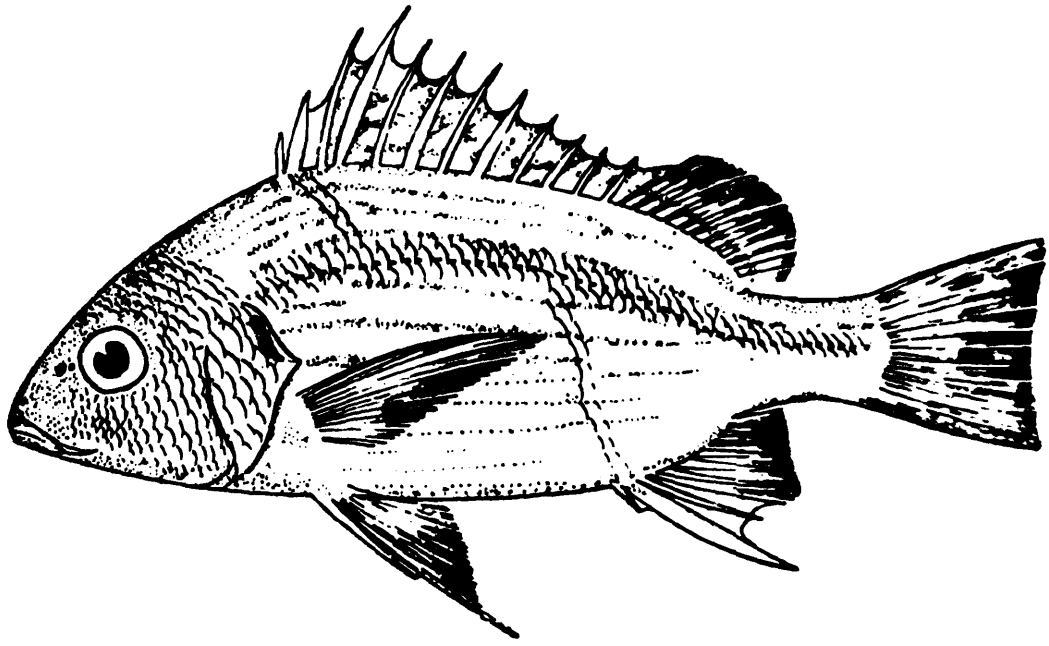
[Text-fig. 233]

Lutjanus hasta Bloch, 1790, *Naturges. ausland. Fische*, **4** : 109, pl. 246, fig. 1 (type-locality : Japan).

Pristipoma hasta : Day, 1875, *Fishes of India* : 73 (*nec.* pl. 19, fig. 3), pl. 19, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **1** : 510.

Pristipoma argenteum Day (*nec* Forsskal), 1875, *Fishes of India* : 74, pl. 8, fig. 3 (marked *P. commersoni*) ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 511.

Pomadasys jubelini Dorairaj (*nec* Cuvier), 1972, *Indian J. Fish.*, 17 : 53, fig. 1.



Text-fig. 233. *Pomadasys hasta* (Bloch)

Common Names :

Silverlined grunt	...	English
Karuppi	...	Telugu
Ghorakan, Kakan	...	Tamil
Karukaruppan	...	Malayalam
Karkara	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth 2.5 to 2.8 times in standard length. Head blunt, its upper profile convex. Mouth small, terminal; lips moderately thick; maxilla (upper jaw) reaching to below front border of eye; narrow band of numerous, small, pointed teeth in jaws, the outer row slightly enlarged. Dorsal fin with 12 or 13 spines and 13 to 15 soft rays. Anal fin with 3 spines and 7 or 8 soft rays, the second spine stout and longer than third spine. Caudal fin truncate or slightly emarginate. Scales moderate, ctenoid, covering body and most of head (excluding snout); lateral line slightly arched, with 45 to 52 scales.

Colour : body silvery-grey, with 4 to 5 interrupted and faint longitudinal dark grey lines along flanks (rather distinct in juveniles), 3 or 4 of these above lateral line. Dorsal fin with 2 or 3 rows of brown spots, the margin black; anal and pelvic fins slightly dusky, other fins yellowish.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters, to depths of 60 m.

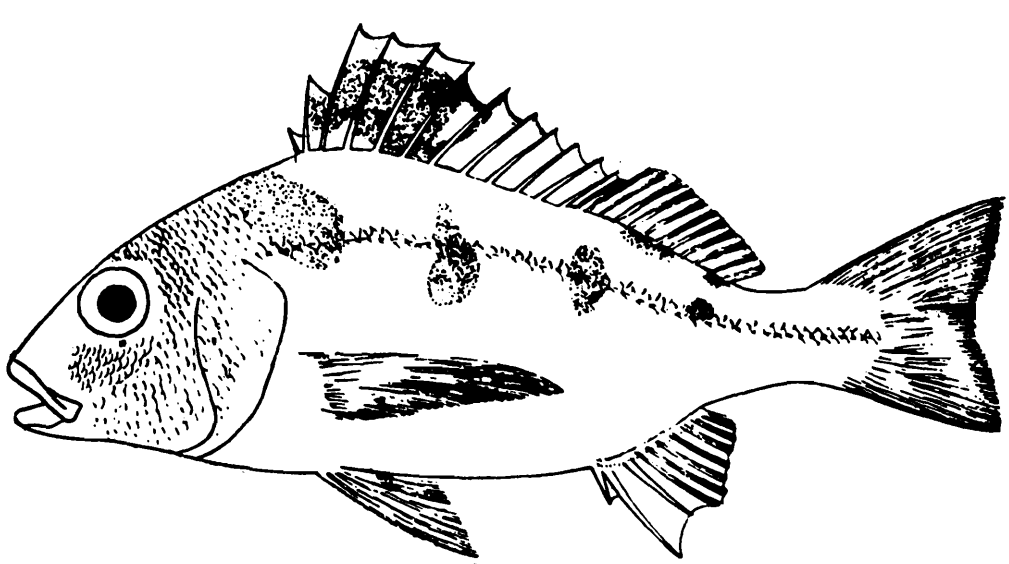
Fishery Information : This species contributes a major element in the trawler landings along the Bombay-Gujarat coast and constitutes 5 to 10% of the total landings. The fishery is mainly supported by three year-classes namely the third, fourth and fifth. Juveniles which are available in the inshore waters around Bombay, are taken by barrier-nets and shore-seines. This fish is very much in demand in the Bombay markets.

Pomadasys maculatus (Bloch)

[Text-fig. 234]

Anthias maculatus Bloch, 1797, *Naturges. ausland. Fische*, **7** : 9. pl. 326, fig. 2 (type-locality : East Indies).

Pristipoma maculatum : Day, 1875, *Fishes of India* : 74, pl. 19, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **1** : 510.



Text-fig. 234. *Pomadasys maculatus* (Bloch)

Common Names :

Blotched-grunt	...	English
Caripe	...	Telugu
Karkara	...	Marathi
Karkara	...	Gujarati

Distinguishing Characters :

Body oblong and compressed, its depth 2.7 to 2 9 times in standard length. Head blunt, its under profile convex ; mouth small, lips moderately thick ; maxilla (upper jaw) extending to front border of eye. Teeth small, in narrow bands in both jaws, the outer series enlarged. Dorsal fin with 12 spines and 13 to 15 soft rays. Anal fin with 3 spines and 7 or 8 soft rays, the second spine distinctly longer than third. Scales moderate, ctenoid, also present on head (excluding snout). Lateral line slightly arched, with 48 to 54 scales.

Colour : body silvery-grey, nape and back with a series of incomplete cross-bars on upper half of body, varying in shape and size, sometimes broken into irregular blotches (the bar on nape most conspicuous). Spinous dorsal fin with a large black blotch ; soft dorsal and caudal fins edged with black, other fins yellowish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters, to depths of 40 m.

Fishery Information : Although this is an abundant, well known fish along the Indian coast, it is rated low as a food fish. It is caught year round by the trawl and shore seines. Good catches of this species are obtained from the Gulf of Mannar. It grows up to a length of 41 cm. The gasbladder of this species also yields isinglass.

Pomadasys olivaceus (Day)

Pristipoma olivaceum Day, 1875, *Fishes of India* : 73, pl. 19, fig. 1 (type-locality : Sind) ; Day, 1889, *Fauna Br. India*, Fishes, 1 : 509, fig. 154.

Common Name :

Olive grunter	...	English

Distinguishing Characters :

Body oblong and compressed, its depth about 2.0 times in standard length. Teeth in villiform bands in jaws, the outer row slightly enlarged, no canines. Dorsal fin with 12 spines and 15 to 17 soft rays. Anal fin with 3 spines and 11 or 12 soft rays, the second spine strongest, about as long as third spine. Caudal fin emarginate. Scales moderate, ctenoid.

Colour : olive grey with purplish head; a large black blotch bordered anteriorly with yellow on upper angle of operculum. Fins yellowish but to some extent clouded with black.

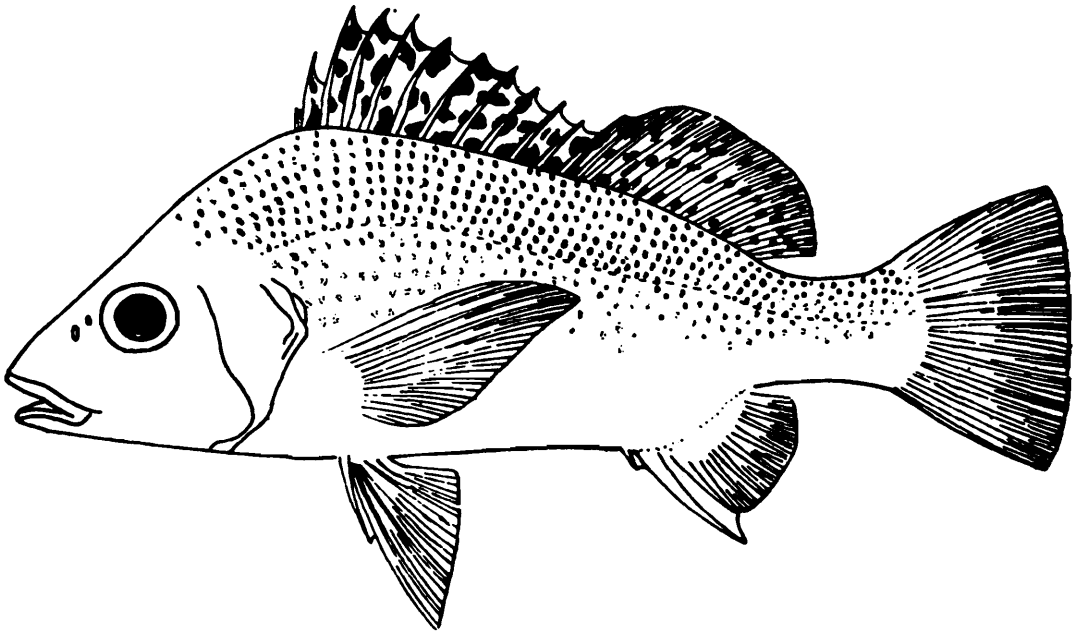
Geographical Distribution : East coast of Africa, India, Sri Lanka and Singapore.

Fishery Information : Contributes a minor fishery mostly on the Gujarat and Maharashtra coasts.

Pomadasys operculatis (Playfair)

[Text-fig. 235]

Pristipoma operculare Playfair, 1866, *Fishes of Zanzibar* : 24, pl. 4, fig. 1 (type-locality : Aden ; Port Natal) ; Day, 1875, *Fishes of India* : 76, pl. 20. fig 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 512.



Text-fig. 235. *Pomadasys operculatis* (Playfair)

Common Name :

Smallspotted grunt ... English

Distinguishing Characters :

Body oblong and compressed, its depth about 3 times in standard length. Head blunt, its upper profile straight or concave (large adults). Mouth small, lips fairly thick ; maxilla (upper jaw) reaching to below nostrils. Teeth in villiform bands, the outer series slightly enlarged. Dorsal fin with 11 or 12 spines and 13 to 16 soft rays Anal fin with 3 spines and 8 to 10 soft rays ; the second spine conspicuously longer than third. Scales moderate, ctenoid.

Colour : back grey-green shading to silvery white on belly ; back and flanks with numerous small dark brown spots that extend also onto dorsal fin. Pelvic and anal fins dark.

Geographical Distribution : Indian Ocean.

Inhabits coastal waters, sheltered estuaries and tidal creeks.

Fishery Information : Taken commercially in small quantities along the north-west coast of India.

Genus **Rhonciscus** Jordan & Evermann

Rhonciscus Jordan and Evermann, 1896, *Rep. U. S. Fish. Comm.*, (pt 21) : 387 (type-species : *Pristipoma crocro* Cuvier).

Allied to *Pomadasys* but with very distinct longitudinal stripes along the body. Four species, two in our area.

KEY TO SPECIES

1 (a) Six longitudinal golden or dark bands along flanks ; scales in lateral series 50 to 60 ... *R. anas*

(b) Three dark longitudinal stripes along flanks ; scales in lateral series 70 to 80 ... *R. stridens**

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* *Rhonciscus stridens* (Forsskal) has been reported from Pakistan and is likely to occur in our area also.

Rhonciscus anas (Valenciennes)

Pristipoma anas Valenciennes, 1862, *Compt. Rendu Acad. Sci. Paris,* **54** : 9 (type-locality : Madagascar).

? *Pristipoma dussumieri* Cuvier : Day, 1875, *Fishes of India* : 75, pl. 19, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 511.

Pristipoma furcatum (Schneider) Day, 1875, *Fishes of India* : 73, pl. 19, fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **1** : 510.

Common Names :

Banded grunter	...	English
Paikeele	...	Telugu
Kullu-korake	...	Tamil
Karkara	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth 2.3 to 2.4 times in standard length. Mouth slightly oblique, its upper jaw (maxilla) extending to below front border of pupil or slightly beyond. Teeth small, in several rows in both jaws, the outer row enlarged, this being the only row on sides of lower jaw. Dorsal fin with 12 spines and 14 to 16 soft rays. Anal fin with 3 spines and 8 or 9 soft rays ; the second spine conspicuously longer and stronger than third. Caudal fin slightly forked or emarginate.

Colour : body silvery, with 6 horizontal dark grey bands, three of which above lateral line. Spinous dorsal fin with 3 rows of brown spots and a dark edge ; upper half of soft dorsal fin dark, a dark band along anal fin.

Geographical Distribution : Indian Ocean.

Fishery Information : Taken commercially in small quantities along the Andhra and Tamil Nadu coasts.

Family : Lethrinidae

[Pigface-breams ; Emperors]

Moderate-sized fishes characterised by a large head with a deep suborbital space and the snout rather pointed ; preoperculum without serrated hind edge. Mouth terminal, moderate, the lips thick and fleshy ; teeth rather small, with 2 or 3 enlarged canines near symphysis ;

lateral teeth in a single row, conical or molariform or submolariform; roof of mouth and tongue toothless. Gill membranes broadly united, but separated from isthmus; pseudobranchia present; gillrakers mostly reduced, knob-like. Dorsal fin continuous, with 10 spines and 9 soft rays, the base of spinous portion about 1.5 times longer than base of soft portion. Anal fin with 3 spines and 8 soft rays; anal-fin base equal to base of soft dorsal-fin. Pectoral fins long and pointed; pelvic fins thoracic, each with a scaly axillary process. Caudal fin emarginate. Lateral line complete, with simple tubes. Scales ctenoid (rough), of moderate-size; no scales on cheeks (pre-operculum) and top of head; inner base of pectoral-fin with or without scales.

Besides the bright colour pattern and markings, all species have dark pattern which may disappear in a moment according to emotional state. Carnivorous fishes, inhabiting coastal waters of the tropical and sub-tropical Indo-west Pacific. Most live about coral reefs, and while some are taken on lines, most are caught in traps. They are very popular as food fish.

Two genera, *Neolethrinus* Castelnau and *Lethrinus* provisionally recognised, the latter genus in our region only.

Genus **Lethrinus** Cuvier

Lethrinus Cuvier, 1830, *Regne Animal*, **2** (ed. 2) : 184 (type-species : *Sparus choerorhynchus* Schneider) ; Sato, 1978, *Bull. Univ. Mus. Univ. Tokyo*, (15) : 1 (Revision).

As defined above.

The species of this genus are most difficult to distinguish since the fin formulae and the squamation are remarkably uniform in all species. A good character for distinguishing the species is, however, the number of scale-rows between the middle of spinous dorsal-fin and the lateral line; these rows are of no value when counted at origin of dorsal fin. About half of the species of this genus have a patch of small scales on the inner side of the base of the pectoral fin while the rest do not. The presence or absence of such scales can easily be confirmed by turning the fin forward, and is, therefore, a clear key character.

Twenty six species, 15 in our area.

KEY TO GENERA

1 (a) Inner base of pectoral fin densely covered with scales	...	2
(b) Inner base of pectoral fin without scales, or with only a few scales	...	9
2 (a) A persistent large black blotch on side of body; lateral teeth of jaws include strong molars in adults	...	*L. harak*
(b) Without such a blotch as above	...	3
3 (a) Five scale-rows between lateral line and median dorsal spines	...	4
(b) Six scale-rows between lateral line and median dorsal spines	...	5
4 (a) Longest soft anal ray distinctly longer than base of soft anal fin; pelvic-fin membranes with dense melanophores uniformly distributed; lateral teeth of jaws wide and roundish but not distinct molars	...	*L. kallopterus**
(b) Longest soft anal ray not longer than base of soft anal fin; pelvic fin membranes with fewer melanophores, especially few on inside of distal portion; lateral teeth of jaws include strong molars in adults	...	*L. mahsena**
5 (a) Pelvic-fin membranes with dense melanophores uniformly distributed excepting the innermost area	...	6
(b) Pelvic-fin membranes with fewer melanophores, especially few on the inside of distal portion	...	7
6 (a) Dark lateral blotch faded in adults; each scale with a white spot	...	*L. nebulosus*
(b) Dark lateral blotch persistent in adults	...	*L. cinereus*
7 (a) Snout length (excluding upper lip) distinctly more than cheek width; several bright yellow longitudinal stripes conspicuous on body	...	*L. ramak*

	(b) Snout length (excluding upper lip) equal to or less than cheek width; strong molars on side of jaws in adults	...	8
8	(a) Posterior rims of preoperculum and operculum bright red; several bright yellow longitudinal stripes conspicuous on body	...	*L. ornatus*
	(b) Posterior rim of operculum only bright red; no conspicuous yellow stripes on body	...	*L. mahsenoides*
9	(a) Length from anteriormost point of snout (next to lip) to anterior nostril more than cheek width; usually 6 scale-rows between lateral line and median dorsal spines (the row on lateral line itself excluded)	...	*L. miniatus*
	(b) Relationship of the above two lengths reverse	...	10
10	(a) Six or seven scale-rows between lateral line and median dorsal spines; strong molars on sides of jaws in adults	...	*L. lentjan*
	(b) Four to five scale-rows between lateral line and median dorsal spines	...	11
11	(a) Pelvic-fin membranes with dense melanophores uniformly distributed	...	12
	(b) Pelvic-fin membranes with fewer melanophores than above, especially few on inside of distal portion; scaleless area on posterior end of operculum bright red (when fresh)	...	*L. rubrioperculatus**
12	(a) Posterior nostril much closer to anterior nostril than to orbit	...	*L. variegatus*
	(b) Posterior nostril about halfway between anterior nostril and orbit		13

* There is no positive record of *Lethrinus kallopterus* Bleeker in our area; *L. mahsena* (Forsskal) is of no fishery importance in our area; and *L. rubrioperculatus* Sato, 1978 known from the Andaman Sea in our area, is also of no fishery importance in our region.

13 (a)	Triangular scaleless area above pectoral-fin base large, bright red when fresh ; interorbital area quite flat	*L. conchyliatus*
(b)	The above area small, not red even when fresh ...	14
14 (a)	Area without melanophores on upper half of pectoral-fin base ...	*L. xanthochilus*
(b)	No such area as above ; a few dark streaks from eye forward ...	*L. microdon*

Lethrinus cinereus Valenciennes

Lethrinus cinereus Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 293 (type-locality : Ceylon) ; Day, 1875, *Fishes of India* : 135 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 38.

Common Names :

Bridled pigface-bream	...	English
Karua	...	Telugu
Valamin	...	Tamil
Kadu	...	Malayalam

Distinguishing Characters :

Body fairly compressed, its depth greater than head length ; interorbital space slightly convex. Maxilla (upper jaw) extending to below vertical from posterior nostril. Canines rather small, the posterolateral teeth of both jaws conical. Dorsal fin continuous, with no notch, with 10 spines and 9 soft rays Anal fin with 3 spines and 8 soft rays. Pectoral fin slightly shorter than length of head ; inner base of pectoral-fin covered with scales ; 6 rows of scales between lateral-line and bases of mid-dorsal fin-spines.

Colour : body olive-brown, with a quadrangular black blotch between pectoral fin and lateral line at middle of pectoral fin ; faint vertical bands more or less broken up into blotches ; numerous white

or blue spots on scales on upper half of body. Dorsal fin with brown spots and a red outer margin; pectoral fins pinkish; other fins dusky with indistinct bands. Inside of mouth orange.

Geographical Distribution : Sri Lanka and east coast of India.

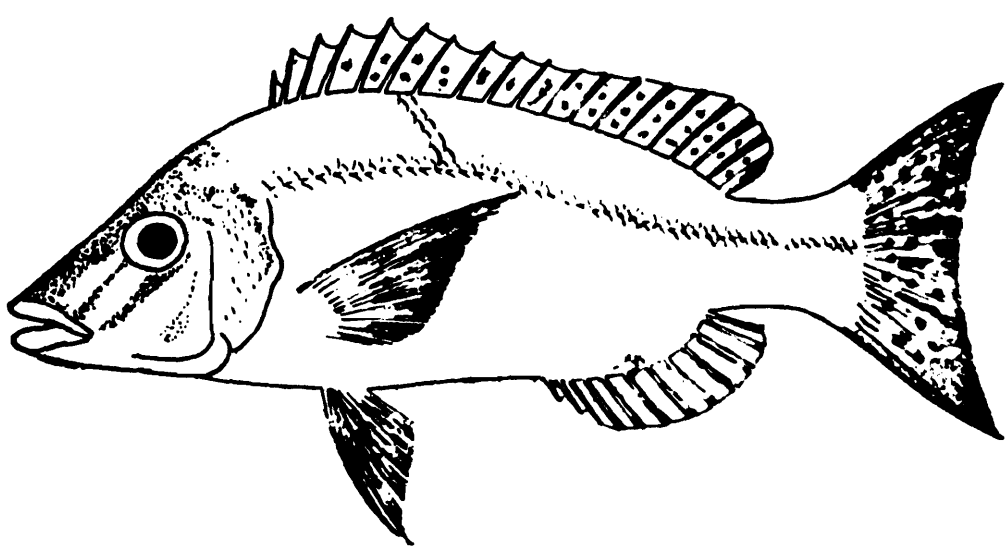
Fishery Information : This species is caught in small quantities along the coasts of Andhra, Tamil Nadu, Kerala and Karnataka. There is a fairly good fishery for this species in the Wadge Bank area.

Lethrinus conchyllatus (Smith)

[Text-fig. 236]

Lethrinella conchyliatus Smith, 1959, *Ichthyol. Bull. Rhodes Univ.*, (17) : 292, pl. 22, fig. E (type-locality : Pinda, Mozambique, 100 fms) ; Silas and Toor, 1963, *J. mar. biol. Ass. India*, 4 (1/2) : 243, fig. 1.

Lethrinus conchyliatus : Sato, 1978, *Bull. Univ. Mus. Tokyo Univ.*, (15) : 50, fig. 29.



Text-fig. 236. *Lethrinus conchyliatus* (Smith)

Common Name :

Smith's pigface bream ... English

Distinguishing Characters :

Body fairly compressed, its depth less than head length. Inter-orbital space distinctly convex, the eyes below dorsal profile. Snout moderate; maxilla (upper jaw) extending to vertical from anterior

nostril; hind nostril little nearer snout-tip than hind margin of head in adults. Canines stout, postero-lateral teeth in jaws conical. Dorsal fin continuous, without notch, with 10 spines and 9 soft rays. Anal fin with 3 spines and 8 soft rays. Five rows of scales between lateral line and bases of mid-spinous dorsal fin; inner base of pectoral fin with scales.

Colour : body dark purple above, paler below; a large triangular area of bright red above pectoral fin base; pectoral-fin base and posterior rim of operculum also bright red. Fins reddish, spinous dorsal and caudal fins darker.

Geographical Distribution : South Africa, Seychelles and India.

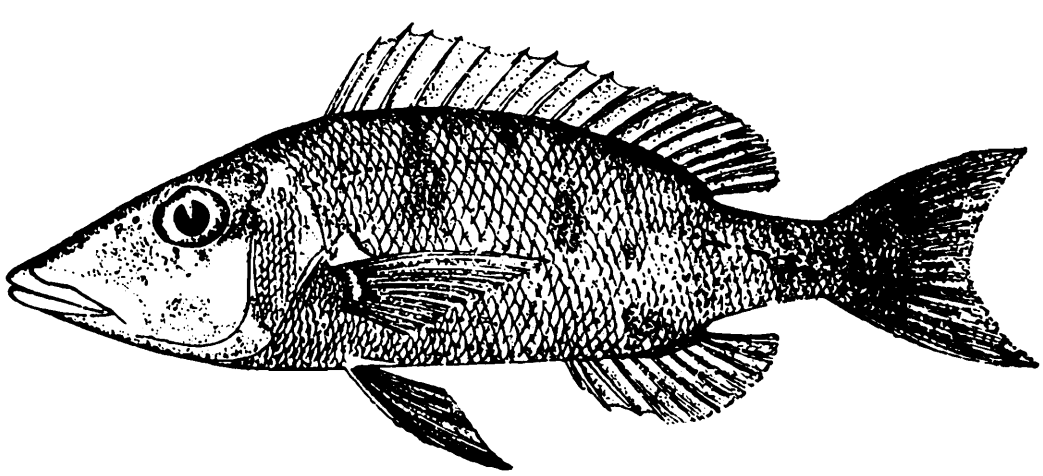
Coastal waters down to 250 m

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea in our area.

Lethrinus harak (Forsskal)

[Text-fig. 237]

Sciaena harak Forsskal, 1775, *Descript. Animal.* : 52 (type-locality : Red Sea).
Lethrinus harak : Day, 1875, *Fishes of India* : 137, pl. 33 fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 41; Silas and Toor, 1962, *J. mar. biol. Ass. India*, **3** : 211.



Text-fig. 237. *Lethrinus harak* (Forsskal)

Common Names :

Blackspot emperor	...	English
Po-tang-dah	...	Andaman Is.
Filolu, Makarimas, Metti, Chuttommetti		Lakshadweep Is.

Distinguishing Characters :

Body fairly compressed, its depth a little greater than head length. Interorbital area moderately convex. Maxilla (upper jaw) extending to vertical from anterior nostril. Canines moderate in size, with a band of villiform teeth behind them in jaws, postero-lateral teeth of jaws molar-like in adults. Dorsal fin continuous, with a very shallow notch, with 10 spines and 9 soft rays, the second spine only slightly longer than first spine. Inner base of pectoral fin densely covered with scales. Scale-rows 6 between lateral line and bases of mid-dorsal spines, the uppermost scales sometimes vestigial or lost (5 scale-rows in this case).

Colour : body olive-green above, paler below; persistent large characteristic oblong dark blotch with an orange rim near tip of pectoral fin; each scale on back sometimes with a white centre. Dorsal, anal and caudal fins striped with pink or red, the margins and soft parts being brighter. Pectoral fins pale orange, pelvic fins paler.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

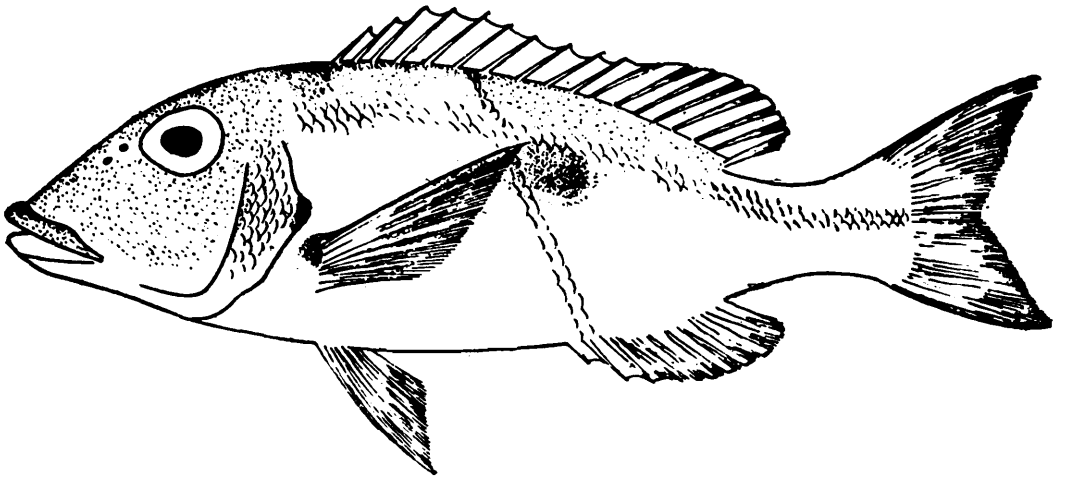
Inhabits coastal waters, usually over sandy bottoms, at depths of less than 50 m.

Fishery Information : One of the most widely distributed and common species of the genus. The flesh is excellent but the fish spoils rapidly. Fairly common in the commercial catches at Port Blair in the Andaman Sea and at Vedalai (Gulf of Mannar).

Lethrinus lentjan (Lacepede)

[Text-fig. 238]

Bodianus lentjan Lacepede, 1802, *Hist. nat. Poiss.*, 4 : 281 (type-locality : Java).
Lethrinus opercularis Day (*nec* Valenciennes), 1875, *Fishes of India* : 136.
Lethrinus lentjan : Sato, 1978, *Bull. Univ. Mus. Univ. Tokyo*, (15) : 42, fig. 24.



Text-fig. 238. *Lethrinus lentjan* (Lacepede)

Common Name :

Redspot emperor ... English

Distinguishing Characters :

Body fairly compressed, its depth a little greater than head length. Interorbital area slightly or well convex. Snout rather pointed ; maxilla (upper jaw) extending to vertical through anterior or posterior nostril. Canines small; postero-lateral teeth of jaws developed as strong molars in adults. Dorsal fin continuous, with barely a notch, with 10 spines and 9 soft rays, the second spine slightly longer than first spine. Anal fin with 3 spines and 8 soft rays. Inner base of pectoral fin with few scales or absent. Six or seven rows of scales between lateral line and base of mid-dorsal spines.

Colour : body olive-green above, paler below; bright red spots on posterior edge of operculum and another on outer pectoral fin; each scale on back sometimes with a white centre. Dorsal and caudal fins mottled or striped with orange; fins yellowish.

Geographical Distribution ; Widespread in the tropical Indo-west Pacific.

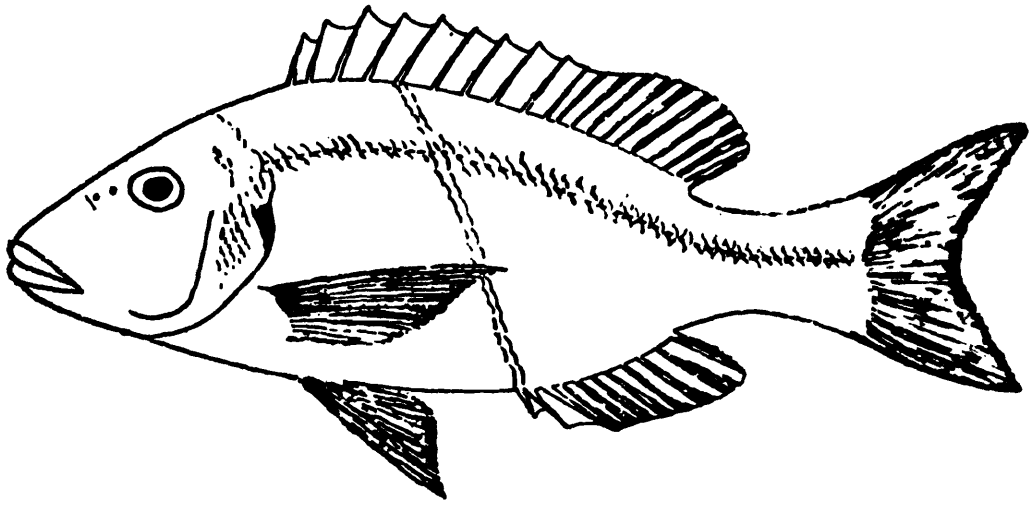
Inhabits sandy bottoms in coastal waters.

Fishery Information : The species is commercially exploited in the Palk Bay and Gulf of Mannar around Mandapam (Tamil Nadu).

Lethrinus mahsenoides Valenciennes

[Text-fig. 239]

Lethrinus mahsenoides Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 286 (type-locality : Red Sea) ; Tclor, 1971, *Res. Bull. Panjab Univ.*, **22** : 375, fig. 1.



Text-fig. 239. *Lethrinus mahsenoides* Valenciennes

Common Name :

Bluestreak emperor ... English

Distinguishing Characters :

Body fairly compressed, its depth a little greater than head length. Interorbital space flat or slightly convex. Maxilla (upper jaw) extending to vertical from anterior nostril. Teeth in jaws in a single series, the canines in front are rather small, postero-lateral teeth rather small but distinct molars present in adults. Dorsal fin continuous, without notch, with 10 spines and and 9 soft rays, 3rd to 5th spines longest. Anal fin with 3 spines and 8 soft rays. Pectoral fin slightly shorter than head length ; inner base of pectoral fin densely covered with scales. Scale-rows 6 between lateral line and base of mid-dorsal spines.

Colour : head yellowish-brown, body greenish-grey ; posterior edge of operculum bright red ; individual scales on body with yellow centre. Fins red, pectoral and pelvic fins paler.

Geographical Distribution : Red Sea, East Africa, east coast of India and the East Indies.

Inhabits coastal waters, usually over sandy bottoms at depths of less than 50 m.

Fishery Information : The species is commercially exploited at Kilakarai (Gulf of Mannar).

Lethrinus microdon Valenciennes

Lethrinus microdon Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 295 (type-locality : Bourou, East Indies) ; Murty, 1969, *Bull. cent. mar. Fish. Res. Inst.*, (10) : 21.

Common Names :

Smalltoothed pigface bream	...	English
Filolu, Metti	...	Lakshadweep Is.

Distinguishing Characters :

Body fairly compressed, its depth about 1.2 times in head length. Interorbital space gently convex. Maxilla extending to below posterior nostril, or to below anterior nostril in large specimens ; hind nostril always distinctly nearer snout-tip than hind margin of head. Canines small, postero-lateral teeth of jaws small and conical. Dorsal fin continuous, with 10 spines and 9 soft rays, the second spine slightly longer than first spine. Anal fin with 3 spines and 8 soft rays. Scale-rows 5 between lateral line and base of mid-spinous dorsal fin ; inner base of pectoral fin without scales.

Colour : uniform greenish, with traces of bluish radiating streaks in front of eyes. Fins bright red, pelvic fins dusky. Young specimens with indistinct cross-bars on body and a dark blotch between lateral line and middle of pectoral fin.

Geographical Distribution : Red Sea, Zanzibar, India, Sri Lanka, to the East Indies.

Fishery Information : Taken commercially in small quantities only occasionally at Tuticorin (Tamil Nadu).

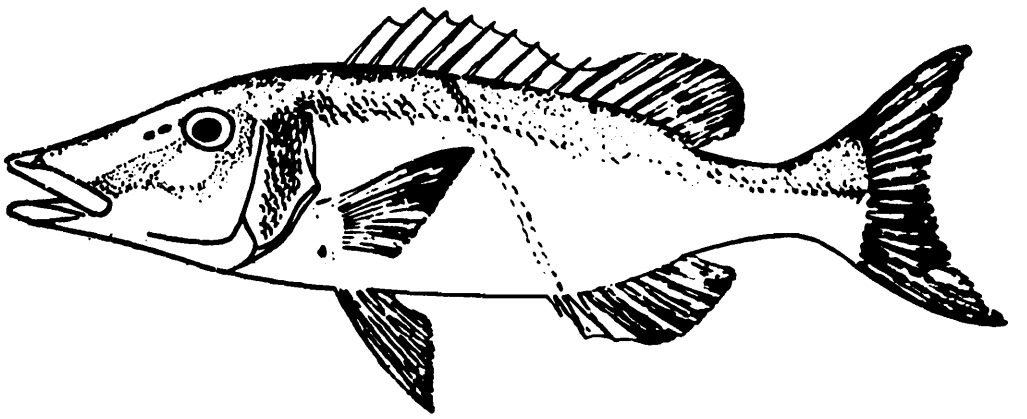
Lethrinus miniatus (Schneider)

[Text-fig. 240]

Sparus miniatus Schneider, 1801, *Syst. Ichth.* : 281 (type-locality : Nomoaka Is., N. Caledonia).

Lethrinus rostratus (*nec* Valenciennes) Day, 1875, *Fishes of India* : 134, pl. 33, fig. 1.

Lethrinus miniatus : Day, 1889, *Fauna Br. India*, Fishes, **2** : 37.



Text-fig. 240. *Lethrinus miniatus* (Schneider)

Common Names :

Longface emperor	...	English
Thundigufilolu, Pulmetti	...	Lakshadweep Is.

Distinguishing Characters :

Body fairly compressed and elongate, with the dorsal profile strongly elevated. Head (especially snout) very elongate, much longer than body depth; interorbital area flat, sometimes convex: maxilla (upper jaw) extending to vertical before or below anterior nostril; lips thick. Teeth in broad villiform bands in jaws, the postero-lateral teeth conical. Dorsal fin with a slight notch, with 10 spines and 9 soft rays, the second spine slightly longer than first but about equal to third. Anal fin with 3 spines and 8 soft rays. Usually 6 rows of scales between lateral line and base of median dorsal spines; inner bases of pectoral fins without scales.

Colour : body olive-brown above, sometimes pink below; occasionally 2 or 3 blue streaks radiating from eye. Dorsal, anal and caudal fins pink to red, with brighter margins; pectoral and pelvic fins yellow. Inside of mouth orange.

Geographical Distribution : Widespread throughout the tropical Indo-Pacific.

Fishery Information : This species is fairly common in and around the pearl oyster beds at Tuticorin (Tamil Nadu) and at Kilakarai (Tamil Nadu).

Lethrinus nebulosus (Forsskal)

Sciaena nebulosa Forsskal, 1775, *Descript. Animal* : 52 (type-locality : Red Sea).
Lethrinus nebulosus : Day, 1875, *Fishes of India* : 136, pl. 33, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **2** : 39, fig. 15.
Lethrinus karwa (Valenciennes) : Day, 1875, *Fishes of India* : 135, pl. 33, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **2** : 38.

Common Names :

Starry pigface bream	...	English
Karwa	...	Telugu
Valamin, Koranguvelu	...	Tamil
Chemballi, Kadu	...	Malayalam

Distinguishing Characters :

Body moderately elongate and fairly compressed, its depth a little greater than head length. Interorbital space broadly convex. Maxilla (upper jaw) extending to vertical from anterior nostril. Canines rather small, postero-lateral teeth developed as small molars in adults. Dorsal fin continuous, with 10 spines and 9 soft rays. Anal fin with 3 spines and 8 soft rays. Inner bases of pectoral fins scaled.

Colour : body olive, with white spot on each scale; bluish bands from eye to posterior nostril and jaw; preopercle spotted blue; inside of mouth orange; opercular membrane red; darkish lateral blotch between pectoral fin and lateral line, fading with age. Fins yellowish.

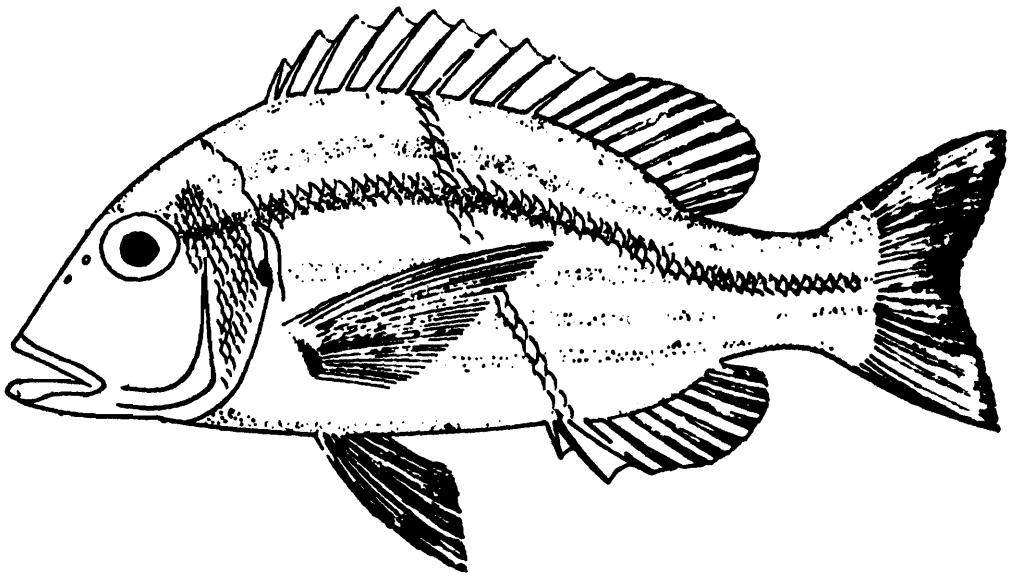
Geographical Distribution : Indian Ocean and tropical western Pacific.

Fishery Information : These fishes inhabit the sections of the sea where the sea-floor is hard with coral rocks. The species is one of the main components of the sea-bream fishery on the Tamil Nadu coast which is one of the important fisheries off Tuticorin in the Gulf of Mannar.

Lethrinus ornatus Valenciennes

[Text-fig. 241]

Lethrinus ornatus Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 310 (type-locality : Java) ; Day, 1875, *Fishes of India* : 137 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 40.



Text-fig. 241. *Lethrinus ornatus* Valenciennes

Common Name :

Ornate emperor ... English

Distinguishing Characters :

Body moderately robust and rather strongly compressed, its depth much greater than head length. Snout blunt, the upper profile steep; interorbital area slightly convex. Maxilla (upper jaw) extending to vertical through posterior nostril. Canines moderate, postero-lateral teeth of jaws developed into strong molars. Dorsal fin continuous, barely notched, with 10 spines and 9 soft rays, the second spine slightly longer than first spine. Anal fin with 3 spines and 8 soft rays. Pectoral fins long and pointed, almost as long as head; inner bases of pectoral fins densely scaled. Scale-rows 6 between lateral line and base of mid-dorsal spines.

Colour : head yellowish-brown, body pale green with 5 or 6 yellow longitudinal stripes; hind margin of operculum, and sometimes preoperculum, bright red. Anal and paired fins yellow.

Geographical Distribution : The Andamans, the East Indies and Taiwan.

Fishery Information : Taken commercially in small quantities at Port Blair in the Andaman Sea.

Lethrinus ramak (Forsskal)

Sciaena ramak Forsskal, 1775, *Descript. Animal.* : 52 (type-locality : Red Sea).
Lethrinus ramak : Day, 1875, *Fishes of India* : 137 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 40.
Lethrinus obsoletus (Forsskal) Jones and Kumaran, 1980, *Fishes of Laccadive archipelago* : 332, fig. 282.

Common Names :

Yellow-banded pigface bream	...	English
Metti	...	Lakshadweep Is

Distinguishing Characters :

Body fairly compressed, its depth about equal to head length. Interorbital space slightly convex ; maxilla (upper jaw) extending to vertical from anterior nostril. Canines moderate, postero-lateral teeth small and molariform. Dorsal fin continuous, with no notch, with 9 spines and 9 soft rays. Anal fin 3 spines and 8 soft rays. Six rows of scales between lateral line and base of median dorsal spines ; inner bases of pectoral fins densely covered with scales.

Colour : head dark purple, body paler, with several orange longitudinal stripes on flanks, the stripe through pectoral-fin base conspicuous. Fins reddish.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Taken commercially in small quantities in the Gulf of Mannar and probably also in the Andaman Sea.

Lethrinus variegatus Valenciennes

Lethrinus variegatus Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 287 (type-locality : Massauah ; Suez) ; Sato, 1978, *Bull. Univ. Mus. Univ. Tokyo,* (15) : 49, fig. 28.

Common Name :

Variegated emperor	...	English

Distinguishing Characters :

Rather small species; body fairly compressed, its depth 3.1 to 3.3 times in standard length; head length more than body depth. Interorbital area flat or slightly convex. Level of hind nostril distinctly nearer snout-tip than hind margin of head. Canines usually strong, postero-lateral teeth of jaws conical. Dorsal fin continuous, without notch, with 10 spines and 9 soft rays. Anal fin with 3 spines and 8 soft rays. Five rows of scales between lateral-line and median dorsal spines; inner base of pectoral fin without scales.

Colour : body yellowish-brown, paler below; two dark bands from eye, one straight downward, the other to middle part of upper jaw; another dark band connects eyes across interorbital space. Fins orange with brighter margin. Juveniles variably mottled or reticulated darker.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

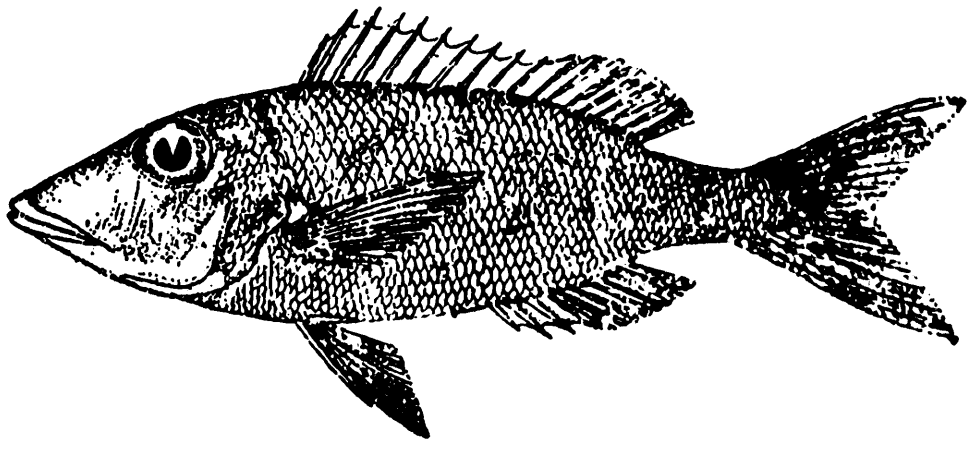
Fishery Information : Taken commercially only occasionally at Tuticorin (Tamil Nadu).

Lethrinus xanthochilus Klunzinger

[Text-fig. 242]

Lethrinus xanthochilus Klunzinger, 1870, *Synopsis Fische Rothen Meeres* : 753 (type-locality : Red Sea).

Lethrinella xanthocheilus : Silas and Toor, 1962, *J. mar. biol. Ass. India*, **3** (1/2) : 210, fig. 1.



Text-fig. 242. *Lethrinus xanthochilus* Klunzinger

Common Names :

Klunzinger's emperor	...	English
Rythang-filolu, Kilukkam-metti	...	Lakshadweep Is.

Distinguishing Characters :

Body fairly compressed, its depth less than length of head. Interorbital area notably flat; eyes virtually in dorsal profile. Maxilla (upper jaw) extending to vertical through anterior nostril; posterior nostrils midway between hind margin of head and snout-tip in adults, but distinctly nearer snout tip in smaller specimens. Canines stout, postero-lateral teeth of jaws conical, sometimes with a large canine among them. Dorsal fin continuous, without notch, with 10 spines and 9 soft rays. Anal fin with 3 spines and 8 soft rays. Four to five rows of scales between lateral line and median dorsal spines; inner bases of pectoral fins without scales.

Colour : body yellowish-grey above, paler below. Characteristic bright red marking on upper half of outer pectoral-fin base; edge of operculum usually also red. Little black spots scattered on body, especially dense on cheeks; lips yellow. Dorsal and caudal fins orange, with brighter margin; anal and paired fins paler.

Geographical Distribution : Red Sea, East Africa, the Andaman Islands to Ryukyus (Japan) and Gilbert Islands.

Fishery Information : Taken commercially only occasionally in the Andaman Sea in our region.

Family : Pentapodidae
[Large-eye Breams]

Perch-like fishes with an oblong, moderately compressed body. Eyes noticeably large; interorbital region wide and flat. Mouth terminal, horizontal or slightly oblique; tip of premaxilla not overlapping maxilla at hind end of mouth; maxilla broad, contained by a strong suborbital shelf when mouth is closed, bearing in two genera (*Monotaxis* and *Gnathodentex*) a lengthwise denticulated ridge. Canine and/or molar teeth in jaws, usually strong; no teeth on roof of mouth. Gill-rakers knob-like, 5 or 6 on first arch. Dorsal fin with 10 spines and 9 or 10 soft rays. Anal fin with 3 spines and 8 to 10 soft rays. Pelvic fin with 1 slender or strong spine and 5 soft rays.

Caudal fin invariably forked. Scales ctenoid; preoperculum and rest of head behind eyes scaled.

Fishes of tropical Indo-west Pacific in shallow coastal waters around rocky outcrops and coral reefs.

KEY TO GENERA**

1 (a) Outer surface of maxillary smooth, entirely devoid of any denticulations	...	2
(b) Outer surface of maxillary with a strongly denticulated longitudinal ridge	...	3
2 (a) Preoperculum fully scaled; edge of suborbital shelf free, tapering to a blunt point posteriorly; anal fin with 7 soft rays	...	**Pentapodus**
(b)) Preoperculum with a broad naked border; edge of suborbital shelf not free; anal fin with 10 soft rays	...	**Gymnocranius***
3 (a) Sides of jaws with large and rounded molars preceded by a patch of small teeth and an anterior series of canines; tooth portion of premaxillary deep and broad, its length about equal to its vertical pedicel; profile of head in front of eyes strongly convex	...	**Monotaxis***
(b) Teeth in jaws pointed or conical, never molar-like; tooth portion of premaxillary slender, its length slightly shorter or distinctly shorter than its vertical pedicel; profile of head in front of eyes slightly convex or straight	...	4
4 (a) Body deep and ovoid, its depth 1.8 to 2.3 times in standard length; 42 or 43 lateral line scales; anal fin with 10 soft rays; pectoral-fin rays 14	...	**Wattsia***

** The various genera of this family (except *Pentapodus*) are placed in the family Lethrinidae, and the genus *Pentapodus* in Nemipteridae by Johnson (1981).

(b) Body slender and oblong, its depth about 2.7 times in standard length; 70 to 78 lateral line scales; anal fin with 9 soft rays; pectoral-fin rays 19 ... **Gnathodentex**

Genus **Gnathodentex** Bleeker

Gnathodentex Bleeker, 1873, *Versl. Meded. Akad. Wet. Amsterdam,* (2) **7** : 41 (type-species : *Sparus aureolineatus* Lacepede).

Body oblong and laterally compressed, its depth about 2.7 times in standard length. Head profile in front of eyes slightly convex or straight. Preoperculum with a rough but not clearly serrated hind edge. Jaws with a narrow band of villiform teeth, an outer series of conical teeth, and 4 canines at front of upper jaw and 6 at front of lower jaw. Maxilla naked, with a longitudinal, strongly and coarsely serrated ridge. Dorsal fin with 10 spines and 10 soft rays. Anal fin with 3 spines and 9 soft rays. Pectoral fin with 19 rays. Caudal fin forked, with pointed lobes.

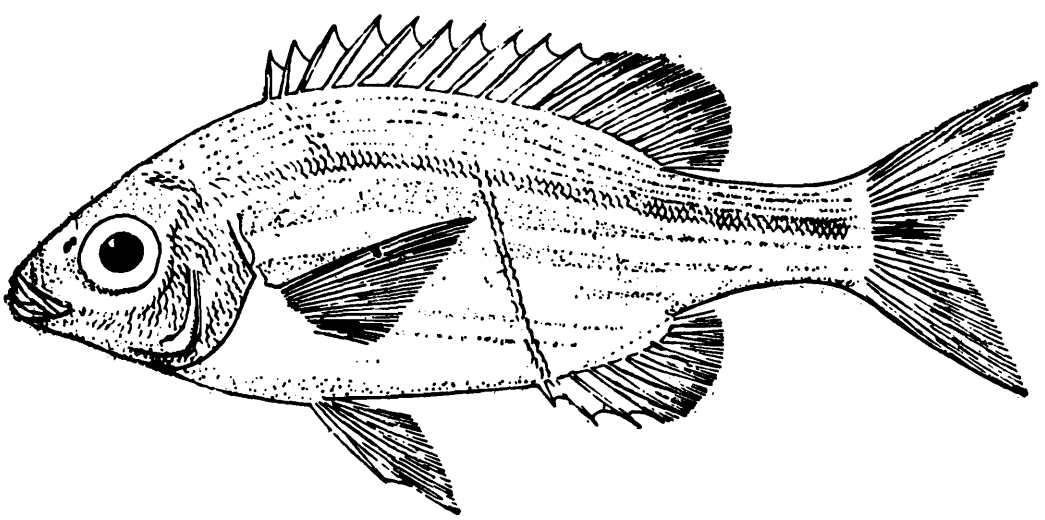
Monotypic.

Gnathodentex aureolineatus (Lacepede)

[Text-fig. 243]

Sparus aureolineatus Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 42, 132 (type-locality : not known).

Pentapus aurolineatus : Day, 1875, *Fishes of India* : 93; Day, 1889, *Fauna Br. India,* Fishes, **1** : 530.



Text-fig. 243. *Gnathodentex aureolineatus* (Lecepede)

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* The fishes of the monotypic genus *Monotaxis* Bennett represented by *M. grandoculis* (Forsskal), the genus *Gymnocranius* Klunzinger represented by *G. griseus* (Schlegel) and *G. robinsoni* (Gilchrist & Thompson), and the monotypic genus *Wattsia* Chan represented by *W. mossambicus* (Smith) in our area, are of no fishery importance.

Common Names :

Striped large-eye bream	...	English
Bandu, Cheekkanni	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and laterally compressed, its depth about 2.7 times in standard length. Eye large, its diameter slightly greater than length of snout; interorbital space wide, slightly convex. Teeth in jaws in narrow, villiform bands, bordered by an outer series of caniniform teeth; 4 moderate canines in front of upper jaw and 6 in lower jaw. Dorsal fin with 10 slender spines and 10 soft rays. Anal fin with 3 slender spines and 9 soft rays. Caudal fin forked, with pointed lobes. Scales in lateral line 70 to 78; 5 scale-rows between lateral line and first dorsal spine, and 6 scale-rows between lateral line and first anal spine.

Colour : body ground colour brown-green, becoming paler below; 8 pearly white longitudinal stripes on body; a broad silvery stripe on preorbital region, continuing below eye to its posterior margin. Spinous parts of dorsal and anal fins, and caudal fin light red; soft parts of dorsal and anal fins, and pectoral and pelvic fins pale.

Geographical Distribution : Widespread in the tropical Indo-west Pacific, but perhaps not beyond northern coasts of Australia.

Inhabits coral reefs and coastal waters, down to 20 m.

Fishery Information : Of minor commercial significance in the Gulf of Mannar and in the Laccadive Sea.

Genus **Pentapodus** Quoy & Gaimard

Pentapodus Quoy and Gaimard, 1824, *Voy. Uranie et Physic., Zool.* : 294 (type-species : *Pentapodus vitta* Quoy & Gaimard).

Body moderately slender, slightly compressed. Maxillary with a smooth surface, devoid of denticulations. Preopercular edge and lower border smooth; suborbital shelf free, tapering to a blunt point posteriorly. Teeth in jaws in villiform band, with an outer series of canino'd ones and with 4 canines in front of upper jaw and 2 distant canines in lower jaw (which may be wanting). Single dorsal fin of 10 spines and 9 soft rays. Anal fin with 3 spines and 7 soft rays. Caudal fin forked. Scales moderate, ctenoid; head scaly except snout, preorbitals and suborbitals; preoperculum fully scaled.

Fishes of small size in the warmer Indo-Pacific. Several species, one in our region.

Pentapodus setosus (Valenciennes)

Pentapus setosus Valenciennes, 1830, *Hist. nat. Poiss.*, **6** : 270 (type-locality : Batavia).

Pentapodus setosus Fowler, 1933, *Bull. U. S. natn. Mus.*, (100) **12** : 78

Common Name :

Threadfin bream ... English

Distinguishing Characters :

Body moderately slender; top of head somewhat flattened. Inferior edge of suborbital indented, curving around end of maxillary, posterior edge of suborbital tapering to a point posteriorly. Mouth terminal, with numerous small pointed (villiform) teeth and a few canines at front of jaws. Dorsal fin with 10 spines and 9 soft rays. Anal fin with 3 spines and 7 soft rays. Caudal fin moderately forked, and with a slender thread-like filament, at least as long as head length, from upper lobe. First ray of pelvic fin slightly elongated. Scales on top of head beginning behind posterior nostrils; scales in lateral line about 46; 6 or 7 rows of scales on preoperculum, preopercular margin naked.

Colour : silvery, darker on upper part of body; two silvery bands from snout to eye; a broader silvery band from behind eye along side of body to caudal-fin base, ending in a black spot; silvery band along anal-fin base, also ending in a black spot on caudal-fin base; silvery band along dorsal-fin base. Caudal fin filament black.

Geographical Distribution : South-east coast of India, through the East Indies, to the Philippines and Australia.

Fishery Information : Of minor fishery significance on the Tamil Nadu coast.

FAMILY : SPARIDAE

[Seabreams, Porgies]

Body oblong, usually deep and more or less compressed. Head large, often with steep upper profile; mouth small, upper jaw (maxilla) not extending beyond middle of eye; distal end of premaxilla overlaps

maxilla externally, the maxilla partly concealed under suborbital bone. Teeth in jaws well developed, usually differentiated into conical (canine-like) or flat (incisor-like) teeth in front and rounded, molar-like teeth laterally; palate toothless. Snout and suborbital area scaleless, hind margin not serrated. Preopercle scaled, without spines or serrations on margin. Dorsal fin with 10 to 13 spines and 10 to 15 soft rays, last spines and first rays usually about equal in length, anterior spines sometimes elongate or filamentous. Pectoral fins long and pointed; pelvic fins below or just behind pectoral-fin base, with 1 spine and 5 soft rays, axillary scales presnt. Anal fin with 3 spines and 8 to 12 soft rays, the spines especially the second often stout. Caudal fin emarginate or forked. Scales cycloid or weakly ctenoid; a single, continuous lateral line.

Fishes of this family are excellent foodfishes and of considerable commercial importance in our region. The young are often quite different from the adult in shape and markings, sometimes more strikingly and vividly coloured.

KEY TO SPECIES

1 (a) Elongated spines in dorsal fin	...	**Argyrops**
(b) No elongated spines in dorsal fin	...	2
2 (a) Second anal spine much longer than third	...	**Acanthopagrus**
(b) Second anal spine not markedly longer than third	...	3
3 (a) A large dark blotch on caudal peduncle	...	**Diplodus***
(b) No dark blotch on caudal peduncle	...	4
4 (a) Teeth all conical, no molars in jaws	...	**Dentex***
(b) Lateral molar-like teeth in jaws present	...	5
5 (a) A distinct separate group of 4 to 6 enlarged, subequal incisiform teeth (rounded in large adults) anteriorly in upper jaw	...	**Rhabdosargus**
(b) No anterior group of enlarged teeth, outer teeth all compressed and incisiform	...	**Crenidens***

* The genus *Crenidens* Valenciennes represented by *C. crenidens* (Forsskal) (Syn. *Crenidens indicus* Day) and the genus *Dentex* Cuvier represented by *D. nufar* (Valenciennes), are of no fishery importance in our area; the fishes of the genus *Diplodus* Rafinesque represented by *D. noct* (Valenciennes) has been recorded from Pakistan and is likely also to be found in our region.

Genus **Argyrops** Swainson

Argyrops Swainson, 1839, *Nat. Hist. Animals*, Fishes, **2** : 221 (type-species : *Sparus spinifer* Forsskal).

Body robust and very deep, strongly compressed. Jaws with an anterior row of conical canines, and laterally 2 rows of rounded molars, with sometimes a rudimentary third. Dorsal fin with 11 or 12 spines and 10 or 11 soft rays, the first two spines very short, 3rd and sometimes 4th, 5th and 7th spines flattened and much elongated (in younger fish reaching to level of caudal fin, shorter in older fish). Anal fin with 3 spines and 8 or 9 soft rays. Scales large, present on cheeks. Colour reddish.

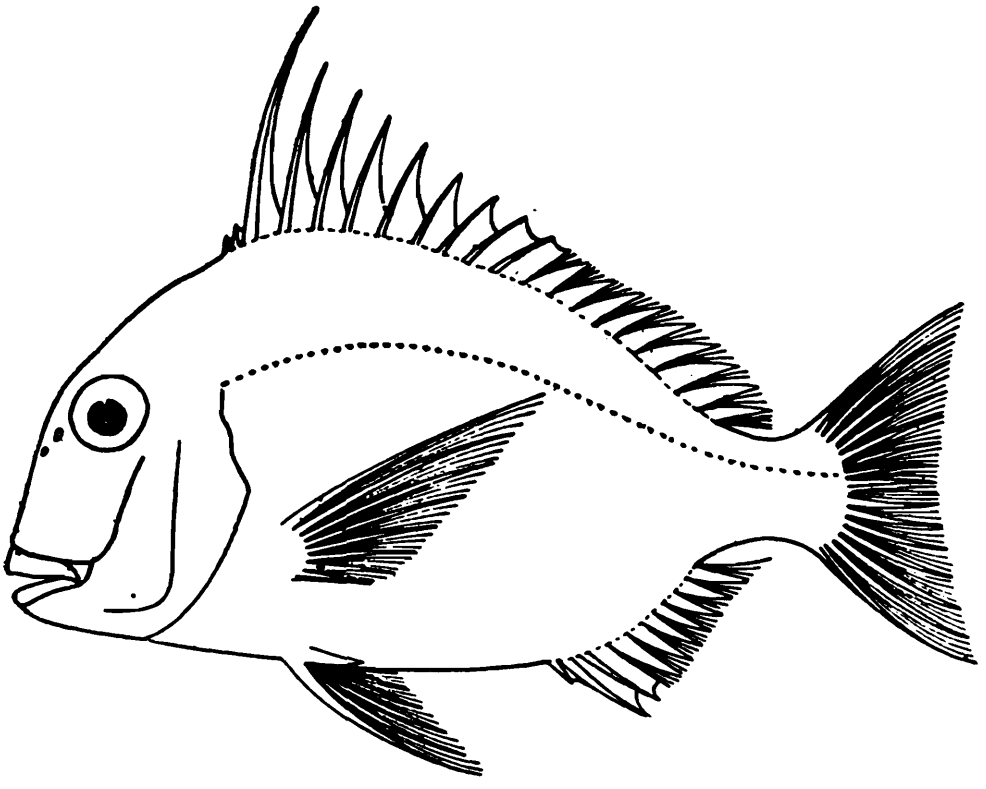
Two species, one in our area.

Argyrops spinifer (Forsskal)

[Text-fig. 244]

Sparus spinifer Forsskal, 1775, *Descript. Animal.* : 32 (type-locality : Djedda, Red Sea).

Pagrus spinifer : Day, 1876, *Fishes of India* : 138, pl. 33, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 42, fig. 16.



Text-fig. 244. *Argyrops spinifer* (Forsskal)

Common Names :

Longspine-seabream	...	English
Kooroota	...	Telugu
Pununtlai	...	Tamil
Palu	...	Marathi

Distinguishing Characters :

Body robust and very deep, strongly compressed; dorsal profile much arched. Depth of head much greater than its length, especially so in large specimens, upper profile of head steep and almost straight or slightly concave from upper jaw to eye; eyes large, close to front profile. Upper jaw (maxilla) reaching to vertical through front border of eye. Four canines in front of upper jaw and 3 rows of molars on each side; in lower jaw 6 much smaller canines and 2 rows of molars on each side behind them. Dorsal fin with 11 or 12 spines and 10 or 11 soft rays, the first two spines very short, 3rd to 5th spines (sometimes to 7th) flattened and much elongated (in young fish reaching to level of caudal fin, shorter in older fish); soft dorsal fin rays all approximately equal in length. Anal fin with 3 spines and 8 or 9 soft rays, the 1st spine short, 2nd and 3rd of equal length or 2nd slightly longer. Caudal fin emarginate, with pointed lobes. Scales large; soft parts of dorsal and anal fins with a low scaly sheath.

Colour : head and body mainly silvery with red iridescence, particularly on upper sides and head, usually red on margin of upper part of operculum; all fins reddish. Young fish with several vertical red bars on body.

Geographical Distribution : Indo-west Pacific.

Inhabits a wide range of bottoms, at depths of 5 to 100 m.

Fishery Information : Taken commercially along the Andhra, Tamil Nadu and Gujarat coasts in our area.

Genus **Acanthopagrus** Peters

Acanthopagrus Peters, 1855, *Arch. Naturgesch.*, **21**(1) : 242 (type-species : *Chrysophrys* (*Acanthopagrus*) *vagus* Peters).

Body fairly deep and compressed. Jaws with 4 to 6 canines anteriorly and rounded molars in 3 or 4 series in each posteriorly; no

teeth on vomer and palatines. Dorsal fin with 11 or 12 strong spines, depressible in groove, no elongated spines. Anal fin with 3 spines, the second spine longer than third. Scales moderate; cheeks scaly.

The generic name *Mylio* has been erroneously used in recent years for these fishes. Fishes of this genus are a predominant group of perch-like fishes within the shallow part of Indian coastal waters.

Rather rodent-like fishes of shallow water of the tropical Indo-Pacific, 3 species in our area.

KEY TO SPECIES

1 (a) Head with two black cross-bars, the first through eye, the second from nape to opercle edge	...	*M. bifasciatus*
(b) Head without markings, or at most with a dark band between eyes	...	2
2 (a) Six series of preopercular scales; depth of body less than 2.4 times in standard length; body dusky grey above, silvery white below, with anal and caudal fins blackish grey; no silvery edges to scales and no dark spot at origin of lateral line	...	*A. berda*
(b) Four or five series of preopercular scales; depth of body greater than 2.4 times in standard length; anal and lower caudal fins yellow; scales with dark bases and silvery edges (especially above lateral line) and a dark spot at origin of lateral line	...	*M. latus*

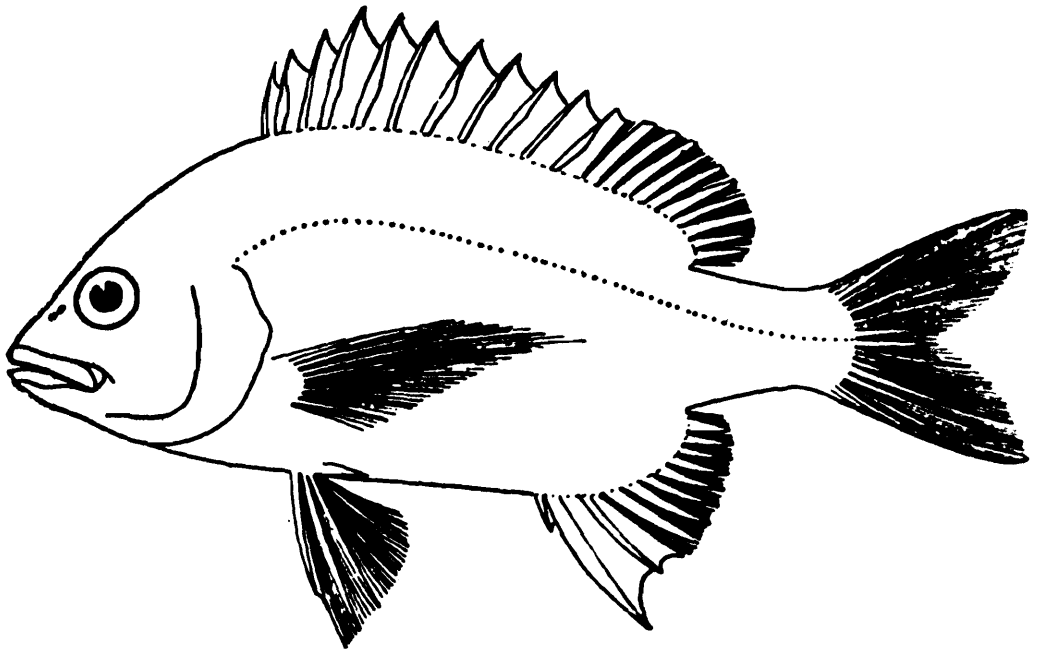
Acanthopagrus berda (Forsskal)

[Text-fig. 245]

Sparus berda Forsskal, 1775, *Descript. Animal.* : 32 (type-locality : Arabia).

Chrysophrys berda : Day, 1875, *Fishes of India* : 140, pl. 34, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **2** : 44.

Chrysophrys berda var. *calamara* Day, 1875, *Fishes of India* : 140, pl. 35, fig. 2.
Chrysophrys cuvieri (Bleeker) : Day, 1875, *Fishes of India* : 141, pl. 34, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, 2 : 45.



Text-fig. 245. *Acanthopagrus berda* (Forsskal)

Common Names :

Picnic seabream	...	English
Calamara	...	Telugu
Coorree, Currapu-mattawa	...	Tamil
Aree	...	Malayalam
Khadak-paalu	...	Marathi
Moorookeedah	...	Andaman Is.

Distinguishing Characters :

Body fairly deep and compressed, its depth less than 2.4 times in standard length. Head large, rather pointed, its upper profile oblique often with a bulge above eyes; eyes moderate in size. Four to six canine teeth in front of either jaw, the other teeth are molar-like and in several rows. Dorsal fin with 11 spines and 11 or 12 soft rays; soft rays equal to or lower than spines. Anal fin with 3 spines and 8 or 9 soft rays. Scales large; six rows of scales on preoperculum.

Colour : body dusky grey above, silvery white below. Dorsal and anal fins with dusky margins; dorsal spines often silvery; pectoral fins yellow; pelvic, soft dorsal and anal fins blackish.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

A bottom-living fish, found mainly on rough and muddy-sandy grounds in coastal waters, especially around river mouths and in estuaries, from shallow water to depths of 50 m.

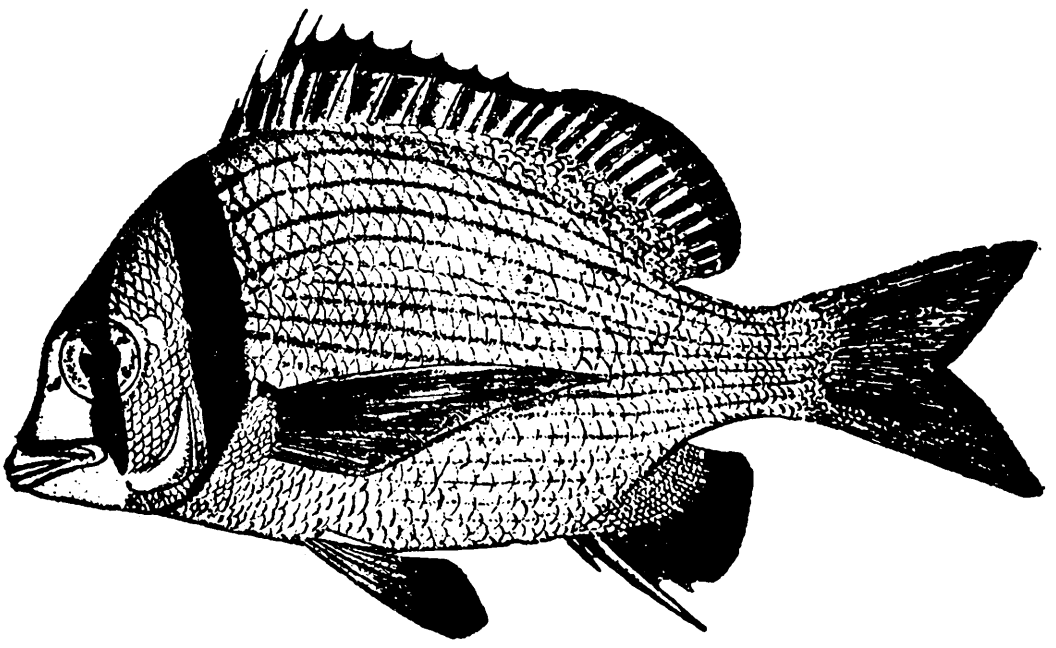
Fishery Information : Taken commercially in small quantities mostly on the Tamil Nadu and Kerala coasts in our area. Flesh excellent.

Acanthopagrus bifasciatus (Forsskal)

[Text-fig. 246]

Chaetodon bifasciatus Forsskal, 1775, *Descript. Animal.* : 64 (type-locality : Djedda, Red Sea).

Chrysophrys bifasciata : Day, 1875, *Fishes of India* : 141, pl. 34, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 46.



Text-fig. 246. *Acanthopagrus bifasciatus* (Forsskal)

Common Name :

Twobar bream ... English

Distinguishing Characters :

Body fairly deep and compressed. Head large, its upper profile steeply inclined, a bulge between eyes ; head becomes very heavy with age. Four to six slightly compressed canines in front of each jaw ; 5 rows of molars in upper jaw and 4 series of molars in lower jaw. Dorsal fin with 11 spines and 12 to 15 soft rays, the spine strong and none prolonged ; soft dorsal rays scarcely higher than spines. Anal fin with 3 spines and 10 to 12 soft rays. Scales moderate, cheeks scaly.

Colour : body silvery, with dark lines along each row of scales. Head with 2 black cross-bands, the first through eye to mouth angle, and second from nape to opercle edge. Yellow band before eyes; snout black. Soft dorsal, caudal and pectoral fins yellow; spinous dorsal fin black, soft dorsal fin with narrow black edge; pelvic and anal fins black except the last anal ray which is yellow.

Geographical Distribution : East coast of Africa, the Red Sea, south Arabia and India.

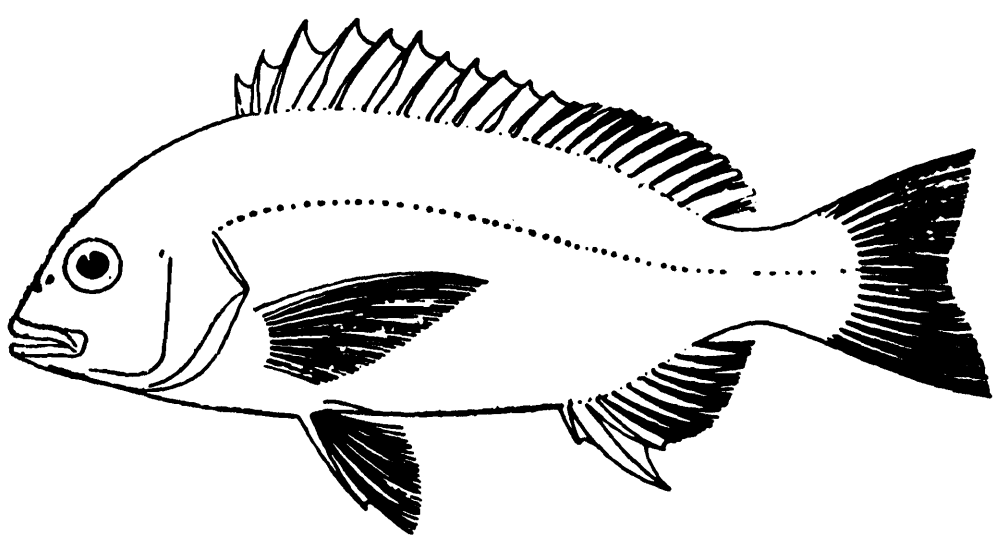
Fishery Information : Taken commercially only occasionally in our area.

Acanthopagrus latus (Houttuyn)

[Text-fig. 247]

Sparus latus Houttuyn, 1782, *Verh. Holland. Maatsch. Wet. Haarlem*, **20** : 322 (type-locality : Japan).

Chrysophrys datnia (Hamilton-Buchanan) : Day, 1875, *Fishes of India* : 140, pl. 34, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 44, fig. 17.



Text-fig. 247. *Acanthopagrus latus* (Houttuyn)

Common Names :

Yellowfin seabream	...	English
Karuppu-mattavan	...	Tamil
Karkutla, Palu	...	Marathi

Distinguishing Characters :

Body fairly deep and compressed, its depth greater than 2.4 times in standard length. Head large, rather pointed ; snout profile oblique, with

a slight bulge above eyes; eyes moderate in size. Four to six canine teeth in front of either jaw, with a band of molar-like teeth behind them. Dorsal fin with 11 or 12 spines and 10 to 12 soft rays; soft rays about same length as last spine. Anal fin with 3 spines and 8 or 9 soft rays. Scales large; 4 or 5 series of scales on preoperculum.

Colour : body dusky grey, darker above, the belly usually yellowish. Scales with dark bases and silvery edges (especially above lateral line) ; often a dark band between eyes and a dark spot at origin of lateral line. Pelvic fins yellow; pectoral and anal fins dusky at base, yellow at margin, lower caudal-fin lobe yellow.

Geographical Distribution : Indo-west Pacific.

Inhabits shallow coastal waters to depths of 50 m, and enters estuaries.

Fishery Information : Taken commercially only occasionally on the Gujarat coast in our area.

Genus **Rhabdosargus** Fowler

Rhabdosargus Fowler, 1933, *Bull. U. S. natn. Mus.*, (100) **12** : 178 (type-species : *Sargus auriventris* Peters = *Sparus sarba* Forsskal) ; Smith, 1979, *Copeia* : 702 (Review).

Body deeper than head, compressed. Upper jaw with 4 to 6 enlarged, subequal incisiform teeth (rounded in large adults) anteriorly; posterior to these incisors, large adults have 3 or more series of large molariform teeth in each jaw with inner posteriormost molars being considerably enlarged. Dorsal fin with 11 spines and 11 to 13 soft rays. Anal fin with 3 spines and 10 to 13 soft rays, the second spine not greatly thickened. Soft dorsal and anal fins naked, with low to medium scaly sheaths. Pectoral fins longer than head. Caudal fin with 9+8 principal rays. Scales moderate, 55 to 65 in lateral line, cycloid anteriorly and dorsally, but weakly ctenoid on posterior ventral part of body. Preopercle flange usually naked. Frontals moderately broad. Interorbital naked, porous, width less than twice eye-diameter. Posterior nostril a slit in front of eye; anterior nostril a pore with slightly raised margin.

Four species, one in our area.

Rhabdosargus sarba (Forsskal)

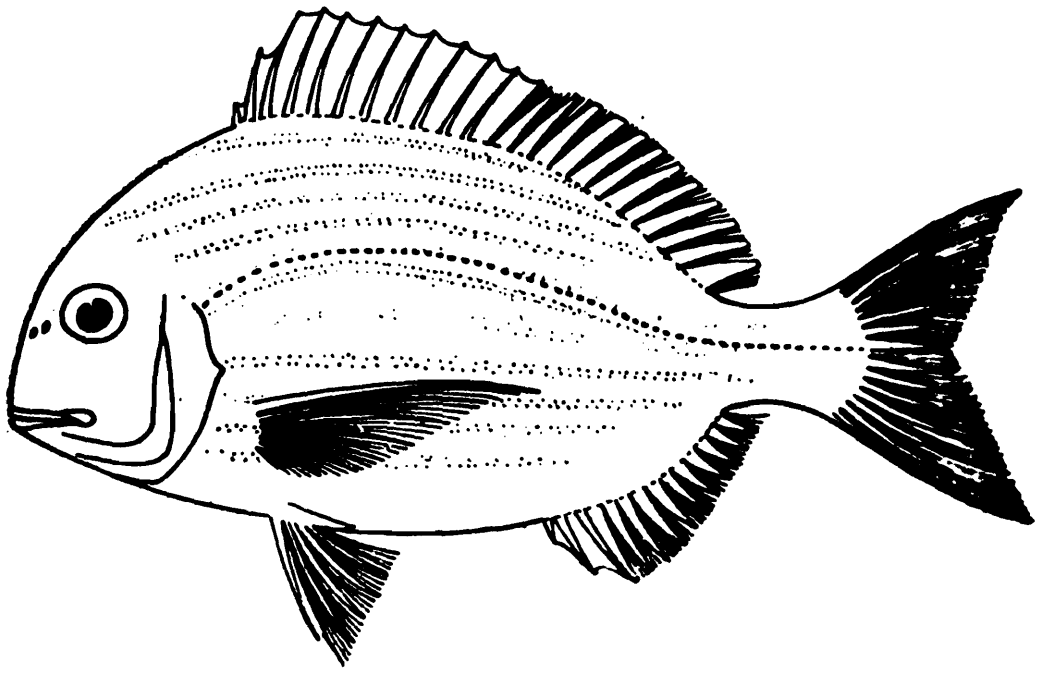
[Text-fig. 248]

Sparus sarba Forsskal, 1775, *Descript. Animal.* : 31 (type-locality : Djedda, Red Sea).

Chrysophrys sarba : Day, 1875, *Fishes of India* : 142, pl. 34, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 47.

Chrysophrys haffara Day (*nec* Forsskal), 1875, *Fishes of India* : 142, pl. 35, fig. 1.

Chrysophrys aries Schlegel : Day, 1889, *Fauna Br. India*, Fishes, 2 : 46.



Text-fig. 248. *Rhabdosargus sarba* (Forsskal)

Common Names :

Goldlined-seabream	...	English
Chitchillee	...	Telugu
Vella-mattawa	...	Tamil
Palu	...	Marathi

Distinguishing Characters :

Body deep, deeper than head length. Head large, its length about 4 times in standard length. Eyes moderate, 4.8 to 5.2 in head. Gill-rakers 7 to 9 on lower arm of first arch. Dorsal fin with 11 spines and 12 or 13 soft rays, the 3rd to 5th spines longest. Anal fin with 3 spines and 11 soft rays. Pectoral fin 1.2 to 1.3 times in head length in adults. Caudal fin deeply emarginate. Scales cycloid ; preopercle flange naked.

Colour : body silvery grey; each scale has a golden centre, so as to form yellow longitudinal lines (darker in preserved specimens) along body, belly with a yellow band, less conspicuous in large adults. Dorsal-fin base hyaline, dusky at margin; pectoral and pelvic fins dusky yellowish green; ventral half of lower caudal lobe yellow, with tip and ventral edge whitish.

Geographical Distribution : Indo-west Pacific.

A bottom living coastal fish which often enters rivers and estuaries.

Fishery Information : Taken commercially only occasionally on the Tamil Nadu coast. It is a handsome premier angling fish, growing to well in excess of 600 mm. in total length.

Family : Sciaenidae
[Croakers]

Body fairly elongate, moderately compressed, whole head and snout usually scaled. Snout rounded or bluntly pointed, mouth terminal (mid-water species) or inferior (bottom-dwellers); eyes small or moderate, in anterior half of head. Pores often conspicuous on snout and at front of lower jaw (mental pores); fleshy rostral fold on underside of snout, often with lobes; barbel sometimes present on chin. Teeth mainly small, but outer teeth of upper jaw and sometimes inner teeth of lower jaw enlarged; canines may be present. Dorsal fin long, almost completely divided by a notch, anterior part with 6 to 10 flexible spines and posterior part with 1 spine and 21 to 45 soft rays. Anal fin with 2 spines and 7 to 13 soft rays. Caudal fin rounded or truncate. Scales cycloid or ctenoid; lateral line extending to end of caudal fin. Gas-bladder present in all Indo-Pacific species.

The sciaenids are usually carnivorous, usually inshore denizens of tropical and temperate seas. They rank fifth in the quantitative abundance of the sea fish resources of India and, apart from prawns, are economically the most valuable among the ground fishes. Maharashtra ranks first, where the sciaenids form about 6% of the total marine fish catch of the state, Tamil Nadu second with 5.4% followed by Andhra and Gujarat. Large fish are usually consumed fresh or transported to interior markets, but smaller ones in excess of local

requirements are sundried on the beach. Probably the most profitable by-product of sciaenids are the gasbladders, called maws in trade. These are removed from the fish before their disposal, split open, washed in seawater and sundried. The maws are used in the preparation of isinglass, a substance utilised in the clarification of wine and beer, as a substitute for gelatin in confectionary and for the preparation of certain cements. Bulk of the better quality gasbladders is presently exported.

KEY TO GENERA

1 (a)	Gasbladder simple, without appendages; a barbel on chin with a pore at its tip; mouth ventral	...	**Umbrina***
(b)	Gasbladder with appendages	...	2
2 (a)	Gasbladder with only 1 or 2 pairs of simple or branched appendages	...	3
(b)	Gasbladder with more than two pairs of arborescent (branched) appendages	...	8
3 (a)	Gasbladder appendages wholly directed forward from anterior end of bladder	...	4
(b)	Gasbladder appendages with at least the main part lying parallel to bladder	...	5
4 (a)	Second anal spine long and robust, 16 to 21% of standard length; gillrakers on lower arm of first arch 8 or 9	...	**Macrospinosa***
(b)	Second anal spine 12 to 16% of standard length; gillrakers 21 to 24 on lower arm of first arch	...	**Kathala**
5 (a)	Gasbladder appendages abdominal, with a pair of simple tubular appendages arising from anterior end of bladder and directed backwards, without extensions into head; soft dorsal fin with 24 to 26 rays	...	**Bahaba***
(b)	Gasbladder appendages caphalic (with branches into head); soft dorsal fin with 27 to 45 rays	...	6

6 (a)	Gasbladder with diverticulum of each side arising from anterior end and immediately dividing into a cephalic and an abdominal branch	...	**Panna**
(b)	Gasbladder with one diverticulum on each side, attached near posterior end	...	7
7 (a)	Soft dorsal fin with 40 to 45 rays	...	**Panna***
(b)	Soft dorsal fin with 27 to 32 rays	...	**Otolithoides**
8 (a)	Gasbladder hammer-shaped	...	**Johnius**
(b)	Gasbladder carrot-shaped	...	9
9 (a)	Anterior pair of pores on front of chin separated by symphysis; anterior pair of arborescent appendages of gasbladder branching on posterior surface of transverse septum and not entering head	...	10
(b)	Anterior pair of pores on chin close together behind symphysis or united by a groove; anterior pair of appendages of gasbladder extending into head and branching under skull (except in *Protonibea*)	...	15
10 (a)	Outer row of teeth in upper jaw enlarged and spaced, but no outstanding canine teeth	...	11
(b)	One or two pairs of canine teeth near symphysis of upper or both jaws	...	13
11 (a)	Gasbladder appendages wing-like, without a dorsal limb, the posterior ones parallel to wall of bladder	...	**Pennahia**
(b)	Gasbladder appendages each with distinct dorsal and ventral limbs; posterior appendages simpler, very short, at right angles to wall of bladder	...	12
12 (a)	Pectoral fin 15.0 to 22.5% of standard length; interorbital width 5.0 to 6.8% of standard length; gasbladder appendages variously developed, the posterior short and bud-like	...	**Argyrosomus***

	(b) Pectoral fin 25.5 to 29.2% of standard length; interorbital width 7.7 to 9.1% of standard length; gasbladder appendages with well marked dorsal and ventral limbs, with the branches directed respectively posteriorly and anteriorly, at least some of them enveloping the bladder	...	**Atrobucca**
13	(a) Canine teeth in upper jaw only; mouth inferior	...	**Chrysochir**
	(b) Canine teeth in both jaws; lower jaw projecting	...	14
14	(a) Soft anal fin with 7 or 8 rays	...	**Otolithes**
	(b) Soft anal fin with 10 or 11 rays	...	**Pterotolithus**
15	(a) First (anterior) pair of gasbladder appendages branching on posterior surface of transverse septum and not entering head; upper parts of body, dorsal and caudal fin usually with black spots	...	**Protonibea**
	(b) Anterior pair of gasbladder appendages cephalic, extending into head and branching between skull and upper gill arches	...	16
16	(a) Teeth of lower jaw uniform, small or rather strong	...	17
	(b) Teeth of lower jaw differentiated in size	...	18
17	(a) Single tapering mental barbel present	...	**Dendrophysa**
	(b) No barbels on chin	...	**Paranibea**
18	(a) A pair of minute barbels present on chin	...	**Daysciaena**
	(b) No barbels on chin	...	**Nibea**

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* The genus *Umbrina* Cuvier represented by *U. sinuata* Day, has not been positively reported from India but has been recorded from Pakistan; the monotypic genus *Macrospinosa* Mohan represented by its type-species, *M. cuja* (Hamilton Buchanan) is a large freshwater species and contributes an important fishery in the Hooghly estuary; the genus *Bahaba* Herre represented by *B. chaptis* (Hamilton-Buchanan) in our region, is a freshwater species; the genus *Pama* Fowler represented by its type-species, *Pama pama* (Hamilton-Buchanan) is also a freshwater species contributing an important fishery in the Hoogly estuary; and the genus *Argyrosomus* Pylaie represented by *A. amoyensis* (Bleeker) (syn. *Sciaena bleekeri* Day), is of no fishery importance in our region.

Genus **Atrobucca** Chu, Lo & Wu

Atrobucca Chu, Lo and Wu, 1963. *Monogr. Fishes of China;* 64 (type-species : *Sciaena nibe* Jordan & Thompson).

Mouth terminal. Teeth sharp and needle-like, differentiated in size in both jaws, the outer row in upper jaw and inner row in lower jaw slightly enlarged and spaced; no canine teeth. Pores on lower jaw 6, the first pair minute at front of chin separated by the symphysis of lower jaw. Anal fin with 2 spines and 7 soft rays, the second spine weak. Pectoral fins long, 25.5 to 29.2% of standard length. Gas-bladder carrot-shaped, with 20 to 30 pairs of arborescent appendages, each with well-marked dorsal and ventral limbs, regularly arranged so that the twiglets of dorsal limb point backwards, those of ventral limb forwards (at least near tip); no appendages entering head.

Four species, 3 in our area.

KEY TO SPECIES

1 (a) Soft dorsal fin with 24 to 26 rays	...	*A. trewavasae*
(b) Soft dorsal fin with 27 to 32 soft rays	...	**2**
2 (a) Eyes conspicuously large, 9.4% of standard length; head length 38% of standard length	...	*A. alcocki**
(b) Eyes moderate, 7.2 to 8.3% of standard length; head length 32.5 to 35% of standard length	...	*A nibe*

Atrobucca nibe (Jordan & Thompson)

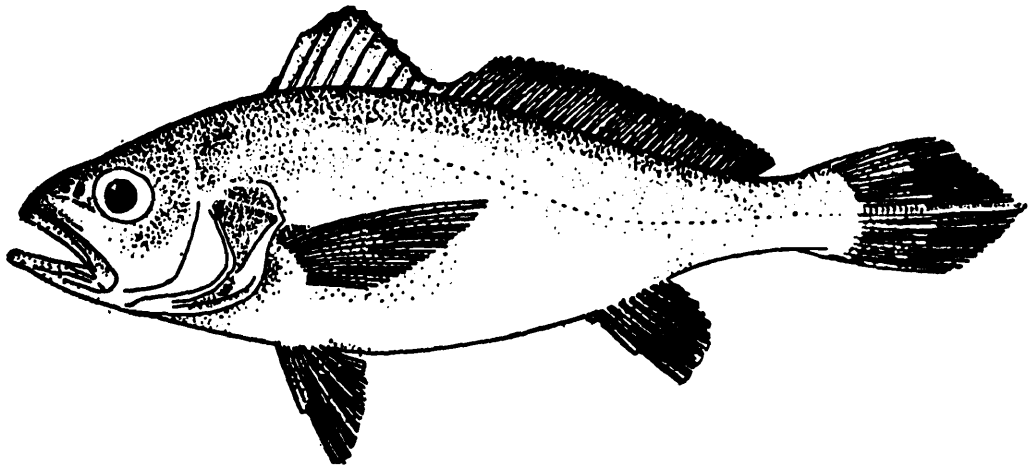
[Text-fig. 249]

Sciaena nibe Jordan and Thompson, 1911, *Proc. U. S. natn. Mus.*, **39** : 258, fig. 4 (type-locality : Wakanoura, Japan).

Atrobucca nibe : Appa-Roa, 1975, *J. mar. biol. Ass. India*, **16**(1) : 310.

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* *Atrobucca alcocki* Talwar recorded from Bombay, is a rare species.



Text-fig. 249. *Atrobucca nibe* (Jordan & Thompson)

Common Names :

Blackmouth croaker	...	English
Gorasa	...	Telugu

Distinguishing Characters :

A small sciaenid, oblong and rather compressed; length of head 32.5 to 35% of standard length. Mouth terminal, the upper jaw (maxilla) slightly less than half of head. Teeth villiform, well differentiated in size in both jaws, the outer series in upper jaw and inner series in lower jaw enlarged; no canine teeth. Gillrakers 9 to 12 on lower arm of first arch. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 27 to 32 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine slender. Pectoral fins long, nearly equal to body depth. Scales cycloid on head, weakly ctenoid on body. Gasbladder carrot-shaped, with 24 to 30 pairs of arborescent appendages.

Colour : back grey, shading to white on belly; linings of mouth, gill chamber and body cavity black. Spinous dorsal fin with scattered melanophores.

Geographical Distribution : East coast of India, Burma, China and Japan.

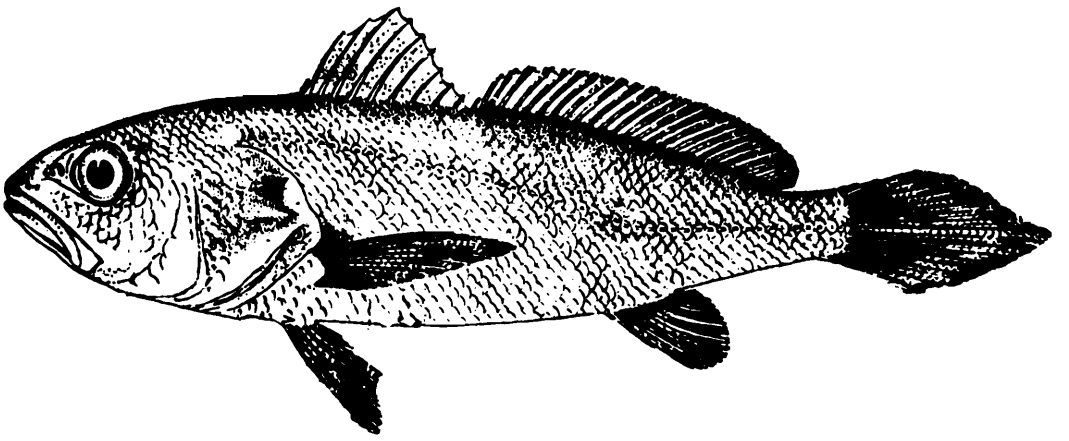
Inhabits shallow coastal waters.

Fishery Information : This species is fairly common in the commercial catches on the Orissa coast.

Atrobucca trewavasae Talwar & Sathiarajan

[Text-fig. 250]

Atrobucca trewavasae Talwar and Sathiarajan, 1975, *J. nat. Hist.*, **9** : 575, figs. 1-3 (type-locality : Off Madras, 250 m.).



Text-fig. 250. *Atrobucca trewavasae* Talwar & Sathiarajan

Common Name :

Trewavas croaker ... English

Distinguishing Characters :

A medium-sized croaker, with an elongate and moderately compressed body. Mouth terminal, the upper jaw (maxilla) slightly less than half head; length of head 37 to 40% of standard length. Teeth villiform, differentiated in size in both jaws, the slightly enlarged teeth forming outer series in upper jaw and inner row in lower jaw. Gill-rakers about 11 on lower arm of first arch. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 24 to 26 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine weak. Pectoral fins long, nearly equal to body depth. Scales cycloid on head, weakly ctenoid on body. Gasbladder carrot-shaped, with about 25 pairs of arborescent appendages.

Colour : back drab grey, paler on belly; linings of mouth, gill chamber and body cavity black.

Geographical Distribution : South-east coast of India.

Fishery Information : This deep-water species is presently not exploited but is fairly common in the experimental catches off the Madras coast at a depth of 250 m.

Genus **Chrysochir** Trewavas & Yazdani

Chrysochir Trewavas and Yazdani, 1966, *Ann. Mag. nat. Hist.*, (13) **8** : 250 (type-species: *Otolithus aureus* Richardson).

Snout acute, slightly projecting before the upper jaw and the upper jaw before the lower. Three pairs of pores on front of chin, the first pair parallel slits and separated by symphysis of lower jaw. Teeth villiform, differentiated in size in both jaws; the outer row in upper jaw enlarged with two pairs of canines at tip of jaw; slightly enlarged teeth in inner series in lower jaw. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 25 to 28 soft rays. Anal fin with 2 spines and 6 or 7 soft rays, the second spine rather weak. Gasbladder carrot-shaped, with 27 to 30 pairs of arborescent appendages, none entering head.

Monotypic.

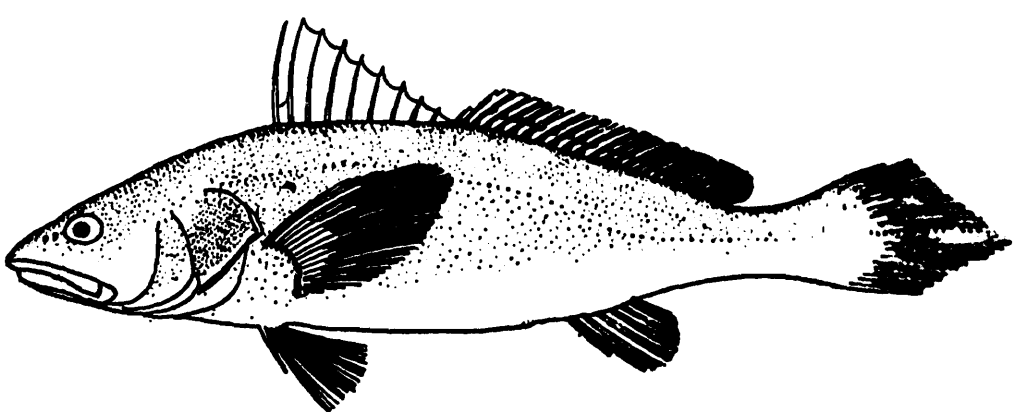
Chrysochir aureus (Richardson)

[Text-fig. 251]

Otolithus aureus Richardson, 1846, *Rep. Br. Ass. Advmt. Sci.*, **15** : 224 (type-locality : Canton).

Sciaena ophiceps Alcock, 1889, *J. Asiat. Soc. Beng.*, **58** : 300 (type-locality : Off Orissa coast).

Chrysochir aureus : Trewavas and Yazdani, 1966, *Ann. Mag. nat. Hist.*, (13) **8** : 249.



Text-fig. 251. *Chrysochir aureus* (Richardson)

Common Name :

Reeve's croaker ... English

Distinguishing Characters :

A small species with an acute snout and large, nearly horizontal and inferior mouth. Teeth villiform, well differentiated in size in both

jaws, in upper jaw the outer row enlarged with two pairs of canines at tip; in lower jaw teeth in inner row slightly enlarged. Gillrakers 6 to 9 in lower arm of first arch, the first 2 to 5 short stumps. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 25 to 28 soft rays. Anal fin with 2 spines and 6 or 7 soft rays, the second spine rather weak. Pectoral fins long. Caudal fin rhomboid with pointed tip. Gasbladder carrot-shaped, with 27 to 30 arborescent appendages, none entering head.

Colour : body metallic blue above, shading to silvery below. Pectoral fins yellow, other fins greyish.

Geographical Distribution : Bay of Bengal, Malay Peninsula, Borneo and Southern China.

Inhabits shallow coastal waters.

Fishery Information : This sciaenid is fairly common in the commercial catches on the Orissa coast.

Genus **Daysciaena** Talwar

Daysciaena Talwar, 1970, *Proc. zool. Soc., Calcutta*, **23** : 192 (type-species : *Corvina albida* Cuvier).

Snout rounded and projecting only slightly beyond tip of upper jaw; mouth terminal or only slightly inferior; a pair of very small, tapering barbels on chin; mental pores 5 of which the median is the opening of a pair lying close together behind the symphysis, and joined by a crescentric groove. Teeth villiform, differentiated in size in both jaws (especially in upper jaw), the inner row in lower jaw and outer row of upper jaw of enlarged teeth; no canine teeth. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 23 to 26 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong, 11.5 to 15.0% of standard length. Gasbladder carrot-shaped, with 17 to 18 pairs of arborescent appendages, the first pair fan-like, wholly or partly cephalic (entering head).

Monotypic.

Daysciaena albida (Cuvier)

[Text-fig. 252]

Corvina albida Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 93 (type- locality : Pondicherry, Mahe and Malabar).

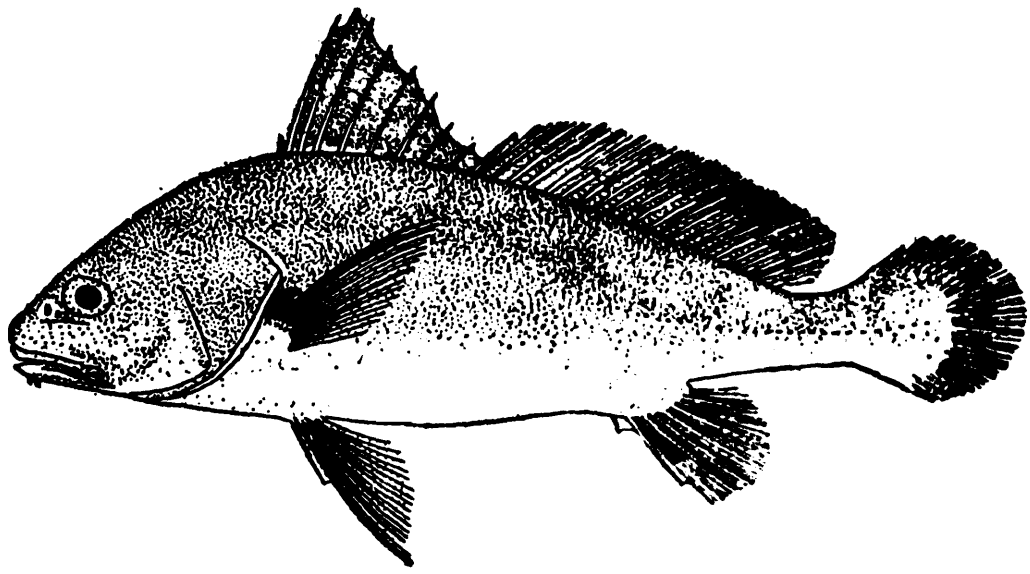
Sciaena albida : Day, 1876, *Fishes of India* : 188, pl. 44, fig. 4 & 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 117.



Daysciaena albida (Cuvier)

Pseudosciaena coibor (*nec* Hamilton-Buchanan) Misra, 1962, *Rec. Indian Mus.*, 57 : 267.

Dendrophysa hoogliensis Sinha and Babu Rao, 1969, *Copeia* : 77, fig. (type-locality : Hooghly estuary)'.



Text-fig. 252. *Daysciaena albida* (Cuvier)

Common Names :

Two-bearded croaker	...	English
Bola	...	Bengali
Vella-kattelle, Karoom-kattelee	...	Tamil
Kora	...	Malayalam

Distinguishing Characters :

A fairly large species, with an oblong body ; snout rounded and projecting slightly beyond tip of upper jaw ; mouth terminal or slightly inferior ; a pair of very small, tapering barbels on chin. Teeth villiform, differentiated in size in both jaws (especially in upper jaw), the outer row in upper jaw of caniniform teeth, the inner row in lower jaw of slightly large teeth. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 23 to 26 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine long and strong, up to $\frac{1}{2}$ of head length. Pectoral fins moderate, about $\frac{1}{4}$ of head length. Caudal fin bluntly rhomboid in adults. Scales cycloid on front part of head, elsewhere ctenoid. Gasbladder carrot-shaped, with 17 to 19 pairs of arborescent appendages, the anterior pair sending some of its twiglets into head.

Colour : back grey, shading to silvery on belly; faint dark dots in oblique series along scale-rows occasionally. Spinous dorsal fin dusky in juveniles, but the outer margin only dusky in adults. Pectoral, pelvic and caudal fins yellowish; pectoral fins with a black blotch at axil.

Geographical Distribution : India and possibly eastward to Borneo.

Inhabits shallow coastal waters and estuaries.

Fishery Information : This croaker constitutes an important fishery in the Hooghly estuary (West Bengal) and along the south-west coast of India. It attains 90 cm in length.

Genus **Dendrophysa** Trewavas

Dendrophysa Trewavas, 1964, *Copeia*, (1) : 110 (type-species : *Umbrina russellii* Cuvier).

Snout rounded and projecting slightly beyond tip of upper jaw; mouth inferior; a single barbel on chin; mental pores 5. Teeth in upper jaw a villose band, with an outer row of slightly bigger teeth; lower teeth uniformly small. Dorsal fin with 10 spines, followed by a deep notch, the second part of fin with 1 spine and 25 to 28 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong and 11.5 to 14.3% of standard length. Gas-bladder carrot-shaped, with 15 to 17 pairs of arborescent appendages, the first pair fan-like, wholly or partly cephalic (entering the head).

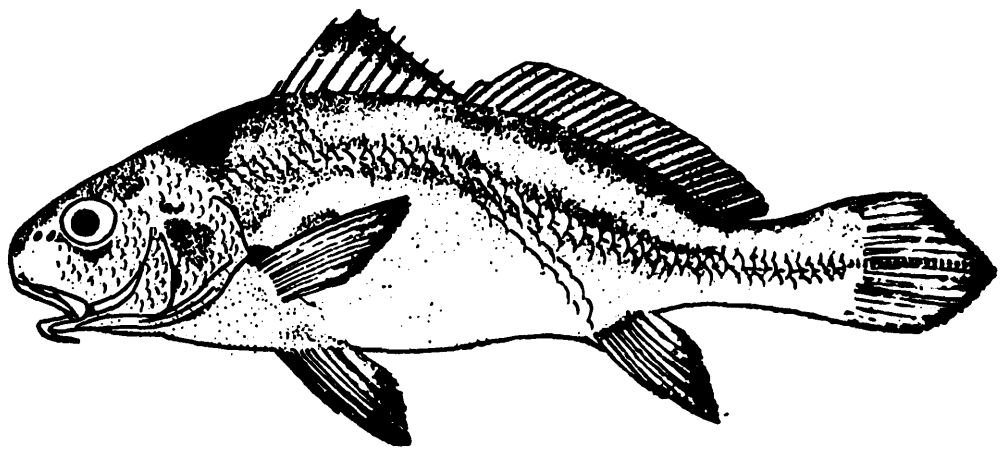
Monotypic.

Dendrophysa russelli (Cuvier)

[Text-fig. 253]

Umbrina russellii Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 178 (type-locality : Vizagapatnam) ; Day, 1876, *Fishes of India* : 183, pl. 43, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 110.

Umbrina indica Chaudhuri, 1923, *Mem. Indian Mus.*, **5** : 725 (false citation).



Text-fig. 253. *Dendrophysa russelli* (Cuvier)

Common Names :

Goatee-croaker	...	English
Qualar-katchelee	...	Telugu

Distinguishing Characters :

A fairly small species; snout rounded and projecting slightly beyond tip of upper jaw; mouth inferior; a single barbel on chin. Teeth in upper jaw a villose band, with an outer series of slightly enlarged teeth; teeth in lower jaw uniformly small. Gill-rakers 8 or 9 on lower arm of first arch, rather short, the lowest sometimes minute. Dorsal fin with 10 spines, followed by a deep notch, second part of fin with 1 spine and 25 to 28 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong and slightly less than $\frac{1}{2}$ of head length. Pectoral fins moderate, about $\frac{3}{4}$ of head length. Caudal fin rhomboid. Scales cycloid on front part of head and lower parts of dorsal and anal fins, elsewhere ctenoid. Gas-bladder carrot-shaped, with 15 to 17 pairs of arborescent appendages, the first entering head.

Colour : back grey, shading to white on belly. Spinous dorsal fin dark, at least in upper three-fifths, other fins pale.

Geographical Distribution : India, Sri Lanka, through the East Indies, to Kwangtung.

Found in coastal waters, down to 40 m.

Fishery Information : The species is fairly common in the commercial catches in the Chilka Lake (Orissa), the east coast of India and the Andaman Sea.

Genus **Johnius** Bloch

Johnius Bloch, 1793, *Naturges. Ausland. Fische*, **7** : 132 (type-species : *Johnius carutta* Bloch).

Mouth small, terminal or inferior. Mental pores 3 pairs of which the anterior open close behind chin either by two pores lying close together in a pit or joined by a groove, or by a median pore which is the outlet of a pair sunk in a pit. Barbel on chin present or absent, if present median with the mental pore at front of its base. Soft dorsal and anal fins scaly. Gasbladder hammer-shaped, bearing 12 to 20 pairs of arborescent appendages, the first appendage of each side arising from front of bladder and branching in head.

Numerous species known, several in our area.

KEY TO SUBGENERA/SPECIES

1 (a) A barbel on chin (Subgenus *Blythsciaena* Talwar)	...	2
(b) No barbel on chin	...	3
2 (a) Scales on body ctenoid ; soft dorsal fin with 27 to 33 rays	...	*J. macropterus*
(b) Scales on body cycloid ; soft dorsal fin with 23 to 26 rays	...	*J. amblycephalus*
3 (a) Teeth in lower jaw in a band, uniform in size or with a few inner slightly enlarged ; mouth ventral or subterminal (Subgenus *Johnius* Bloch)	...	4
(b) Teeth in lower jaw more or less enlarged, spaced ; mouth subterminal or terminal (Subgenus *Johnieops* Mohan)	...	9
4 (a) Scales on head and at least upper anterior part of body cycloid	...	*J. carutta*
(b) Scales on occiput and whole body (except breast) ctenoid	...	5
5 (a) Gillrakers 10 to 13 on lower arm of first arch ; snout prominent and projecting	...	*J. coitor**
(b) Gillrakers 5 to 10 on lower arm of first arch	...	6

6 (a)	Snout steeply rounded, not or but slightly projecting	...	7
(b)	Snout swollen, projecting	...	8
7 (a)	Gillrakers 8 or 9 on lower arm of first arch; dorsal fin usually with 9 (rarely 10) spines	...	*J. belangerii*
(b)	Gillrakers 10 to 14 on lower arm of first arch; dorsal fin with 10 spines	...	*J. carouna**
8 (a)	Pores on chin 5, surrounded by thickened skin whose outer layers may be produced into irregular tags; teeth in lower jaw uniform in size	...	*J. elongatus*
(b)	Pores on chin not surrounded by thickened skin produced into tags, the anterior pair exposed or opening by a median pore	...	*J. macrorhynus**
9 (a)	Gillrakers 9 to 12 on lower arm of first arch	...	*J. vogleri*
(b)	Gillrakers 13 to 15 on lower arm of first arch	...	10
10 (a)	Snout and preorbital inflated	...	*J. dussumieri*
(b)	Snout decurved, but not inflated	...	11
11 (a)	Soft dorsal fin with 24 or 25 rays	...	*J. aneus*
(b)	Soft dorsal fin with 27 to 31 rays	...	*J. sina*

Johnius amblycephalus (Bleeker)

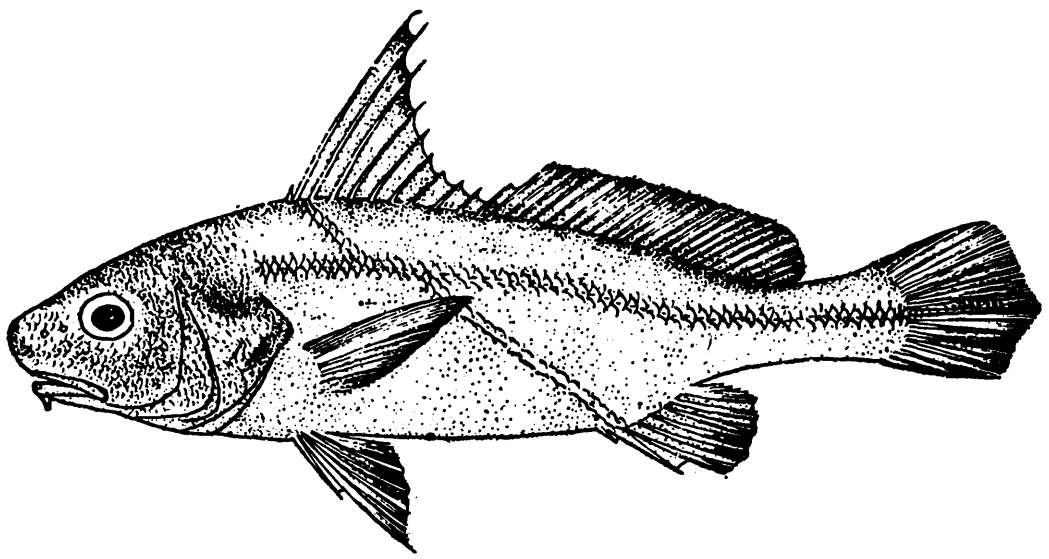
[Text-fig. 254]

Umbrina amblycephala Bleeker, 1855, *Nat. Tijdsch. Ned.-Indie*, 8 : 412 (type-locality : Amboina).

Umbrina dussumieri Valenciennes : Day, 1876, *Fishes of India* : 183, pl. 43, fig. 2 & 3; Day, *Fauna Br. India*, Fishes, 2 : 110.

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* *Johnius coitor* (Hamilton-Buchanan), *J. carouna* (Cuvier) and *J. macrorhynus* (Mohan) (= ? *Sciaena glauca* Day, 1876) do not contribute to any fishery in our area.



Text-fig. 254. *Johnius amblycephalus* (Bleeker)

Common Names :

Bearded-croaker	...	English
Taru-kattelee	...	Tamil

Distinguishing Characters :

A medium-sized species with a rounded, projecting snout and an inferior mouth; upper jaw (maxilla) extending to below hind part of pupil; a blunt barbel on chin with median mental pore at front of its base. Teeth of upper jaw differentiated in size only, the outer row slightly enlarged (no canine teeth), in lower jaw villiform and in a narrow band. Gillrakers 6 to 9 on lower arm of first arch. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 23 to 26 soft rays, the second and third spines fairly elongate. Anal fin with 2 spines and 7 soft rays, the second spine weak. Caudal fin rhomboid in young, its posterior edge truncate or S-shaped in adults. Scales on body cycloid. Gasbladder hammer-shaped, with 14 or 15 pairs of arborescent appendages, the first branching in head.

Colour : dark grey on head, dorsum and flanks to below level of pectoral fins, silvery on belly. Upper part of spinous dorsal fin black.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits coastal waters, down to 40 m.

Fishery Information : The species is fairly common in the catches along the Tamil Nadu and Maharashtra coasts, and reaches a length of 20 to 23 cm.

Johnius aneus Bloch

Johnius aneus Bloch, 1793, *Naturges. ausland. Fische*, **7** : 135, pl. 357 (type-locality : Malabar).

Sciaena osseus Day, 1876, *Fishes of India* : 193, pl. 46, fig. 3 (type-locality : Malabar).

Sciaena ossea : Day, 1889, *Fauna Br. India*, Fishes, **2** : 123.

Common Names :

Bloch's croaker	...	English
Kallur	...	Kannada

Distinguishing Characters :

A small species with a prominent, swollen snout. Mouth slightly inferior, the upper jaw (maxilla) extending to below posterior edge of eye. Teeth villiform, differentiated in size in both jaws, the outer row in upper jaw and inner row in lower jaw enlarged, no canine teeth. Gillrakers about 16 on lower arm of first arch. Dorsal fin with 10 spines, followed by notch, second part of fin with 1 spine and 24 or 25 soft rays. Anal fin with 2 spines and 7 soft rays. Caudal fin rhomboid. Scales cycloid on head and breast, elsewhere ctenoid. Gas-bladder hammer-shaped, with 13 or 14 pairs of arborescent appendages, the first entering head.

Colour : dark grey on back, silvery on flanks and belly.

Geographical Distribution : ? Persian Gulf, south-west coast of India and probably Sri Lanka.

Fishery Information : This sciaenid forms a minor fishery along the south-west coast of India.

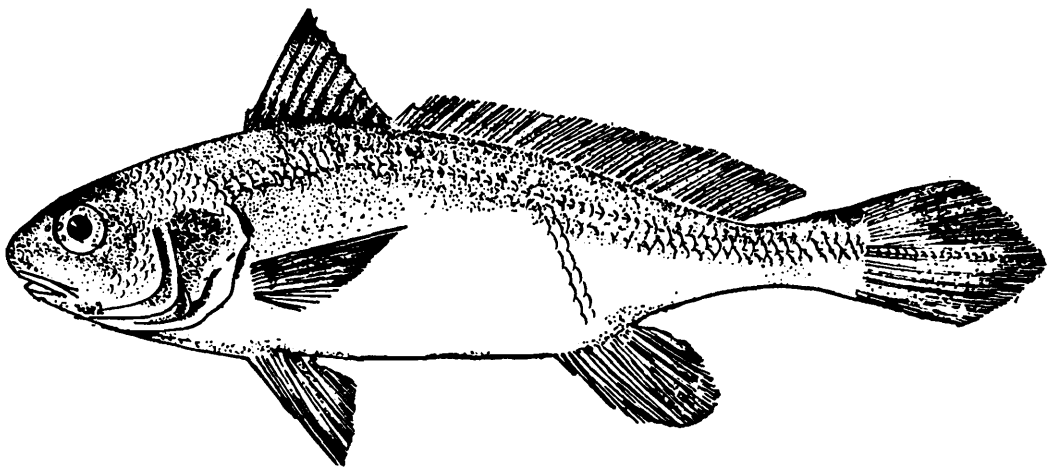
Johnius belangerii (Cuvier)

[Text-fig. 255]

Corvina belengerii Cuvier, 1830, *Hist nat. Poiss.*, **5** : 120 (type-locality : Pondicherry).

Sciaena belengeri : Day, 1876, *Fishes of India* : 191, pl. 44, fig. 5.

Sciaena belangeri : Day, 1889, *Fauna Br. India*, Fishes, **2** : 120.



Text-fig. 255. *Johnius belangerii* (Cuvier)

Common Names :

Belanger's croaker	...	English
Tooroo-katchelee	...	Tamil

Distinguishing Characters :

A medium-sized species with a steeply rounded snout. Mouth small, inferior, the upper jaw (maxilla) extending to below pupil ; no barbels on chin. Teeth in broad villiform bands in both jaws, differentiated in size in upper jaw only, the outer row of upper jaw slightly enlarged ; no canine teeth. Gillrakers short, 8 or 9 on lower arm of first arch. Dorsal fin with 9 (rarely 10) spines, followed by a deep notch, second part of fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine rather strong and about 1/3 of head length. Caudal fin rhomboid. Scales cycloid on snout and lower parts of head, elsewhere strongly ctenoid. Gas-bladder hammer-shaped, with 11 to 14 pairs of arborescent appendages, the first entering head.

Colour : darkly pigmented, sometimes concentrated into short dark bars along back, ventral surface deep grey. Spinous dorsal fin black ; lower fins also occasionally black.

Geographical Distribution : Arabian Sea along the coasts of the Indian peninsula and south-east Asia to China and Japan, and along the eastern coast of Australia.

Inhabits coastal waters, down to 40 m.

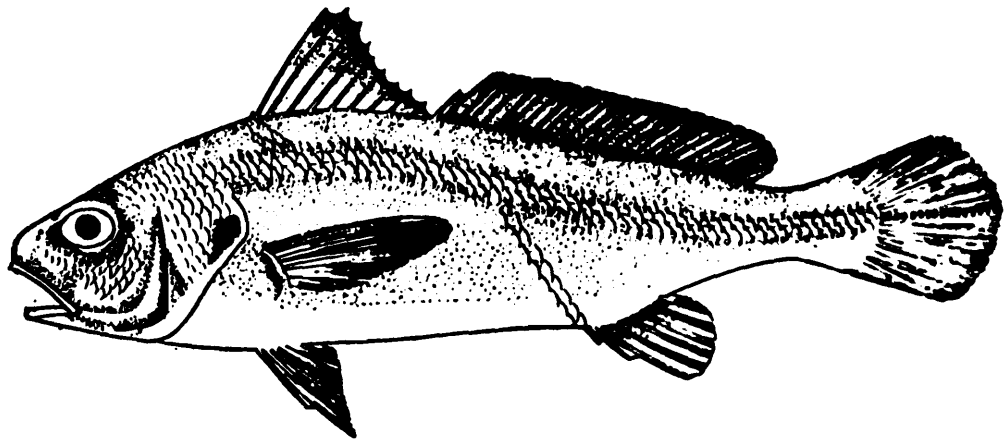
Fishery Information : This sciaenid is common in the commercial catches in our area.

Johnius carutta Bloch

[Text-fig. 256]

Johnius carutta Bloch, 1793, *Naturges. ausland. Fische*, 7 : 138, pl. 356 (type-locality : Tranquebar).

Sciaena carutta : Day, 1876, *Fishes of India* : 192, pl. 44, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 122.



Text-fig. 256. *Johnius carutta* Bloch

Common Names :

Karut croaker	...	English
Gorasa	...	Telugu

Distinguishing Characters :

A small species with a rounded snout and a small, inferior mouth ; no barbel on chin. Teeth villiform, differentiated in size in upper jaw only, the outer row of upper jaw slightly enlarged : no canine teeth. Gillrakers 7 to 9 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 25 to 28 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine weak. Caudal fin rhomboid. Scales on head and breast cycloid, most of body scales either cycloid or with a feebly ctenoid zone, but nowhere feeling rough to touch. Gasbladder hammer-shaped, with 15 or 16 pairs of arborescent appendages, the first largest and branching in head.

Colour : body drab grey with a deep soiled appearance, the flanks and belly golden-silvery ; lateral line with a characteristic pale yellow median streak. Spinous dorsal fin dusky ; other fins pale yellow, minutely dotted with bla

Geographical Distribution : India, Sri Lanka and the western coast of peninsular Thailand.

Inhabits inshore waters, down to 40 m.

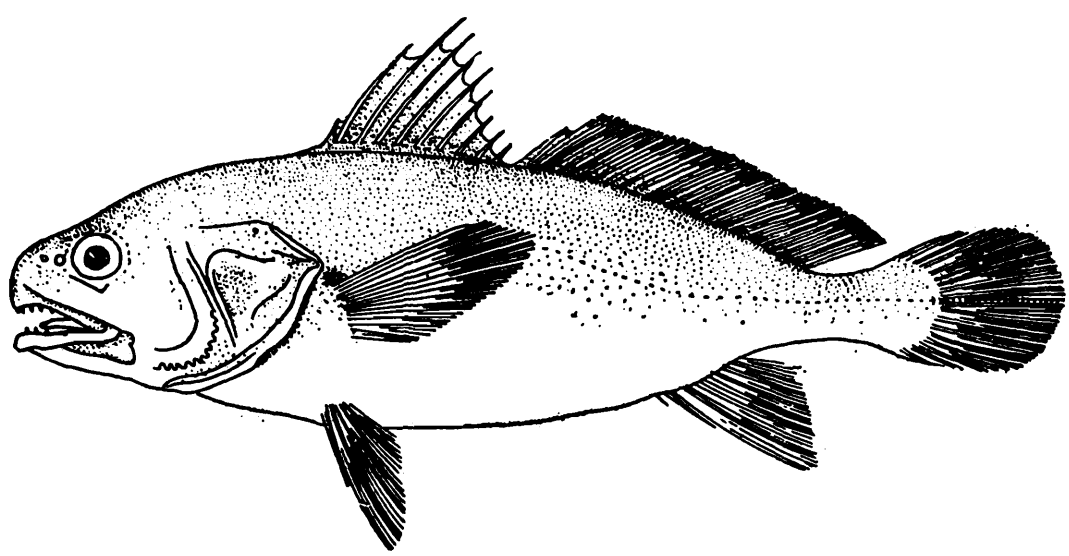
Fishery Information : This croaker is widely distributed along the coast of India and forms a minor fishery along the Tamil Nadu coast.

Johnius dussumieri (Cuvier)

[Text-fig. 257]

Corvina dussumieri Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 119 (type-locality : Malabar).

Johnius (*Johnieops*) *dussumieri* : Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : 437.



Text-fig. 257. *Johnius dussumieri*, (Cuvier)

Common Names :

Dussumier's croaker	...	English
Dudra	...	Oriya
Gorasalu	...	Telugu
Olde	...	Kannada
Dhoma	...	Marathi

Distinguishing Characters :

A fairly small species, with a blunt snout projecting slightly beyond upper jaw. Mouth slightly inferior, the upper jaw (maxilla) extending

to below hind edge of eye. Teeth villiform in narrow bands, moderately differentiated in size in both jaws, the outer row in upper jaw and inner row in lower jaw of enlarged spaced teeth; no canine teeth. Gillrakers short, 12 to 16 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 28 to 30 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine moderate. Caudal fin rhomboid. Scales cycloid on lower part of head, elsewhere ctenoid; soft dorsal and anal fins scaly. Gasbladder hammer-shaped, with about 15 pairs of arborescent appenadages, the first entering head.

Colour : dusky brown on back, silvery on flanks and belly. Upper third of spinous dorsal fin dusky; dusky blotch at axil of pectoral fin.

Geographical Distribution : Mozambique, east coast of India and Andaman Is.

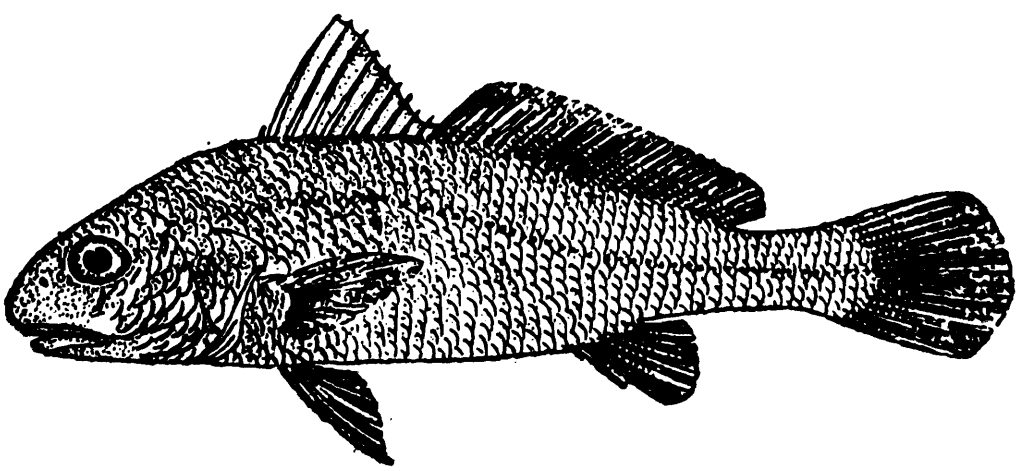
Inhabits coastal waters, down to 40 m.

Fishery Information s The 'Dhoma' of Bombay markets is abundant along the Maharashtra coast and the Gulf of Mannar. It attains a length of 20 cm. and a weight of 680 gm.

Johnius elongatus Mohan

[Text-fig. 258]

Johnius elongatus Mohan, 1976, *Matsya*, (1) : 19, fig. 1 (type- locality : Veraval, Gujarat).



Text-fig. 258. *Johnius elongatus* Mohan

Common Name :

Mohan's croaker ... English

Distinguishing Characters :

A small and rather slender species, with a swollen snout projecting beyond the ventral mouth. Pores on chin 5, surrounded by thickened skin, produced into two short and irregular tags between the median and first lateral pores. Teeth villiform, differentiated in size in upper jaw, the outer row of upper jaw enlarged, curved, not widely spaced. Gillrakers short, 6 or 7 on lower arm of first arch. Dorsal fin with 10 or 11 spines, followed by notch, second part of fin with 1 spine and 25 to 29 soft rays. Anal fin with 2 spines and 7 soft rays. Caudal fin rhomboid. Scales cycloid on snout below eyes, ctenoid on top of head and whole of body. Gasbladder hammer-shaped, with 13 or 14 pairs of arborescent appendages, the first branching in head.

Colour : back grey, flanks and belly silvery, peppered with melanin on lower flanks and tips of dorsal, anal and caudal fins.

Geographical Distribution : West coast of India.

Inhabits coastal waters.

Fishery Information : The species constitutes a fishery on the Gujarat and Maharashtra coasts.

Johnius macropterus (Bleeker)

Umbrina macropterus Bleeker, 1853. *Nat. Tijdschr. Ned.-Indie*, **4** : 254 (type-locality : Sumatra).

Umbrina macroptera : Day, 1876, *Fishes of India* : 182; Day, 1889, *Fauna Br. India*, Fishes, **2** : 108.

Johnius mannarensis Mohan, 1969, *J. mar. biol. Ass. India*, **11** : 320, figs. 1 & 2 (type-locality : Gulf of Mannar).

Common Name :

Large-fined croaker ... English

Distinguishing Characters :

A medium-sized species, with a rounded and slightly projecting snout and an inferior mouth; upper jaw (maxilla) extending to below middle of eye. Mental pores 5; a short, stiff, blunt barbel behind the median pore. Teeth in villiform bands, the outer row of upper jaw slightly enlarged, teeth in lower jaw uniform. Gillrakers 10 to 12 on lower arm of first arch. Dorsal fin with 10 spines, followed by notch, second part of fin with 1 spine and 27 to 33 soft rays. Anal fin with 2 spines and 7 or 8 soft rays. Caudal fin rhomboid. Scales cycloid

on snout below eyes and on breast, elsewhere ctenoid. Gasbladder hammer-shaped, with 12 to 15 pairs of arborescent appendages, the first branching in head.

Colour : dark grey on back, silvery on flanks and belly. Spinous dorsal fin grey, soft dorsal fin light grey, pectoral and caudal fins lightly mottled.

Geographical Distribution : Indo-west Pacific.

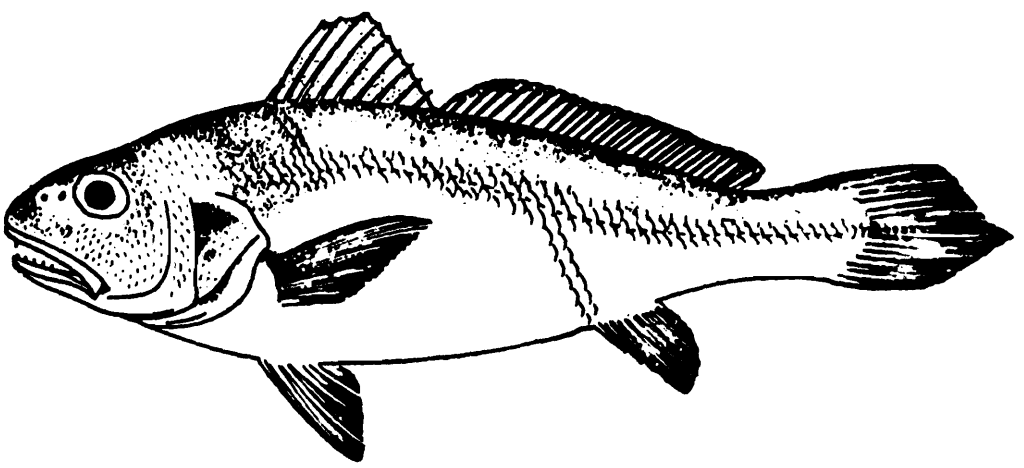
Inhabits coastal waters, down to 40 m.

Fishery Information : Fairly common in the commercial catches on the Tamil Nadu coast.

Johnius sina (Cuvier)

[Text-fig. 259]

Corvina sina Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 122 (type-locality : Malabar).
? *Wak menoni* Talwar and Joglekar, 1970, *J. Inland Fish. Soc. India*, **1** : (type-locality : Hooghly estuary).



Text-fig. 259. *Johnius sina* (Cuvier)

Common Name :

Sin-croaker ... English

Distinguishing Characters :

A fairly small species with the snout rounded but not projecting, not inflated. Mouth fairly large, slightly inferior, the upper jaw (maxilla) extending to below posterior part of eye. Teeth villiform in narrow bands, moderately differentiated in size in both jaws, the outer row in upper jaw and inner row in lower jaw of enlarged spaced

teeth ; no canine teeth. Gillrakers slender, 13 to 15 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine moderate, about 1/3 of head length. Caudal fin rhomboid. Scales cycloid on head, ctenoid on body. Gasbladder hammer-shaped, with 12 to 17 pairs of arborescent appendages, the first entering head.

Colour : dusky brown on back, silvery on flanks and belly. Upper part of spinous dorsal fin dusky.

Geographical Distribution : Coastal waters of the Indian Ocean from Natal to Malay Peninsula.

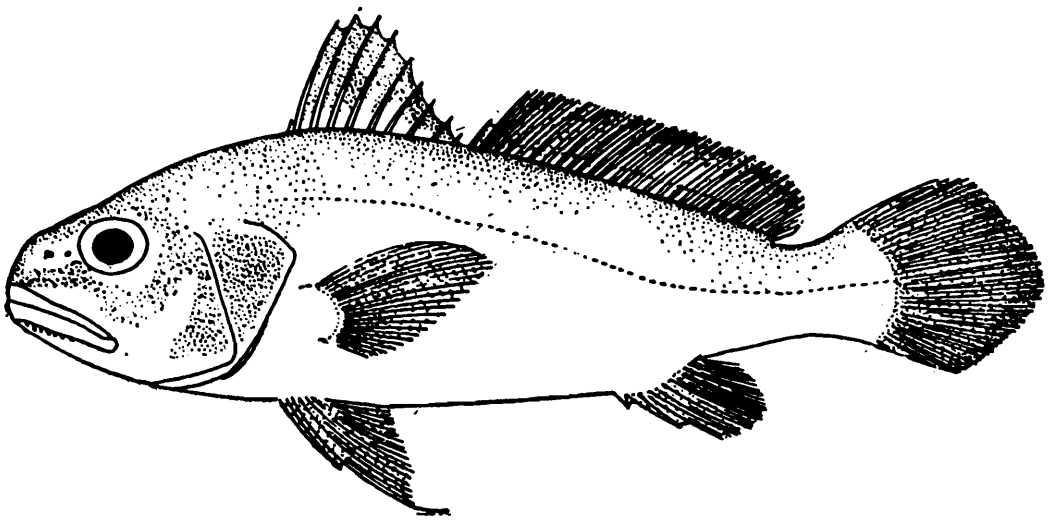
Fishery Information : It is fairly common in the commercial catches on the east coast of India.

Johnius vogleri (Bleeker)

[Text-fig. 260]

Otolithus vogleri Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie*, **4** : 253 (type-locality : Sumatra).

Sciaena vogleri : Day, 1876, *Fishes of India* : 186, pl. 45, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 113.



Text-fig. 260. *Johnius vogleri* (Bleeker)

Common Name :

Sharp-toothed hammer croaker ... **English**

Distinguishing Characters :

A fairly small species, with a rounded snout but not projecting nor greatly swollen. Eyes fairly large. Mouth fairly large, subterminal, the upper jaw (maxilla) extending to below hind margin of pupil. Teeth villiform in narrow bands, strongly differentiated in size in both jaws, the outer row of upper jaw and inner row of lower jaw of fairly large, widely spaced teeth; no canine teeth. Gillrakers 9 to 12 in lower arm of first arch. Dorsal fin with 10 spines, followed by a deep notch, second part of fin with 1 spine and 27 to 30 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine short. Caudal fin rhomboid. Scales cycloid on head, ctenoid on body; scaly sheath on lower parts of dorsal and anal fins. Gasbladder hammer-shaped, with 14 or 15 pairs of arborescent appendages, the first entering head.

Colour : greyish on back and silvery (glossed with golden) on flanks and belly. Spinous dorsal fin dusky in its upper third; pectoral, pelvic and anal fins yellowish.

Geographical Distribution : India, Sri Lanka, through the East Indies, to the Philippines and Australia.

Inhabits shallow coastal waters.

Fishery Information : This sciaenid is common in the commercial catches on the east coast of India.

Genus **Kathala** Mohan

Kathala Mohan. 1969, *Curr. Sci.*, **38** (12) : 295 (type-species : *Corvina axillaris* Cuvier).

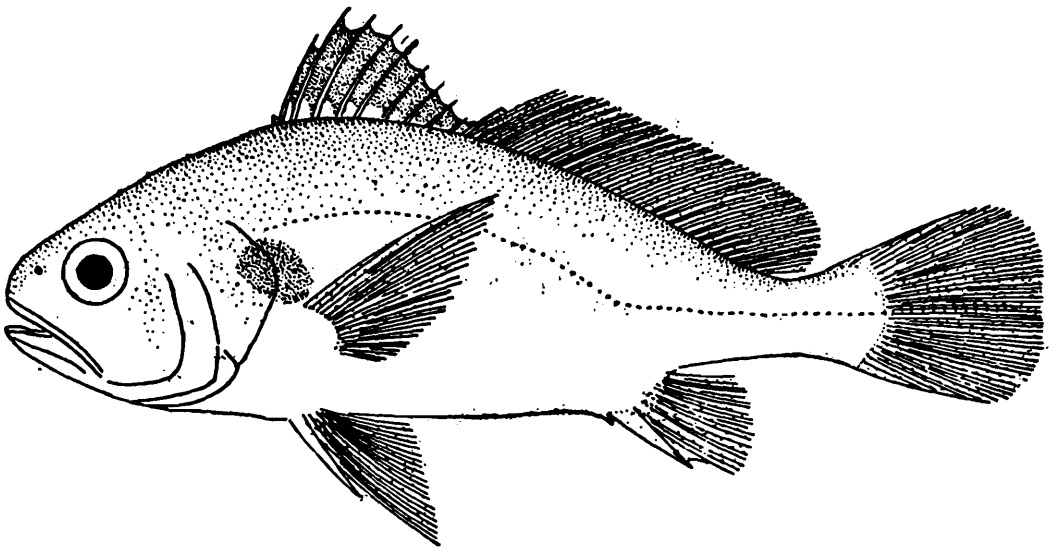
Mouth terminal, jaws about equal. Teeth villiform in very narrow bands, the outer row of upper jaw of moderate large teeth and inner row of lower jaw of slightly enlarged teeth; no canine teeth. Gill-rakers 19 to 24 on lower arm of first arch. Lower jaw with 3 pairs of pores, the first minute on either side of symphysis in front of chin, followed by a pair of two larger pores on either side posterior to it; no barbels. Dorsal fin deeply notched. Anal fin with 2 spines and 7 soft rays, the second spine 12 to 16% of standard length. Gas-bladder carrot-shaped, with a pair of short, horn-like simple appendages at anterior end which enter head under skull.

Monotypic.

Kathala axillaris (Cuvier)

[Text-fig. 261]

Corvina arillaris Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 113 (type-locality : Malabar).
Sciaena axillaris : Day, 1876, *Fishes of India* : 188, pl. 43, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 116.



Text-fig. 261. *Kathala axillaris* (Cuvier)

Common Name :

Kathala-croaker ... English

Distinguishing Characters :

Medium-sized fish with a fairly deep body, its depth 32.5 to 38.7% of standard length. Snout rounded, mouth terminal and oblique, upper jaw (maxilla) extending to hind edge of pupil or of eye ; inter-orbital region broad and convex. Teeth villiform, in very narrow bands, with the outer row in upper jaw and inner row in lower jaw of slightly large teeth ; no canine teeth. Gillrakers lanceolate, 19 to 24 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 26 to 29 soft rays. Anal fin with 2 spines and 7 soft rays. Caudal fin bluntly truncate. Scales cycloid on head and nape, ctenoid on rest of body. Gasbladder carrot-shaped, with a pair of short, horn-like simple appendages at its broad anterior end and entering head.

Colour : drab-grey on back, flanks yellow-silvery ; a black prominent blotch on pectoral fin axil. Upper two-thirds of spinous dorsal fin dusky.

Geographical Distribution : Coasts of India and Sri Lanka.

Inhabits shallow coastal waters.

Fishery Information : This is well represented in the commercial catches of our area and reaches a length of 26 cm.

Genus **Nibea** Jordan & Thompson

Nibea Jordan and Thompson, 1911, *Proc. U.S. natn. Mus.*, **39** : 244 (type-species : *Pseudotolithus mitsukurii* Jordan & Snyder).

Mouth terminal; teeth differentiated in size in both jaws, the lower inner row and outer upper row enlarged but no outstanding caninoids. No barbels on chin; 5 pores on chin. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 24 to 31 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong, 9 to 17% of standard length. Gasbladder carrot-shaped, bearing a series of arborescent (branched) appendages along each side, the anterior pair extending into head partly or wholly and branching under the skull.

Six species known, 3 in our area.

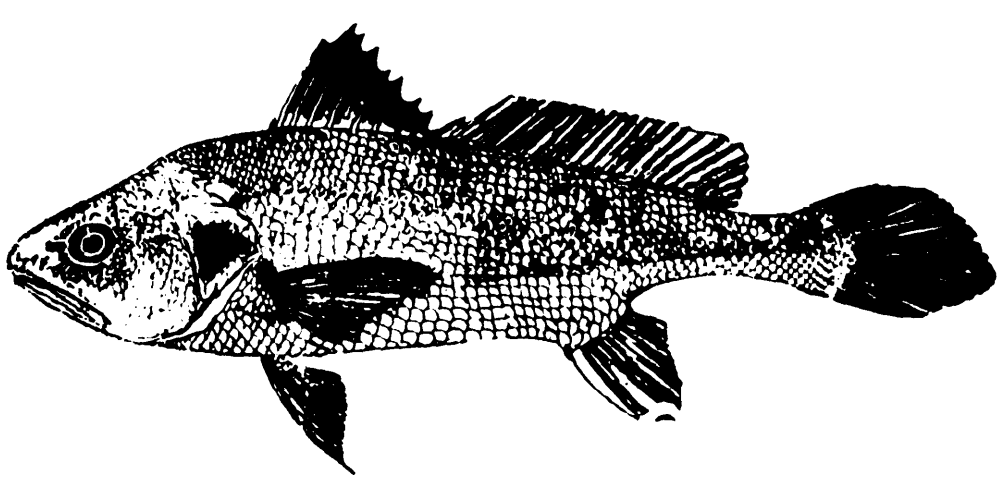
KEY TO SPECIES

1 (a) Soft dorsal-fin with 28 to 31 rays	...	*N. soldado*
(b) Soft dorsal-fin with 24 or 25 rays	...	2
2 (a) Upper part of body with 4 or 5 broad, dark, broken bands on a silvery background and blotch on top of caudal peduncle; head length 32 to 35% of standard length	...	*N. maculata*
(b) Body silvery, without stripes or with faint narrow oblique stripes along the anterodorsal scales; head length 29.5 to 31.5% of standard length	...	*N. chui*

Nibea chui Trewavas

[Text-fig. 262]

Nibea chui Trewavas, 1971, *J. Fish. Biol.*, **3** : 456 (type-locality : Hongkong and Japan) ; Jayaprakash, 1977, *Indian J. Fish.*, **22** : 261, fig. 1.



Text-fig. 262. *Nibea chui* Trewavas

Common Name :

Chu's croaker ... English

Distinguishing Characters :

A large-sized species, with an evenly rounded head; head length 29.5 to 31.5% of standard length. Teeth villiform, well differentiated in size in both jaws, firm, surrounded by dense papillae. Gillrakers about 12 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 24 or 25 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine long and strong, about $\frac{1}{2}$ of head length. Pectoral fins moderate, about $\frac{3}{4}$ of head length. Caudal fin bluntly rhomboid. Scales cycloid on snout and lower part of head, elsewhere ctenoid. Gasbladder carrot-shaped, with 17 to 22 pairs of arborescent appendages, the first appendage long, entering head and branching under the skull.

Colour : body silvery; spinous dorsal fin dusky with black edge, soft dorsal fin with a row of black spots along the base, and distal part of rays dusky.

Geographical Distribution : North-west coast of India, China, Korea and Japan.

In coastal waters, down to 40 m.

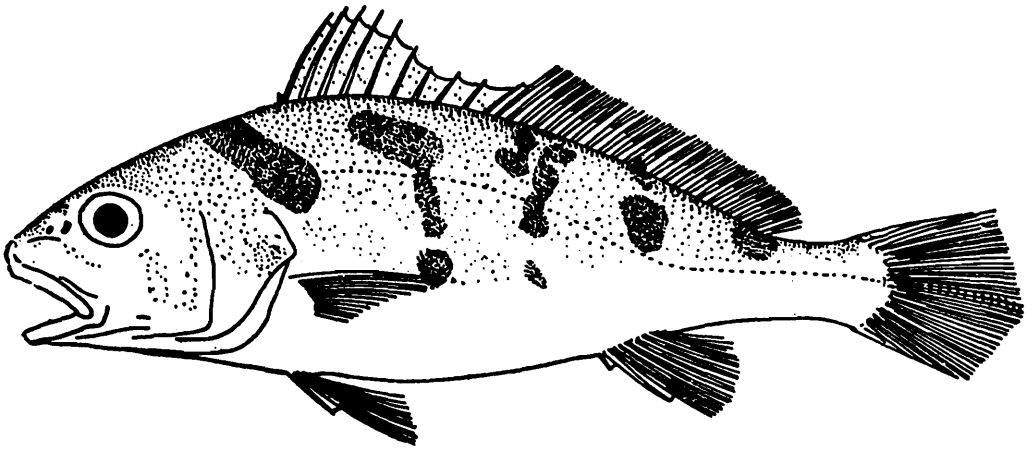
Fishery Information : The species grows to a fairly large size and has been recognised only recently at Bombay in our area.

Nibea maculata (Schneider)

[Text-fig. 263]

Johnius maculatus Schneider, 1801, *Syst. Ichth. Bloch* : 75 (type-locality : Tranquebar).

Sciaena maculata : Day, 1876, *Fishes of India* : 190; Day, 1889, *Fauna Br. India*, Fishes, **2** : 119.



Text-fig. 263. *Nibea maculata* (Schneider)

Common Names :

Blotched-croaker		English
Sari-kullah	...	Telugu
Cooroowa, Vari-katchelee	...	Tamil
Cutlah	...	Malayalam

Distinguishing Characters :

A medium-sized species, with an acute snout projecting beyond upper jaw ; mouth inferior ; head length 32 to 35% of standard length. Teeth villiform, differentiated in size in both jaws, surrounded by papillae. Gillrakers 4 to 9 on lower arm of first arch, with some tooth-plates below them. Dorsal fin with 10 spines, followed by a notch, second part of fin with 1 spine and 24 or 25 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong. Pectoral fins moderate, about 2/3rds head length. Scales cycloid on snout and below, between and behind eyes; finely ctenoid on operculum, occiput and whole body. Gasbladder carrot-shaped, with 15 to 18 pairs of arborescent appendages, the first appendage enters head and branches there.

Colour : Five dark blotches extending from the back to lower part of flanks, and a sixth dark blotch on top of caudal peduncle ; the blotches may be broken or entire, narrowing ventrally. Spinous dorsal fin black except along base, soft part of dorsal fin with black margin ; lower fins pale.

Geographical Distribution : India and probably Burma also.

Inhabits coastal waters.

Fishery Information : This specis is fairly common in the commercial catches of our area and forms a minor fishery on the Tamil Nadu coast.

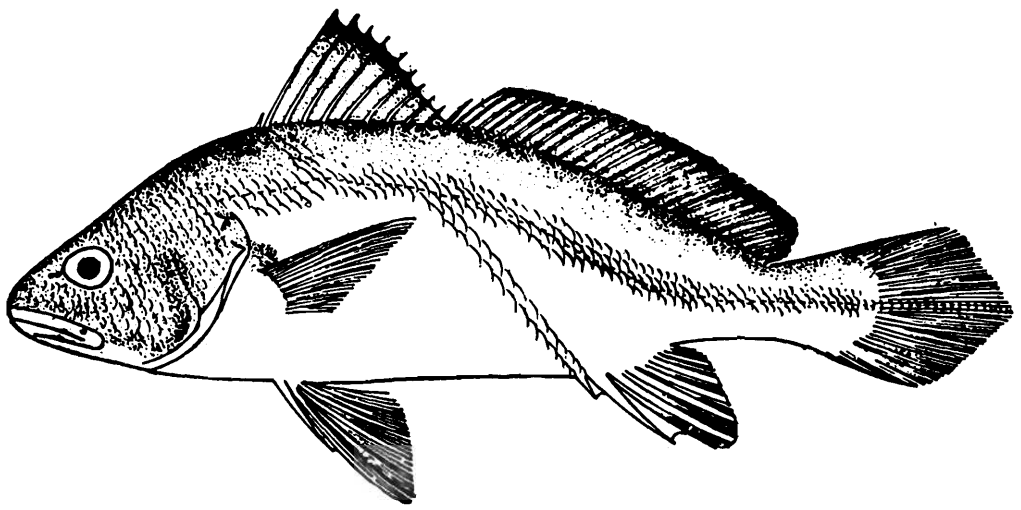
Nibea soldado (Lacepede)

[Text-fig. 264]

Holocentrus soldado Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 344, 389 (type-locality : Cayenne, East Indies).

Sciaena miles (Cuvier) : Day, 1876, *Fishes of India* : 185, pl. 43, fig. 5 ; Day, *Fauna Br. India*, Fishes, **2** : 113.

Pseudosciaena soldado : Misra, 1962, *Rec. Indian Mus.*, **57** : 369.



Text-fig. 264. *Nibea soldado* (Lacepede)

Common Names :

Soldier-croaker	...	English
Tella-katchelee	...	Telugu
Vella-katchelee	...	Tamil

Distinguishing Characters :

A fairly large species, with an arched back. Mouth terminal and at a low angle with the horizontal. Teeth villiform, well differentiated in size in both jaws, firm, usually buried in papillae. Gill-rakers 8 or 9 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a deep notch, second part of fin with 1 spine and 28 to 31 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine very strong and nearly $\frac{1}{2}$ of head length. Pectoral fins short, about 2/3rds of head length. Pelvic fin with a short filament. Caudal fin rhomboid. Scales cycloid on head and breast, otherwise ctenoid; lateral line with 48 to 50 pored-scales. Gasbladder carrot-shaped, with 18 to 22 pairs of appendages; those of main part of bladder branched in a fan-like manner; the first appendage long, enters head and branching below the skull.

Colour : body generally silvery, with faint series of oblique stripes along scale-rows of the anterior upper part of body.

Geographical Distribution : Both coasts of the Indian Peninsula, Sri Lanka, Malay Peninsula, Bangkok, Borneo, Celebes, Northern Australia and Queensland.

Found in coastal waters, down to 40 m.

Fishery Information : This is common in the commercial catches on the east coast of India.

Genus **Otolitholdes** Fowler

Otolithoides Fowler, 1933, *Bull. U. S. natn. Mus.*, (100) **12** : 353, 364 (type-species : *Otolithus biauritus* Cantor).

Mouth large and terminal; teeth villiform, well differentiated in size in both jaws, with one upper pair usually enlarged as canines. A pair of small mental pores on front of chin. Dorsal fin with 8 or 9 spines, followed by a low notch, second part of fin with 1 spine and 27 to 32 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine weak. Scales of upper anterior part of body very small; lateral line scales cycloid, usually covered with small subsidiary scales. Gasbladder carrort-shaped, with a single pair of appendages, arising from posterior end of bladder and running forward besides main bladder and in front of it into the head, where they ramify under the skull.

Monotypic.

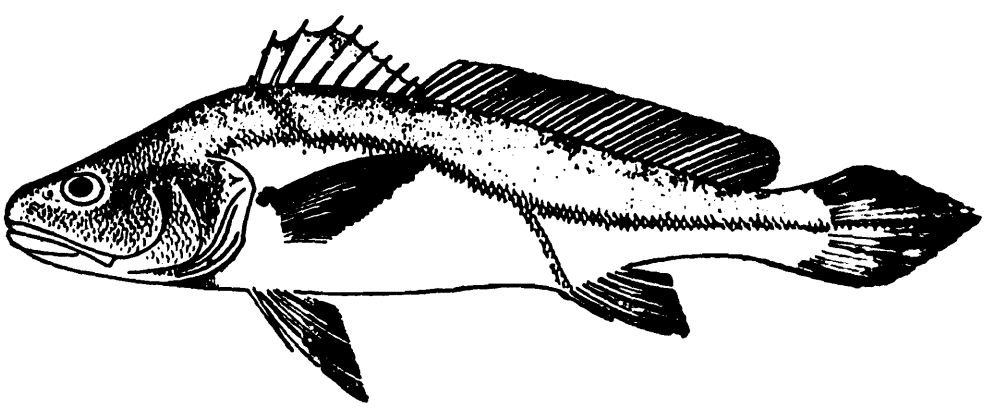
Otolitholdes biauritus (Cantor)

[Text-fig. 265]

Otolithus biauritus Cantor, 1850, *J. Asiat. Soc. Beng.*, **18**(2) : 1039 (type-locality : Penang, Malay Peninsula).

Sciaenoides biauritus : Day, 1876, *Fishes of India* : 194, pl. 47, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **2** : 125.

Sciaenoides brunneus (Day, 1873) : Day, 1876, *Fishes of India* : 195, pl 45, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 126, fig. 50.



Text-fig. 265. *Otolithoides biauritus* (Cantor)

Common Names :

Bronze-croaker	...	English
Koth	...	Marathi
Koth	...	Gujarati

Distinguishing Characters :

A large species, with a fairly acute snout. Mouth large and terminal, the upper jaw (maxilla) extending well beyond eye. Teeth strong and spaced in both jaws, with one upper pair enlarged as canines usually. Gillrakers 11 or 12 on lower arm of first arch. Dorsal fin with 8 or 9 spines, followed by a low notch, second part of fin with 1 spine and 27 to 32 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the secoed spine weak. Pectoral fins moderate, about $\frac{3}{4}$ths of head length. Caudal fin lanceolate. Scales cycloid on head and upper part of front of body, elsewhere finely ctenoid.

Colour : head and back greyish, flanks silvery with golden tinge, paler on belly; lateral line golden. Dorsal, anal and caudal fins yellowish to pale orange, pelvic fins pale orange, pectoral fins brownish with a black spot at axil.

Geographical Distributon : India, Burma, Malay Peninsula, Sumatra, Borneo, Vietnam, and Annam.

Fishery Information : This large demersal species forms an important element of the trawl fisheries of the Maharashtra-Gujarat coast, the best grounds are, however, off Dwaraka and Kutch. It grows to a length of 120 cm.

Genus **Otolithes** Oken

Otolithes Oken, 1817, *Isis* : 1782 (type-species : *Johnius ruber* Schneider).

Mouth large, the lower jaw projecting; 1 or 2 pairs of strong canine teeth near the symphysis in both jaws. Pores on chin absent or reduced to anterior pair and clusters of minute pores. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine weak; origin of anal fin behind middle of soft dorsal fin. Gasbladder carrot-shaped, with 28 to 36 pairs of arborescent appendages, branching in a very regular pattern and set in an oblique plane in wedge of tissue flanking the bladder, not ex-

tending on to the dorsal surface of bladder, the first appendage not entering the head.

KEY TO SPECIES

1 (a) Gillrakers 8 to 11 on lower arm of first arch; depth of body 4 to 5 times in standard length ... *O. ruber*

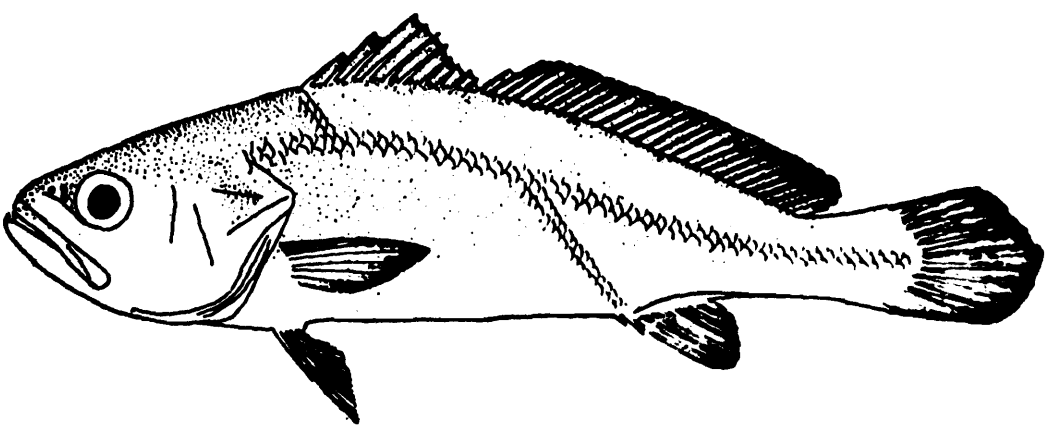
(b) Gillrakers 12 to 14 on lower arm of first arch; depth of body 3.2 to 4.5 times in standard length ... *O. cuvieri*

Otolithes cuvieri Trewavas

[Text-fig. 266]

Otolithus ruber Day (*nec* Schneider) (*part.*), 1876, *Fishes of India* : 196; Day (*part.*), 1889, *Fauna Br. India*, Fishes, **2** : 128.

Otolithes cuvieri Trewavas, 1974, *FAO species identification sheets*, **3** : SCIAEN Otol 1 (type-locality : Malabar; Karachi).



Text-fig. 266. *Otolithes cuvieri* Trewavas

Common Name :

Lesser tiger-toothed croaker ... English

Distinguishing Characters :

A fairly slender species, its depth 3.2 to 4.5 times in standard length; snout slightly longer than eye-diameter. Mouth large, terminal, the lower jaw projecting. Teeth in a single row in lower jaw (sometimes part of a second row present) and two rows in upper jaw; 1 or 2 pairs of strong canines in upper jaw and 1 pair at tip of lower jaw. Gillrakers 12 to 14 on lower arm of first arch, with some toothed plates anteriorly. Dorsal fin with 10 spines, followed by a notch, second part of the fin with 1 spine and 29 to 31 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine short and weak.

Caudal fin rhomboid, but with tip pointed. Scales cycloid on head, elsewhere ctenoid. Gasbladder carrot-shaped, with 32 to 36 pairs of arborescent appendages, none entering head.

Colour : body brownish-grey above, silvery on flanks. Spinous dorsal fin edged with black; pectoral and pelvic fins yellowish.

Geographical Distribution : Pakistan, India and Sri Lanka.

Inhabits inshore and coastal waters.

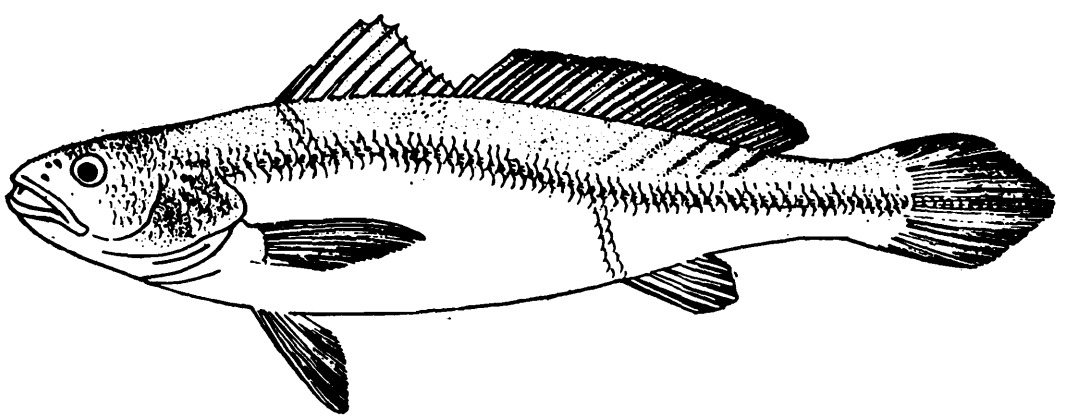
Fishery Information : This is a good tablefish which is abundant along the Tamil Nadu coast. It grows to a length of 76 cm., but the commercial catches consist of much smaller fish. The isinglass obtained from this fish is considered to be of very good quality and is capable of gelatinizing water twenty-six times its weght.

Otolithes ruber (Schneider)

[Text-fig. 267]

Johnius ruber Schneider, 1801, *Syst. Ichth. Bloch.* : 75, pl. 17 (type-locality : Tranquebar).

Otolithus argenteus Kuhl and van Hasselt : Day, 1876, *Fishes of India* : 197, pl. 45, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 129.



Text-fig. 267. *Otolithes ruber* (Schneider)

Common Names :

Tiger-toothed croaker	...	English
Kuddali	...	Kannada

Distinguishing Characters :

A slender species, its depth 4 to 5 times in standard length. Mouth large and terminal, the lower jaw slightly projecting. Teeth in

two rows in upper jaw with 1 or 2 pairs of strong canine teeth at front, and a pair of canines at tip of jaw. Gillrakers 8 to 11 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 27 to 30 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine short and weak. Caudal fin rhomboid, pointed in juveniles. Scales cycloid, but with a few ctenoid on lower part of hind end of body. Gasbladder carrot-shaped, with 32 to 36 pairs of arborescent appendages in adults, none entering head.

Colour : body silvery, with no distinctive markings.

Geographical Distribution : East coast of Africa, throughout the Indian Ocean and the Indo-Australian Archipelago.

Inhabits coastal waters, down to 40 m.

Fishery Information : This species is caught all along the coast of India, and is the most abundant sciaenid along the Kerala and Maharashtra coasts. It reaches a length of 75 cm.

Genus **Panna** Mohan

Panna Mohan, 1969, *Curr. Sci.*, **38**(12) : 296 (type-species : *Otolithus microdon* Blecker).

Snout acute ; mouth large and terminal. Eyes small, 13 to 18% length of head ; interorbital width 24 to 27% length of head in adults, about 35% in juveniles. Teeth villiform in jaws, the outer series in upper jaw enlarged, spaced, with 1 or 2 canine teeth at its tip, the inner series in lower jaw slightly enlarged. Lower jaw with 3 pairs of minute pores at symphysis, the first pair inconspicuous on front of chin : no barbels. Single dorsal fin, with 8 or 9 spines, followed by a notch, second part of fin with 1 spine and 31 to 37 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine weak. Lateral line scales cycloid, bigger than the scales above them. Gasbladder carrot-shaped, with a pair of tubular appendages arising at its anterior end and immediately dividing into an anterior (cephalic) branch entering head and a posterior (abdominal) simple, long branch lying parallel to main bladder.

Two species, both in our area.

KEY TO SPECIES

1 (a) Gillrakers 11 to 13 on lower arm of first arch ; cephalic branch of gasbladder branching under posterior part of skull ; scales on body ctenoid ... *P. microdon*

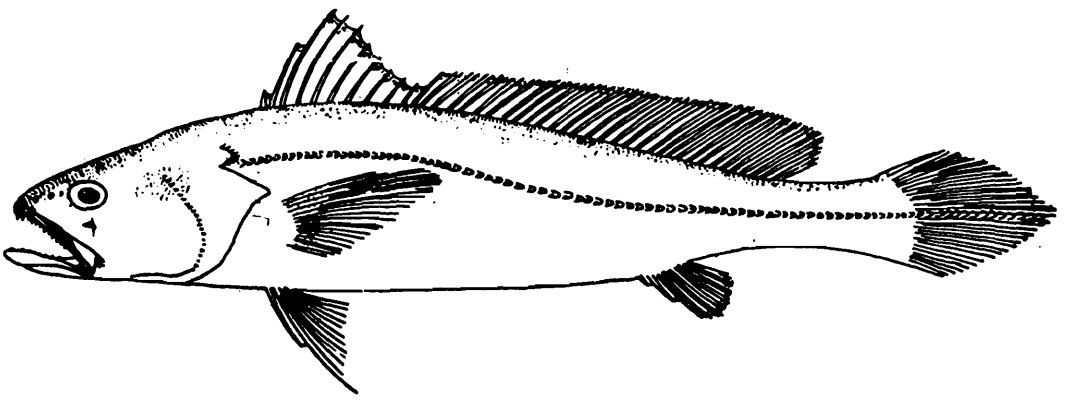
(b) Gillrakers 16 on lower arm of first arch; cephalic branch of gasbladder unbranched; scales on body cycloid ... *P. heterolepis**

Panna microdon (Bleeker)

[Text-fig. 268]

Otolithus microdon Bleeker, 1849, *Verh. Batav. Gen.*, **22** : 10 (type-locality : Madura).

Sciaenoides microdon : Day, 1876, *Fishes of India* : 194, pl. 45, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 125.



Text-fig. 268. *Panna microdon* (Bleeker)

Common Name :

Panna-croaker ... English

Distinguishing Characters :

A medium sized species, with an acute snout and large terminal mouth; upper jaw (maxilla) extending slightly beyond vertical from hind edge of eye. Gillrakers 11 to 13 on lower arm of first arch. Teeth villiform, the outer series in upper jaw enlarged and distantly placed with 1 or 2 canine teeth, the inner series of teeth in lower jaw slightly enlarged. Dorsal fin with 9 or 10 spines, followed by a shallow notch, second part of fin with 1 spine and 31 to 37 soft rays. Anal fin with 2 spines and 6 to 8 soft rays, the second spine short and weak. Caudal fin acutely rhomboid. Scales small, cycloid on head and breast, elsewhere weakly ctenoid.

Colour : body brown, becoming lighter on flanks and belly. Fins yellow, dorsal and anal fins with darker border.

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* *Panna heterolepis* Trewavas in presently known only from its type specimen from Calcutta.

Geographical Distribution : Coasts of India, Burma, Malay Peninsula, Sumatra, and eastwards to Borneo and Vietnam.

Inhabits coastal waters.

Fishery Information : Fairly common in the commercial catches on the Orissa-West Bengal coast.

Genus **Paranibea** Trewavas

Paranibea Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : 370 (type-species : *Corvina semiluctuosa* Cuvier).

Teeth villiform, differentiated in size in upper jaw only, the outer row of teeth in upper jaw firm, moderately enlarged, teeth of lower jaw uniform and rather strong. No barbels on chin ; 5 pores on chin, the median single ; no mental barbel. Dorsal fin with 10 or 11 spines, followed by a shallow notch, second part of fin with 27 to 31 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong and 11.5 to 14.5% of standard length Gasbladder carrot-shaped, with 15 to 21 pairs of arborescent appendages, the first appendage has an inner branch ramifying on posterior surface of transverse septum and four other branches in head region

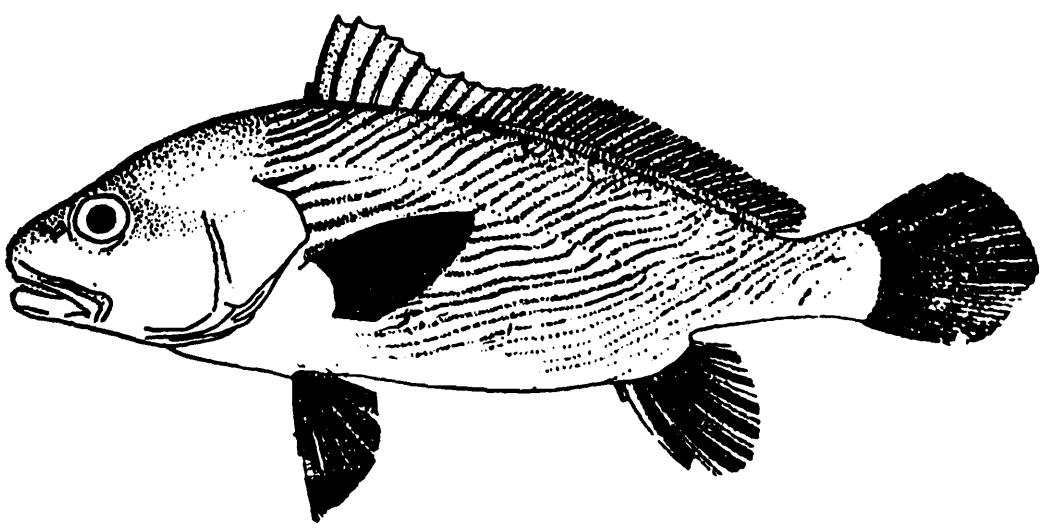
Monotypic.

Paranibea semiluctuosa (Cuvier)

[Text-fig. 269]

Corvina semiluctuosa Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 105 (type-locality : Goa, Malabar, Pondicherry).

Sciaena semiluctuosa : Day, 1876, *Fishes of India* : 191 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 121



Text-fig. 269. *Paranibea semiluctuosa* (Cuvier)

Common Name :

Half-mourning croaker ... English

Distinguishing Characters :

A fairly small species, with the dorsal profile much more arched than ventral profile. Snout moderately acute, slightly projecting before the upper jaw when mouth is closed ; lips thick and papillose. Teeth villiform, differentiated in size in upper jaw only, teeth of lower jaw uniform and rather strong. Gill-rakers 5 to 8 on lower arm of first arch. Dorsal fin with 10 or 11 spines, followed by a shallow notch, second part of fin with 1 spine and 27 to 31 soft rays. Anal fin with 2 spines and 7 soft rays, the second spine strong and up to half of head length. Caudal fin rhomboid or rounded Gasbladder carrot-shaped, with 15 to 21 arborescent appendages ; the first appendage rather long, entering head but an inner branch ramifying on posterior surface of transverse septum.

Colour : dark with series of narrow dark stripes along the scale-rows covering the whole body except a narrow strip on the belly. Pelvic and anal fins very dark.

Geographical Distribution : Indian Ocean.

Inhabits coastal waters.

Fishery Information : Fairly common in the commercial catches on the west coast of India.

Genus **Pennahia** Fowler

Pennahia Fowler, 1926, *J. Bombay nat. Hist. Soc.*, **30** (4) : 776 (type-species : *Otolithus macrophthalmus* Bleeker) ; Trewavas and Talwar, 1977, *Bull. zool. Nomencl.*, **34** (3) : 185.

Mouth large ; teeth well differentiated in size in both jaws, the outer upper teeth and lower inner series enlarged and spaced but no outstanding canine teeth. Two or three pairs of pores on front of chin, the first pair small and separated by symphysis of lower jaw. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 23 to 29 soft rays. Anal fin with 2 spines and 7 to 8 soft rays, the second spine weak. Gasbladder carrot-shaped, with 17 to 27 pairs of appendages, the first branching

fanwise, not entering head, the rest arborescent, wing-like, without dorsal limb.

Four species known, 2 in our area.

KEY TO SPECIES

1 (a) Spinous dorsal fin with 23 to 25 rays; caudal fin truncate ... *P. macrophthalmus*

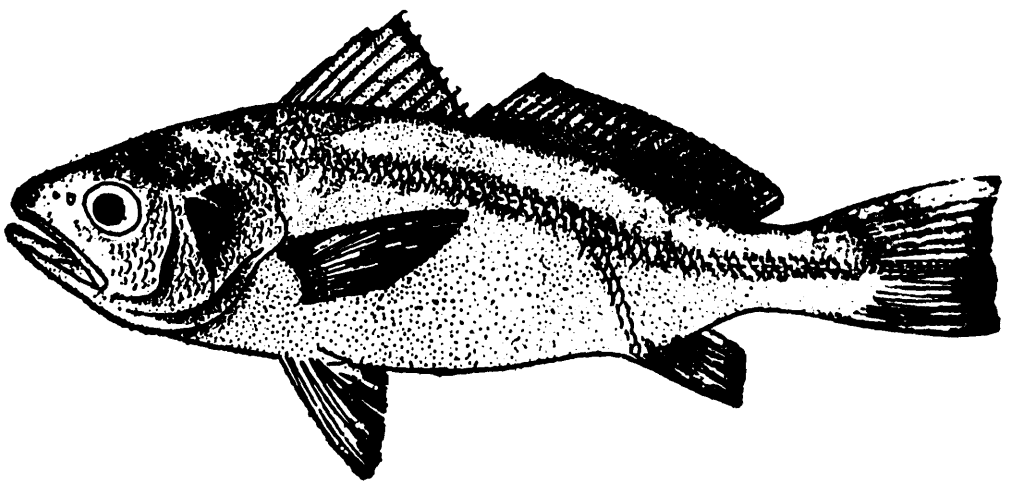
(b) Spinous dorsal fin with 27 to 29 soft rays; caudal fin bluntly rhomboid ... *P. macrocephalus**

Pennahia macrophthalmus (Bleeker)

[Text-fig. 270]

Otolithus macrophthalmus Bleeker, 1850, *Verh. Batav. Gen.*, **23** : 16 (type-locality : Java).

Sciaena aneus Day (*nec* Bloch), 1876, *Fishes of India* : 189, pl. 45, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, **2** : 119.



Text-fig. 270. *Pennahia macrophthalmus* (Bleeker)

Common Names :

Bigeye croaker	...	English
Gorasa	...	Telugu
Pennah	...	Tamil
Chalburndah	...	Andaman Is.

* *Pennahia macrocephalus* (Tang) is rare in our area.

Distinguishing Characters :

A fairly large species, with a large, terminal, oblique mouth. Teeth well differentiated in size in both jaws, the outer upper teeth and lower inner series enlarged and spaced, but no outstanding canines. Gill-rakers 10 to 12 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 23 to 25 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine weak. Caudal fin rhomboid. Scales cycloid on snout, elsewhere ctenoid.

Colour : back greyish, flanks and belly silvery. Spinous dorsal fin dusky in upper half ; a dusky diffused blotch on pectoral fin axil.

Geographical Distribution : Pakistan, India, through the East Indies, to China.

Inhabits coastal waters, down to 60 m.

Fishery Information : This croaker reaches a length of 22 cm., and contributes a good fishery on the Tamil Nadu coast and the Andaman Sea in our region.

Genus **Protonibea** Trewavas

Protonibea Trewavas, 1971, *J. Fish. Biol.*, **3** : 458 (type-species : *Lutjanus diacanthus* Lacepede).

Snout acute ; mouth large and terminal ; no barbels. Teeth villiform, well differentiated in size in both jaws, a row of enlarged teeth in lower jaw ; no canine teeth. Three pairs of pores on chin, the anterior pair close to symphysis and joined by a semi-circular groove. Dorsal fin with 9 or 10 spines, followed by a low notch, second part of fin with 1 spine and 22 to 24 soft rays. Anal fin with 2 spines and 7 or 8 soft rays, the second spine moderate, 10 to 11% of standard length. Gasbladder carrot-shaped, with 16 to 26 pairs of arborescent appendages, the first appendage branching on septum transversum but not entering the head.

Monotypic.

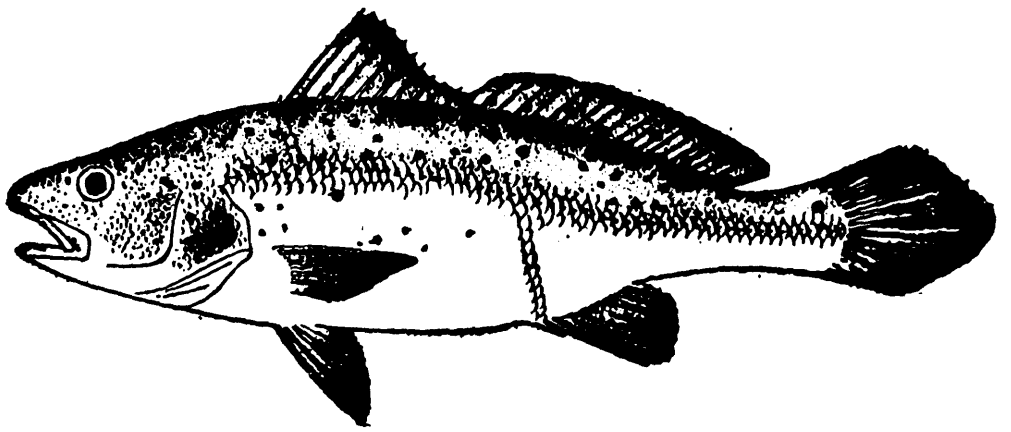
Protonibea diacanthus (Lacepede)

[Text-fig. 271]

Lutjanus diacanthus Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 240 (type-loeality : not known).

Sciaena diacanthus : Day, 1876, *Fishes of India* : 189; Day, 1889, *Fauna Br. India*, Fishes, **2** : 118.

Pseudosciaena diacanthus : Misra, 1962, *Rec. Indian Mus.*, **57** : 268.



Text-fig. 271. *Protonibea diacanthus* (Lacepede)

Common Names :

Spotted croaker	...	English
Nella-katchelee	...	Telugu
Kooral	...	Tamil
Kora	...	Malayalam
Balde, Gholi	...	Kannada
Ghol	...	Marathi
Ghol	...	Gujarati

Distinguishing Characters :

A large, rather slender species with an acute snout and large, terminal mouth. Teeth villiform, differentiated in side in both jaws, the outer row in upper jaw enlarged and spaced, the anterior 1 or 2 pairs caniniform but no outstanding canine teeth, the inner row of teeth in lower jaw slightly enlarged Gillrakers 8 or 9 on lower arm of first arch. Dorsal fin with 9 or 10 spines, followed by a low notch, second part of fin with 1 spine and 22 to 24 soft rays Anal fin with 2 spines and 7 or 8 soft rays, the second spine moderate. Pectoral fins fairly small, slightly more than $\frac{1}{4}$ of head length. Caudal fin rhomboid, acutely so in young. Scales cycloid on snout and below eyes, elsewhere ctenoid and very rough to touch. Gasbladder carrot-shaped, with 16 to 26 pairs of arborescent appendages, the first behind transverse septum.

Colour : body silvery, with 5 dark blotches on back, many small dots on top of head, upper half of body, and dorsal and caudal fins. Pectoral, pelvic, anal and lower part of caudal fins black, the blotches or spots may be absent in larger adults.

Geographical Distribution : Gulf of Oman, India, Sri Lanka, through the East Indies, to China, Japan, the Philippines and Western Australia.

Inhabits coastal waters, down to 60 m.

Fishery Information : This sciaenid forms an important trawl fishery in the northwest region, consisting of Bombay, Cambay, Veraval, Porbundar, Dwaraka and Kutch areas but generally better ghol grounds are off Kutch, Pobandar and Dwarka. The species is a highly esteemed table-fish and ranks first as a commercially important offshore sciaenid, forming 5 to 8% of the trawler catches. It grows up to 153 cm. and weights 11 kg. The peak landings are obtained during the months from June to April. This species also supports a minor fishery in the Gulf of Mannar and Palk Bay, and is captured in areas ranging in depths between 20 to 55 m.

Genus **Pterotolithus** Fowler

Pterotolithus Fowler, 1933, *Bull. U. S. natn. Mus.,* (100) **12** : 359 (type-species : *Otolithus maculatus* Kuhl & van Hasselt).

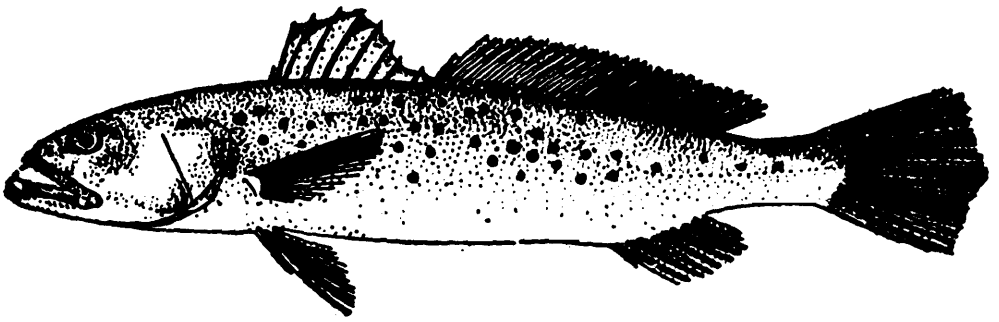
Mouth large, the lower jaw strongly projecting; a pair of canine teeth in each jaw, the lower pair between the two upper in adults fitting into sockets in upper lip. No conspicuous pores on lower jaw. Dorsal fin with 9 or 10 spines, followed by a notch, second part of fin with 1 spine and 24 to 34 soft rays. Anal fin with 2 spines and 10 to 12 soft rays (if 7 or 8, then anal fin before middle of soft dorsal fin), the second spine weak and about $\frac{1}{2}$ length of longest soft ray. Scales cycloid or part cycloid, part finely ctenoid. Gasbladder carrot-shaped, with 41 to 53 pairs of diverticula, branching in a shallow wedge of tissue flanking the bladder, some or all with the distal twiglets extending on to dorsal surface of bladder with a filigree of tubules, none entering head.

Two species known, one in our area.

Pterotolithus maculatus (Kuhl & van Hasselt)

[Text-fig. 272]

Otolithus maculatus Kuhl and van Hasselt, 1830, *Hist. nat. Poiss.*, **5** : 64 (type-locality : Java) ; Day, 1876, *Fishes of India* : 196, pl. 46, fig. 4 ; Day, 1889, *Fauna Br India*, Fishes, **2** : 127, fig. 51.



Text-fig. 272. *Pterotolithus maculatus* (Kuhl & van Hasselt)

Common Names :

Blotched tiger-toothed croaker	...	English
Burralli	...	Oriya
Gorasalu	...	Telugu

Distinguishing Characters :

A fairly large and slender species. Mouth large and strongly oblique, the lower jaw strongly projecting. Teeth in 2 rows in upper jaw, the inner row small, and a pair of strong canine teeth in front ; in lower jaw in a single row, with a pair of strong canine teeth at its tip. Gillrakers 8 or 9 on lower arm of first arch, with 1 or 2 small knobs in front. Dorsal fin with 9 spines, followed by a notch, second part of fin with 1 spine and 30 to 34 soft rays ; anal fin with 2 spines and 10 or 11 soft rays, the second spine weak. Caudal fin rhomboid. Scales cycloid. Gas-bladder carrot-shaped, with numerous arborescent appendages, non entering head.

Colour : body greyish above, silvery on flanks and belly, upper part of body and dorsal fin with numerous black patches.

Geographical Distribution : Bay of Bengal to Borneo.

Inhabits coastal waters.

Fishery Information : This sciaenid is common in the trawl catches of our area. And minor fisheries exist on the Tamil Nadu and Kerala coasts.

FAMILY : MULLIDAE
[Goatfishes]

Small to moderate-sized fishes; body fairly elongate; underside of head, and usually also the belly, flat. Eyes situated near dorsal profile of head; mouth rather small; teeth small; two long fleshy barbels on chin (used in detecting food) which can be folded into a median groove on throat. Two widely separated dorsal fins, the first with 6 to 8 spines, the second with 1 spine and 8 soft rays. Anal fin short, with 1 or 2 spines. Pelvic fins rather large, inserted below pectoral fins, with 1 spine and 5 soft rays. Caudal fin forked. Scales large, weakly ctenoid (rough to touch).

Estuarine and coastal water fishes, always near the bottom. These fishes are noted for their brilliant colours, as well as for their excellence of their flesh, which is most delicate and tasty, with few bones. The goatfishes form a fishery of some magnitude along the Andhra and Tamil Nadu coasts along the east coast, and Kerala, Karnataka, Maharashtra and Gujarat coasts along the west coast of India. Goatfishes are caught mainly in trawl nets in Andhra, Karnataka and Maharashtra. Goatfishes contribute 0.26 to 1.47% of the total marine fish production in India; about 5307 tonnes of goatfishes (also referred to as red mullets) are landed in our area, the maximum catches are from Kerala State, followed by Tamil Nadu and Gujarat.

Comprises 6 genera, 3 in our area.

KEY TO GENERA

1 (a) Teeth present on roof of mouth (to be seen after removal of lower jaw); no spine on opercular margin; stripes on both dorsal fins, but never on anal fin ... **Upeneus**

(b) No teeth on vomer and palatines; a small spine on opercular margin; either no stripes on any fin, or when there are stripes, these are always present on second dorsal and anal fins, but not on first dorsal fin ... 2

2 (a) Band of fine teeth in each jaw; 5 vertical scale-rows along space between dorsal fins; 12 vertical scale-rows along upper part of caudal peduncle; no marks on any of fins ... **Mulloides**

(b) Single row of large, blunt teeth in each jaw; 2 to 3 vertical scale-rows along space between dorsal fins; 8 to 9 vertical rows of scales along upper part of caudal peduncle; stripes always present on second dorsal and anal fins, but never on first dorsal fin ... **Parupeneus**

Genus **Mulloides** Bleeker

Mulloides Bleeker, 1849, *Verh. Batav Gen.*, **22** : 6 (type-species : *Mullus flavolineatus* Lacepede).

Body rather elongate; snout rather long, rounded above: a small spine on opercular margin. Teeth villiform in jaws, in several rows anteriorly and one or two irregular rows laterally; no teeth on roof of mouth (vomer and palatines). Five vertical scale-rows along space between the dorsal fins; 12 vertical scale-rows along upper part of caudal peduncle Dominant color on body yellow.

Rather small fishes of the Indo-Pacific; three species, one in our area.

Mulloides flavolineatus (Lacepede)

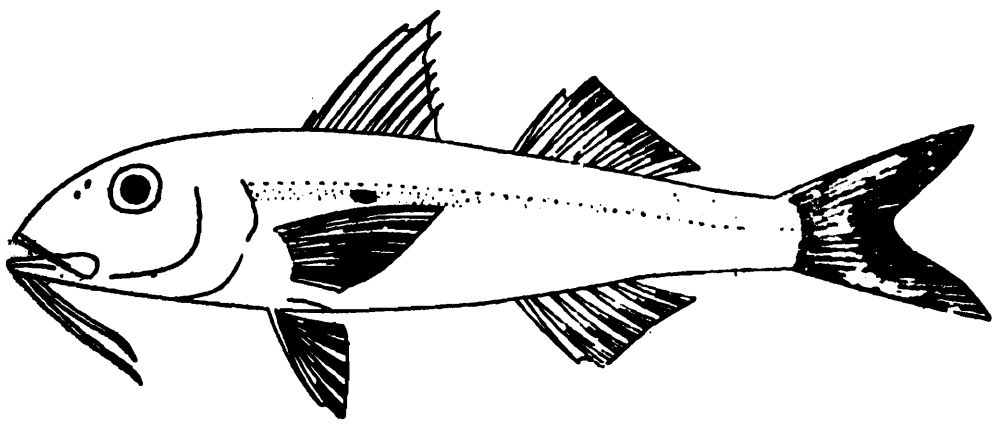
[Text-fig. 273]

Mullus flavolineatus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 384, 406 (type-locality : Mauritius).

Mulloides flavolineatus : Day, 1875, *Fishes of India* : 122, pl. 30, fig. 6 : Day, 1889, *Fauna Br. India*, Fishes, **2** : 28, fig. 11.

Mulloidichthys samoensis (Gunther) : Thomas, 1969, *Mem. Mar. biol. Ass. India*, (3) : 71, pl. 7, fig. B.

Mulloidichthys auriflamma (*nec* Forsskal) Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 346, fig. 294.



Text-fig. 273. *Mulloides flavolineatus* (Lacepede)

Common Names :

Slender goldband goatfish	...	English
Thelakanthi, Manakkam	...	Lakshadweep Is.

Distinguishing Characters :

Body very elongate, but robust. Chin with 2 short and thin barbels; a spine on upper half of opercular margin. A band of villiform teeth in jaws, in 1 or 2 irregular rows posteriorly. Gillrakers 17 to 25 on lower arm of first arch. Two dorsal fins, separated by 5 vertical rows of scales; first dorsal fin with 8 spines, second dorsal with 1 spine and 8 soft rays. Anal fin with 1 or 2 spines and 5 or 6 soft rays. Twelve vertical rows of scales along upper part of caudal peduncle.

Colour : head and back greyish bronze, belly whitish; a narrow golden band runs from opercular spine to base of upper caudal-fin lobe, anteriorly well below lateral line, then crossing the line at level of second dorsal fin; often 1 or 2 grey or black blotches on the longitudinal band below first dorsal fin. No marks on any of the fins. Barbels white.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Inhabits coastal waters.

Fishery Information : The species is one of the most valued as food; taken commercially only occasionally in our area.

Genus **Parupeneus** Bleeker

Parupeneus Bleeker, 1863, *Ned. Tijdschr Dierk.*, **1** : 342 (type-species : *Mullus trifasciatus* Lacepede).

Single series of stout and widely spaced teeth in both jaws; no teeth on vomer and palatines. Mouth small; two barbels on chin, rather long. Two widely separated dorsal fins, the first fin with 8 spines, the 1st spine very small; second dorsal fin with 1 spine and 8 soft rays. Lateral line usually with 28 to 30 scales; 2 or 3 vertical rows of scales along space between dorsal fins; 8 or 9 vertical rows of scales along upper part of caudal peduncle; no scales on preorbital. Stripes always present on second dorsal and anal fins, but never on first dorsal fin.

Several species, widespread in all tropiral seas, 8 in our region.

KEY TO SPECIES

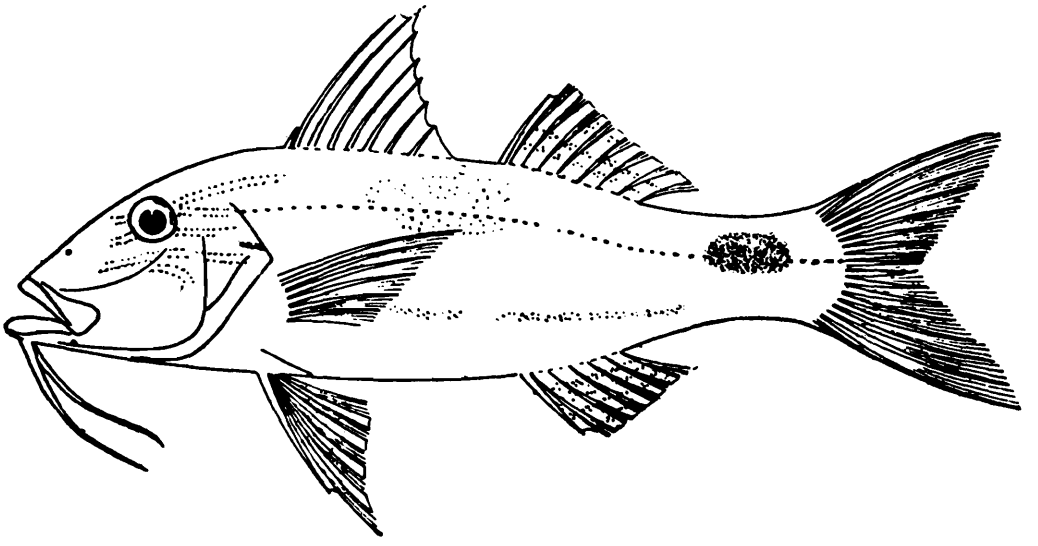
1 (a)	Second spine of dorsal fin rigid	... 2
(b)	Second spine of dorsal fin flexible, not pungent	... 3
2 (a)	Body with 2 or 3 blackish vertical bars; one bar below each dorsal fin, the 1st long and narrow, triangular in shape, the 2nd broad and short; often a black saddle on caudal peduncle	... *P. bifasciatus**
(b)	Body without dark vertical bars; a broad and dark brown band runs from hind margin of eye to below hind margin of second dorsal fin; a dark blotch at midpoint of caudal peduncle	... *P. macronema**
3 (a)	Caudal peduncle with a lateral black blotch	... 4
(b)	Caudal peduncle without a lateral black blotch.	... 7
4 (a)	A large elongate yellow blotch, mostly above lateral line, extending from below hind part of first dorsal fin to below front part of second dorsal fin	... *P. indicus*
(b)	No yellow blotch on lateral line	... 5
5 (a)	Caudal peduncle with a black saddle	... 6
(b)	Caudal peduncle without black saddle, but with an oblong dark blotch, longer than eye, placed behind midpoint of caudal peduncle; a narrow, dark band runs from upper jaw through eye, above lateral line, to about end of second dorsal fin	... *P. barberinus**
6 (a)	A broad purplish band, with a light silvery edge, from the snout through eye to behind hind end of first dorsal fin	... *P. pleurotaenia**
(b)	No dark band on sides; a large whitish saddle on anterior part of caudal peduncle followed by a black saddle	... *P. fraterculus**

7 (a) Large, oblong, golden saddle on caudal peduncle; barbels on chin very long	...	*P. chryserydros**
(b) No golden saddle on caudal peduncle; barbels on chin not very long	...	8
8 (a) Body rather deep, its upper profile forming a characteristic regular arch; pleural spot bright red, placed below mid-base of first dorsal fin	...	*P. pleurospilus**
(b) Body more elongate, the upper profile of head straight, or even concave in older specimens; pleural spot grey or red, placed below last spines of first dorsal fin	...	*P. pleurostigma**

Parupeneus indicus (Shaw)

[Text-fig. 274]

Mullus indicus Shaw, 1803, *Gen. Zoology*, **4** : 611 (type-locality : Vizagapatnam).
Upeneus indicus : Day, 1875, *Fishes of India* : 126, pl. 31, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **2** : 32.



Text-fig. 274. *Parupeneus indicus* (Shaw)

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* *Parupeneus bifasciatus* (Lacepede), *P. macronema* (Lacepede), *P. barberinus* (Lacepede), *P. chryserydros* (Lacepede), *P. fraterculus* (Valenciennes), *P. pleurospilus* (Bleeker) and *P. pleurostigma* (Bennett) do not contribute to any fishery in our area; *P. pleurotaenia* (Playfair) has been recorded from Pakistan and is likely to be found in our area also; *P. luteus* (Valenciennes) and *P. trifasciatus* (Lacepede) reported from the Laccadive Sea by Jones & Kumaran (1980) are identical with *P. chtyserydros* (Lacepede) and *P. bifasciatus* (Lacepede) respectively.

Common Names :

Indian goatfish	...	English
Rahtee-goolivinda	...	Telugu
Kulnaveri, Mussara	...	Tamil
Thelakanthi, Manakkam	...	Lakshadweep Is.

Distinguishing Characters :

Body deep; chin with two moderately long barbels; a small spine on upper third of opercular margin. Teeth in jaws in single row. Two widely separated dorsal fins; first fin with 8 spines, the 1st spine minute, and second fin with 1 spine and 8 soft rays. Anal fin with 1 spine and 7 soft rays. Scales large; 3 vertical rows of scales along the space between dorsal fins; 8 vertical rows of scales along upper part of caudal peduncle.

Colour : ground colour of head and body purple; head with 3 to 5 violet or blue lines from snout to operculum; scales on back each with a greenish yellow edge and scales on caudal peduncle with violet or blue spots; a large elongate yellow blotch, mostly above lateral line, extending from below hind part of first dorsal fin to below front part of second dorsal fin; a large black blotch immediately behind midpoint of caudal peduncle, 2/3 of it above lateral line: a line of yellow spots from pectoral fin to caudal peduncle. Second dorsal fin with horizontal violet or pink stripes, but no stripes on first dorsal fin: anal fin with yellow horizontal stripes. Barbels white to pink.

Geographical Distribution : Tropical Indo-west Pacific.

Inhabits shallow coastal waters.

Fishery Information : Dominant species of the goatfish fishery along the Tamil Nadu coast and the best catches are from the Gulf of Mannar. Fairly common also on the Andhra coast; grows to a length of 41 cm.

Genus **Upeneus** Cuvier

Upeneus Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 448 (type-species : *Mullus vittatus* Forsskal).

Body elongate and compressed; no opercular spine. Teeth in villiform bands in jaws; small teeth on roof of mouth (vomer and

palatines). Scales present on soft dorsal, anal and caudal fins. Stripes on both dorsal fins but never on anal fin. Caudal fin marked with dark, oblique bars in most species.

An Indo-Pacific genus of about 10 species, 9 in our area.

KEY TO SUBGENERA/SPECIES

1 (a)	Five to seven vertical scale-rows along space between dorsal fins; 12 vertical scale-rows along upper part of caudal peduncle; both dorsal fins with grey or black (or sometimes red) horizontal stripes; stripes on caudal fin, if present, always more numerous on upper than lower lobe (subgenus *Upeneus*)	...	2
(b)	Four vertical scale-rows along space between dorsal fins; 10 vertical scale-rows along upper part of caudal peduncle; both dorsal fins with red or brown horizontal stripes; stripes on caudal fin, if present, always more numerous on lower than on upper lobe (subgenus *Pennon*)	...	5
2 (a)	No cross-bars on caudal fin	...	*U. sulphureus*
(b)	Dusky cross-bars on caudal fin	...	3
3 (a)	Caudal fin with 5 or 6 dusky cross-bars on upper lobe only, no bars on lower lobe	...	*U. moluccensis*
(b)	Caudal fin with black cross-bars on both lobes	...	4
4 (a)	Pelvic fins short, about 2/3rds the length of pectoral fins; first dorsal fin with 3 horizontal stripes	...	*U. vittatus*
(b)	Pelvic fins almost as long as pectoral fins; first dorsal fin with orange blotches	...	*U. taeniopterus**
5 (a)	Dorsal fin with 7 spines, the first spine longest	...	*U. bensasi*
(b)	Dorsal fin with 8 spines, the first spine minute	...	6
6 (a)	Lateral line scales 30 to 32	...	7
(b)	Lateral line scales 33 or 34	...	8
7 (a)	Caudal fin with 2 to 7 dusky oblique bars on each lobe, those on lower lobe more conspicuous	...	*U. luzonius**

(b) Caudal fin with a characteristic dark brown triangular stripe prolonging the lateral band along lower fin lobe ... *U. sundaicus**

8 (a) Head distinctly longer than caudal-fin length; scales of back and upper sides of body with brown or reddish spots forming regular longitudinal lines; both dorsal fins with horizontal brown or reddish stripes; caudal fin with brown or red cross-bars (4 to 6 on upper lobe and 5 to 8 on lower) ... *U. tragula*

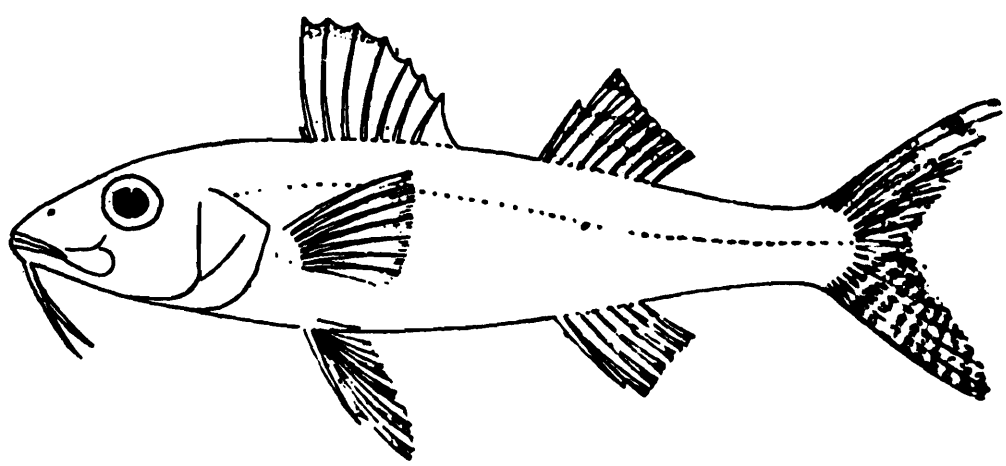
(b) Head about equal to caudal-fin length; a few small dusky spots on sides of head, almost completely absent on sides of body to belly but with large, dusky to blackish blotches on body; caudal fin with 3 or 4 dusky, oblique bars ... *U. oligospilus**

Upeneus (Pennon) bensasi (Schlegel)

[Text-fig. 275]

Mullus bensasi Schlegel, 1842, *Fauna Japonica, Pisces* : 30, pl. 1, fig. 2 (type-locality : Bay of Nagasakai, Japan).

Upeneoides bensasi : Day, 1875, *Fishes of India* : 121, pl. 30, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, 2 : 27.



Text-fig. 275. *Upeneus* (*Pennon*) *bensasi* (Schlegel)

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* *Upeneus taeniopterus* Cuvier, *U. luzonius* Jordan & Seale, *U. oligospilus* Lachner and *U. sundaicus* (Bleeker) do not contribute to any fishery in our area; *U. arge* Jordan & Evermann reported from the Laccadive Sea by Jones & Kumaran (1980) is conspecific with *U. taeniopterus* Cuvier.

Common Names :

Yellowfin goatfish	...	English
Te-nevere	...	Tamil

Distinguishing Characters :

Body elongate and slender. Chin with two short, thin barbels. Teeth villiform in both jaws. Two widely separated dorsal fins, the first fin with 7 spines (the first spine longest) and second fin with 1 spine and 8 soft rays. Anal fin with 1 spine and 6 soft rays. Pelvic fins about equal in length to pectoral fins. Caudal peduncle moderately deep, its depth about 10 times in standard length. Scales ctenoid; 4 vertical rows of scales along space between dorsal fins; 10 vertical rows of scales along upper part of caudal peduncle.

Colour : head and back dark brown, sides golden, belly whitish. Both dorsal fins golden, with red stripes (second dorsal fin) or marblings (first dorsal fin); pelvic fins with red stripes; anal fin yellow/orange, without any marks; caudal fin golden yellow, with 4 to 6 oblique red bars across upper lobe, and 10 or more across lower lobe. Barbels and gill-membrane golden.

Geographical Distribution : Tropical Indo-Pacific.

Inhabits coastal waters, down to about 40 m.

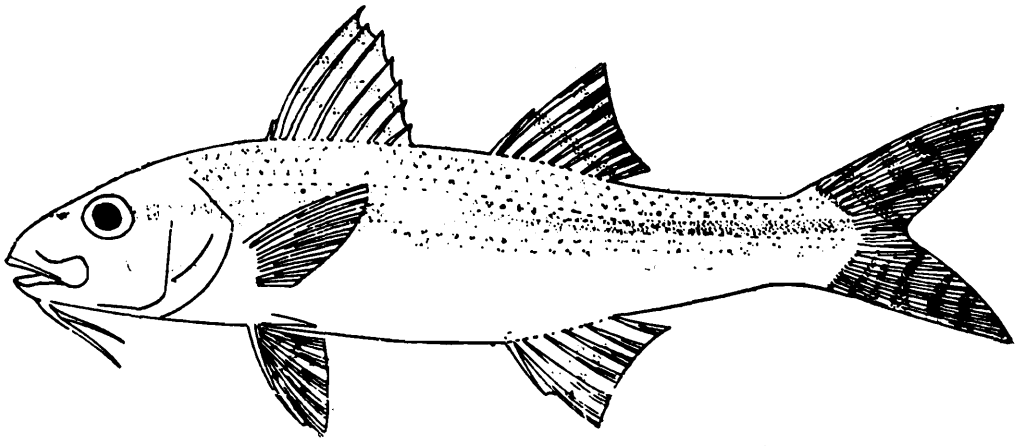
Fishery Information : Taken commercially only occasionally in our region.

Upeneus (Pennon) tragula Richardson

[Text-fig. 276]

Upeneus tragula Richardson, 1846, *Ichth. China Japan* : 220 (type-locality : Canton).

Upeneoides tragula : Day, 1875, *Fishes of India* : 121, pl. 30, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, 2 : 26.



Text-fig. 276. *Upeneus* (*Pennon*) *tragula* Richardson

Common Names :

Darkband goatfish	...	English
Chiri	...	Marathi
Galithelakanthi, Manakkam	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and slender; head distinctly longer than caudal fin. Chin with two short, thin barbels. Teeth villiform in both jaws. Two widely separated dorsal fins; first fin with 8 spines (the 1st spine minute), and the second fin with 1 spine and 8 soft rays; dorsal fins about equal in height. Anal fin with 1 spine and 6 or 7 soft rays. Pelvic fins about equal in length to pectoral fins. Caudal peduncle deep, its depth about 9 times in standard length. Scales ctenoid; 4 vertical rows of scales along space between dorsal fins; 10 vertical rows of scales along upper part of caudal peduncle; 33 or 34 scales along lateral line.

Colour : head and back brownish, belly white; a dark red band runs from snout through eye to base of caudal fin; scales of back and upper sides with brown or reddish spots forming regular longitudinal lines. Both dorsal fins with horizostal brown or reddish stripes; pelvic and anal fins with horizontal lines of round spots; caudal fin with brown or red cross bars (4 to 6 on upper lobe and 5 to 8 on lower). Barbels yellow.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters. down to 40 m.

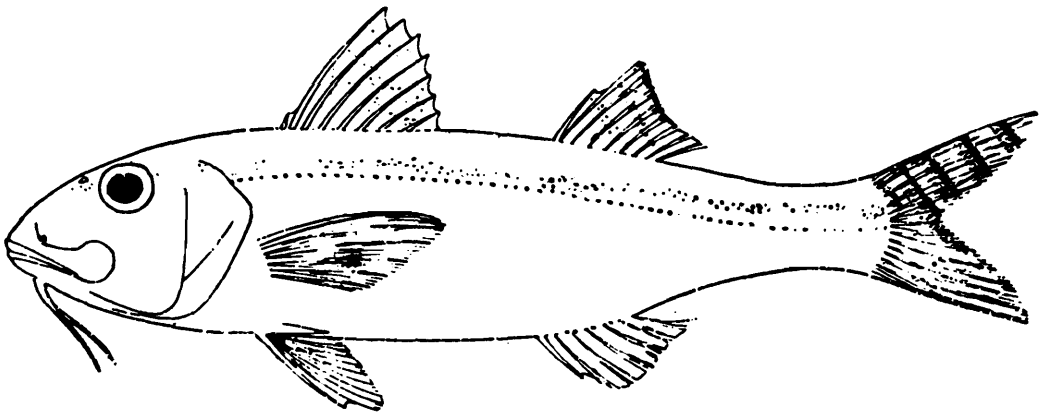
Fishery Information : This species is the most dominant species along with *U. indicus*, of the goatfish fishery of the Tamil Nadu coast. The main gear employed in the fishery of goatfishes along Palk Bay and Gulf of Mannar are shore-seines ('olai-valai') and fish traps ('koodu').

Upeneus (Upeneus) moluccensis (Bleeker)

[Text-fig. 277]

Upeneoides moluccensis Bleeker, 1855, *Nat. Tijdschr. Ned.-Indie*, **8** : 409 (type-locality : Amboina).

Upeneoides sulphureus Day (*nec* Cuvier) (*partim*), 1875, *Fishes of India* : 120; Day (*partim*), 1889, *Fauna Br. India*, Fishes, **2** : 25.



Text-fig. 277. *Upeneus* (*Upeneus*) *moluccensis* (Bleeker)

Common Names .

Goldband goatfish	...	English
Navarei	...	Tamil

Distinguishing Characters :

Body elongate. Chin with two stout, thin barbels. Teeth in several rows in both jaws. Gillrakers 18 to 22 on lower arm of first arch. Two dorsal fins; first dorsal fin with 8 spines; second dorsal fin with 1 spine and 8 soft rays. Anal fin with 1 spine and 6 soft rays. Pectoral fins much longer than pelvic fins. Caudal peduncle moderately deep, its depth about 10% of standard length. Scales ctenoid; 5 vertical rows of scales along space between dorsal fins; 12 rows of scales along upper part of caudal peduncle.

Colour : head and back brown-red, sides and bally white; a distinct lemon yellow longitudinal band runs from anterior profile of head through eye above lateral line to caudal fin. Both dorsal fins yellow, with 3 red horizontal stripes, those on the first dorsal fin ill-defined (marblings rather than stripes); anal fin whitish, without any marks; caudal fin with 5 or 6 dusky cross-bars on upper lobe, the 2nd bar extending to hind margin of lower lobe.

Geographical Distribution : East coast of Africa, eastern Mediterranean (as immigrant), India, the East Indies, the Philippines and the northern coast of Australia.

Inhabits predominantly coastal waters at depths of 10 to 80 m; usually found in large schools.

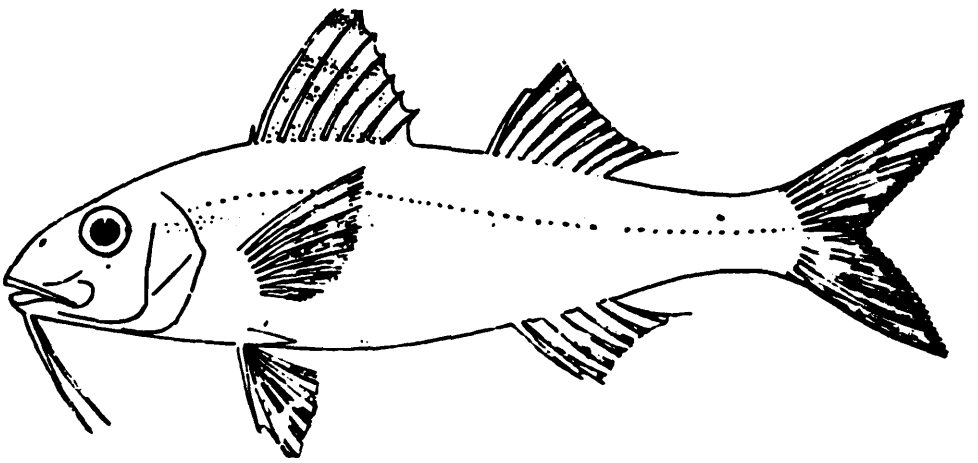
Fishery Information : Of minor fishery value in our region.

Upeneus (Upeneus) sulphureus Cuvier

[Text-fig. 278]

Upeneus sulphureus Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 450 (type-locality : Anjer Straits of Sunda).

Upeneoides sulphureus : Day (*partim*), 1876, *Fishes of India* : 120, pl. 30, fig. 3 ; Day (*partim*), 1889, *Fauna Br. India*, Fishes, **2** : 25.



Text-fig. 278. *Upeneus* (*Upeneus*) *sulphureus* Cuvier

Common Names :

Yellow-goatfish	...	English
Rahtee-goolirindi	...	Telugu
Sennagarai	...	Tamil
Chidi	...	Marathi
Cheeri	...	Gujarati

Distinguishing Characters :

Body elongate and rather deep. Chin with two thin, short barbels. Teeth in several rows in both jaws. Gillrakers 18 to 22 on lower arm of first arch. Two dorsal fins ; first dorsal fin with 8 spines ; second dorsal fin with 1 spine and 8 soft rays. Anal fin with 1 spine and 6 soft rays. Pelvic fins short, about 2/3rds the length of pectoral fins. Scales ctenoid ; scale-rows 5 between space of dorsal fins ; 12 vertical scale-rows along upper part of caudal peduncle.

Colour : head reddish, back greenish bronze, lower sides and belly yellow ; 2 lemon yellow longitudinal bands along sides, the upper from eye to caudal peduncle and the lower from axil of pectoral fin to caudal peduncle. Both dorsal fins white, with 3 horizontal stripes, the uppermost (at tips of fin) black, the others grey ; no marks on anal or caudal fins, the latter with a dusky margin.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

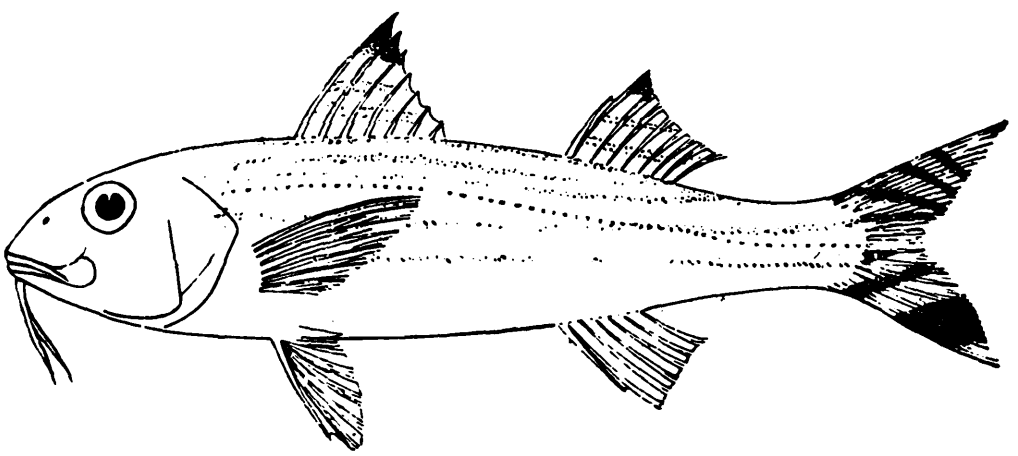
Fishery Information : This species along with *U. vittatus*, forms a fishery of some magnitude along the Andhra, Kerala, Karnataka and Maharashtra coasts. The species also constitutes an important component of the goatfish fishery from Kilakarai to Rameswaram Road along the Gulf of Mannar and from Devipatnam to Rameswaram along Palk Bay. The catches from the trawling grounds measure from 12 to 17 cm.

Upeneus (Upeneus) vittatus (Lacepede)

[Text-fig. 279]

Mullus vittatus Lacepede (*nec* Forsskal), 1801, *Hist. nat. Poist.*, **3** : 382, 401 (type-locality : unknown).

Upeneoides vittatus : Day, 1876, *Fishes of India* : 120, pl. 30, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 25, fig. 10.



Text-fig. 279. *Upeneus* (*Upeneus*) *vittatus* (Lacepede)

Common Names :

Yellowstriped goatfish	...	English
Cheerul	...	Malayalam
Chidi	...	Marathi
Chahtiinguddah	...	Andaman Is.
Manakkam	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and rather robust. Chin with two short, thin barbels. Teeth villiform in both jaws. Two widely separated dorsal fins; first fin with 8 spines, and second dorsal fin with 1 spine and 8 soft rays. Anal fin with 1 spine and 7 soft rays. Pelvic fins short,

about 2/3 rds length of pectoral fins. Scales ctenoid; 6 or 7 vertical rows of scales along space between dorsal fins, 12 vertical rows of scales along upper part of caudal peduncle.

Colour : head and back bronze, belly white; 3 deep-bronze longitudinal bands above lateral line (one of them median, running along dorsal profile) and 2 yellow bands below lateral line (the upper crossing the lateral line at level of second dorsal fin). Both dorsal fins white, with 3 horizontal stripes, the uppermost (at tips of fins) black, the others grey; no marks on anal fin; upper lobe of caudal fin with 4 or 5 grey or black cross-bars, alternating with slightly broader white bars; lower lobe with 3 or 4 grey or black cross-bars, the third forming a characteristic black square.

Geographical Distribution : Tropical Indo-Pacific.

Lives in coastal waters down to 100 m.

Fishery Information : This species along with *U. sulphureus*, contributes a fishery of some magnitude along the Andhra, Kerala, Karnataka and Maharashtra coasts. It also constitutes an important element of the goatfish fishery from Kilakerai to Rameswaram Road in the Gulf of Mannar and from Devipatnam to Rameswaram (Palk Bay). It is the commonest species of the family along the east coast of India and reaches a length of 30 cm.

FAMILY : MONODACTYLIDAE
[Moonfishes]

Body strongly compressed and deep (deeper than long in some). Mouth small, with feeble teeth, some also on palate. Gill openings continue to under throat. Single dorsal fin with a long base, with 5 to 8 spines. Pelvic fins small or vestigial. Anal fin with 3 spines, with a long base. Scales fine, cycloid or ctenoid, extending over vertical fins also. Body usually silvery.

The moonfishes live in both salt and freshwater throughout many parts of the tropical Indo-Pacific. Comprises only one genus

Genus **Monodactylus** Lacepede

Monodactylus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 131 (type-species : *Monodactylus falciformis* Lacepede).

Body ovoid, deep and compressed, with fine ctenoid scales. Mouth small, with feeble teeth in jaws, vomer, palatines and on tongue. Dorsal fin with 7 or 8 spines; pelvic fin close to vent, minute but

otherwise normally developed or vestigial with a spine and 2 or 4 rudimentary soft rays. Caudal fin superficially emarginate.

Two species, closely related, distinguished by shape and markings.

KEY TO SPECIES

1 (a) Body depth 1.5 to 2.0 times in standard length ... *M. falciformis**

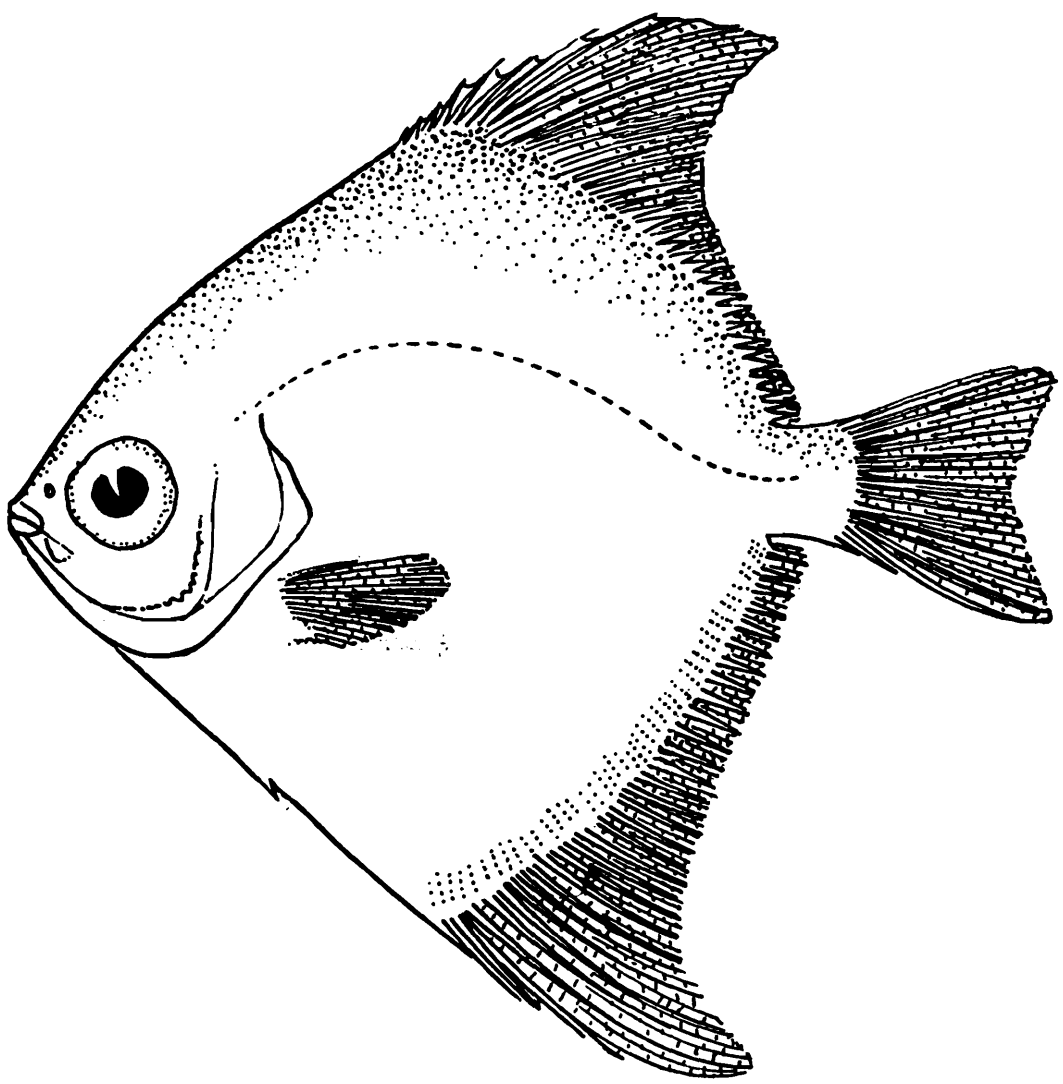
(b) Body depth 1.2 to 1.5 times in standard length ... *M. argenteus*

Monodactylus argenteus (Linnaeus)

[Text-fig. 280]

Chaetodon argenteus Linnaeus, 1758, *Systema Naturae* (ed. 10), **1** : 272 (type-locality : "Indies").

Psettus argenteus : Day, 1876, *Fishes of India* : 235, pl. 51B, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, **2** : 180, fig. 62.



Text-fig. 280. *Monodactylus argenteus* (Linnaeus)

* *Monodactylus falciformis* Lacepede is of no commercial significance in our area.

Common Names :

Silver-batfish	...	English
Purrandee	...	Tamil
Vavalmeen	...	Malayalam
Chandlak	...	Marathi
Akoli	...	Lakshadweep Is

Distinguishing Characters :

Body compressed, its depth 1.2 to 1.5 times in standard length. Eyes moderately large. Mouth small and terminal; small villiform teeth in bands in both jaws. Dorsal fin with 7 or 8 spines, almost hidden in scaly sheath, and 28 to 31 soft rays. Anal fin with 3 spines and 28 to 32 soft rays. Pectoral fins short and rounded. Each pelvic fin reduced to a short spine, the rays rudimentary. Caudal fin wih concave margin. Scales small, ctenoid.

Colour : brilliant silvery; juveniles with two dusky bars across head which fade with growth. Tip of dorsal fin orange in young specimens.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Fishery Information : Common in the coastal waters and trawling grounds, but is most common on the Kerala coast during the monsoon months. It is low in importance as a food fish. This species is a favourite of aquarists since it does well in captivity, living for a number of years.

FAMILY : PEMPHERIDAE
[Sweeps]

Body strongly compressed and deep, of characteristic shape. Eyes relatively large, greater than interorbital, without adipose lid. Mouth usually oblique, with small teeth in bands in jaws and on palate; maxillae (upper jaw) not reaching beyond centre of eye; preorbital smooth. Gill-rakers long and usually 25 to 31. Single short dorsal fin, its origin before middle of body, with 4 to 7 graduated spines and 7 to 12 soft rays. Anal fin with 3 (very rarely 2) spines and 17 to 45 soft rays. Scales fairly large, easily shed; lateral line scales usually 40 to 82; tubes of lateral line usually short and wide. Luminescent organs in a few species.

Rather small fishes, mainly of shallow tropical waters, often in shoals.

Three genera, 2 in our area.

KEY TO GENERA

1 (a) Body elongate or subovate; no spines at angle of preoperculum; anal fin with less than 30 soft rays ... **Parapriacanthus***

(b) Body ovate and deeper; 1 to 3 strong spines at angle of preoperculum; anal fin with more than 30 soft rays ... **Pempheris**

Genus **Pempheris** Cuvier

Pempheris Cuvier, 1829, *Regne animal.* (ed. 2), **2** : 195 (type-species : *Pempheris touea* Cuvier).

Body ovate and strongly compressed. Head short, with wide and strongly oblique mouth. Preopercle spiny at angle. Single dorsal fin, with 5 or 6 spines and 9 soft rays. Anal fin elongate, falciform, with 3 spines and with more than 30 soft rays. Caudal fin emarginate. Scales ctenoid or cycloid, often with smaller basal axillary scales.

KEY TO SPECIES

1 (a) No forward-directed teeth in lower jaw ... *P. vanicolensis*

(b) Anterior teeth of lower jaw directed outwards ... 2

2 (a) Rostro-frontal line nearly straight, interorbital space slightly convex to flattened; pectoral fins without a blackish basal spot ... *P. moluca*

(b) Rostro-frontal line convex, interorbital space strongly convex; pectoral fins with a blackish basal spot ... *P. oualensis*†

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* The genus *Parapriacanthus* Steindachner represented by *P. guentheri* (Klunzinger), has been reported in the Laccadive Sea in our area, but is of no fishery value.

† *Pempheris oualensis* Cuvier has recently been reported from the Laccadive Sea in our region, but is of no fishery value.

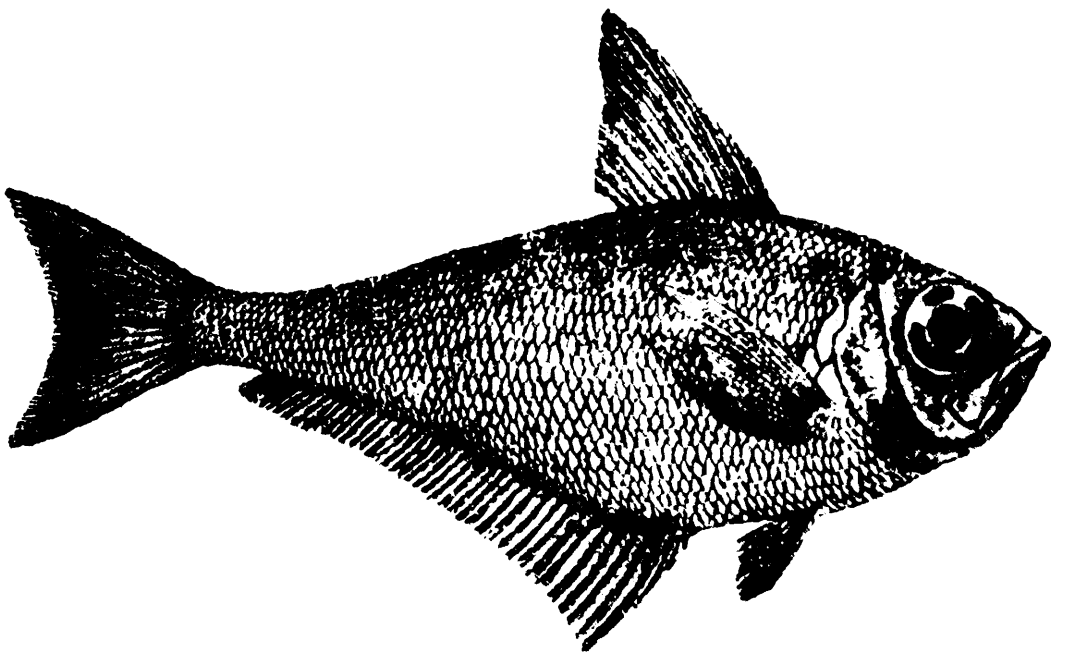
Pempheris moluca Cuvier

[Text-fig. 281]

Pempheris moluca Cuvier, 1831, *Hist. nat. Poiss.*, **7** : 304 (type-locality : Moluccas ; Batavia, Java).

Pempheris mangula Cuvier : Day, 1875, *Fishes of India* : 175, pl. 42, fig. 3.

Pempheris malabarica Cuvier : Day, 1889, *Fauna Br. India*, Fishes, **2** : 100.



Text-fig. 281. *Pempheris moluca* Cuvier

Common Names :

Moluccan-sweeper	...	English
Moondakun-karawa		Tamil

Distinguishing Characters :

Body compressed, deep at anterior end, narrowing sharply from anus to caudal peduncle ; rostro-frontal line nearly straight, interorbital space slightly convex to flattened. Mouth large ; wide band of very small granular teeth, the outer series large and conical, the anterior teeth in lower jaw partly directed forward and outwards, and thereby visible from below. Dorsal fin with 6 spines and 9 soft rays. Anal fin with 3 spines and 41 soft rays.

Colour : body silvery, brownish on back and coppery on flanks ; base of pectoral fins with a blackish patch. Vertical fins reddish.

Geographical Distribution : Widespread in the central Indo-Pacific.

Fishery Information : The species is fairly common around rocky shores and coral reefs at Port Blair in the Andaman Sea.

Pempheris vanicolensis Cuvier

Pempheris vanicolensis Cuvier, 1831, *Hist. nat. Poiss.*, **7** : 305 (type-locality : Vanicola).

Common Name :

Vanikoro-sweeper ... English

Distinguishing Characters :

Body compressed, deep at anterior end, narrowing sharply from anus to caudal peduncle. Mouth large; teeth in jaws small, forming a rather narrow setiform band, the outer intermaxillary ones stronger than others. Dorsal fin with 6 spines and 9 soft rays; distance of dorsal fin to tip of snout conspicuously less than body depth. Anal fin with 3 spines and 39 to 43 soft rays.

Colour : body brown, darker above, silvery below. Dorsal fin with black tip; anal and caudal fins with dusky margins; pectoral fins yellow, pelvic fins orange.

Geographical Distribution : Mauritius, Sri Lanka, the Andaman Islands, through the East Indies, to the Phiiippines and Australia.

Fishery Information : This species is fairly common around rocky shores and coral reefs at Port Blair in the Andaman Sea.

FAMILY : KYPHOSIDAE
[Rudderfishes]

Body rather deep, oval-shaped. Head short, with a blunt snout. Mouth small, terminal; each jaw with a regular row of closeset, strong, incisor-like, round-tipped teeth of a peculiar hockey-stick shape, with their bases set horizontally, resembling a radially striated bony plate inside mouth; fine teeth on roof of mouth (vomer and palatines). Single dorsal fin, its spinous part with 10 or 11 spines depressible into a scaly groove, about as or much longer than soft part with 12 to 15 rays. Anal fin with 3 spines and 11 to 16 rays. Pectoral fins short, about equal in length to pelvic fins; pelvic fin with 1 spine and 5 soft rays, and with a scaly axillary process. Scales rather small, thick, ctenoid, covering also fins (except spinous part of dorsal fin) and most of head (except snout).

Marine herbivorous fishes of moderate size, living in shoals along coral reefs and rocky areas in all tropical and subtropical coasts Rudderfishes derive their name from the habit some species have of following behind ships, often for long distances. Edible, but of poor quality.

Two genera in the Indo-west Pacific, one in our area.

Genus **Kyphosus** Lacepede

Kyphosus Lacepede, 1802, *Hist. nat. Poiss.*, 3 : 114 (type-species : *Kyphosus* bigibbus Lacepede).

Body oval-shaped, moderately compressed, covered with rather small and thick ctenoid scales, wanting only before eyes, forming a thick coat on soft dorsal and soft anal fins, and on paired fins; lateral line complete, arched. Mouth small, more or less horizontal. Gill membranes separate, free from isthmus. Dorsal fin with 11 or 12 spines but last so low to form depression, depressible in a scaly groove; anal fin with 3 spines and 11 to 14 soft rays. Pectoral fins short, rounded.

About 5 species in the Indo-west Pacific, 3 in our area.

KEY TO SPECIES

1 (a) Soft dorsal fin higher than spinous dorsal fin	...	*K. cinerascens*
(b) Soft dorsal fin lower than spinous dorsal fin	...	2
2 (a) Dorsal fin with 13 to 15 soft rays	...	*K. vaigiensis*
(b) Dorsal fin with 11 or 12 soft rays	...	*K. bigibbus**

Kyphosus cinerascens (Forsskal)

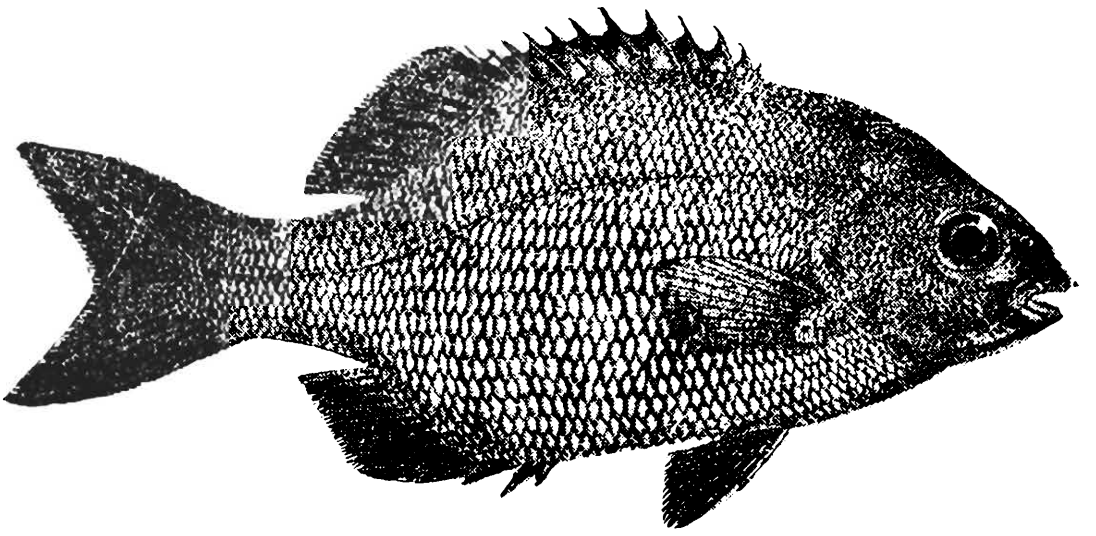
[Text-fig. 282]

Sciaena cinerascens Forsskal, 1775, *Descript. Animal.* : 53 (type-locality : Arabia).

Pimelepterus cinerascens : Day, 1875, *Fishes of India* : 143, pl. 35, fig. 3; Day, 1889, *Fauna Br. India, Fishes*, 2 : 48, fig. 18.

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* *Kyphosus bigibbus* Lacepede has been reported from the Minicoy Island in our area, but is of no fishery importance



Text-fig. 282. *Kyphosus cinerascens* (Forsskal)

Common Names :

Ashen drummer	...	English
Thendala	...	Tamil
Kiruliamas, Kakkuratti, Punji	..	Lakshadweep Is.

Distinguishing Characters :

Moderately deep-bodied, with a distinct bulge above nostrils; depth of body 1.9 to 2 5 times in standard length. Teeth in jaws in a single row, conspicuous in upper jaw. Dorsal fin with 11 spines and 12 soft rays, the soft dorsal fin higher than spinous fin. Anal fin with 3 spines and 11 or 12 soft rays. Caudal fin emarginate. Lateral line with 60 to 66 scales.

Colour : body silvery, darker on dorsal surface ; scales with light coloured or white centres, giving effect of white longitudinal lines on body; a silvery band below eye. Dorsal and pelvic fins dusky.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Fishery Information : Common around estuaries in Bengal and Orissa. It is not quite important as a food fish and brings a low price.

Kyphosus vaigiensis (Quoy & Gaimard)

Pimelepterus vaigiensis Quoy and Gaimard, 1824, *Voy. "Uranie" et Physic. Zool.* : 386, pl. 62, fig. 41 (type-locality : "Ilas des Papous" and "Bony") ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 48.

Pimelepterus fuscus Day (*nec Lacepede*), 1875. *Fishes of India* : 143.

Common Names :

Lowfinned rudderfish	...	English
Kiruliamas, Kakkuratti	...	Lakshadweep Is

Distinguishing Characters :

Body ovoid, its dorsal and ventral profiles equally convex, a small bulge on head between nostrils. Preopercular angle rounded, the margin of preopercle with very small serrations. Mouth terminal, small, with a single row of flattened incisor-like teeth in both jaws. Dorsal fin with 10 or 11 spines and 13 to 15 soft rays, the spines slightly higher than soft rays. Anal fin with 3 spines and 12 or 13 soft rays. Caudal fin forked. Lateral line with 65 to 70 tubular scales.

Colour : body silvery bluish, darker on dorsal surface, each scale with a light grey centre, giving effect of longitudinal stripes on body; grey band along lower edge of eye to snout. Fins dark brown, pectoral fins orange.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Taken commercially only occasionally in our area.

FAMILY : EPHIPPIDAE*
[Spadefishes]

Body deep, almost circular, and strongly compressed Head fairly short with steep upper profile. Mouth small, terminal. Teeth in jaws small and setiform. Dorsal fin with 10 spines, the spinous fin distinct from the soft-rayed part by a deep notch (except in *Platax*). Anal fin with 3 spines. Scales of moderate size, cycloid; scales dense and irregular on head, put absent on operculum and near mouth Gill membranes united to isthmus. Young with 5 or 6 bands across body.

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* Spelt Ephippididae in some works.

KEY TO SUBFAMILIES

1 (a) Mouth protractile; pectoral fins falcate, longer than head length; maxillae distally exposed ... Drepaninae

(b) Mouth not protractile or scarcely so; pectoral fins short, rounded, shorter than head length; maxillae distally hidden ... Ephippinae

SUBFAMILY : DREPANINAE

Body very deep and strongly compressed; head short, with parabolic profile. Mouth very small, terminal and protractile, forming a downward-pointing tube; teeth small and setiform. Dorsal fin with 8 to 10 spines, the first spine small, procumbent and visible only in young; the spinous dorsal fin differentiated from soft dorsal fin by a deep notch. Anal fin with 3 spines. Pectoral fins long, sickle-shaped (falcate); pelvic fins present. Caudal fin rounded. Scales of moderate size, finely ciliated, extending onto dorsal and anal fins. Lateral line strongly arched.

One genus only.

Genus **Drepane** Cuvier

Drepane Cuvier, 1831, *Hist. nat. Poiss.*, **7** : 132 (type-species : *Chaetodon punctatus* Linnaeus).

For characters of genus, see those of subfamily.

KEY TO SPECIES

1 (a) Dorsal fin with 8 spines, the third spine longest; 4 to 9 vertical grey bars usually present on upper half of sides, but no spots ... *D. longimana*

(b) Dorsal fin with 9 spines, the fourth spine longest; 4 to 11 vertical rows of small black spots on upper half of body ... *D. punctata*

Drepane longimana (Bloch and Schneider)

Chaetodon longimanus Bloch and Schneider, 1801, *Syst. Ichth.* : 229 (type-locality : Tranquebar).

Drepane longimana : Murthy, 1969, *J. mar. biol. Ass. India*, **10**(1) : 126, pl. 1A.

Common Name :

Banded drepane ... English

Distinguishing Characters :

Body and head deep, strongly compressed. Mouth protractile; teeth pointed, slender, crowded together; fringe of 4 to 10 short cirri on chin. Dorsal fin notched, with 8 spines and 21 or 22 soft rays; third dorsal spine longest. Anal fin with 3 spines and 17 to 19 soft rays. Pectoral fins long and pointed, reaching to base of caudal fin. Scales of moderate size, finely ciliated.

Colour : body silvery with 4 to 9 vertical grey bars on upper half of sides (but no spots), bands sometimes absent. Soft dorsal, anal and caudal fins dusky. Pelvic fins light brown with outer rays whitish. Pectoral fins hyaline.

Geographical Distribution : West and east coast of Africa, the Red Sea, seas of India to Japan, New Guinea and Samoa.

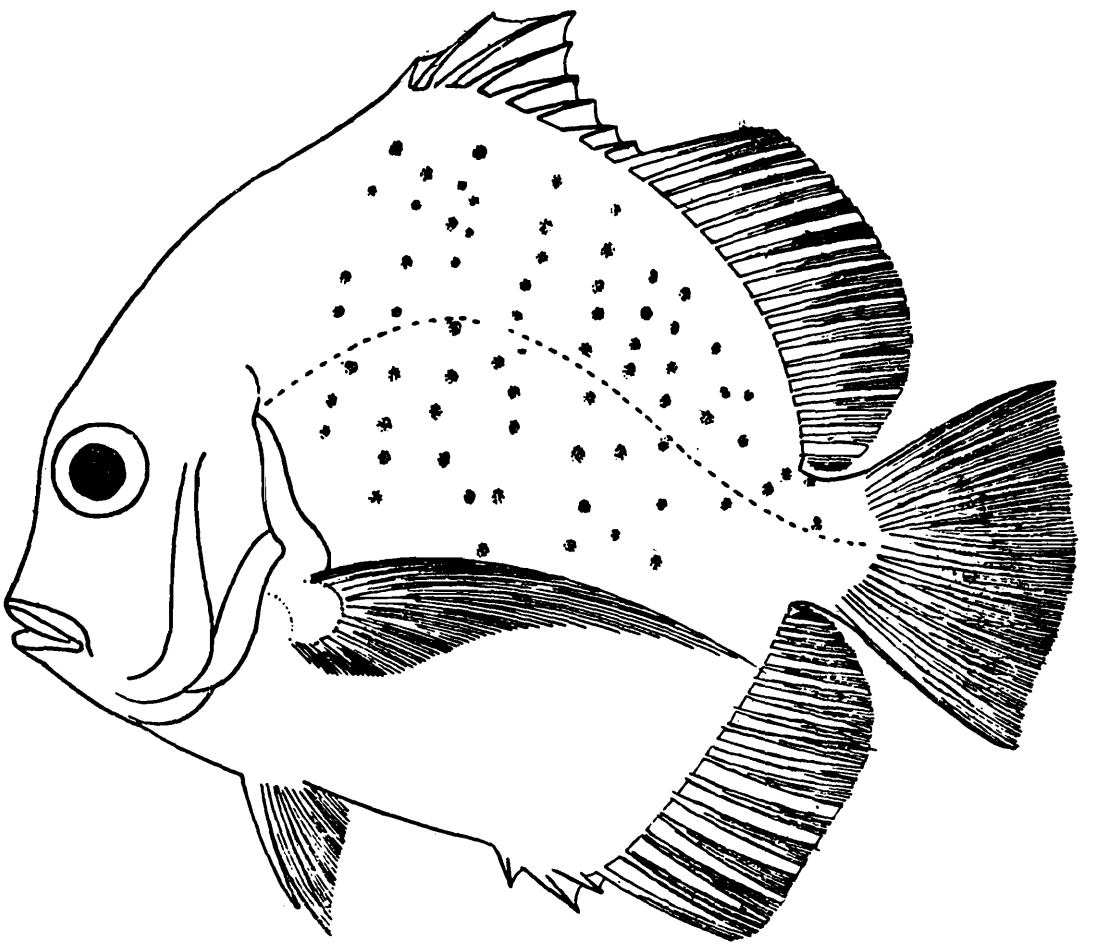
Fishery Information : Common in the trawl catches in our area.

Drepane punctata (Linnaeus)

[Text-fig. 283]

Chaetodon punctata Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 273 (type-locality : Asia).

Drepane punctata : Day, 1875, *Fishes of India* : 116, pl. 29, fig. 5; Day, 1889, *Fauna Br. India, Fishes*, **2** : 21, fig. 8.



Text-fig. 283. *Drepane punctata* (Linnaeus)

Common Names :

Spotted drepane	...	English
Thetti	...	Telugu
Therattai, Painthi	...	Tamil
Chand	...	Marathi
Chand	...	Gujarati

Distinguishing Characters :

Body and head deep, strongly compressed Mouth protractile; teeth pointed, slender, crowded together; fringe of 2 to 10 short cirri on chin (absent in adults). Dorsal fin deeply notched, with 9 spines and 19 to 22 soft rays; fourth dorsal spine longest. Anal fin with 3 spines and 17 to 19 soft rays. Pectoral fins long and pointed, reaching to base of caudal fin. Scales of moderate size, finely ciliated; lateral line makes a low symmetrical arch.

Colour : body silvery, with greyish tinge on upper half and a large orange spot just above base of pectoral fin; 4 to 11 vertical bands of

small black spots usually present on upper half of body or with rows of spots with underlying bands or with both rows of spots and dark bands.

Geographical Distribution : Indo-west Pacific

Fishery Information : This species supports a seasonal fishery at several places along the Indian coast, being fairly common in the trawl catches.

SUBFAMILY : EPHIPPINAE

Mouth not protractile or scarcely so; maxillae distally hidden. Pectoral fins shorter than head length.

Six genera known, 3 in our area.

KEY TO GENERA

1 (a) Spinous dorsal fin confluent with soft-rayed portion, with no notch; spines of dorsal fin increasing in length posteriorly	...	**Platax****
(b) Spinous dorsal fin separated from soft-rayed portion by a deep notch, spines in dorsal fin not increasing in length posteriorly		2
2 (a) Subocular shelf strong; teeth setiform	...	**Ephippus**
(b) Subocular shelf very feeble teeth compressed	...	**Tripterodon***

Genus **Ephippus** Cuvier

Ephippus Cuvier, 1817, *Regne Animal*, **2** : 335 (type-species : *Chaetodon orbis* Bloch).

Body deep, almost circular and laterally compressed. Head fairly short with steep upper profile; subocular shelf strong, usually hidden. Mouth very small, terminal but not protractile; teeth in jaws

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**F. Yasuda (with P. C. Lim and Y. Taki) considers this genus under the family Platacidae and the family is being reviewed by them.

* The genus *Tripterodon* Playfair represented by *T orbis* Playfair, is rare in our area.

small and setiform. Dorsal fin with 10 spines (the first procumbent and visible only in young), the spinous-fin quite distinct from soft-rayed part. Anal fin with 3 spines. Pectoral fins small, rounded; pelvic fins present. Caudal fin somewhat emarginate. Scales of moderate size, cycloid; scales dense and irregular on head, but absent on operculum and near mouth. Lateral line angularly arched.

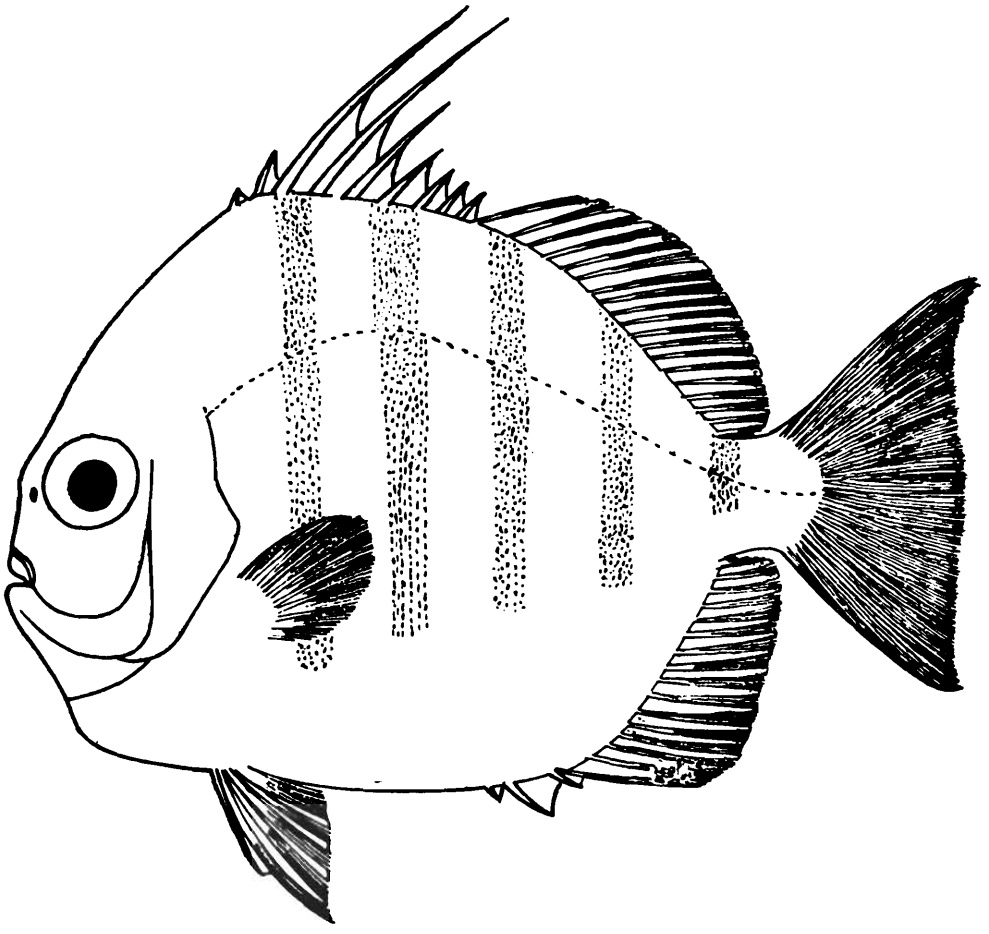
Monotypic.

Ephippus orbis (Bloch)

[Text-fig. 284]

Chaetodon orbis Bloch, 1787, *Naturges. ausland. Fische*, **3** : 81, pl. 202, fig. 2 (type-locality : East Indies).

Ephippus orbis : Day, 1875, *Fishes of India* : 115, pl. 29, fig. 4; Day, 1889, *Fauna Br. India*, Fishes, **2** : 20, fig. 7.



Text-fig. 284. *Ephippus orbis* (Bloch)

Common Names :

Spadefish	..	English
Nulla-torriti, Peenaari	...	Tamil
Thavanakary	...	Malayalam
Kharvad, Chandwa	...	Marathi
Kolliddah	...	Andaman Is.

Distinguishing Characters :

Body strongly compressed, rounded in shape, not angular at dorsal and anal fin origins; depth of body 1.2 to 1.3 times in standard length. Mouth small, terminal, not protractile. Teeth in bands, setiform: no teeth on palate. Dorsal fin with 1 procumbent (forward-pointing) spine (visible only in young specimens) and 9 normal spines, and 19 or 20 soft rays, the 4th spine longest. Anal fin with 3 spines and 15 or 16 soft rays. Pectoral fins short and rounded. Scales smooth; operculum covered with scales almost to its ventral edge.

Colour : body silvery, with 4 or 5 vertical black bands on body from dorsal fins almost to belly. Margins of soft dorsal, anal, pelvic and caudal fins dusky black.

Geographical Distribution : Indo-west Pacific.

Found is shallow waters at depths of 10 to 30 m.

Fishery Information : Contributes a small fishery in our area.

Genus **Platax** Cuvier

Platax Cuvier, 1817, *Regne Animal*, **2** : 334 (type-species : *Chaetodon teira* Forsskal).

Body deep and almost circular in outline, covered with small adherent scales. Mouth small, with tricuspid teeth. Single dorsal fin, extremely long, the five fin spines increasing in length posteriorly and inconspicuously continuous with the soft dorsal rays. Anal fin extremely long, with 3 spines and 24 to 29 soft rays. Pectoral fins short; pelvic fins elongate. Caudal fin truncate.

Some authors put all the species in the synonymy of *pinnatus* Linnaeus, 1758. The more modern view is that they are about 5 species.

Specimens of *Platax* vary considerably with age in size and number of scales, shape of dorsal and anal fins, shape of head, size of eye and coloration.

Platax pinnatus (Linnaeus)

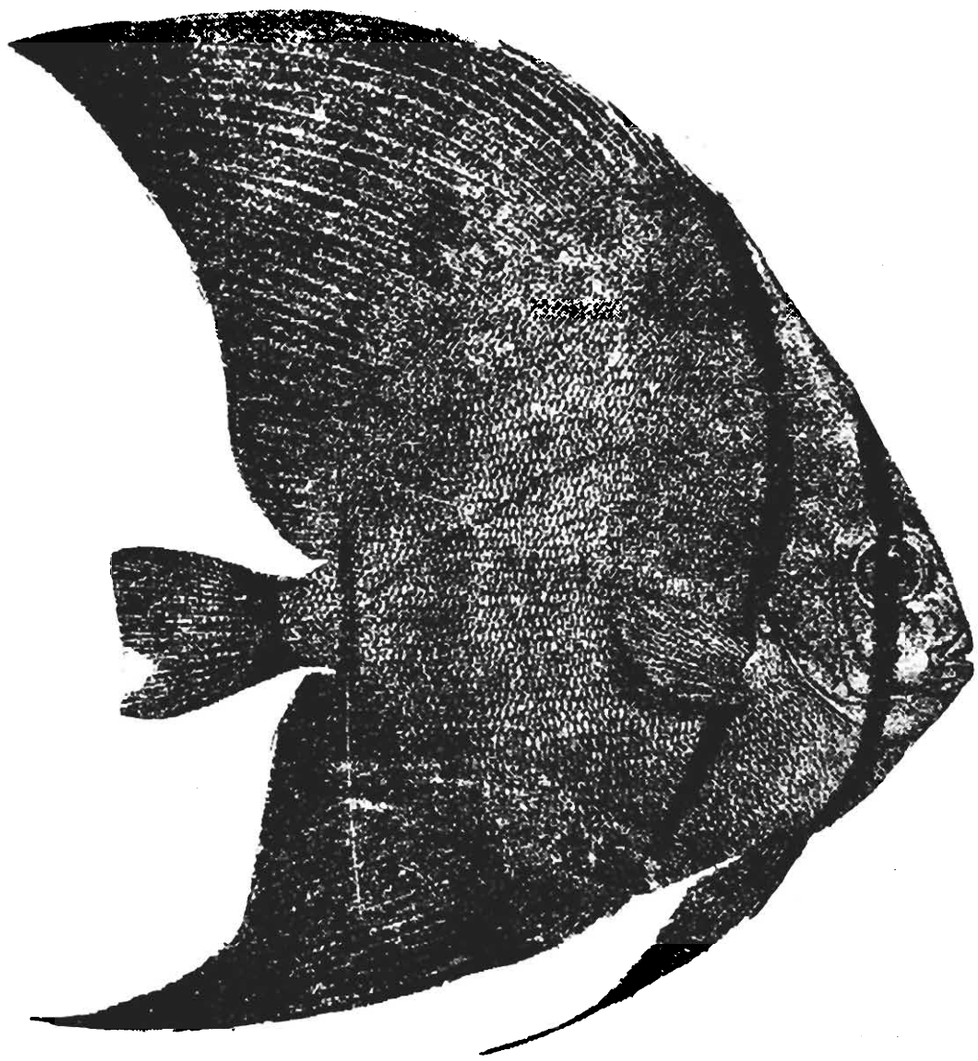
[Text-fig. 285]

Chaetodon pinnatus Linnaeus, 1758. *Systema Naturae,* **1** (ed. 10) : 272 (type-locality : East Indies).

Platax vespertilio Bloch : Day, 1876. *Fishes of India* : 236, pl. 51A, fig. 5.; Day. 1889. *Fauna Br. India,* Fishes, **2** : 183.

Platax teira Forsskal : Day, 1876. *Fishes of India* : 235, pl. 51B, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 182, fig. 63.

Platax orbicularis Forsskal : Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago* : 361, fig. 307.



Text-fig. 285. *Platax pinnatus* (Linnaeus)

Common Names :

Round batfish	...	English
Kalhisandawa	...	Telugu
Kavala, Kawala	...	Marathi
Gundolimas, Patha, Akoli	...	Lakshadweep Is.

Distinguishing Characters :

Body compressed, much elevated, rounded in outline, the snout forming an angle in front of head or somewhat projecting in large specimens. Body as deep as long. Mouth small and terminal, with long, slender, tricuspid teeth. Dorsal fin with 5 spines and 35 to 39 soft rays, the spines increasing in length posteriorly. Anal fin with 3 spines and 25 to 28 soft rays Pectoral fins short and rounded. Pelvic fins well developed, the first soft ray extending to at least the anal fin. Caudal fin truncate. Scales fairly small and rough.

Colour : body silvery to black with a bluish sheen; a broad vertical band anteriorly through eye, a second broad black vertical band from the dorsal-fin origin across the pectoral-fin base to pelvic fins (this band less distinct dorsally), a third black band over posterior part of body, diffuse and very indistinct. Dorsal and anal fins grayish-black with narrow dusky border; pectoral fins black basally, yellow distally; pelvic fins black with yellowish tinge.

Geographical Distribution : Widespread in the warm waters of the Indo-Pacific.

Fishery Information : Of minor commercial significance in our area.

FAMILY : SCATOPHAGIDAE
[Scats]

Body deep and angular, compressed, with firm skin and small ctenoid scales. Mouth small, with bands of setiform and tricuspid teeth; no teeth on roof of mouth. Gill membranes narrowly united to isthmus. A procumbent spine present before dorsal fin; spinous dorsal fin differentiated from soft dorsal fin. Anal fin with 4 spines. Scales extending onto the soft dorsal and anal fins; axillary process at base of pelvic spines. Lateral line complete. Caudal fin with 16 branched fin rays. The young are quite unlike the adult having heavy bony shields on the head and a large shoulder spine, all vanishing with growth.

Small fishes of the tropical Indo-Pacific. Two genera, *Prenes* and *Scatophagus*, the latter genus in our area. The generic name *Scatophagus*, meaning "dung-eater" requires some explanation. It can be traced back to an early ichthyologist in India who studied the food habits of these fishes and discovered that the stomachs of the scats sometimes contained offal. Although primarily marine species, they move into shallow brackish water. The scats have 4 anal fin spines, an exception condition which is quite helpful in identification.

Genus **Scatophagus** Cuvier

Scatophagus Cuvier, 1831, *Hist. nat. Poiss.*, **7** : 136 (type-species : *Chaetodon argus* Linnaeus).

Squarish in outline with triangular head projecting anteriorly. Mouth very small, not protrusible. Dorsal fin with 11 spines and 15 to 18 soft rays. Anal fin with 4 spines and 14 to 16 soft rays.

KEY TO SPECIES

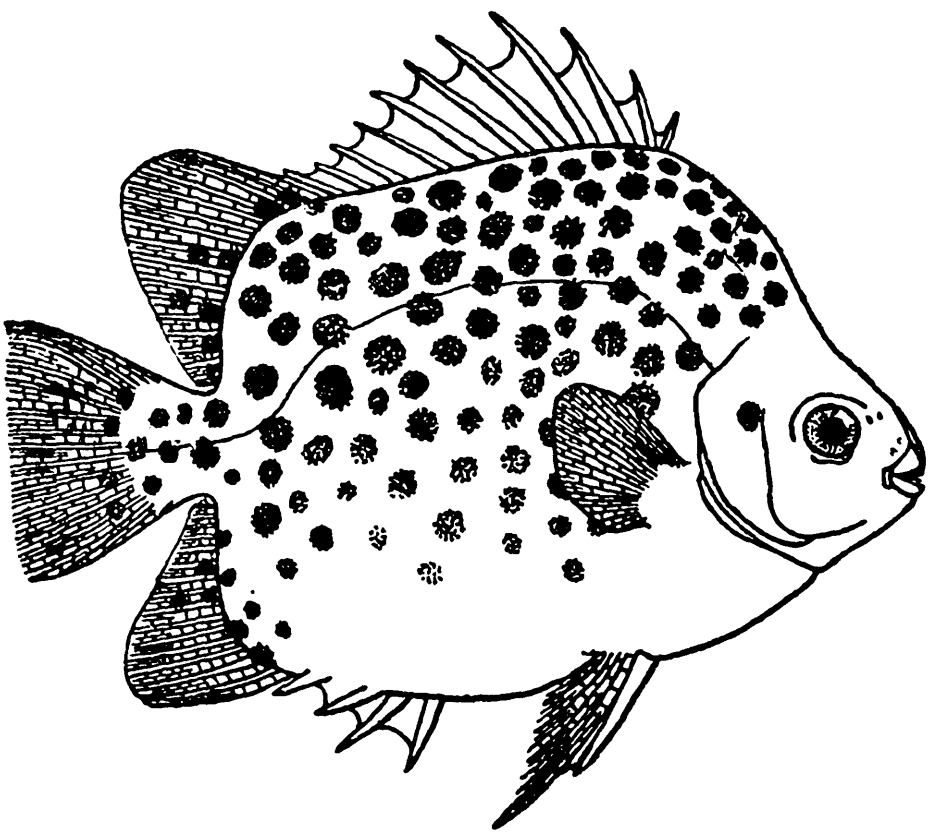
1 (a) Numerous black blotches/spots over entire body (except breast and belly)	...	*S. argus*
(b) Body with cross-bars on body	...	*S. tetracanthus**

Scataphagus argus (Linnaeus)

[Text-fig. 286]

Chaetodon argus Linnaeus, 1766, *Systema Naturae*, ed. 12, **1** : 464 (type-locality : India).

Scatophagus argus : Day, 1875, *Fishes of India* : 114, pl. 29, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 18, fig. 6.



Text-fig. 286. *Scatophagus argus* (Linnaeus)

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* *Scatophagus tetracanthus* (Lacepede) though widespread in the tropical Indo-Pacific, has not been reported in our area.

Common Names :

Spotted butterfish	...	English
Chitsillo, Eesputti	...	Telugu
Sipili	...	Tamil
Nutchar-char	...	Malayalam
Baraayi, Chandar	...	Kannada
Vadda	...	Marathi
Vada, Sungeli	...	Gujarati

Distinguishing Characters :

Body squarish in outline, with bluntly pointed and triangular head : rostro-dorsal profile strongly ascending and followed by a deep concavity above the eyes. Mouth very small, not protrusible ; teeth small, movable, tricuspid, in bands in jaws. Dorsal fin notched, with 11 strong spines and 16 to 18 soft rays. Anal fin with 4 spines and 14 or 15 soft rays. Scales small.

Colour : body bluish or greenish-grey to dusky brown above, with numerous irregular large round brown spots which may extend on to soft dorsal fin ; belly silvery. Fins pink, yellowish to brown-grey.

Geographical Distribution : India, Sri Lanka, through the East Indies, to China, Taiwan, the Philippines, Melanesia, Polynesia and Queensland (Australia).

Fishery Information : It attains 30 cm in length and enters backwaters and rivers. Of minor fishery significance in our area. These fishes are popular aquarium fishes because of the attractiveness of the juveniles. The young has a beautiful colour pattern of black spots on the body and orange-red colour on the dorsal surface, extending downward on the body. With growth the red are lost but the spots remain, and the butterfish is much less attractive.

FAMILY : CHAETODONTIDAE

Deep and discus-shaped body, with moderate or hard rough adherent scales. Mouth small, with comblike teeth. Gill membranes united to isthmus. Single continuous dorsal fin. Caudal fin emarginate to rounded Vertical fins densely scaled.

Chaetodontids form one of the most colourful elements of coral reefs. Their range in colour asd pattern is fantastic. Very popular with aquarists.

KEY TO SUBFAMILIES*

1 (a) Large spine (posteriorly pointing) at angle of preoperculum; no axillary scaly process at base of pelvic fin; very colourful (Angelfishes)	...	**Pomacanthinae**
(b) No large spine at angle of preoperculum; well-developed axillary scaly process at base of pelvic-fin spine; less colourful (Butterflyfishes)	...	**Chaetodontinae**

Subfamily : CHAETODONTINAE
[Butterflyfishes]

Body strongly compressed, usually deep, oval to orbicular (exclusive of fins). Head about as high as long; snout, at times, slightly to greatly prolonged; mouth small, terminal, protractile; teeth setiform, curved, slightly flattened; no teeth on roof of mouth. Dorsal fin continuous or with slight notch; no procumbent spine preceding dorsal fin. Scales ctenoid, small to large, extending onto soft portions of vertical fins; axillary scaly process present at base of pelvic spine. Lateral line variously arched, ending either in vicinity of last rays of dorsal fin or continuing to base of caudal fin. Caudal fin with 15 branched fin rays.

Butterflyfishes are among the most popular of reef fishes. Ten genera recognised, 6 in our area.

KEY TO GENERA

1 (a) Lateral line incomplete, ending in vicinity of last rays of dorsal fin	...	2
(b) Lateral line complete, ending at base of caudal fin	...	3
2 (a) Dorsal fin with 6 spines	...	**Parachaetodon***
(b) Dorsal fin with 9 to 16 spines	...	**Chaetodon**

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* Treated as distinct families by some recent workers.

3 (a) Fourth dorsal spine elongate to filamentous; supraorbital of adults with spines or horns; nape of adults usually with hump or strong bony projection	...	**Heniochus**
(b) Fourth dorsal spine normal or only slightly elongate, no horns on supra-orbital; normally no hump or projection at nape	...	4
4 (a) Less than 60 scales in lateral line; pectoral fins not elongate, rounded	...	**Chelmon***
(b) More than 65 scales in lateral line; pectoral fins elongate. falcate	...	5
5 (a) Snout elongate, tubular	...	**Forcipiger***
(b) Snout not elongate, not tubular	...	**Hemitaurichthys***

Genus **Chaetodon** Linnaeus

Chaetodon Linnaeus, 1758, *Systema Naturae*, ed. 10, 1 : 272 (type-species : *Chaetodon capistratus* Linnaeus) ; Burgess, 1978, *Butterflyfishes of the World* : 306 (Review).

Body oval, orbicular or subrhomboid; snout short to moderate. Dorsal fin with 11 to 16 spines; base of spinous dorsal fin equal to or longer than that of soft dorsal. Scales rounded or angular, less than 55 in lateral line; lateral line incomplete, reaching only to vicinity of last dorsal-fin rays. Colour pattern various, often changing from juvenile to adult.

A large genus of 90 species; they are of little importance as food. A key to the 20 species of our area shall have to await further work.

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* The fishes of the monotypic genus *Parachaetodon* Bleeker represented by *P. ocellatus* (Cuvier) ; the genus *Chelmon* Cloquet represented by *C. rostratus* (Linnaeus) ; the genus *Forcipiger* Jordan & Mc Gregor represented by *F. longirostris* (Broussonet) ; and the genus *Hemitaurichthys* Bleeker represented by *H. zoster* (Bennett), are of no fishery value in our region.

Chaetodon decussatus Cuvier

Chaetodon decussatus Cuvier, 1831, *Hist. nat. Poiss.*, **7** : 54 (type-locality : Pondicherry).

Chaetodon pictus (*nec* Forsskal) Day, 1875, *Fishes of India* : 105, pl. 26, fig. 6.

Common Names :

Black-finned vagabond	...	English
? Chand	...	Marathi
Pahnoodah	...	Andaman Is.

Distinguishing Characters :

Body elevated, strongly compressed. Snout moderate to short, 3.0 to 4.0 times in head. Mouth small; teeth brush-like. Dorsal fin with 13 spines and 24 or 25 soft rays. Anal fin with 3 spines and 20 or 21 soft rays. Lateral line scales 36 to 41.

Colour : five or six diagonal lines extending from upper part of head to base of dorsal spines; 11 to 12 similar lines extending at right angles from last of previous lines toward anal fin; upper lip and adjacent part of snout dusky; dorsal and anal fins, caudal peduncle, and adjacent part of body black; yellow streak in anal fin.

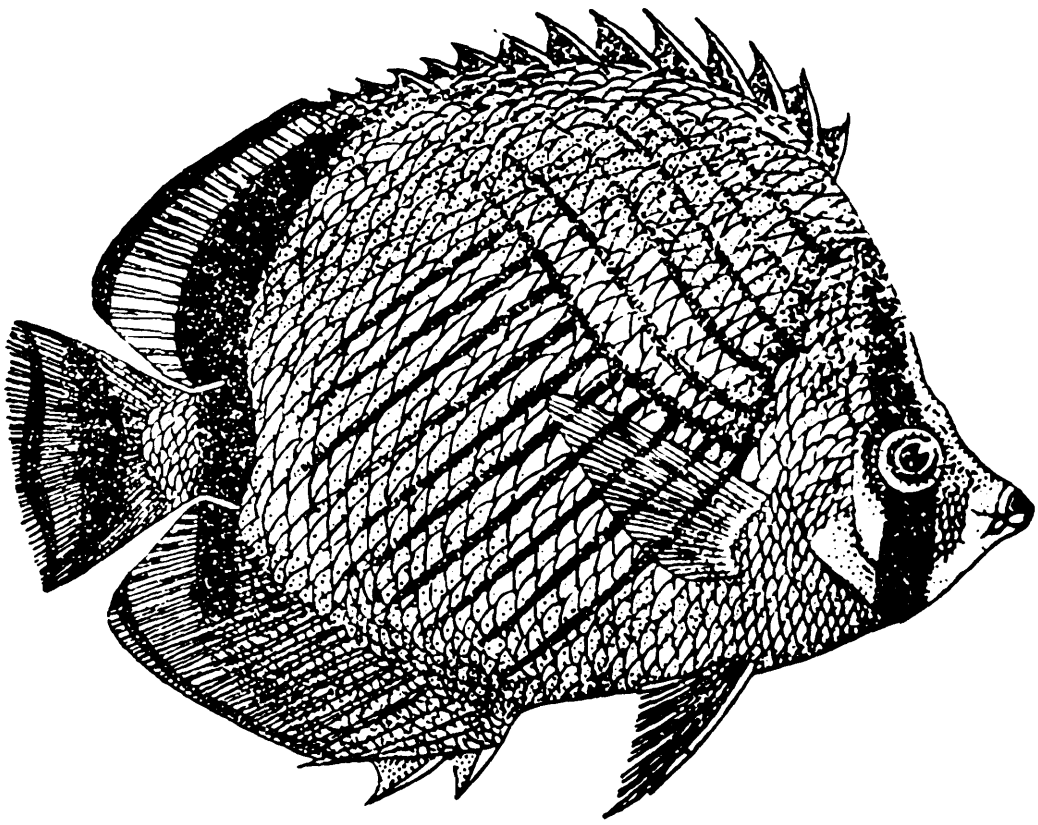
Geographical Distribution : India, Sri Lanka, and the Andaman Islands to the East Indies.

Fishery Information : This fish attains a length of about 19 cm and is of aquarium interest. Fairly common in the trap fishery in the Gulf of Mannar and on the Kerala coast.

Chaetodon vagabundus Linnaeus

[Text-fig. 287]

Chaetodon vagabundus Linnaeus, 1758, *Systema Naturae*, ed. 10, **1** : 276 (type-locality : "Indies"); Day, 1875, *Fishes of India* : 105, pl. 27, fig. 1; Day, 1889, *Fauna Br.* India, Fishes, 2 : 4, fig. 1.



Text-fig. 287. *Chaetodon vagabundus* Linnaeus

Common Names :

Vagabond butterflyfish	...	English
Manjakkalli	...	Malayalam
Chand	...	Marathi
Pahnoodah	...	Andaman Is.
Handupholimas	...	Lakshadweep Is.

Distinguishing Characters :

Body elevated, strongly compressed. Snout moderate to short, 2.5 to 3.2 times in head. Mouth small; teeth brush-like. Dorsal fin with 13 spines and 23 to 25 soft rays. Anal fin with 3 spines and 19 or 20 soft rays. Lateral line scales 34 to 40.

Juveniles similar to adults in form.

Colour : six diagonal lines running from head to spinous dorsal fin, 11 or 12 running at right angles from the last of these to the anal fin and caudal peduncle; a black band originates in spinous dorsal fin, crosses that fin and soft dorsal fin to caudal peduncle, extending into

anal fin; eye-bands broadly joined at nape, slightly faded between nape and eye. Dorsal and anal fins not entirely black.

Geographical Distribution: Widespread throughout the Indo-Pacific.

Fishery Information: Fairly common in the trap fishery in the Gulf of Mannar.

Genus **Heniochus** Cuvier

Heniochus Cuvier, 1817, *Regne Animal*, **2** : 335 (type-species : *Chaetodon macrolepidotus* Linnaeus) ; Burgess, 1978, *Butterflyfishes of the World* : 218 (Review).

Dorsal outline elevated; predorsal contour varies depending on extent of development of body protuberances at supraorbital and nape; supraorbital projection in form of short spike to form complicated structures resembling antlers (these 'horns' are absent in juveniles and may not appear in some species until it reaches considerable size) ; bony projection at nape variously developed. Dorsal fin with 11 or 12 spines and 21 to 28 soft rays, the fourth dorsal spine elongated, at times filamentous and approaching or exceeding length of body. Lateral line complete. Usually brown or black blands on light background.

Seven species, 4 or 5 in our area.

KEY TO SPECIES

1 (a) First dark band includes eyes as well as pectoral and pelvic fins ... *H. chrysotomus**

(b) First dark band does not include eyes but does include pectoral and pelvic fins ... 2

2 (a) Dark band includes pectoral and pelvic fins, and first three spines of dorsal fin ... 3

(b) Dark band which includes pelvic and pectoral fins can include one or more dorsal fin spines but posterior to first three ... 4

3 (a) Dark band which passes through eye extends below to edge of interopercle ; a black band encircles snout ; a white streak crosses under chin ... *H. singularius**

(b) Dark band which passes through eye does not continue below it to interopercle; no black band encircling snout; no white streak crossing under chin (entire area below level of eye whitish) ... *H. acuminatus*

4 (a) Dark band which includes pectoral and pelvic fins does not include elongate (fourth) dorsal-fin spine ... *H. monoceros**

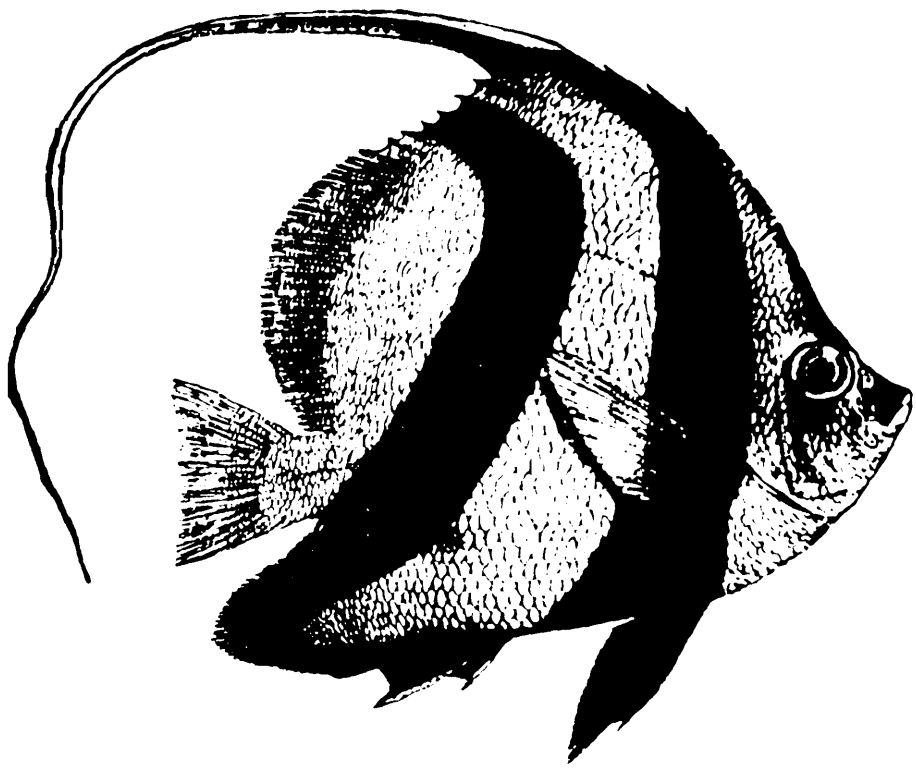
(b) Dark band which includes pectoral and pelvic fins includes elongate (fourth) dorsal-fin spine ... *H. pleurotaenia**

Heniochus acuminatus (Linnaeus)

[Text-fig. 288]

Chaetodon acuminatus Linnaeus, 1758, *Systema Naturae*, ed. 10, **1** : 278 (type-locality : 'Indies').

Heniochus macrolepidotus (Linnaeus) : Day, 1875, *Fishes of India* : 110, pl. 28, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, **2** : 12, fig. 3.



Text-fig. 288. *Heniochus acuminatus* (Linnaeus)

* *Heniochus chrysostomus* Cuvier seems restricted to the Pacific Ocean, although there are questionable records from Madras; *H. singularius* Smith & Radcliffe, *H. monoceros* Cuvier and *H. pleurotaenia* Ahl are of no fishery value in our area.

Common Names :

Pennant coralfish	...	English
Chuddukun	...	Tamil
Purroamee	...	Malayalam
Pahnoodah	...	Andaman Is.
Didanegi, Changanchema	...	Lakshadweep Is.

Distinguishing Characters :

Body compressed, rounded in outline; predorsal contour with slight convexity at nape and concavity at interorbital. Snout pointed, 2.6 to 3.8 in head length. Mouth small and terminal; teeth in about 10 spaced rows in each jaw. Dorsal fin with 11 spines and 22 to 26 soft rays, the fourth dorsal spine greatly elongated, filamentous, often longer than body length. Anal fin with 3 spines and 17 to 19 soft rays. Pectoral fins moderately long. Juveniles similar to adults in form and colour.

Colour : dark bar crosses interorbital from one eye to the other, not continued below eyes; snout with dark blotch from nostrills to lip, not reaching lower edge of lachrymal; first dark band connecting with one opposite across pelvic fin base and abdomen; posteriorly this band may or may not connect with dark anal spines; this latter dark area of spines may or may not connect with next body band around edge of anal fin; second band includes portion of fifth and sixth dorsal spines and most of seventh to nineth spines.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : A common species at Port Blair in the Andaman Sea. They are apparently not highly regarded as food, and the prices are quite low.

SUBFAMILY : POMACANTHINAE
[Angelfishes]

The most distinctive feature of the Pomacanthinae is the large and strong spine at the angle of the preoperculum. In other features they resemble Chaetodontinae (Butterflyfishes), except that they have an oval outline (round in Chaetodontinae) and the mouth is oblique

(horizontal in Chaetodontinae). Fin spines well developed; no well developed pelvic axillary process.

These fishes have been difficult to identify because of nomenclatoral changes and because of colour changes from juvenile to adult. The juveniles of these species are of commercial importance in the marine aquarium fish hobby, and the adults are the basis of a fishery in some parts of our region.

Found in all tropical seas, most are small or of moderate size. Mainly frequenting reefs they are among the most beautifully adorned of all creatures. Nowhere abundant, they are widespread and excellent eating.

Seven genera, 5 in our area.

KEY TO GENERA

1	(a) Scales small to moderate, irregular in size and placement, more than 70 in longitudinal series	..	**Pomacanthus**
	(b) Scales moderate, regularly arranged, not more than 50 in longitudinal series	...	2
2	(a) Interorbital space not wider than eye	...	**Centropyge***
	(b) Interorbital space wider than eye	...	3
3	(a) Lateral line complete	...	**Arusetta***
	(b) Lateral line terminating at end of soft dorsal fin, sometimes a separate portion on caudal peduncle	...	4
4	(a) Interoperculum large, usually with spines anteriorly; scales on operculum in about 9 rows	...	**Holacanthus***
	(b) Interoperculum small, without spines; scales on operculum in about 8 rows	...	**Pygoplites***

* The fishes of the genera *Arusetta* Fraser-Brunner, *Holacanthus* Lacepede, *Centropyge* Kaup and *Pyoplites* Fraser-Brunner, are of no fishery importance in our area.

Genus **Pomacanthus** Lacepede

Pomacanthus Lacepede, 1803, *Hist. nat. Poiss.*, **4** : 517 (type-species : *Chaetodon arcuatus* Linnaeus)

Body ovate or nearly rhomboidal, the rostro-dorsal profile more or less convex. Scales small and irregular, rough. Lateral line smoothly arched, not easily visible. Preorbital without spines, its hind edge not free. Preoperculum with hind edge finely denticulate, angular spine longer or shorter than eye.

Five Indo-Pacific species, 3 in our area.

KEY TO SPECIES

1 (a) Dorsal fin with 14 spines	...	*P. imperator*
(b) Dorsal fin with 13 spines	...	2
2 (a) Longitudinal more or less oblique stripes on side of body; anal fin rounded	...	*P. annularis*
(b) Vertical stripes on side of body; anal fin acute or produced in adult	...	*P. semicirculatus**

Pomacanthus annularis (Bloch)

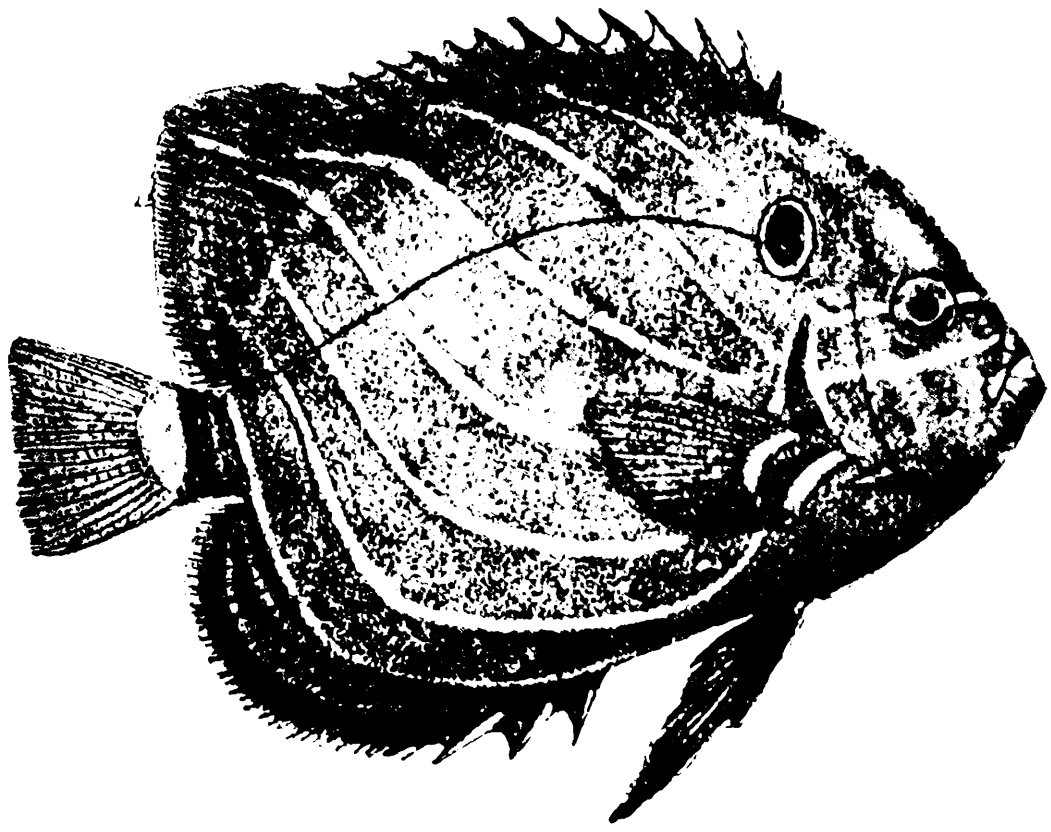
[Text-fig. 289]

Chaetodon annularis Bloch, 1787, *Naturges. ausland. Fische*, **3** : 114 (type-locality : not known).

Holacanthus annularis : Day, 1875, *Fishes of India* : 112, pl. 29, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 16.

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* *Pomacanthus semicirculatus* (Cuvier) is of no fishery importance in our area.



Text-fig. 289. *Pomacanthus annularis* (Bloch)

Common Names :

Ringed angelfish	...	English
Jatipyna	...	Telugu
Lolla-terate	...	Malayalam

Distinguishing Characters :

Body oval, with bluntly pointed snout. Mouth small, with numerous teeth, long and equal in size. Preoperculum with a stout spine at its angle ; posterior and lower edge of preoperculum with small denticles. Dorsal fin with 13 spines and 20 to 22 soft rays. Anal fin with 3 spines and 20 or 21 soft rays ; soft dorsal fin sharply pointed, soft anal fin rounded. Caudal fin rounded.

Colour : body yellowish or greyish brown, with conspicious 5 to 7 curved blue lines radiating obliquely from pectoral fin to soft dorsal fin, the last crossing caudal peduncle ; two similar horizontal streaks across, below and above eye ; a blue irregular ring on shoulder. Caudal and pectoral fins yellow ; pelvic fins greyish.

Geographical Distribution : Indo-west Pacific.

Ftshery Information : Common in the Gulf of Mannar in out area.

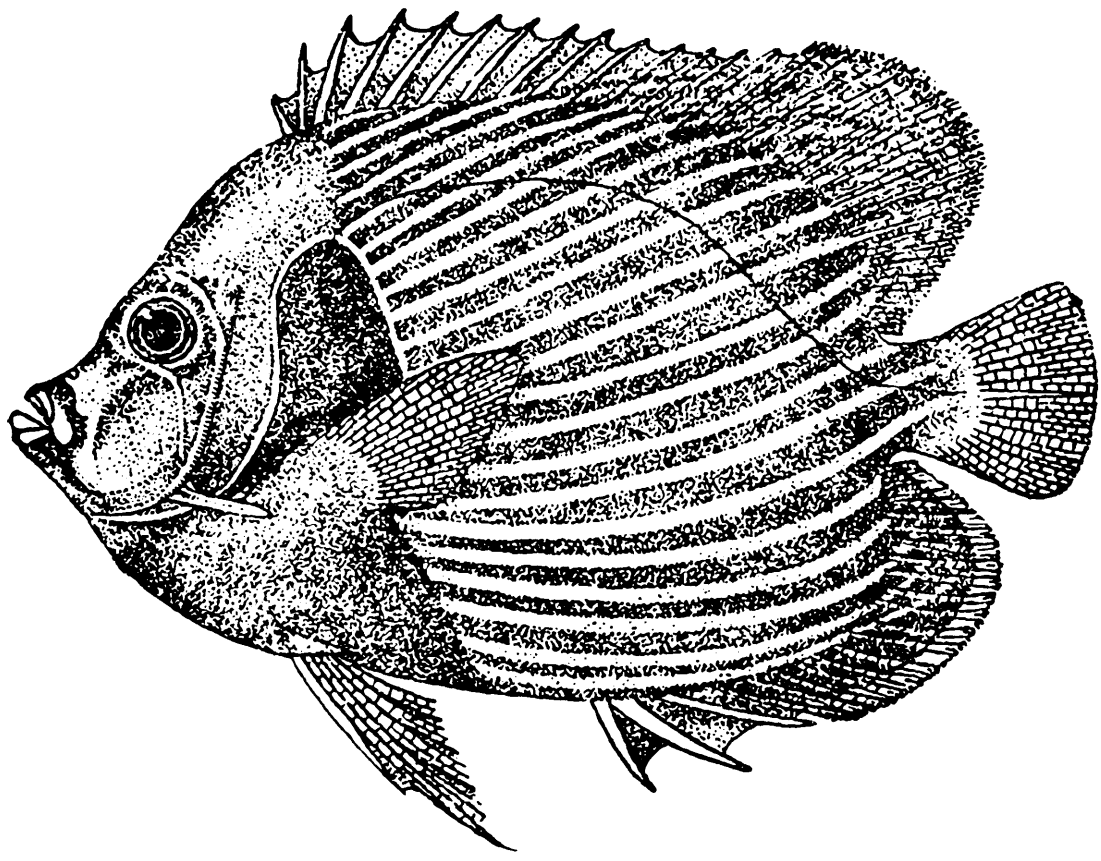
Pomacanthus imperator (Bloch)

[Text-fig. 290]

Chaetodon imperator Bloch, 1787, *Naturges. ausland.* Fische, **3** : 51, pl. 194 (type-locality : Japan).

Holacanthus imperator : Day, 1875, *Fishes of India* : 112, pl. 28, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 15.

Halocanthus nicobariensis (Bloch) : Day, 1875, *Fishes of India* : 112, pl. 28, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 16.



Text-fig. 290. *Pomacanthus imperator* (Bloch)

Common Names :

Imperial angelfish	...	English
Kullookolimeen	...	Tamil
Handupholimas, Harabalukokkamas	...	Lakshadweep Is.

Distinguishing Characters :

Body oval, with bluntly pointed snout. Mouth small, with nemerous teeth. Preoperculum finely serrate, the angular spine about equal to eye. Dorsal fin with 14 spines and 19 to 21 soft rays; anal fin with 3 spines and 18 to 21 soft rays. Caudal fin convex.

Colour : pattern changes with growth. Young specimens (sometimes considered a separate variety, *nicobariensis*) black with concentric streaks of white or blue, the last usually forming a complete white ring before the tail. Dorsal and anal fins with vermiculated lines. Adults purplish brown, with black patch above pectoral fin extending on to breast and throat; from this run numerous oblique yellow bands towards soft dorsal, caudal and anal fins. Older specimens with a brown band through eye. Pectoral and pelvic fins yellow.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Fishery Information : It grows to at least 20 cm. in length and is fairly common in he Gulf of Mannar in our area.

SUBORDER : MUGILOIDEI
FAMILY : MUGILIDAE
[Mullets]

Fairly elongate fishes, usually with broad, flattened head, blunt snout and cylindrical or little compressed body. Mouth rather small, terminal or inferior; premaxillae protractile. Teeth absent or minute, feeble or hidden. Eyes often partly covered by fatty tissue (adipose eyelid). No lateral line. Two short, widely separated dorsal fins; the first with 4 slender spines. Anal fin with 3 spines. Pectoral fins set rather high on body; pelvic fins subabdominal, about equidistant between pectoral-fin base and dorsal-fin origin. Caudal fin moderately forked, emarginate or truncate. Scales large or moderate, often with one or more striae to give appearance of longitudinal streaks down sides; modified (axillary) scales may be present below first dorsal fin, and above pectoral and pelvic fins. Mostly silvery.

The family is one of the most uniform in the kingdom of fishes, for there is a general similarity amongst the many species, and rarely exceed a length of 60 cms. Mullets are medium-sized to large, inhabiting coastal marine waters, estuaries and freshwaters. They are important food fishes and fished commercially throughout the country

mostly with cast-nets and shore seines. Landings from the sea in India during the years 1971-77 ranged from 862 to 3155 tonnes. Most of the species are suitable for culture either in enclosed coastal waters or in fresh-water tanks. The maximum landings of mullets are from Gujarat, followed by Andhra Pradesh, Tamil Nadu and Maharashtra.

KEY TO GENERA

1 (a) Spine on operculum above pectoral-fin base	...	**Sicamugil***
(b) No spine on operculum	...	2
2 (a) Head concave between eyes, the latter projecting above this level; anterior nostrils at level of eye centre or lower	...	**Rhinomugil**
(b) Head flattened dorsally, the eyes not projecting above this level; anterior nostrils above level of eye-centre	...	3
3 (a) Lower third of upper lip bearing enlarged papillae or crenullations	...	4
(b) Lower third of upper lip without enlarged papillae or crenullations	...	5
4 (a) Preorbital deeply notched; lips with a single row of horny projections	...	**Oedalechilus***
(b) Preorbital only slightly or not notched; lips with several rows of papillae	...	**Crenimugil***
5 (a) Hind tip of maxilla not curved below tip of premaxilla	...	**Mugil**
(b) Hind tip of maxilla curved below tip of premaxilla	...	6
6 (a) Scales without membranous digitated hind margin; pectoral axillary scale rudimentary or absent	...	**Liza**
(b) Scales with membranous digitated hind margin; pectoral axillary scale very long	...	**Valamugil**

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* The genus *Sicamugil* Fowler represented by *S. cascasia* (Hamilton-Buchanan) in our region, is a purely freshwater species; the genus *Oedalechilus* Fowler represented by *O. labiosus* (Valenciennes) in our region, is known only from the Minicoy and Andaman Is. where it is rather rare in the catches; the genus *Crenimugil* Schultz represented by *C. crenilabris* (Forsskal) in our region, is also rare in the catches.

Genus Liza Jordan & Swain

Liza Jordan and Swain, 1884, *Proc. U. S. natn. Mus.*, 7 : 261 (type-species : *Mugil capito* Cuvier).

Head concave between eyes, the latter not projecting above this level; no spine on operculum. Lips thin, without fleshy lobes and papillae; anterior nostril above level of eye-centre. Adipose eyelid absent, or a rim around eye or to iris only. Large symphasial knob at front of lower jaw. Hind tip of maxilla curves down sharply below tip of premaxilla; tip of maxilla visible when mouth is closed. Teeth present or absent on lips: no teeth on vomer and palatines. Scales ctenoid or cycloid, but with no digitations on hind margin. Caudal fin forked.

A number of species in tropical and temperate seas, 6 in our area.

KEY TO SPECIES

1 (a) Anal rays 8	...	*L. vaigiensis*
(b) Anal rays 9	...	2
2 (a) Back keeled in front of first dorsal fin	...	*L. carinata**
(b) Back not keeled in front of first dorsal fin	...	3
3 (a) Pelvic fin reaching vertical behind base of fourth spine of first dorsal fin; 13 transverse rows of scales	...	*L. macrolepis*
(b) Pelvic fin reaching vertical in front of fourth spine of first dorsal fin; fewer than 13 transverse scales	...	4
4 (a) Second dorsal-fin origin on vertical more than half along anal-fin base	...	*L. tade*
(b) Second dorsal-fin origin over first half of anal-fin base	...	5
5 (a) Preorbital not filling space between lip and eye; corner of mouth reaches to vertical from anterior nostrils	...	*L. subviridis*
(b) Preorbital fills space between lip and and eye; corner of mouth reaches to vertical from posterior nostrils	...	*L. parsia*

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* *Liza carinata* (Valenciennes) has been reported only from Bombay in our area and does not contribute to any fishery in our region.

Liza macrolepis (Smith)

Mugil macrolepis Smith. 1849, *Illust. Zool. S. Africa,* **4** : pl. 28, fig, 2 (type-locality : S. Africa).

Mugil poecilus Day, 1865 : Day, 1876, *Fishes of India* : 351, pl. 75, fig. 4; Day, 1889, *Fauna Br. India,* Fishes, **2** : 345.

Mugil borneensis Bleeker : Day, 1876, *Fishes of India* : 357, pl. 76, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 353.

Mugil troschellii Bleeker : Day, 1876, *Fishes of India* : 358.

Mugil troschelii : Day, 1889, *Fauna Br. India,* Fishes, **2** : 355.

Common Names :

Borneo-mullet	...	English
Avelemeen	...	Tamil
Kanbo	...	Malayalam

Distinguishing Characters :

Body moderately robust ; head wide, flattened above, its length 26 to 28% of standard length. Fatty (adipose) tissue a rim around eye ; lips thin, lower lip with a high symphysial knob ; hind end of upper jaw reaching vertical from anterior rim of eye. Teeth labial, peg-like, in two rows in upper lip, ciliiform in lower lip. Preorbitals moderately wide, filling space between lip and eye, notched anteriorly. Two widely separated dorsal fins, the first with 4 spines, and second fin with 1 spine and 8 soft rays ; origin of first dorsal-fin nearer caudal-fin base than to snout tip. Anal fin with 3 spines and 9 soft rays. Pectoral fins short, about 3/4 of head length, with no axillary scale ; pelvic fins reaching vertical behind base of 4th spine of first dorsal fin. Caudal fin slightly forked. Scales on body cycloid in juveniles, ctenoid in adults ; scales in lateral series 28 to 33 ; 13 transverse rows of scales

Colour : body dark greenish above, silvery on sides and belly. Fins dusky along margins.

Geographical Distribution : Widespread in tha tropical Indo-west Pacific.

Fishery Information : *Liza macrolepis* is the second most important species of mullet in India and is known to occur in the sea, brackish-water and freshwater. In the Chilka Lake (Orissa) its annual contribution ranges from 36 to 235 tonnes, forming 1 to 7% of the Lakes annual fish production and about 20 % of the total mullet catch ; it

occurs throughout the year with the peak fishing season between December and January. Seaward breeding migration has been reported in December-January. In the Mahanadi estuary (Orissa) the species forms nearly 8.6% of the total fish catch; peak fishing season is between September-February. In the Pulicat Lake (Tamil Nadu) this species forms 58% of the mullet catch, with a peak fishing season during August to February. This is a common species in the Kayamkulam and the Vembanad Lakes (Kerala), with fishing season extending from July to April.

Liza parsia (Hamilton-Buchanan)

Mugii parsia Hamilton-Buchanan, 1822, *Fishes of Ganges* : 215, pl. 17, fig. 71 (type-locality : River Hooghly) ; Day, 1876, *Fishes of India* : 350, pl. 75, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 344.

Mugil olivaceus Day, 1876, *Fishes of India* : 357 (type-locality : Seas of India) ; Day, 1889, *Fauna Br.* India, Fishes, **2** : 354.

Mugil oligolepis Bleeker* : Day, 1876, *Fishes of India* : 358, pl. 76, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 255.

Common Names :

Goldspot-mullet	...	English
Bonthalu	...	Telugu
Avele-meen	...	Tamil
Kanbo	...	Malayalam
Boi, Sherto	...	Marathi

Distinguishing Characters :

Body slender ; head moderately wide, flattened on top, its length 23 to 26% of standard length. Fatty (adipose) tissue covers most of the posterior iris, rather less of anterior portion ; lips thin, lower lip with high symphysial knob ; hind end of upper jaw reaching vertical between posterior nostril and anterior rim of eye. Teeth labial, two rows of short teeth in upper lip, lower lip edendate. Preorbital wide, filling space from lip to eye, notched anteriorly. Two widely separated dorsal fins ; first fin with 4 spines, second fin with 1 spine and 8 soft rays ; origin of first dorsal fin nearer to tip of snout than to caudal-fin base. Anal fin with 3 spines and 9 soft rays. Pectoral fins short, about 3/4 of head length, with no axillary scale. Caudal fin slightly forked. Scales on body cycloid in juveniles, ctenoid in adults ; scales in lateral series 31 to 36.

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* Reddy (Ph.D. thesis, Annamalai University, 1977) considers *Mulil oligolepis* Bleeker a valid species and accommodated it in a new genus *Rajamugil* whereas Thompson (in press) considers it identical with *Liza melinoptera* (Valenciennes).

Colour : body greenish-brown above, flanks and belly white to silvery ; a golden spot on upper portion of operculum. Edge fo both dorsal fins dusky ; caudal-fin base yellowish.

Geographical Distribution : Seas and estuaries of India, Sri Lanka anl Pakistan.

Enters freshwater.

Fishery Information : *Liza parsia* is a common mullet in the Hooghly-Matlah estuary and forms about 0.4 to 0.9% of the total fish catch. Fish with roe occur during October to February. In the Mahanadi estuary (Orissa) this species forms 6 to 9% of the total catch, the fishing season being from September to December. In the Pulicat Lake the species is common during August and November. At Mandapam (Tamil Nadu) a minor fishery exists, fish with roe occuring during June to August. It is also a common species in the Kayamkulam and Vembanad Lakes.

Liza subviridis (Valenciennes)

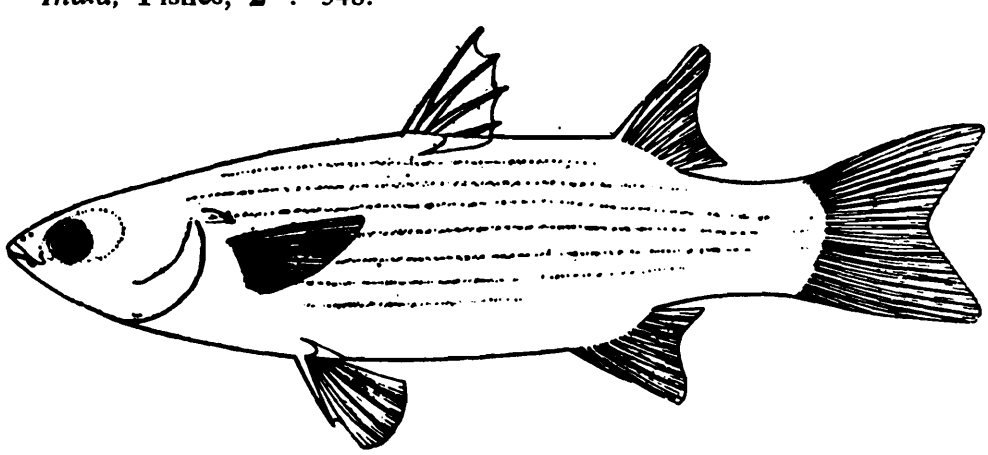
[Text fig. 291]

Mugil subviridis Valenciennes, 1836, *Hist. nat. Poiss.*, **11** : 115 (type-locality : Ganges R.).

Mugil dussumieri Valenciennes : Day, 1876, *Fishes of India* : 352, pl. 74, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 347.

Mugil jerdoni Day, 1876, *Fishes of India* : 352 (type-locality : Seas of India) ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 346.

Mugil subviridis : Day, 1876, *Fishes of India* : 353 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 348.



Text-fig. 291. *Liza subviridis* (Valenciennes)

Common Names :

Greenback grey mullet	...	English
Koinga	...	Telugu
Avelemeen	...	Tamil
Kanbo	...	Malayalam
Boyea	...	Gujarati

Distinguishing Characters :

Body robust; head broad and flattened on top, its length 23 to 25% of standard length. Adipose eyelid covering iris in adults. Lips thin, lower lip with high symphysial knob; hind end of upper jaw reaching vertical from anterior rim of eye. Teeth labial, several rows of fine teeth in upper lip, one row of ciliiform teeth in lower lip. Preorbitals narrow, filling only three-quarters of space between lip and eye, notched anteriorly. Two widely separated dorsal fins; first fin with 4 spines, second fin with 1 spine and 8 or 9 soft rays; origin of first dorsal fin nearer to tip of snout than to caudal-fin base. Anal fin with 3 spines and 9 soft rays. Pectoral fins very short, about 3/4 of head length, axillary scale rudimentary or absent. Caudal fin slightly forked. Scales in lateral series 27 to 32; 11 in transverse series.

Colour : back dark greenish, flanks and belly white to silvery; caudal fin edged with black.

Geographical Distribution : Persian Gulf, Pakistan, India, Sri Lanka, through the East Indies, to northern coasts of Australia.

Enters freshwater.

Fishery Information : This species is confused with *Liza parsia* (Hamilton-Buchanan) in the fishery literature in India. Schools occur in shallow coastal waters, and enter lagoons and estuaries to feed. Spawning takes place in the sea.

Liza tade (Forsskal)

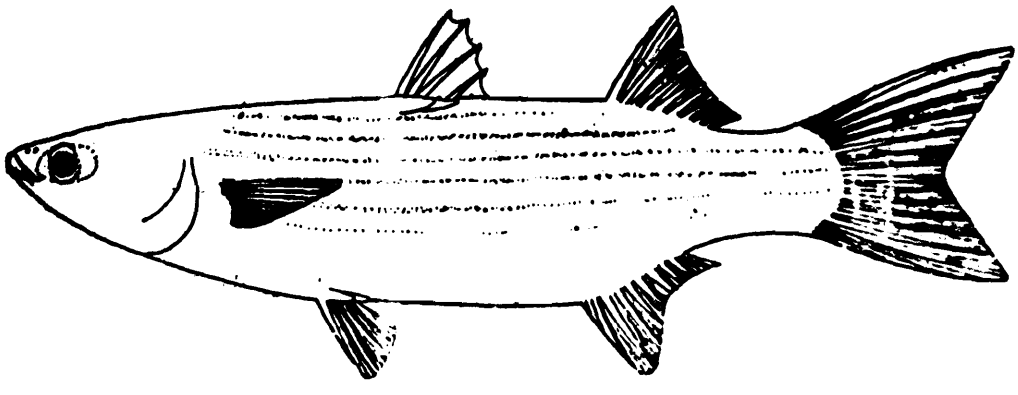
[Text-fig. 292]

Mugil crenilabris tade Forsskal, 1775, *Descript. Animal.* : 74 (type-locality : Arabia).

Mugil planiceps Valendiennes : Day, 1876, *Fishes of India* : 350.

Mugil belanak Bleeker : Day, 1876, *Fishes of India* : 351, pl. 74 fig. 5; Day, 1889, *Fauna Br. India*, Fishes, **2** : 345.

Mugil tade : Day, 1889, *Fauna Br. India*, Fishes, **2** : 344.



Text-fig. 292. *Liza tade* (Forsskal)

Common Names :

Tade grey mullet	...	English
Bangon	...	Bengali
Avelemeen	...	Tamil
Pare	...	Kannada
Gendiya	...	Gujarati

Distinguishing Characters :

Body slender and elongate; head wide, much depressed, with distinctive bulge at sides, its length 19 to 25% of standard length. Fatty (adipose) tissue covers most of iris. Lips thin, lower lip with a high symphysial knob; hind end of upper jaw reaching vertical between posterior nostril and anterior rim of eye. Teeth labial, 5 to 9 rows of small teeth in upper lip, one row of sparse ciliiform teeth in lower lip; Preorbitals wide, filling the space between the lip and the eye, notched anteriorly. Two widely separated dorsal fins; first fin with 4 spines, second fin with 1 spine and 8 soft rays; origin of first dorsal fin nearer to snout-tip than to caudal-fin base. Anal fin with 3 spines and 9 soft rays. Pectoral fin very short, 18 to 20% of standard length, about 3/4 of head length; with no axillary scale. Caudal fin forked. Scales in lateral series 31 to 33; transverse scale series 11.

Colour : back pale olive, flanks and belly silvery; 5 to 7 indistinct longitudinal lines on sides.

Geographical Distribution : Red Sea, Pakistan, India, Sri Lanka, Bangladesh, through the East Indies, to China and Marianas.

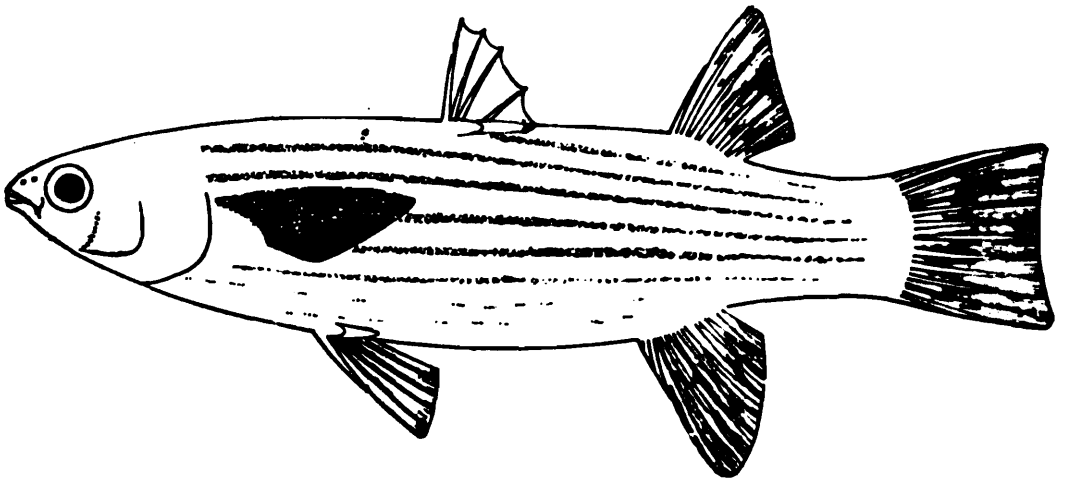
Fishery Information : *Liza tade* is common in the Hooghly-Matlah estuary, forming 0.1 to 0.2% of the total fish catch. In the Mahanadi estuary (Orissa) this fish forms about 0.7% of the total catch, and is abundant during September to November. It forms an important fishery in the Kayamkulam Lake (Kerala) from July to February. Fish with roe occur from September to March. Spawning takes place in the sea.

Liza vaigiensis (Quoy & Gaimard)

[Text-fig. 293]

Mugil vaigiensis Quoy and Gaimard, 1824, *Voy. 'Uranie' et Physic., Zool.* : 337, pl. 59, fig. 2 (type-locality : Waigiu).

Mugil waigiensis Day, 1876, *Fishes of India* : 359, pl. 73, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 356.



Text-fig. 293. *Liza vaigiensis* (Quoy & Gaimard)

Common Names :

Diamond-scale grey mullet	...	English
Peddaraki-sovere	...	Telugu
Teruvan	...	Tamil
Boi	...	Marathi

Distinguishing Characters :

Body robust ; head broad and flattened on top, its length 24 to 27% of standard length. Fatty (adipose) tissue a rim around the eye. Lips thin, lower lip with a high symphysial knob ; hind end of upper jaw reaching vertical from anterior rim of eye in small fishes, further forward in larger fishes. Teeth labial, 1 or 2 rows of short unicuspid teeth in upper lip, lost between 25 and 30 cm length, a single row of long ciliiform teeth in lower lip, lost at about 10 cm. Preorbital wide, filling space between lip and eye, notched anteriorly. Two widely separated dorsal fins ; first fin with 4 spines, second fin with 1 spine and 8 soft rays ; origin of first dorsal fin nearer to base of caudal fin than to snout-tip. Anal fin with 3 spines and 8 soft rays. Pectoral fins about equal to head length, with no axillary scale. Caudal fin slightly emarginate. Scales ctenoid on body in adults ; 24 to 27 in lateral series.

Colour : olive brown on back, silvery on sides, white with pale yellow suffusion on belly ; scales on upper sides with brown blotches giving the effect of longitudinal lines. Margins of fins dusky, otherwise yellowish-white ; pectoral fins wholly black in small fish, lower section yellowish in adults.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : *Liza vaigiensis* is common in the catches along the west coast of India and on the east coast up to Madras, contributing stray numbers. In the Vembanad Lake (Kerala) it is one of the four common species of mullets.

Genus **Mugil** Linnaeus

Mugil Linnaeus, 1758, *Systema Naturae,* (ed. 10), **1** : 316 (type-species : *Mugil cephalus* Linnaeus).

Head much flattened dorsally, the eyes not projecting above this level; no spine on operculum; anterior nostril above level of eye centre. Adipose eyelid well developed, covering most of eye in adults. Lips thin. A large symphysial knob at front of lower jaw; posterior tip of maxilla (upper jaw) not curved down and hidden when mouth is closed. Several rows of teeth in upper lip, one row or sometimes more in lower lip; no teeth on vomer, palatines and tongue. Scales cycloid.

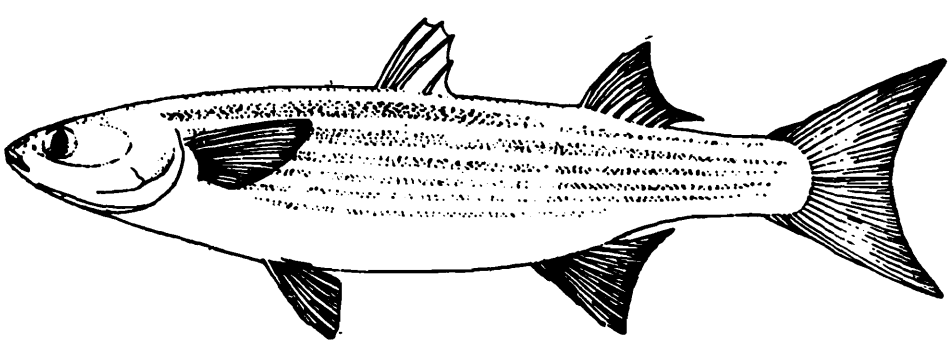
Several species, one in our area.

Mugil cephalus Linnaeus

[Text-fig. 294]

Mugil cephalus Linnaeus, 1758, *Systema Naturae,* (ed. 10), **1** : 316 (type-locality : 'European Ocean').

Mugil oeur Forsskal : Day, 1876, *Fishes of India* : 353, pl. 75, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, **2** : 348, fig. 114.



Text-fig. 294. *Mugil cephalus* Linnaeus

Common Names :

Flathead grey mullet	...	English
Kathi-parenga	...	Telugu
Manla, Kasmeen	...	Tamil
Thirutha, Tiruta	...	Malayalam
Boi, Mangan, Pilsa	...	Marathi

Distinguishing Characters :

Body rather robust; head broad and much flattened on top, its length 27 to 29% of standard length. Eyes with well-developed adipose eyelids, covering most of eye in adults. Lips thin, lower lip with a high symphysial knob. Teeth labial, fine, 1 to 6 rows in upper lip, 1 to 4 rows in lower lip, outer row unicuspid, inner rows usually bicuspid. Preorbital slender, filling only half the space between lip and eye, not notched. Two widely separated dorsal fins; first fin with 4 spines, second fin with 1 spine and 8 soft rays. Anal fin with 3 spines and 8 soft rays. Pectoral fins short, not reaching origin of first dorsal fin, with long axillary scale. Caudal fin forked. Scales in lateral series 38 to 42.

Colour : body olive-green above, silvery on sides, shading into white below; 6 or 7 indistinct longitudinal brown bars down flanks, a dark purple blotch at base of pectoral fin.

Geographical Distribution : Worldwide in temperate and tropical waters.

Common in estuaries, even far from the sea, extending into almost freshwater.

Fishery Information : The most common and widely distributed species of the mullets in India. In the Chilka Lake (Orissa) this is the most common mullet with an annual catch ranging between 269 and 355 tonnes. Fishing season extends throughout the year. The species undertakes seaward breeding migration from September-October to December, when 35-53 cms size-range are common in the commercial catches. In the Mahanadi and the Godavari estuaries the species is common throughout the year, with the peak fishing season during September to December. In the Pulicat Lake (Tamil Nadu) the species is very common in the mullet catch and is abundant during April, June-July, December and March. At Mandapam sizes between 7 to 31 cms are commonly caught from the Palk Bay and the Gulf of Mannar.

Genus **Rhinomugil** Gill

Rhinomugil Gill, 1863, *Proc. Acad. nat. Sci. Philad.*, **15** : 169 (type-species : *Mugil corsula* Hamilton-Buchanan).

Head concave between eyes, the latter projecting above this level; anterior nostril at level of eye-centre or lower; no spine on operculum. Lips directed downwards, without lobes and papillae. The distinguishing feature of this genus is that the upper lip does not

form tip of snout or part of dorsal profile but is distinctly ventral, overhung by the snout, the mouth, therefore, is conspicuously ventral in position. Maxilla and premaxilla not strongly bent downward posteriorly. Adipose eyelids absent. Teeth indistinct. Scales ctenoid.

Three species in the Indo-Pacific, one in our region.

Rhinomugil corsula (Hamilton-Buchanan)

Mugil corsula Hamilton-Buchanan, 1822, *Fishes of Ganges* : 221, pl. 9, fig. 97 (type-locality : Ganges R.) ; Day, 1876, *Fishes of India* : 354, pl. 71, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 349.

Common Names :

Corsula mullet	...	English
Corsula, Ingelee	...	Bengali
Kakunda	...	Oriya
Thiruta	...	Malayalam

Distinguishing Characters :

Body rather stout; head moderate, concave between eyes, the latter projecting above this level. Eyes without adipose eyelids. Mouth distinctly ventral and protrusible. Teeth indistinct. Two widely separated dorsal fins; first fin with 4 spines, the second fin with 1 spine and 8 soft rays; first dorsal fin nearer to base of caudal fin than to tip of snout. Anal fin with 3 spines and 9 soft rays. Caudal fin slightly emarginate. Scales in lateral series 48 to 52.

Colour : body dull olive-brown dorsally, silvery below. Fins with a golden tinge.

Geographical Distribution : India, Bangladesh and Burma.

Fishery Information : *Rhinomugil corsula* occurs in small quantities in the river Ganges, the Hooghly-Matlah estuary, along the Midnapore coast, in Mahanadi estuary and in the Chilka Lake (Orissa).

Genus **Valamugil** Smith

Valamugil Smith, 1948, *Ann. Mag. nat. Hist.*, (11) **14** : 841 (type-species : ***Mugil seheli*** Forsskal).

Head concave between eyes, the latter not projecting above this level; no spine on operculum; anterior nostril above level of eye-centre. Adipose eyelid around rim of eye or covering eye to iris only. Upper lip fleshy, lower lip thin; without papillae. Large symphysial

knob at front of lower jaw; posterior tip of maxilla curved down at corner of mouth below tip of premaxilla, posterior tip of maxilla hidden beneath tendon when mouth closed. Teeth absent on vomer and palatines Anal fin opposite second dorsal fin. Caudal fin forked. Scales cycloid, hind margin with digitations.

Six species known, 4 in our region.

KEY TO SPECIES

1 (a) Fatty (adipose) tissue cover half to most of iris	...	2
(b) Fatty (adipose) tissue only a rim around eye	...	3
2 (a) Scales in lateral series 37 to 40	...	*V. speigleri*
(b) Scales in lateral series 30 to 35	...	*V. cunnesius*
3 (a) Scales in lateral series 38 to 42; pectoral fin reaching vertical from second spine of first dorsal fin	...	*V. seheli*
(b) Scales in lateral series 32 to 35; pectoral fin just reaches vertical from origin of first dorsal fin	...	*V. buchanani*

Valamugil buchanani (Bleeker)

Mugil buchanani Bleeker, 1853. *Verh. Bat. Gen.*, **25** : 99 (type-locality : Ganges R.) ; Day, 1876, *Fishes of India* : 358 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 354.

Valamugil buchanani : Luther, 1975, *J. mar. biol. Ass. India*, **16** (1) : 290, fig.

Common Names :

Buchanan's blue-tail mullet	...	English
Sarya	...	Tamil

Distinguishing Characters :

Body robust; head wide, flattened dorsally, its length 25 to 26% of the standard length. Fatty (adipose) tissue a rim around eye. Lips thin, lower lip with a high double symphysial knob; hind end of upper jaw reaching vertical between the posterior nostril and anterior rim of eye. Teeth labial, small, fine and spaced, sparser in upper lip. Preorbitals wide, filling the space between lip and eye, notched anteriorly. Two widely separated dorsal fins; first fin with 4 spines, and second fin with 1 spine and 8 soft rays; origin of first dorsal fin equidistant from snout-tip and base of caudal fin; origin of second dorsal fin on vertical from anal-fin origin. Anal fin with 3 spines and 9 soft rays. Pectoral fin equal to head length or slightly shorter, with elongated

axillary scale; pectoral fin just reaches vertical from origin of first dorsal fin. Caudal fin forked. Scales in lateral series 32 to 35.

Colour : body greenish above, silvery on sides and belly; dark spot at base of pectoral fin. Caudal fin bluish; pectoral and pelvic fins yellowish.

Geographical Distribution : Warm areas of the Indo-west Pacific where it is abundant and widespread.

Fishery Information : The species occurs seasonally in the Palk Bay and the Gulf of Mannar, near Mandapam. Fishes with mature gonads ranging between 20 to 30 cm fork-length, are caught around Mandapam in cast nets and in 'Vidu-vala' during June-August. Juveniles of this species together with *V seheli* and *V cunnesius* of similar size-range, commonly occur in the lagoon near Mandapam during November to February when it is flooded with rain water. The species is also common in the catches from the Veli Lake near Trivandrum (Kerala).

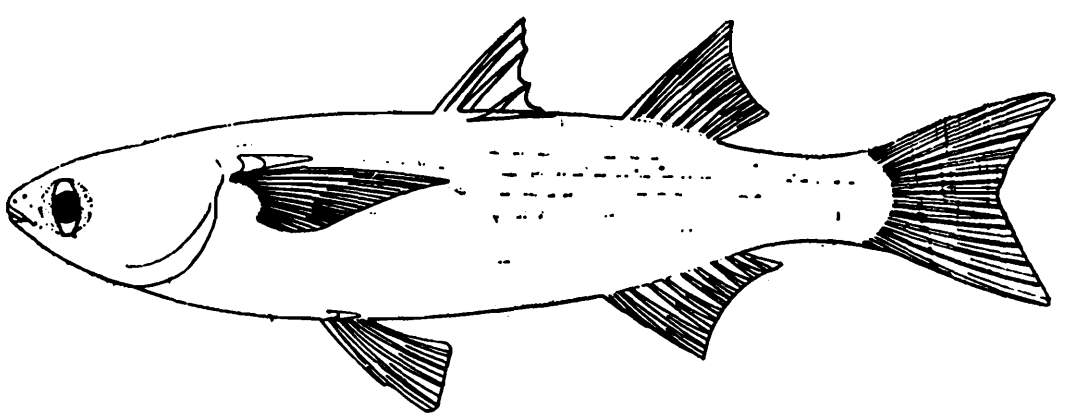
Valamugil cunnesius (Valenciennes)*

[Text-fig. 295]

Mugil cunnesius Valenciennes, 1836, *Hist. nat. Poiss.*, **11** : 114 (type-locality : Vizagapatnam & Bombay; Moluccas) ; Day, 1876, *Fishes of India* : 349, pl. 74, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 342.

Mugil amarulus Valenciennes : Day, 1876, *Fishes of India* : 356 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 352.

Mugil kelaartii Gunther : Day, 1876, *Fishes of India* : 352, pl. 75, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 346.



Text-fig. 295. *Valamugil cunnesius* (Valenciennes)

* Luther (1975, *Aguaculture*, **5** : 107) has proposed a new genus *Osteomugil* for *Mugil cunnesius* Valenciennes; the genus is described in detail in Luther (1982, *J. mar. biol. Ass. India*, **19**, p. 17), but further work is needed.

Common Names :

Longfin-mullet	...	English
Kunnesee	...	Telugu
Avelemeen	...	Tamil
Boi, Bhadvi	...	Marathi

Distinguishing Characters :

Body moderately robust; head wide, flattened above, its length 24 to 26% of standard length. Fatty (adipose) tissue covering half iris. Lips thin, lower lip with high symphysial knob; hind end of upper jaw on vertical from anterior rim of eye. Teeth labial, short and scattered in upper lip, long, ciliate and spaced in lower lip. Preorbitals wide, filling the space between lip and eye, notched anteriorly, filling with age. Two widely separated dorsal fins; first fin with 4 spines, and second fin with 1 spine and 8 soft rays; origin of first dorsal fin slightly nearer to snout-tip than to base of caudal fin. Anal fin with 3 spines and 9 soft rays, its origin in advance of second dorsal fin. Pectoral fins long, equal to or slightly shorter than head length, extending to vertical between 3rd and 4th spines of first dorsal fin; with a long axillary scale. Caudal fin forked. Scales in lateral series 30 to 35.

Colour : back dark grey, flanks and belly silvery; dark spot on base of pectoral fin.

Geographical Distribution : India, Sri Lanka, Bangladesh, through the East Indies, to the Western Pacific.

Fishery Information : *Valamugil cunnesius* does not contribute to any notable fishery anywhere in India. Small quantities are caught in the river Matlah, in the coastal waters off the Digha coast (West Bengal) from May to October, and in the outer channel of the Chilka Lake (Orissa) during summer and winter months. In the Mahanadi estuary (Orissa) this fish sometimes contributes significantly to the catches during September to November-December. It is common in the Kayamkulam and the Vembanad Lakes (Kerala).

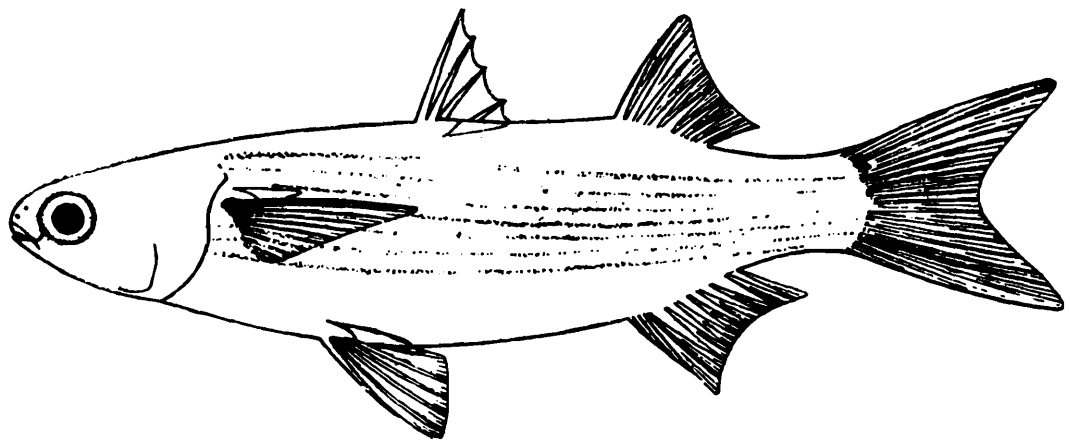
Valamugil seheli (Forsskal)

[Text-fig. 296]

Mugil crenilabis seheli Forsskal, 1775, *Descript. Animal.* : 73 (type-locality : Lohaja, Red Sea).

Mugil seheli : Day, 1876, *Fishes of India* : 355; Day, 1889, *Fauna Br. India, Fishes*, **2** : 350.

Mugil coeruleomaculatus Lacepede : Day, 1876, *Fishes of India* : 356; Day, 1889, *Fauna Br. India*, Fishes, **2** : 351.



Text-fig. 296. *Valamugil* seheli (Forsskal)

Common Names :

Bluespot grey mullet	...	English
Magi	...	Oriya
Sarya	...	Tamil
Bengu, Thirutha	...	Lakshadweep Is.

Distinguishing Characters :

Body moderately robust: head wide, flattened dorsally, its length 25 to 27% of standard length. Fatty (adipose) tissue a rim around the eye. Lips thin, the lower lip with a high double symphysial knob; hind end of upper jaw reaching vertical between the posterior nostril and anterior rim of eye. Teeth labial, fine and well spaced in both lips, sparser in the upper. Preorbital wide, filling the space between lip and eye, slightly notched anterorly, filling with age. Two widely separated dorsal fins; the first fin with 4 spines, and second fin with 1 spine and 8 soft rays; origin of first dorsal fin nearer snout-tip than base of caudal fin; origin of second dorsal fin on vertical from anal-fin origin. Anal fin with 3 spines and 9 soft rays. Pectoral fin 84.5 to 87% of head length, reaching to vertical from second spine of first dorsal fin, with along axillary scale. Caudal fin forked. Scales in lateral series 38 to 42; 9 rows of scales down the caudal peduncle.

Colour : body greenish-brown on back, silvery below; upper rows of scales with dusky spots forming indistinct bands along body. Second dorsal and caudal fins pale blue; pelvic, anal and first dorsal fins white; pectoral fin a dull yellow, with a blue axillary spot; upper lobe of caudal fin with a dark blue tip.

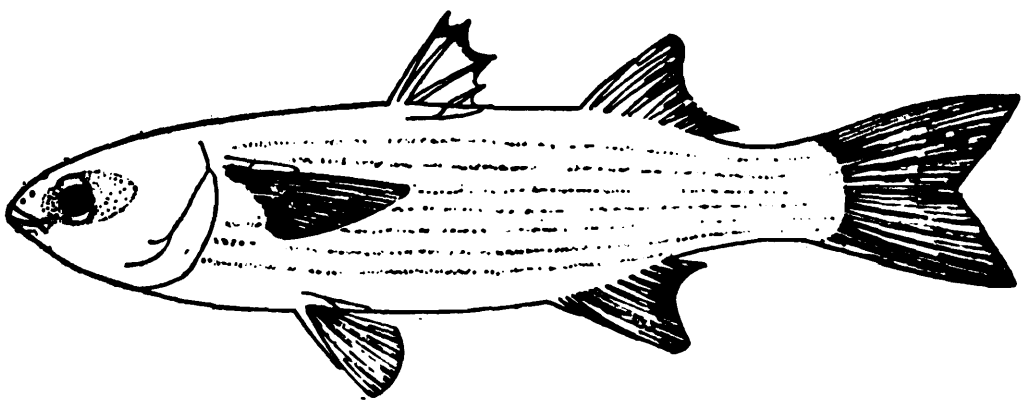
Geographical Distribution : Abundant in the tropics from east coast of Africa, India, Sri Lanka, through the East Indies, to the Western Pacific.

Fishery Information : *Valamugil seheli* is caught occasionally in the Chilka Lake (Orissa). In the Palk Bay and Gulf of Mannar fish ranging from 30 to 45 cm are caught during June to August. It is also caught extensively on the Contai coast (West Bengal).

Valamugil speigleri (Bleeker)

[Text-fig. 297]

Mugil speigleri Bleeker, 1858, *Nat. Tijdschr. Ned.-Indie*, **16** : 279 (type-locality : Java) ; Day, 1876, *Fishes of India* : 348, pl. 74, fig. 1 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 342.



Text-fig. 297. *Valamugil speigleri* (Bleeker)

Common Names :

Speigler's grey mullet	...	English
Madavi	...	Tamil
Mangan, Boi	...	Marathi
Mangan, Boi	...	Gujarati

Distinguishing Characters :

Body moderately robust ; head wide, flattened above, its length 23 to 24% of standard length. Fatty (adipose) tissue covering most of the iris .Lips thin, lower lip with a high symphysial knob ; hind end of upper jaw reaching the vertical from anterior rim of eye. Teeth labial, abundant fine ciliiform teeth in lower lip, similar but shorter, finer and sparser teeth on upper lip. Preorbital moderately wide, filling the space between lip and eye, notched well down on anterior edge. Two widely separated dorsal fins ; the first fin with 4 spines, and second fin with 1 spine and 8 soft rays ; origin of first dorsal fin

nearer the snout-tip than caudal-fin base. Anal fin with 3 spines and 9 soft rays. Pectoral fins slightly shorter than head length, extending to vertical from second spine of first dorsal fin; pectoral axillary scale long, 32 to 34% of pectoral fin length. Caudal fin forked. Scales in lateral series 37 to 40; 7 rows of scales down side of caudal peduncle.

Colour : back dark green, flanks and belly silvery. Pectoral fins with black spot at axil; margin of first dorsal fin black; other fins dusky.

Geographical Distribution : Pakistan, India, through the East Indies, to the Western Central Pacific.

Fishery Information : This species is clearly mixed with *Liza cunnesius* in the fishery literature of our region.

SUBORDER : SPHYRAENOIDEI

FAMILY : SPHYRAENIDAE

[Barracudas]

Body elongate, usually slightly compressed. Head large, with long pointed snout; mouth large, with the lower jaw projecting beyond the upper. Strong sharp teeth (fang-like) in both jaws and on palatines (roof of mouth), of unequal size; no teeth on vomer; tongue with rows of small asperities. Two short, widely separated dorsal fins, the first with 5 moderately strong spines, inserted about opposite to pelvic fins, the second (soft) fin opposite to anal fin. Pelvic fins abdominal in position, closer to pectoral-fin base than to anal-fin origin; pectoral fins short and relatively low-set Caudal fin forked. Scales small, cycloid; lateral line well developed, nearly straight.

The barracudas are caught in sizeable quantities along the Indian coast. They are pelagic in habitat and are caught at varying depths from the surface down upto 100 m. Though they are shoaling species the large individuals are solitary. Due to the swift swimming efficiency they are highly predatory in nature feeding voraciously on other pelagic fishes. Large barracudas are dreaded by fishermen in tropical and sub-tropical seas due to their alleged attack on humans. During the period 1969-80, the maximum landings of barracudas (4,862 tonnes) from the Indian waters were recorded in 1974. Out of an estimated landings of 2,265 tonnes in 1979, Tamilnadu contributed the maximum (1,463 tonnes) followed by Kerala (477 tonnes). Most of the larger species are caught in hooks and lines, bottom-set gill nets and drift gill nets while sizeable quantities of smaller varieties are caught by trawlers

from the inshore waters along the Indian coast. The large varieties are in good demand due to their delicate flesh and are marketed in fresh condition.

One genus, with 18 species of which 9 in our area.

Genus **Sphyraena** Rose

Sphyraena Rose, 1793, *Artedi Piscium* : 52 (type-species : *Esox sphyraena* Linnaeus) ; De Sylva, 1974, *J. mar. biol. Ass. India*, **15**(1) : 83 (Revision).

For characters, see those of family.

KEY TO SPECIES

1 (a) First gill-arch with platelets, each bearing several small spines ; no gill-rakers on first arch ; a well-defined dusky blotch underneath base of pectoral fin	...	*S. forsteri*
(b) First gill-arch without spine-covered platelets as above ; either 1 or 2 (rarely 3) gill-rakers or none on first arch	..	2
2 (a) Gill-rakers present on first arch	..	3
(b) Gill-rakers absent on first arch	..	6
3 (a) Single gill-raker at angle of first arch	..	4
(b) Two (rarely 3) gill-rakers on first arch	...	5
4 (a) Lateral line pores 130 to 155, usually more than 135 ; depth of body 9.5 times in standard lesgth	...	*S. novaehollandiae**
(b) Lateral line pores about 120 ; depth of body 8.0 times in standard length	...	*S. acutipinnis**
5 (a) Pectoral fin reaches past origin of first dorsal fin ; height of first dorsal fin equal to or greater than postorbital length	...	*S. obtusata*
(b) Pectoral fin does not reach to origin of first dorsal fin ; height of first dorsal fin less than postorbital length	...	*S. flavicauda*
6 (a) Lateral line pores less than 100 (usually 80 to 90) ; sides with several inky blotches beneath lateral line	...	*S. barracuda*

(b) Lateral line pores more than 100; no black blotches on lower sides of body ... 7

7 (a) Origin of first dorsal fin distinctly behind the origin of pelvic fins; sides marked with vertical or angled bars, or with chevrons ... 8

(b) Vertical line at first dorsal-fin origin intersects at or only slightly behind origin of pelvic fins; sides without vertical or angled bars, or chevrons ... *S. raghava**

8 (a) Preopercle edge obliquely rounded; sides with chevron-shaped markings ... *S. bleekeri*

(b) Preopercle edge smoothly rounded; dark bars on sides not in form of chevrons ... 9

9 (a) Lateral line pores 120 to 130 (usually 127 to 130); sides of body with angled vertical bars reaching between lateral line forming an SS-pattern; dorsal fins and anal fin usually dark, the last two anal-fin rays pale ... *S. qenie**

(b) Lateral line pores 130 to 140 (usually 135 to 140); sides of body with about 20 vertical dusky cross-bars of a serpentine pattern; dorsal fins dusky to pale ... *S. jello*

Sphyraena barracuda (Walbaum)

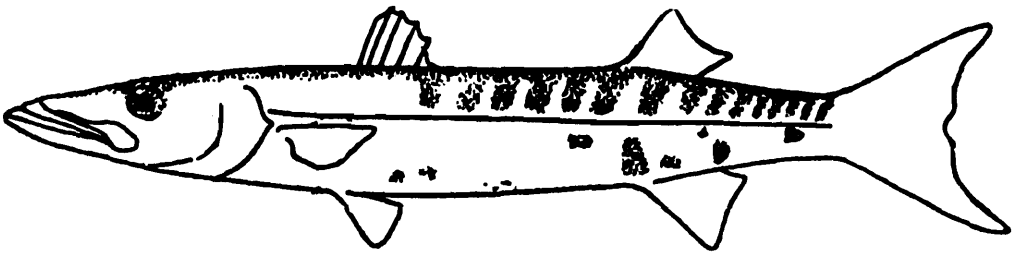
[Text-fig. 298]

Esox barracuda Walbaum, 1792, *Ichthyologie*, (3) : 94 (type-locality : West Indies).

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* *Sphyraena novaehollandiae* Gunther has been recorded only once from our region; there is no positive record of *Sphyraena acutipinnis* Day from the country, the species was originally described from Sind (Pakistan); *Sphyraena raghava* Chaudhuri has never been cited since its original discovery from the Chilka Lake (Orissa) and is considered probably conspecific with *Sphyraena idiates* Heller & Snodgrass from the Galapagos Islands; *Sphyraena qenie* Klunzinger is rare in the catches of our region.

Sphyraena commersonii Cuvier : Day, 1876, *Fishes of India* : 343 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 336,



Text-fig. 298. *Sphyraena barracuda* (Walbaum)

Common Names :

Great barracuda	...	English
Farutholi, Thiruthakkadayan	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and slightly compressed ; head large, with long pointed snout ; edge of preoperculum rounded, no produced flap. Mouth large, the upper jaw (maxilla) extending to level of anterior margin eye in large adults (does not reach to eye in young). Upper jaw with small teeth and 2 sharp canines in front, lower jaw with a single series of about 15 moderate teeth and 2 large canines at symphysis ; palatines with 5 or 6 large broad canine teeth. Gill-rakers absent. Two widely separated dorsal fins ; the first fin with 5 spines, and second fin with 1 spine and 9 soft rays. Anal fin with 1 spine and 9 soft rays. Lateral line with 75 to 90 pored scales.

Colour : body deep green to steel grey above, silvery below, with 18 to 20 inky blotches on posterior part of lower sides. Upper part of first dorsal fin, anal fin and middle rays of caudal fin black ; pectoral and pelvic fins white

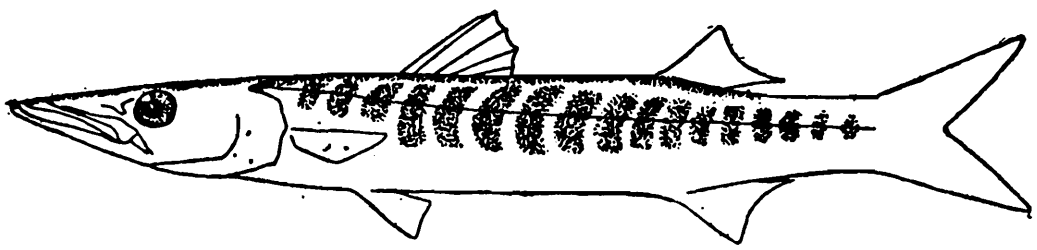
Geographical Distribution : Circumglobal.

Fishery Information : The adults of *Sphyraena barracuda* are reported to be solitary and are caught in shallow coastal waters. Taken commercially in small quantities mostly along the Tamil Nadu and Kerala coasts. It attains more than 1.5 m in length.

Sphyraena bleekeri Williams

[Text-fig. 299]

Sphyraena bleekeri Williams, 1959, *Ann. Mag. nat. Hist.*, (2) **13** (14) : 122, pl. 11D (type-locality : Msuka Bay, North Pemba, Tanzania) ; De Sylva, 1974, *J. mar. biol. Ass. India*, **15**(1) : 85, fig. 4b,



Text-fig. 299. *Sphyraena bleekeri* Williams

Common Name :

William's barracuda ... English

Distinguishing Characters :

Body elongate and cylindrical ; head large, with long pointed snout ; preopercle obliquely rounded, no membranous flap at lower posterior edge. Mouth large, the maxilla reaches almost to the front edge of eye. Upper jaw with a single row of many minute triangular teeth at sides, directed backwards, and 2 pairs of well spaced curved canines in front ; lower jaw with a single symphysial canine which fits into notch in upper jaw, and a single row of few small teeth at sides ; palatines with 6 pairs of canines ; tongue rough, with minute asperities. No gill-rakers. Two widely separated dorsal fins ; first fin with 5 spines, and second fin with 1 spine and 9 soft rays ; origin of first dorsal fin just in front of tip of pectoral fin and distinctly behind origin of pelvic fins. Anal fin with 2 spines and 8 soft rays. Lateral line with 122 to 134 pored-scales.

Colour : body iridescent dusky-green to black above the lateral line and silvery below ; with distinctive 18 to 20 chevron-shaped markings reach from back to about three-quarters distance across body towards the ventral surface, the angle of the cross-bars directed forwards below the lateral line anteriorly, at the lateral line posteriorly ; inside of mouth dusky yellow. First dorsal fin dusky green ; anal fin pale.

Geographical Distribution Widespread in the tropical Indo-west Pacific.

Fishery Information : The species is one of the most cosmopolitan of all the Indo-Pacific barracudas and has been usually identified as *Sphyraena jello* Cuvier in the fishery literature of our region. Taken commercially in small quantities along the Tamil Nadu coast.

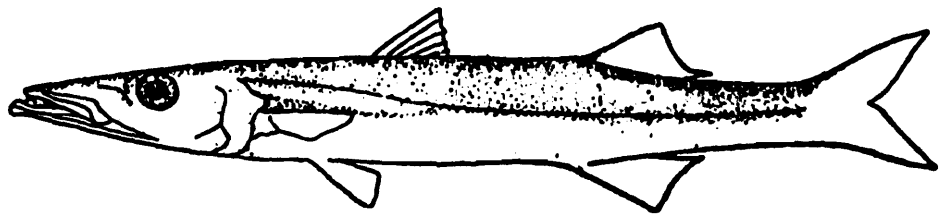
Sphyraena flavicauda Ruppell

[Text-fig. 300]

Sphyraena flavicauda Ruppell, 1835, *Neue Wirbelth. Fauna Abyssinien gehorig* : 100, pl. 25, fig. 3 (type-locality : Red Sea) : De Sylva, 1974, *J. mar. biol. Ass. India*, **15**(1) : 83, fig. 3f.

Sphyraenella chrysotaenia (Klunzinger) : Dutt and Rao, 1967, *Proc. Indian Acad. Sci.*, 65(6) : 239, fig. 1a.

Sphyraena chinensis Lacepede : Jones and Kumaran, 1980, *Fishes of the Laccadive archipelago*, : 186, fig. 159.



Text-fig. 300. *Sphyraena flavicauda* Ruppell

Common Names :

Shortjawed barracuda	...	English
Fandiyarutholi, Kolas	...	Lakshadweep Is

Distinguishing Characters :

Body elongate and slightly compressed; head large, with long pointed snout; preopercle with a produced membranous flap. Mouth large, the maxilla not extending to level of front edge of eye. Upper jaw with minute teeth at sides and 2 canines in front; lower jaw with small teeth at sides, few in number, with a single canine at symphysis; palatines with 2 to 4 pairs of moderate canines anteriorly and several smaller pairs posteriorly. First gill arch with a single raker at angle and second raker anterior to it on lower arm. Two widely separated dorsal fins; first fin with 5 spines, the second fin with 1 spine and 9 or 10 soft rays; first dorsal fin behind pelvic-fin origin and tip of pectoral fins; height of dorsal fin less that postorbital length. Anal fin with 2 spines and 8 or 9 soft rays. Lateral line with 80 to 90 pored-scales.

Colour body and head iridescent dark-green above, silvery below. Dorsal fins dark blue-green; anal and pelvic fins white; pectoral fins pale, with dusky axillary patch; caudal fin dusky green.

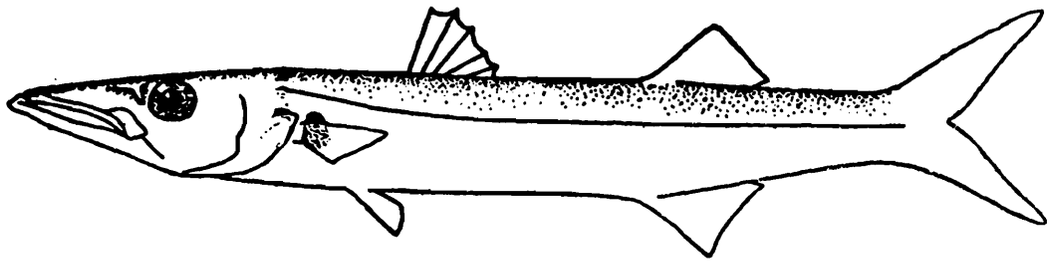
Geographical Distribution: Probably throughout the tropical Indo-west Pacific; true distribution not wholly known due to confusion with *Sphyraena obtusata.*

Fishery Information: Of minor fishery importance, being taken by boat seines and trawlers at Visakhapatnam, Porto Novo and Ernakulam during April and May. Juveniles of the species are common in the shore seines during March-May at Visakhapatnam.

Sphyraena forsteri Cuvier

[Text-fig 301]

Sphyraena forsteri Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 261 (based on *Esox sphyraenoides* of Banks library; type-locality : Otaiti); De Sylva, 1974, *J. mar. biol. Ass. India,* **15**(1) : 80, fig. 3a



Text-fig. 301. *Sphyraena forsteri* Cuvier

Common Names :

Forster's barracuda	...	English
Fandiyarutholi, Kolas	...	Lakshadweep Is.

Distinguishing Characters :

Body fusiform, slightly compressed. Head large, with long pointed snout; preopercle edge rounded, the lower angle not produced. Mouth large, the maxilla about reaching to level of front of eye. Upper jaw with a series of minute teeth and 2 sharp canines in front; lower jaw with a series of small to moderate teeth at sides, increasing in size posteriorly where they are directed slightly backwards, a single backward-directed canine at front of lower jaw; palatines with a few sharp long canines. First gill arch with distinctive platelets, each bearing several small spines. Two widely separated dorsal fins; first fin with

5 spines, second fin with 1 spine and 9 soft rays; first dorsal fin behind origin of pelvic fins. Anal fin with 2 spines and 8 soft rays. Lateral line with 105 to 115 pored-scales.

Colour : body and head dusky green to blue-black above, silvery below; no cross-bars on body. Dorsal and caudal fins dusky; pelvic fins white; pectoral fins with a distinctive inky blotch below their base.

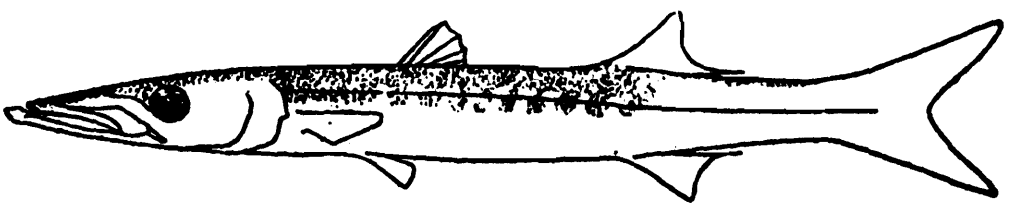
Geographical Distribution : Indo-Pacific.

Fishery Information : The species is caught in coastal waters to depth of 50 m. in our region. Of minor fishery importance, being taken occasionally on the Tamil Nadu coast.

Sphyraena jello Cuvier

[Text-fig. 302]

Sphyraena jello Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 258 (based on Russell's "Jellow", pl. 174; type-locality : Vizagapatnam); Day, 1876, *Fishes of India* : 242; Day, 1889, *Fauna Br. India, Fishes*, **2** : 335.



Text-fig. 302. *Sphyraena jello* Cuvier

Common Names :

Banded barracuda	...	English
Jellow	...	Telugu
Cheelahoo	...	Malayalam
Kandai	...	Kannada
Jaban-tal, Badvi	...	Marathi

Distinguishing Characters :

Body elongate, fusiform and slightly compressed; head large, with long pointed snout, snout about 3 times eye-diameter. Edge of preoperculum smoothly rounded, no produced flap. Mouth large, the maxilla reaches to level of front edge of eye. Upper jaw with a single series of very small teeth and 2 sharp canines in front; lower jaw with larger teeth than those in upper jaw, in a single row with hind

teeth much longer than those in front; a single strong canine at symphysis of lower jaw which fits a notch in upper jaw; palatines with a few sharp canines. No or rudimentary gill-rakers on first arch. Two widely separated dorsal fins; first fin with 5 spines, second fin with 1 spine and 9 soft rays; first dorsal fin distinctly behind the origin of pelvic fins. Anal fin with 2 spines and 8 soft rays. Lateral line with 130 to 140 (uslally 135 to 140) pored-scales.

Colour : head and body dusky yellow-green above, silvery below; with 10 to 20 vertical dusky cross-bars of a sepentine pattern on back, fading below lateral line. All fins dusky, except pelvic fins.

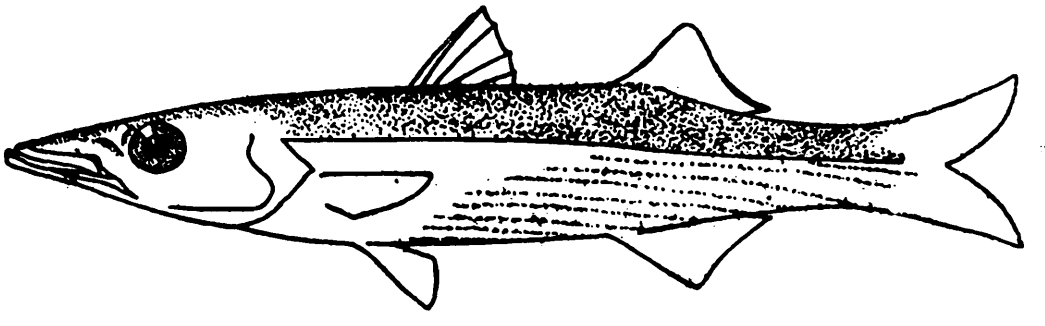
Geographical Distribution : Indo-west Pacific.

Fishery Information : The species is confused with *Sphyraena bleekeri* in the fishery literature in our region. It is reported to grow to at least 125 cm and attain a weight of 10 kgm. Taken commercially in small quantities along the Andhra and Tamil Nadu coasts.

Sphyraena obtusata Cuvier

[Text-fig. 303]

Sphyraena obtusata Cuvier, 1829, *Hist. nat. Poiss.*, **3** : 350, pl. 10, fig. 2 (type-locality : Pondicherry) ; Day, 1876, *Fishes of India* : 343, pl. 71, fig. 5; Day, 1889, *Fauna Br. India,* Fishes, **2** : 337, fig. 112.



Text-fig. 303. *Sphyraena obtusata* Cuvier

Common Names :

Obtuse barracuda	...	English
Jellow	...	Telugu
Ganjya, Badvi	...	Marathi
Kunga	...	Gujarati

Distinguishing Characters :

Body elongate, slightly compressed ; head large, with long pointed snout ; edge of preoperculum triangular, with a produced membranous flap at lower posterior edge in juveniles. Mouth large, the maxilla not extending to level of front edge of eye. Upper jaw with a series of minute teeth and 2 sharp canines in front ; teeth in lower jaw slender, a single canine at symphysis ; palatine with a single row of a few sharp teeth followed by numerous minute teeth. A single gillraker at angle of first arch, and a second (rarely a third also) gillraker anterior to it on lower arm. Two widely separated dorsal fins ; first fin with 5 spines, second fin with 1 spine and 9 soft rays ; origin of first dorsal fin infront of tip of pectoral fin ; height of first dorsal fin equal to or greater than posorbital length of head. Anal fin with 2 spines and 9 soft rays. Lateral line with 85 to 96 pored scales

Colour : body grey-green above, silvery below ; inside of mouth yellow. First dorsal fin dusky, with yellow tinge ; second dorsal fin and caudal fin yellow, with dark margin ; pectoral and anal fins yellow ; pelvic fins white.

Geographical Distribution : Indo-Pacific.

Fishery Information : It schools in large numbers in the juvenile stages, and adults are taken by trawl just off the bottom ; grows to about 23 cms. One of the most important of the barracudas in India, being frequently seen in the commercial catches of the Kerala and Tamil Nadu coasts.

SUBORDER : POLYNEMOIDEI

FAMILY : POLYNEMIDAE

[Threadfins]

Body moderately elongate, somewhat compressed. Mouth subterminal, the overhanging snout conical and prominent. Teeth in villiform bands in jaws ; small teeth on palatines and ectopterygoids, sometimes on vomer. Two dorsal fins, widely separated, the first with 7 or 8 flexible spines ; anal fin with 2 or 3 spines. Pectoral fin divided in two parts, the upper with rays attached, and the lower with 3 to 15 free filamentous rays ; pelvic fins subabdominal in position. Caudal fin deeply forked. Lateral line continuing to end of caudal fin. Scales ctenoid, the head nearly fulled scaled. Airbladder, when present, varying in form and structure. Vertebrae 24.

Fishes of sandy shores and muddy estuaries, well adapted to poor visibility by their projecting snout, prolonged free pectoral rays

and adipose eyelids. They occur along the entire coast of India and support fisheries of significant importance throughout the year, though peak landings are restricted to certain periods of definite duration in regions especially on the north-west coast of India where they are most abundant. Being migratory fishes, at least some of the species, they occur not only in the sea but also in the river mouths and estuaries. The polynemids constitute about 0.46% of the total marine-fish catch in the country, and about 80% of the catches come from Maharashtra and Gujarat. These are excellent as food, and from some the very large airbladder is manufactured into isinglass.

Seven genera, 3 in our area.

KEY TO GENERA

1 (a) Pectoral fin inserted high, the upper part of its base in level with the middle line of body, or higher; without a sharp pectoral fold extending down from lower part of pectoral-fin base to cover the bases of one or more of the pectoral filaments; lateral line with its anterior part rising in a long, low curve; free pectoral filaments very long, 7 or 8	...	**Polynemus**
(b) Pectoral fin inserted low, the upper part of its base well below the middle line of body; a sharp fold of skin projecting downward or forward from the lower end of the base of pectoral fin and covering the base of one or more of the pectoral filaments; lateral line nearly straight; free pectoral filaments rather short, 3 to 7	...	**2**
2 (a) Lower lip fully developed, extending far forward; no teeth on exterior part of jaws	...	**Polydactylus**
(b) Lower lip absent, except towards the rictus (mouth corners); teeth extending on the exterior part of jaws	...	**Eleutheronema**

Genus **Eleutheronema** Bleeker

Eleutheronema Bleeker, 1862, *Versl. Akad. Amsterdam*, **14** : 110 (type-species : *Polynemus tetradactylus* Shaw).

Mouth chiefly horizontal; snout projecting considerably beyond the mouth. Lips absent except for the lower lip which is reduced to

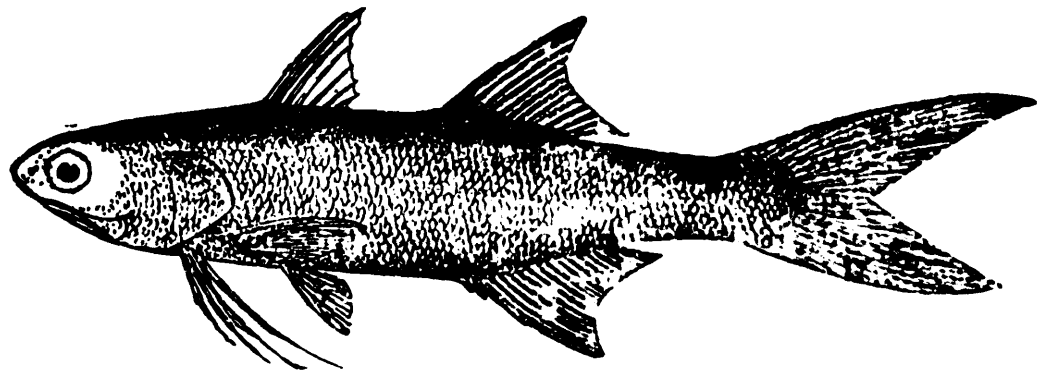
small fold at corner of mouth. Teeth villiform, extending on the exterior part of jaws. Pectoral fins inserted low on body, the upper part of its base well below the middle line of body, with 3 or 4 free filamentous rays; a sharp fold of skin projecting down or forward from the lower end of base of pectoral fin and covering the bases of one or more pectoral filamants. Lateral line nearly straight.

Two species, one in our area.

Eleutheronema tetradactylum (Shaw)

[Text-fig. 304]

Polynemus tetradactylus Shaw, 1804, *General Zoology*, **5** : 155 (type-locality : Vizagapatnam) ; Day, 1876, *Fishes of India* : 180 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 106.



Text-fig. 304. *Eleutheronema tetradactylum* (Shaw)

Common Names :

Fourfinger-threadfin	...	English
Guchhia, Sahal	...	Bengali
Sahal	...	Oriya
Maga	...	Telugu
Pozhakkala, Yevakala	...	Tamil
Bameen	...	Malayalam
Vameenu, Ramsi	...	Kannada
Rawas	...	Marathi
Rawas		Gujarati
Tobrodah	...	Andaman Is.

Distinguishing Characters :

Body elongate and compressed. Snout projecting; mouth very large, with small teeth. Two widely separated dorsal fins; first fin

with 8 spines, the second fin with 1 or 2 spines and 13 to 15 soft rays. Anal fin with 2 spines and 15 to 17 soft rays Pectoral-fin rays unbranched, the lower four rays free and filamentous. Airbladder absent.

Colour : body silvery green above, yellowish white on sides and abdomen. Dorsal and caudal fins yellowish, dusky at edges; pelvic and anal fins orange, pectoral filamentous rays white.

Geographical Distribution : Pakistan, India, Bangladesh, the Andamans, Sri Lanka, through the East Indies, to China, the Philippines and Queensland (Australia).

Fishey Information : There is a fishery for this species in the Hooghly estuarine system. They are caught from September to November along the west coast of India. It is fished mostly by gillnets and sometimes by the trawl nets in the Bombay waters. The species enters the estuaries in West Bengal for breeding when the salinity of the water starts rising. Grows to a length of about 4 ft. The fish is marketed fresh is West Bengal and Bombay.

Genus **Polydactylus** Lacepede

Polydactylus Lacepede, 1803, *Hist. nat. Poiss.*, **5** : 491 (type-species : *Polydactylus plumierii* Lacepede = *Polynemus virginicus Linnaeus*).

Upper lip absent, the lower lip well developed and extending far forward but not to symphysis. Teeth villiform, no teeth on the exterior part of jaws. Pectoral fin inserted low on body, the upper part of its base well below the middle line of the body, with 4 to 7 rather short free filamentous rays; a sharp fold of skin projecting downward or forward from the lower end of the base of pectoral fin and covering the base of one or more pectoral filaments. Lateral line nearly straight.

About 20 species, 8 in our area

KEY TO SPECIES

1 (a) Pectoral fin with 5 free filamentous rays ... 2

(b) Pectoral fin with 6 or 7 free filamentous rays ... 4

2 (a) A distinctive dusky blotch present at beginning of lateral line above pectoral fin; scales in lateral series 47 to 50 ... *P. microstoma**

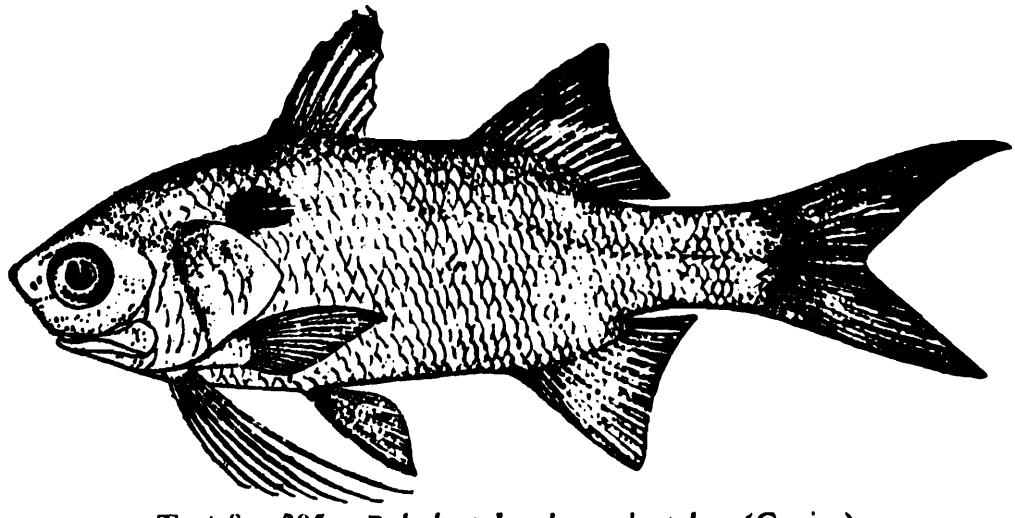
(b) No dusky shoulder blotch; scales in lateral series 60 to 75 ... 3.

3 (a) Eyes small, about 7 times in head; longest free pectoral filamentous ray extending nearly to anal fin; body with faint dark stripes along scale-rows	...	*P. indicus*
(b) Eyes large, 3.8 to 4 times in head; free pectoral filamentous rays extend only to tip of pelvic fin; body with dark narrow dusky stripes along scale-rows	...	*P. plebeius*
4 (a) Pectoral fin with 7 free filamentous rays	...	*P. heptadactylus*
(b) Pectoral fin with 6 free filamentous rays	...	5
5 (a) Upper pectoral-fin rays simple (undivided)	...	*P. kuru*
(b) Upper pectoral-fin rays mostly branched	...	6
6 (a) A large black blotch present at beginning of lateral line; free pectoral filamentous rays extending to tip of pelvic fin	...	*P. sextarius*
(b) No black blotch at beginning of lateral line; free pectoral filamentous rays extending beyond tip of pelvic fin	...	*P. xanthonemus**

Polydactylus heptadactylus (Cuvier)

[Text-fig. 305]

Polynemus heptadactylus Cuvier, 1829, *Hist. nat., Poiss.*, 3 : 299 (type-locality : Batavia) ; Day, 1876, *Fishes of India* : 177, pl. 42, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 103.



Text-fig. 305. *Polydactylus heptadactylus* (Cuvier)

* *Polydactylus microstoma* (Bleeker) and *P. xanthonemus* (Valenciennes) do not contribute to any fishery in our region.

Common Names :

Sevenfinger-threadfin	...	English
Maga	..	Telugu
Ma-kala	...	Tamil
Bameen	...	Malayalam
Shendya-rawas		Kannada
Shende		Marathi
Shiri	..	Gujarati
Kela	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and somewhat compressed. Mouth large, with small teeth in jaws, vomer and palatines. Eyes large, about 3.5 times in head length. Two widely separated dorsal fins, the first fin with 8 spines, and second fin with 1 spine and 11 to 13 soft rays; anal fin with 3 spines and 11 or 12 soft rays. Pectoral fin in two parts, the upper part with all rays simple (unbranched), lower part with 7 free filamentous rays of which 3rd to 5th are longest and extend usually to anal fin. Caudal fin forked, with equal lobes. Scales large, ctenoid; lateral line with 48 to 50 scales. Airbladder present.

Colour : body golden, with a distinct shoulder blotch. Pectoral fins black, other fins yellowish and blackish distally.

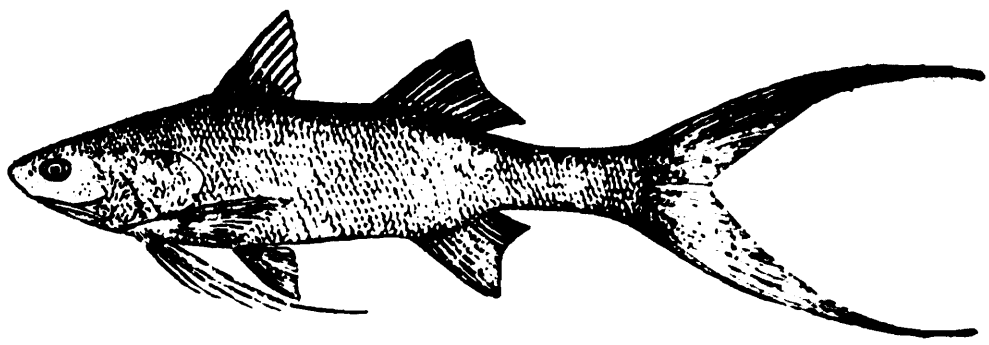
Geographical Distribution : Pakistan, India, Sri Lanka, the East Indies and ? Australia.

Fishery Information : The inshore fishery along the Bombay coast consists mainly of juveniles. The fishing operation on the trawling grounds along the north-west coast of India have indicated the adults of this species occur in these grounds all round the year. The off-shore catch is more during the neap tide period.

Polydactylus indicus (Shaw)

[Text-fig. 306]

Polynemus indicus Shaw, 1804, *General Zoology*. **5** : 155 (type-locality : Vizagapatnam) ; Day, 1876, *Fishes of India* : 179 ; Day, 1889, *Fauna Br. India*. Fishes, **2** : 105.



Text-fig. 306. *Polydactylus indicus* (Shaw)

Common Names :

Indian-threadfin	...	English
Maga-booshee	...	Telugu
Tahlunkala	...	Tamil
Yeta	...	Malayalam
Ramas	...	Kannada
Dara, Chelna	...	Marathi
Dara, Dadha	...	Gujarati

Distinguishing Characters :

Body oblong and slightly compressed. Mouth large, with small teeth in jaws, palatines and vomer. Eyes small, about 7 times in head length. Two widely separately dorsal fins ; first fin with 8 spines, second fin with 1 spine and 13 or 14 soft rays. Anal fin with 2 or 3 spines and 11 or 12 soft rays. Pectoral fin in two parts, the lower part with 5 free filamentous rays of which the upper one is longest and extends nearly to anal fin. Caudal fin deeply lunate, with pointed lobes ending in filaments. Scales small, ctenoid ; lateral line with 70 to 75 scales. Airbladder large.

Colour : golden-olive, dark above, with faint dusky stripes along sides of body. Fins yellowish.

Geographical Distribution : Indo-west Pacific.

Lives mainly over shallow muddy and sandy bottoms of the continental shalf, occasionally entering rivers, rare beyond depth of 60 m.

Fishery Information : The species is found all along the coast of India, growing to over a metre in length, and forms one of the major threadfin fisheries of the country, especially in Maharashtra and Gujarat; it occurs to a large extent in the inshore fishery from December to May and forms a fair proportion of the landings from trawlers operating in offshore fising grounds. The fish is highly esteemed as a foodfish.

Polydactylus kuru (Bleeker)

Polynemus kuru Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie,* **4** : 600 (type-locality : East Indies).

Polynemus sexfilis (*nec* Valenciennes) Day, 1876, *Fishes of India* : 178, pl. 43, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 105 ; Kagwade, 1970, *Bull. cent. mar. Fish. Res. Inst.,* (18) : 50.

Common Names :

Golden sixthread threadfin	...	English
Kala	...	Tamil
Kela, Mookkan	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and somewhat compressed. Snout projecting; mouth large, with small teeth in jaws, vomer and palatines. Two widely separated dorsal fins; first fin with 8 spines, the second fin with 1 spine and 12 or 13 soft rays. Anal fin with 3 spines and 11 or 12 soft rays. Pectoral fin in two parts, upper part with all rays simple (undivided), the lower part with 6 free filamentous rays, extending slightly beyond the tip of pelvic fin. Caudal fin forked, with equal lobes. Airbladder large.

Colour : body silvery yellow, dark above. Pectoral fins black, anal fin with dark margin.

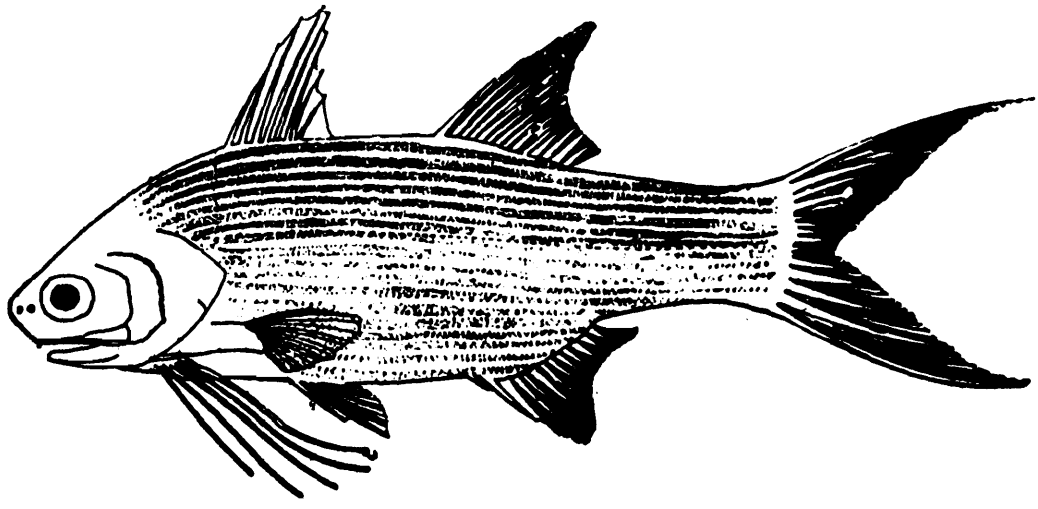
Geographical Distribution : Seychelles to India, the East Indies and W. Pacific.

Fishery Information ; Of minor fishery value in our area.

Polydactylus plebeius (Broussonet)

[Text-fig. 307]

Polynemus plebeius Broussonet, 1782, *Ichthyologica* : 23, pl. 8 (type-locality : Pacific Ocean, near Tahiti) ; Day, 1876, *Fishes of India* : 179; Day, 1889, *Fauna Br. India*, Fishes, 2 : 106.



Text-fig. 307. *Polydactylus plebeius* (Broussonet)

Common Names :

Common threadfin	...	English
Polekala, Barmeen	...	Tamil
Kela, Mookkan	...	Lakshadweep Is.

Distinguishing Characters :

Body oblong and slightly compressed. Snout projecting; mouth large, with small teeth in jaws, vomer and palatines. Eyes large, 3.8 to 4.0 times in head length. Two widely separated dorsal fins; first fin with 8 spines, the second fin with 1 spine and 13 soft rays. Anal fin with 2 or 3 spines and 11 soft rays. Pectoral fin in two parts, upper part with all rays simple (unbranched), lower part with 5 free filamentous rays of which the upper 2 are the longest and reaching to or near tip of pelvic fin. Caudal fin forked, with lobes equal. Scales small, ctenoid, 60 to 65 in lateral series. Airbladder elongated, narrow and simple.

Colour : body golden olive, with a few narrow dusky stripes along scale-rows. Pectoral fins black ; inner side of pelvic fins white, the outer side grey ; dorsal and caudal fins grey edged.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Lives mainly over shallow muddy bottoms on the continental shelf.

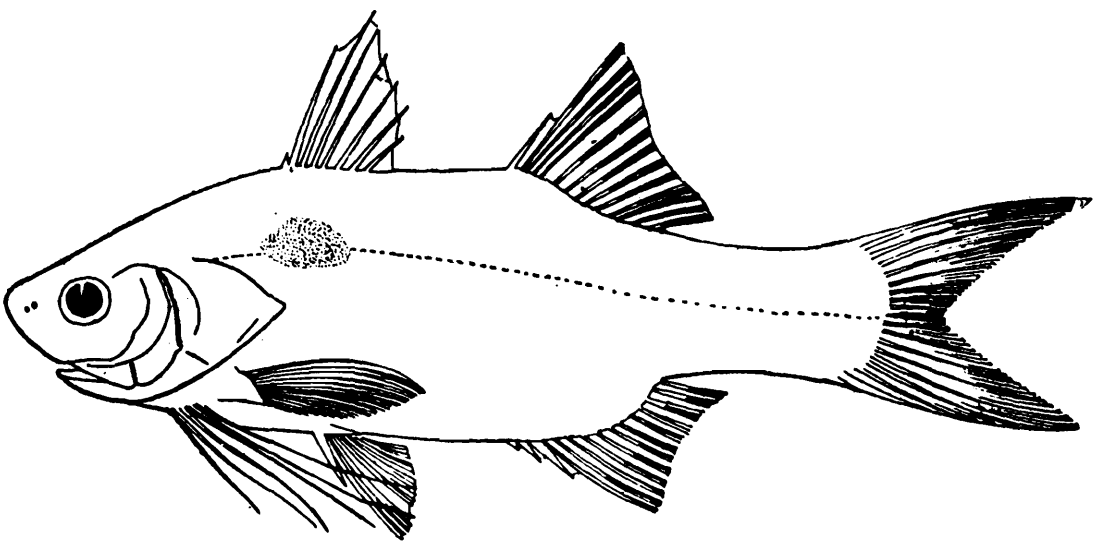
Fishery Information : The species is caught incidentally in seine-nets and gill-nets in our area ; it appears in trawl nets also. *P. plebeius* is found in abundance in the trawling grounds of Pakistan.

Polydactylus sextarius (Bloch)

[Text-fig. 308]

Polynemus sextarius Bloch, 1801, *Syst. Ichth.* : 18, pl. 4 (type-locality : Tranquebar) ; Day, 1876, *Fishes of India* : 177, pl. 42, fig. 6 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 104, fig. 47.

Polynemus sextarius mullani Hora, 1925, *Rec. Indian Mus.*, **27** : 453 (type-locality : Bombay ; Sind, Pakistan).



Text-fig. 308. *Polydactylus sextarius* (Bloch)

Common Names :

Blackspot-threadfin	...	English
Kutlikala	...	Tamil
Cheeral	...	Malayalam
Ravas	...	Marathi

Distinguishing Characters :

Body oblong and slightly compressed. Snout projecting ; mouth large, with small teeth in jaws and palatines, no teeth on vomer. Eyes large, 3.0 to 3.8 times in head length. Two widely separated dorsal fins ; first fin with 8 spines, the second fin with 1 spine and 12 or 13 soft rays ; anal fin with 2 or 3 spines and 12 or 13 soft rays. Pectoral fin in two parts, upper part with nearly all rays branched, lower part

with 6 (variably 7 left or right) free filamentous rays of which the upper 2 are longest and extending to tip of pelvic fin. Caudal fin forked, with equal lobes. Scales small, ctenoid. Airbladder simple and small.

Colour : body golden-olive above, silvery on sides and below; a large black blotch at beginning of lateral line; inner side of operculum dusky. Fins yellowish with black spots.

Geographical Distribution : Indo-west Pacific.

Lives over shallow sandy shores and in estuaries.

Fishery Information : On the east coast of India it is captured incidentally along with other fishes by all the commonly employed gears in the inshore waters; also fairly common in the trawl nets operating at about 60 m. in the Bay of Bengal. At Madras it is one of the major species supporting the polynemid fishery.

Remarks : *Polynemus sextarius nullani* Hora has an equal number of free pectoral-fin rays with additional 7th ray in the left or right fin; 7 free pectoral rays in both fins are not uncommon, in which case it can be distinguished from *P. heptadactylus* in having branched rays in the upper part of the pectoral fin.

Genus **Polynemus** Linnaeus

Polynemus Linnaeus, 1758, *Systema Naturae*, ed. 10 : 317 (type-species : *Polynemus paradiseus* Linnaeus).

Head small; snout projecting. Mouth large, with villiform teeth in jaws. Upper lip absent, lower lip well developed. Pectoral fin inserted high, the upper part of its base in level with the middle line of body, or higher, without a sharp pectoral fold extending down from lower part of pectoral base to cover the bases of one or more of pectoral filaments; base of upper pectoral filamentous ray inserted higher than the lowest ray of pectoral fin; pectoral filamentous rays very long, 7 or 8 (variably 9, left or right). Lateral line with its anterior part rising in a long, low curve. Caudal peduncle elongate.

Seven species, 3 in our area.

KEY TO SPECIES

1 (a) Pectoral fin with 8 free filamentous rays ... *P.* sp.*

(b) Pectoral fin with 7 free filamentous rays ... 2

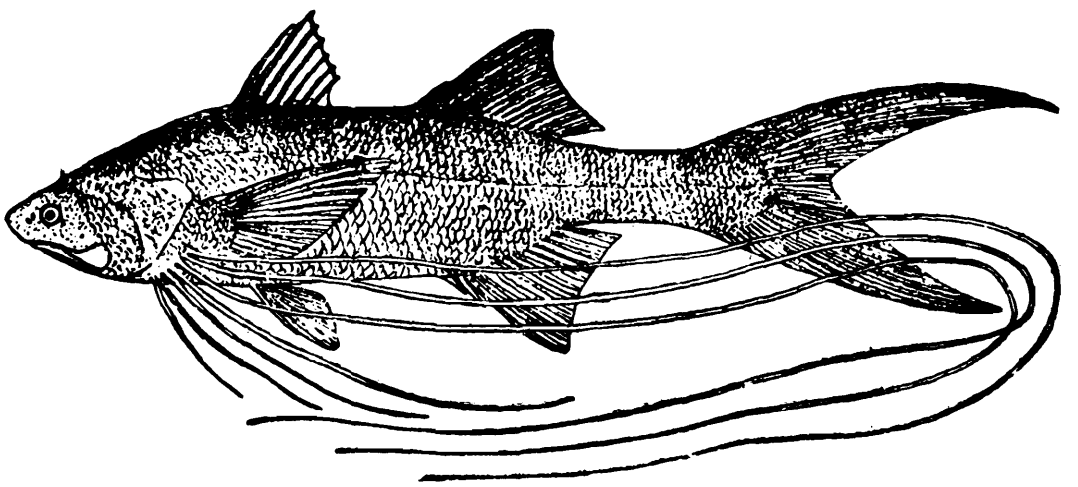
2 (a) Three upper pectoral filamentous rays extending far beyond caudal-fin tip ... *P. paradiseus*

(b) Two upper pectoral filamentous rays extending far beyond caudal-fin tip, but the third filament reaching only to tip of caudal fin ... *P. longipectoralis**

Polynemus paradiseus Linnaeus

[Text-fig. 309]

Polynemus paradiseus Linnaeus, 1758, *Systema Naturae*, **1** (ed. 10) : 317 (type-locality : India) ; Day, 1876, *Fishes of India* : 176, pl. 42, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 102.



Textt-fig. 309. *Polynemus paradiseus* Linnaeus

Common Names :

Paradise threadfin	...	English
Tapsee-machh	...	Bengali
Dodywa-rawas	...	Marathi

Distinguishing Characters :

Body elongate and slightly compressed. Snout projecting; mouth large, with small teeth. Eyes small (minute in young). First dorsal fin with 7 spines, second dorsal fin with 1 spine and 15 or 16 soft rays; anal fin with 2 spines and 12 soft rays. Pectoral-fin rays simple

* The identity of the *Polynemus* sp. with 8 free filamentous rays from the Hooghly estuary, is under study ; *P. longipectoralis* Weber & de Beaufort has been recorded only recently (Talwar & Mukherjee, in press) from the Hooghly estuary also.

(unbranched), the lower 7 free and filamentous of which the upper 3 longest—about twice the length of fish. Caudal fin deeply forked, the upper lobe longer. Airbladder absent.

Colour : body generally golden, with a shade of grey along back ; fins greyish.

Geographical Distribution : Indo-west Pacific.

Lives overs shallow sandy bottoms, regularly entering fresh-waters during breeding season.

Fishery Information : Caught in shallow waters of the continental shelf and lower reaches of rivers. The species is presently fished in the region between Bengal and central Andhra (Kakinada) by trawlers and attains a size of about 23 cm. in length. The species is know to enter the Hooghly river up to about 100 km. for breeding, from about April to June. The species is available throughout the year in the Hooghly-Matlah estuarine system with peak catches from May to October.

SUBORDER : LABROIDEI
FAMILY : SCARIDAE
[Parrot-fishes]

Mouth fairly small and non-protractile ; jaw fused to form beak-like dental plates, some species with posterior canine teeth. Dorsal fin with 9 spines and 10 or 11 soft rays ; anal fin with 3 spines and 9 soft rays. Pelvic fin with 1 spine and 5 soft rays ; branched caudal rays 11. Scales very large and cycloid ; opercular scales large. Lateral line interrupted below hind end of dorsal-fin base, with 22 to 24 scales. Caudal fin rounded in young, the lobes often extended in adults.

Medium to large very colourful reef fishes of all warm seas. They live mainly about reefs and feed on vegetable matter. Scale and fin counts are very similar in most species, which have been separated on the basis of colour and pattern. The heavy reliance on colour pattern to identify parrot-fishes has led to enormous confusion because of the striking changes that most of these fishes undergo with growth and sex changes. There may be a different juvenile colour pattern, sometimes very distinctive, which alters as the fishes mature. The next phase is very grey, brown or reddish brown ; it has been termed initial, primary or drab by various authors. The final colour phase is

the terminal male; generally it has a more complex colour pattern, often dominated by green. As a result there has been a great deal of confusion.

Seven genera, 4 in our area.

KEY TO SUBFAMILIES/GENERA

1 (a) Check with 2 to 4 rows of scales below eye, teeth completely fused (subfamily Scarinae)	...	2
(b) Check below eye with 3 or 4 scales in a single row; teeth incompletely fused (subfamily Sparisomatinae)	...	3
2 (a) Dental plates narrow, their height about 1.5 to 2.0 times in orbit diameter; head pointed	...	**Hipposcarus***
(b) Dental plates not narrow, their height usually greater than orbit diameter; head not pointed	...	**Scarus**
3 (a) Inner upper lip fully developed and separate from outer lip; teeth in upper jaw coalesed with denticulate edges, teeth in lower jaw coalesed but individual teeth distinct at edges	...	**Leptoscarus***
(b) Inner lip developed only posteriorly; free, imbricate, incisor-like teeth present externally on both jaws	...	**Calotomus***

Genus **Scarus** Forsskal

Scarus Forsskal, 1775, *Descript. Animal.* : 25 (type-species : *Scarus psittacus* Forsskal) ; Randall and Bruce, 1983, *Ichthyol. Bull. Rhodes Univ.*, (47) : 1 (Review).

Dental plates not narrow, their height usually greater than orbit diameter; head not pointed; eye not near dorsal profile, the interorbital strongly convex; cheek scales not small and not in an isolated patch.

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* The fishes of the genus *Hipposcarus* Smith represented by *H. harid* (Smith), the monotypic genus *Leptoscarus* Swainson by its type-species *L. vaigiensis* (Quoy and Gaimard), and the genus *Calotomus* Gilbert by *C. viridescens* (Ruppell) and *C. spinidens* (Quoy and Gaimard), are of no fishery value in our region.

KEY TO SUBGENERA/SPECIES

1 (a) Median predorsal scales 3; dorsal profile of head of adults with a prominent convexity above eye (subgenus *Ypsiscarus* Schultz)	...	*S. oedema**
(b) Median predorsal scales 4 to 7; dorsal profile of head not as above (subgenus *Scarus*)	...	2
2 (a) Dorsal head profile rising steeply from mouth to level of eye, then curving sharply to nearly straight for remaining profile of head; no rudimentary lateral row of teeth on upper pharyngeal bones	..	*S. rubroviolaceus**
(b) Snout not shaped as above; a row of rudimentary teeth laterally on each upper pharyngeal bone nearly always present	...	3
3 (a) Pectoral fin rays usually 16 (rarely 15 or 17); dorsal profile of initial phase strongly convex, of terminal male very steep from mouth to above level of eye, then curving sharply to slightly convex profile of remainder of head	...	*S. gibbus**
(b) Pectoral fin rays 13 to 15 (rarely 16); dorsal profile of head not as above	...	4
4 (a) Usually 4 median predorsal scales; 2 or 3 rows of cheek scales	...	5
(b) Usually 5 to 7 median predorsal scales; 3 rows of cheek scales	...	8
5 (a) Pectoral rays usually 14; lips cover half or more of dental plates; 2 or 3 rows of cheek scales	...	6
(b) Pectoral rays usually 15; lips cover less than half of dental plates; 2 rows of cheek scales	..	7
6 (a) Median predorsal scales subequal	..	*S. psittacus**
(b) First and second median predorsal scales larger than third and fourth	...	*S. russelli*

7 (a)	Paired fins relatively long ; pectoral fin about 1.4 times in head and pelvic fins about 1.7 times in head ; dorsal head profile of large adults moderately steep above mouth, with a break in the contour antero-dorsal to eye	...	*S. enneacanthus**
(b)	Paired fins not long, pectoral fins 1.4 to 1.6 times in head, and pelvic fins 1.8 to 2.1 times in head ; dorsal profile of head evenly convex	...	*S. sordidus**
8 (a)	Median predorsal scales usually 7 ; pectoral-fin rays usually 14	...	*S. niger**
(b)	Median predorsal scales usually 5 or 6 (more often 6) ; pectoral fin rays usually 14 or 15	...	9
9 (a)	Median predorsal scales usually 5 ; pectoral fin rays 14 ; initial phase brown to greyish brown with three whitish stripes on abdomen following centres of scale rows ; terminal male green with an orange bar on each scale except on abdomen where green is arranged in three stripes	...	*S. globiceps**
(b)	Median predorsal scales usually 6 ; pectoral fin rays usually 14 or 15 ; colour not as above	...	10
10 (a)	Pectoral fin rays nearly always 14	...	11
(b)	Pectoral fin rays 15 (rarely 16)	...	12
11 (a)	Scales in third row on cheek usually 2 or 3 ; no canine teeth on dental plates	...	*S. scaber**
(b)	Scales in third row on cheek usually 4 or 5 ; terminal males and occasionally large initial-phase fish with 1 or 2 canine teeth posteriorly on side of upper dental plate	...	*S. tricolor**
12 (a)	Posterior nostril 2 to 5 times larger than anterior nostril	...	*S. ghobban*
(b)	Posterior nostril at most slightly larger than anterior nostril	...	*S. prasiognathos**

* *Scarus oedema* (Snyder), *S. rubroviolaceus* Bleeker, *S. gibbus* Ruppell, *S. psittacus* Forsskal,, *S. enneacanthus* Lacepede, *S. sordidus* Forsskal, *S. nigen* Forsskal, *S. globiceps* Valenciennes, *S. scaber* Valenciennes, *S. tricolor* Bleeker and *S. prasiognathos* Valenciennes are of no fishery value in our region.

Scarus ghobban Forsskal

Scarus ghobban Forsskal, 1775, *Descript. Animal.* : 28 (type-locality : Jeddah, Red Sea).

Pseudoscarus ghobbam : Day, 1877, *Fishes of India* : 412.

Pseudoscarus ghobban : Day, 1889, *Fauna Br. India*, Fishes, 2 : 425.

Common Names :

Flame parrotfish	...	English
Kalimeen	...	Tamil

Distinguishing Characters :

Mouth slightly ventral; lips covering 0.5 to 0.8 of dental plates; small initial-phase fish without canine teeth posteriorly on one side of dental plates; large initial phase and terminal phase fish with 1 to 3 canines on upper dental plate, none on lower. Posterior nostril oval and large, 2 to 5 times larger than anterior. Median predorsal scales nearly always 6; usually 3 rows of check scales. Pectoral fin with 15 or 16 rays.

Colour : very light orange to yellowish, marked with bright blue spots in centre of scales, these blue-spotted scales arranged to form 5 bars that are 2 or 3 scales wide; a blue cross-band on lips, a curved blue streak from angle of mouth to below eye. Base and outer margins of dorsal and anal fins blue edged.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Common element in the trap fishery of the Gulf of Mannar in the Mandapam area.

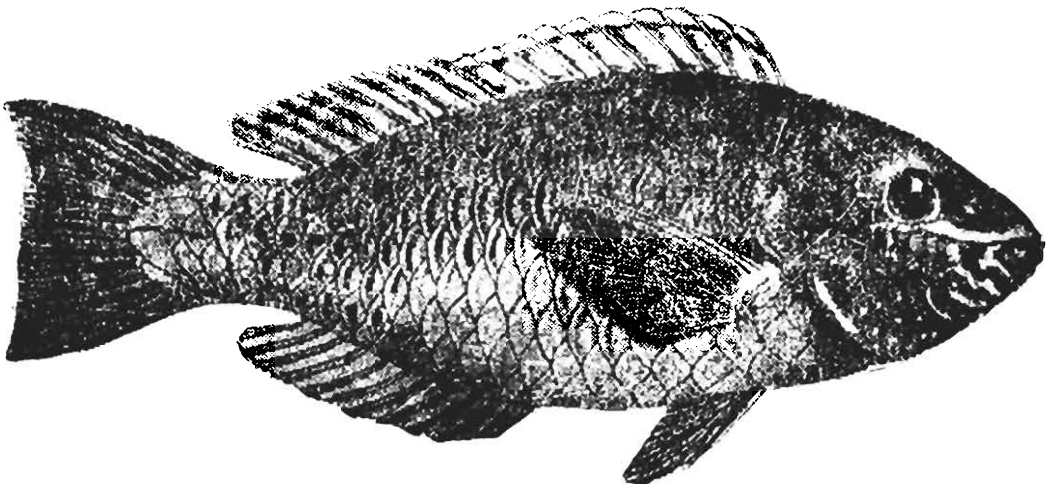
Scarus russelli Valenciennes

[Text-fig. 310]

Scarus russelii Valenciennes, 1840, *Hist. nat. Poiss.*, 14 : 234 (after 'Sahnee Moia' of Russell, 1803; type-locality : Vizagapatnam).

Pseudoscarus chrysopoma (*nec* Bleeker) : Day, 1877, *Fishes of India* : 412, pl. 89, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 2 : 424, fig. 149.

Pseudoscarus rivulatus (*nec* Valenciennes) Day, 1877, *Fishes of India* : 413, pl. 87, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, 2 : 426.



Text-fig. 310. *Scarus russelii* Valenciennes

Common Names :

Indian parrotfish	...	English
Sahnee-moia	...	Telugu

Distinguishing Characters :

Mouth slightly inferior; dental plates from three-fourths to completely covered by lips; 0 to 2 canine teeth on upper and lower dental plates. Snout blunt. Pectoral fin with 13 to 15 rays, 1.3 to 1.5 times in head. Median predorsal scales 4, the first and second largest; 2 rows of cheek scales.

Colour : of initial phase reddish to purplish brown, with an orange-red bar on each scale; 5 dark bars often present on body. Colour of terminal males blue-green, scales rimmed with salmon-pink.

Geographical Distribution : A moderately common species throughout the tropical western Indian Ocean from Sri Lanka and the south-east coast of India to the west, except the Red Sea and the Persian Gulf.

Fishery Information : Common element in the trap fishery of the Gulf. of Mannar.

SUBORDER : KURTOIDEI

FAMILY : KURTIDAE

[Nursery-fish, Humpheads]

Oblong and much compressed body, with small cycloid scales; head naked except preopercle and opercle. Lateral line short and

rudimentary. Mouth large; teeth in villiform bands in jaws and smaller ones on vomer and palatines. Opercular bones thin and paper-like. Single dorsal fin, with spines and soft rays. Anal fin with 2 spines and 31 to 47 soft rays. Pelvic fin with 1 spine and 5 soft rays. Caudal fin deeply forked. Males with occipital hook, used for carrying eggs.

The kurtids contain a single genus of small fishes.

Genus **Kurtus** Bloch

Kurtus Bloch, 1786, *Naturges. ausland. Fische*, **2** : 121 (type-species : *Kurtus indicus* Bloch).

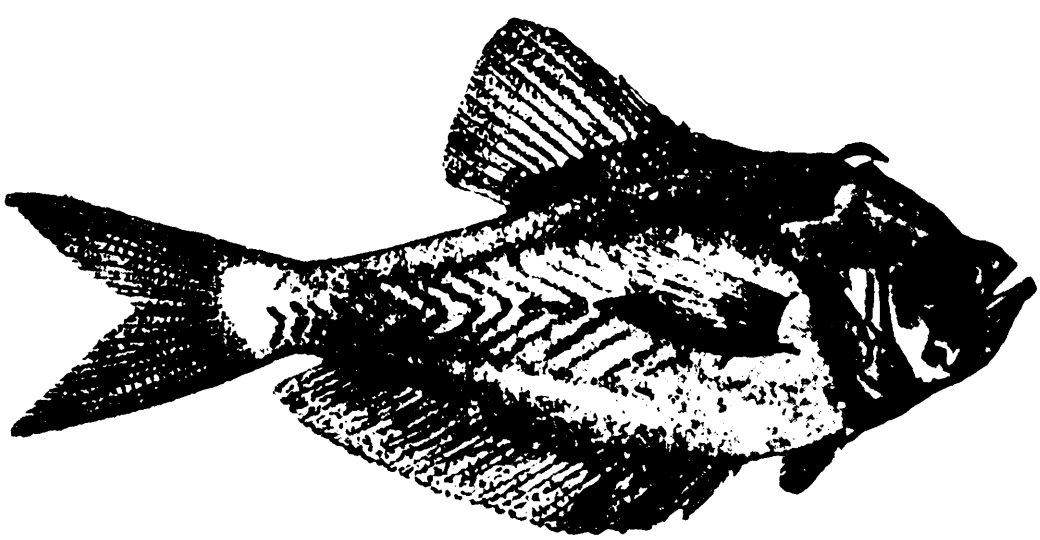
For characters of genus, see those of family.

Two species, one in our area.

Kurtus indicus Bloch

[Text-fig. 311]

Kurtus indicus Bloch, 1786, *Naturges. ausland. Fische*, **2** : 122 (type-locality : India) ; Day, 1876, *Fishes of India* : 174, pl. 42, fig. 1 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 98, fig. 45.



Text-fig. 311. *Kurtus indicus* Bloch

Common Names :

Indian humphead	...	English
Kakasi, Somdrum kara-mooddee	...	Telugu
Oordah, Valliaul-cutchul	...	Tamil

Distinguishing Characters :

Body strongly compressed, back elevated. Preoperculum with 4 spines at its angle ; operculum thin and paper-like. Villiform teeth in jaws, vomer and palatines. Dorsal fin with 5 rudimentary spines preceded by a recumbent spine directed anteriorly, and 12 or 13 soft rays. Anal fin with 2 spines and 31 or 32 soft rays. Caudal fin deeply forked. Scales very small ; lateral line ceasing opposite end of soft dorsal fin. Males with prominent hook on occiput comprising skin covering the supraoccipital crest.

Colour : body silvery shot with steel blue or lilac; back with fine black dots which form a round black spot behind occiput.

Geographical Distribution : Indo-Malay area (India, Borneo, China, etc.).

Fishery Information : The species is caught all along the east coast of India and especially so along the Tamil Nadu coast. Large shoals of this species migrate into the inshore waters during the cold months, and during this period a good fishery exists. Newly located resources with good commercial potentialities on the north-east coast of India, are worth mentioning.

Suborder : Acanthuroidei

Body deeply compressed ; mouth small ; gas bladder large ; elongated nasal bones give a high-headed appearance. Single dorsal fin, with spines and soft rays. Gill-openings restricted. Caudal fin lunate.

All are herbivorous, feeding mostly on algae. They pass through a strange planktonic larval stage, terned the "acronurus" in which their bodies are transparent and have vertical ridges.

Family : Acanthuridae

[Surgeon-fishes]

Body moderately elongate or deep, laterally compressed, with small usually rough scales. Small mouth ; no teeth on palate. Anal fin with 2 or 3 spines. Pelvic fins with 1 spine and 2 to 5 soft rays. Lateral line complete. Caudal peduncle with one or more spines, or unarmed.

KEY TO SUBFAMILIES

1 (a) Caudal peduncle with one or more spines on sides; premaxillae not protractile; third dorsal spine not filamentous ... *Acanthurinae*

(b) Caudal peduncle unarmed; premaxillae protractile; third dorsal spine filamentous and prolonged ... *Zanclinae**

SUBFAMILY : ACANTHURINAE

High-bodied, compressed fishes with one or two lancet-like spines (usually bearing sharp keels 'knives') on side of caudal peduncle, which not only are the source of their name but also a mark of identification. Dorsal profile of head steep; eye high on head. Mouth small, low on head, the premaxilla not protractile; teeth spatulate and close-set. A continuous unnotched dorsal fin with 4 to 9 spines; anal fin with 2 or 3 spines; pelvic fin with 1 spine and 3 soft rays or 1 spine and 5 soft rays; caudal fin truncate to lunate. Scales small.

These fishes are not of great commercial value, though in insular and coastal regions with coral reefs they may be locally important.

KEY TO GENERA

1 (a) One or two immovable bony plates, often keeled, on side of caudal peduncle ... **Naso***

(b) Single sharp erective antrorse spine on side of caudal peduncle ... 2

2 (a) Pelvic fin with 1 spine and 3 soft rays; scales on head modified to tuberated plates .. **Paracanthurus***

(b) Pelvic fin with 1 spine and 5 soft rays; scales on head not modified to tuberated plates ... 3

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* The subfamily Zanclinae contains a single genus and species, *Zanclus cornutus* (L.) and is of no fishery value.

3 (a) Dorsal fin with 4 or 5 spines	...	**Zebrasoma***
(b) Dorsal fin with 8 or 9 spines	...	4
4 (a) Teeth fixed, rather broad, denticulate on both margins; dorsal fin with 9 spines	...	**Acanthurus**
(b) Teeth movable, elongate with expanded incurved tips which bear only lateral denticulations; dorsal fin with 8 spines	...	**Ctenochaetus**

Genus **Acanthurus** Forsskal

Acanthurus Forsskal, 1775, *Descript. Animal.* : 59 (type-species : *Chaetodon sohal* Forsskal).

Body elliptic and compressed, covered with rather thick, minute ctenoid scales, but generally lanceolate. Mouth small, trrminal; a single series of flattened teeth in both jaws, denticulate along their cutting edge. Gill-openings restricted to sides; gill membranes attached to isthmus. An erectile antrorse spine on each side of caudal peduncle, fitting into a definite socket. Dorsal fin with 6 to 9 spines (usually 9) and 22 to 33 soft rays. Anal fin with 3 spines and 19 to 29 soft rays. Pelvic fin with 1 spine and 5 soft rays.

KEY TO SPECIES

1 (a) Body light in colour with vertical black bars; caudal fin truncate or slightly emarginate; caudal spine very small	...	*A. triostegus*
(b) Body not light in colour nor with vertical black bars; caudal fin, at least in adults, emarginate to lunate; caudal spine usually not small	...	2
2 (a) Snout short, its length contained 6.6 to 8.2 times in standard length; mouth small; teeth small and numerous, 22 or more in lower jaw of adults	...	3

* The genera *Naso* Lacepede represented by 6 species in our region, *Paracanthurus* Bleeker represented by *P. hepatus* (L), and *Zebrasoma* Swainson represented by 2 species in our area, are of no fishery importance.

(b) Snout not short, its length contained 3.9 to 5.3 times in standard length; mouth usually not small (if small, not more than 12 teeth in lower jaw) and teeth not small and numerous, 22 or less (rarely 22) in lower jaw of adults ... 4

3 (a) Lengthwise blue lines on side of head and body (may be faded in preserved specimens); snout 6.6 to 6.9 times in standard length; no dark brown spot just below axil of pectoral fin ... *A. bleekeri*

(b) No lengthwise blue lines on side of head and body; snout 7.9 to 8.2 times in standard length; a dark brown spot just below axil of pectoral fin .. *A. thompsoni**

4 (a) A black spot at base of last few rays of both the dorsal and anal fins ... 5

(b) No black spot at base of last few rays of dorsal and anal fins ... 6

5 (a) Caudal fin moderately concave; black spot at axil of soft dorsal fin not large, its greatest width more than 2 times in eye diameter; no definite black margin around groove of caudal spine; body depth 1.8 to 2.0 times in standard length ... *A. nigroris**

(b) Caudal fin lunate; black spot at axil of soft dorsal fin large, its greatest width less than 2 times in eye-diameter; a definite black margin around groove of caudal spine; body depth 2.0 to 2.3 times in standard length ... *A. nigrofuscus*

6 (a) Upper 3/4 of body with conspicuous lengthwise black bands and in sharp contrast to uniform light grayish brown of lower ¼; caudal spine very long (1.9 to 2.0 times in head length) and without a definite sheath ... *A. lineatus**

	(b) Body without conspicuous lengthwise black bands; caudal spine not very long (2.1 to 8.0 times in head length) and with a definite sheath	...	7
7	(a) Dorsal fin with 8 spines	...	*A. pyroferus**
	(b) Dorsal fin with 9 spines	...	8
8	(a) Mouth very small, its width from rictus to rictus 4.5 to 6.0 times in length of head; depth of body 1.7 to 1.9 times in standard length; dorsal soft rays 28 to 33; anal soft rays 26 to 29	...	9
	(b) Mouth not very small, its width from rictus to rictus 3.2 to 4.8 times in length of head; depth of body 1.9 to 2.5 times in standard length; dorsal soft rays 23 to 28; anal soft rays 22 to 26	...	10
9	(a) Isthmus and chest with a chalky white band (as broad as depth of caudal peduncle) extending to base of pectoral fin	...	*A. leucosternon**
	(b) Isthmus and chest without a broad white band	...	*A. glaucopareius**
10	(a) A prominent dark mark on shoulder (absent in young)	...	11
	(b) No dark mark on shoulder	...	12
11	(a) Shoulder mark semicircular (open and forward at level of eye)	...	*A. tennenti**
	(b) Shoulder mark a black or dark brown bar	...	*A. gahhm**
12	(a) Outer 1/3 of pectoral fin pale (yellowish in life) and contrasting with darker basal 2/3 of fin (in specimens over about 120 mm in standard length); dorsal fin with about 4 broad lengthwise bands	...	*A. xanthopterus*

(b) Pectoral fin uniform brown ; dorsal fin with about 8 narrow lengthwise bands ... *A. mata**

Acanthurus bleekeri Gunther

Acanthurus bleekeri Gunther, 1861, *Cat. Fishes Br. Mus.*, **3** : 335 (type-locality : Java) ; Randall, 1956, *Pacific Sci.*, **10** (2) : 180, fig. 2c, 7.

Acanthurus aurolineatus Day, 1876, *Fishes of India* ; 204, pl. 48, fig. 3 (type-locality : Waltair) ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 139.

Common Name :

Bluelined surgeonfish ... English

Distinguishing Characters :

Body compressed, its depth 2.1 to 2.5 times in standard length. Mouth small ; snout short, its length 6.6 to 6.9 times in standard length. Teeth small and numerous, 14 to 18 in upper and 16 to 24 in lower jaw. Dorsal fin with 9 spines and 24 to 26 soft rays. Anal fin with 3 spines and 23 or 24 soft rays. Caudal fin lunate. Lancet-shaped spine on caudal peduncle which folds in a deep horizontal groove.

Colour : dark brown with lengthwise blue lines on head and body, a yellow area behind eye, and two yellow bands extending anterior from eye, one from the upper edge and one from the lower.

Geographical Distribution : Indo-west Pacific.

Fishery Information : Of minor fishery significance in our area.

Acanthurus nigrofuscus (Forsskal)

Chaetodon nigro-fuscus Forsskal, 1775, *Descript. Animal.* : 64 (type-locality : Red Sea).

Acanthurus mata Day (*nec* Valenciennes), 1876, *Fishes of India* : 205, pl. 48, fig. 1.

Acanthurus gahm Day (*nec* Forsskal), 1889, *Fauna Br. India*, Fishes, **2** : 141.

Acanthurus nigrofuscus : Randall, 1956, *Pacific Sci.*, **10** (2) : 190.

Acanthurus thompsoni (Fowler) (= *A philippinus Herre*), *A. nigroris* Cuvier (= *A. elongatus* of Jones & Kumaran, 1980), *A lineatus* (L.), *A. pyroferus* Kittlitz, *A. leucosternon* Benett, *A. glaucoparelus* Cuvier (= *A. alala* Lesson), *A. tennenti* Gunther, *A. gahhm* (Forsskal) (= *A. nigricans* of Jones & Kumaran, 1980) and *A. mata* (Cuvier), do not contribute to any fishery in our area.

Common Names :

Dusky surgeonfish	...	English
Koli	...	Tamil
Suraiya	...	Marathi

Distinguishing Characters :

Body compressed and deep, its depth 2.0 to 2 3 times in standard length. Mouth small; teeth slender and strongly lobate, 8 on each side of both jaws. Dorsal fin with 9 spines and 24 to 27 soft rays. Anal fin with 3 spines and 22 to 24 soft rays. Caudal fin lunate, the upper lobe the longer. Scales rudimentary on head and over nape, becoming ctenoid and in angular rows on body. Lancet-shaped spine on side of caudal peduncle which folds into a deep horizontal groove.

Colour : body chocolate brown; a black postocular bar extending posteriorly from gill opening; a black spot at base of last few rays of both dorsal and anal fins. Fins all deep brown with dusky tinge, edge of caudal fin narrowly white, a narrow pointed black streak extending anteriorly from caudal spine.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

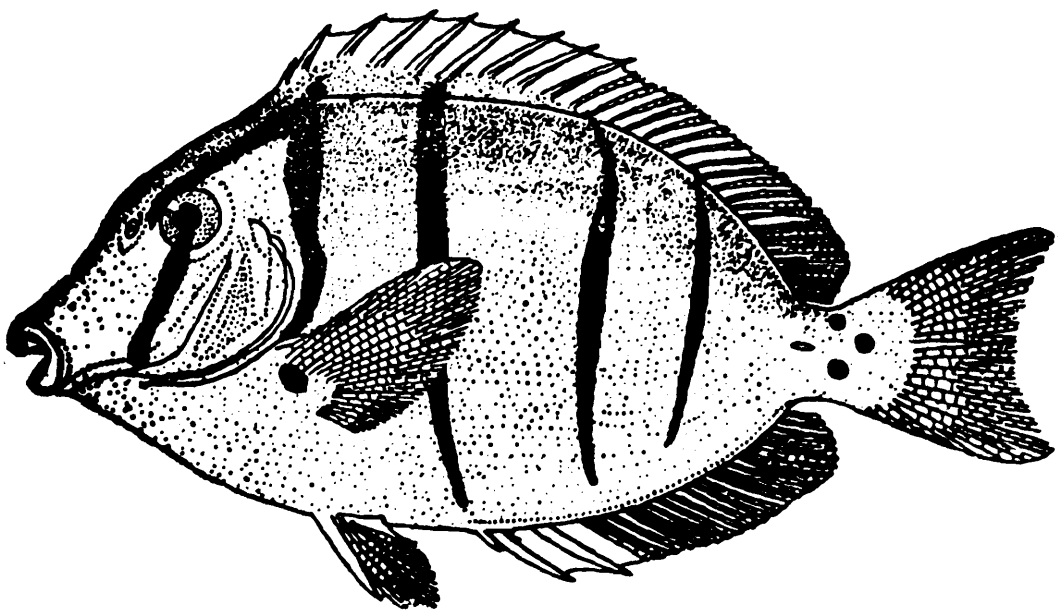
Fishery Information : Of minor fishery significance in our region. A reef-dwelling species which has been observed in the depth range of less than 1 to over 20 m.

Acanthurus triostegus (Linnaeus)

[Text-fig. 312]

Chaetodon triostegus Linnaeus, 1758, *Systema Naturae*, ed. 10 : 274 (type-locality : Indies).

Acanthurus triostegus : Day, 1876, *Fishes of India* : 204, pl. 48, fig. 2.; Day, 1889, *Fauna Br. India*, Fishes, **2** : 139, fig. 54; Randall, 1956, *Pacific Sci.*, **10** (2) : 172.



Text-fig. 312. *Acanthurus triostegus* (Linnaeus)

Common Names :

Convict surgeonfish	...	English
Mootah	...	Telugu
Varipara	...	Malayalam
Kozhimeen	...	Tamil
Rabolu, Nelalan, Kurichul	...	Lakshadweep Is.

Distinguishing Characters :

Body compressed and deep, its depth 1.8 to 2.1 times in standard length. Mouth small; teeth spatulate, close-set, with denticulate edges. Gill-rakers 19 to 22. Dorsal fin with 9 spines and 22 to 24 soft rays. Anal fin with 3 spines and 19 to 22 soft rays. Caudal fin truncate. Scales rudimentary, cycloid on head, small and ctenoid on body. Lancet-shaped spine on each side of caudal peduncle which folds into a deep horizontal groove.

Colour : body light greenish-grey, white ventrally, with narrow dark bars as follows : one on head passing through eye, four on body beneath dorsal fin, and one on caudal peduncle.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : Of minor fishery significance on the Tamil Nadu coast where it is caught in the inshore catches, particularly in insular areas.

Acanthurus xanthopterus Valenciennes

Acanthurus xanthopterus Valenciennes, 1835, *Hist. nat. Poiss.*, **10** : 215 (type-locality : Seychelles) ; Randall, 1956, *Pacific Sci.*, **10** (2) : 215.

Acanthurus matoides Day (*nec* Valenciennes), 1876, *Fishes of India* : 205 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 141.

Common Name :

Cuvier's Surgeonfish ... English

Distinguishing Characters :

Body compressed, its depth 1 9 to 2.25 times in standard length. Mouth small ; snout length 3.9 to 5.3 times in standard length. Teeth 12 to 18 in upper jaw, 14 to 21 in lower jaw. Dorsal fin with 9 (rarely 8) spines and 25 to 27 soft rays Anal fin with 3 spines and 23 to 25 soft rays. Caudal fin lunate. Caudal spine small, 5.5 times in head length, and with a definite sheath.

Colour : body uniform purplish grey to a colour phase in which extremely irregular dark grey lines alternate with blue grey lines ; posterior part of caudal peduncle and base of caudal fin dull white, remainder of caudal fin purplish grey ; dorsal and anal fins yellowish grey basally, shading to dull yellow distally, with four longitudinal broad blue bands ; a narrow bluish grey band at base of dorsal and anal fins ; basal two-thirds of pectoral fin dusky, outer one-third yellow.

Geographical Distribution : Indo-west Pacific.

Fishery Information : This species is probably the largest species of *Acanthurus* and is of minor fishery value in our area.

Genus **Ctenochaetus** Gill

Ctenochaetus Gill, 1884, *Proc. U. S. natn. Mus.*, **7** : 277 (type-species : *Acanthurus strigosus Bennett*).

Body oblong and compressed, covered by small ctenoid scales. Mouth very small, terminal. Teeth in both jaws in a single series, long and thin, freely movable. Gill-openings restricted to sides. A

sharp erectile spine on each side of caudal peduncle, fitting in a groove. Single dorsal fin, with 8 or 9 spines and 26 to 29 soft rays. Anal fin with 3 spines and 25 soft rays. A sharp erectile spine at base of tail.

KEY TO SPECIES

1 (a) Caudal fin slightly emarginate, the lobes falcate; dorsal fin soft rays 25 to 28 ... *C. strigosus*

(b) Caudal fin almost lunate; dorsal fin soft rays 27 to 31 ... *C. striatus**

Ctenochaetus strigosus (Bennett)

[Text-fig. 313]

Acanthurus strigosus Bennett, 1828, *Zool. Jour* **4** : 41 (type-locality : **Hawatian Islands**) ; Day, 1876, *Fishes of India* : 207, pl. 47, fig. 2 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 143.



Text-fig. 313. *Ctenochaetus strigosus* (Bennett)

Common Names :

Slender-toothed surgeonfish	...	English
Matta	...	Telugu
Kozhimeen, Orandah	...	Tamil
Ryakathi, Pala	...	Lakshadweep Is.

* *Ctenochaetus striatus* (Quoy & Gaimard) has been recorded only once in our area.

Distinguishing Characters :

Body compressed, its depth 1.9 to 2.0 times in standard length. Mouth small ; teeth in jaws in a single series, movable setiform, slender and somewhat curved, with expanded tips which are denticulate on lateral margin. Dorsal fin with 8 or 9 spines and 25 to 28 soft rays. Anal fin with 3 spines and 25 soft rays. Caudal fin slightly emarginate, the lobes falcate and somewhat produced in large adults ; a sharp erectile spine on caudal peduncle which folds into a deep horizontal groove.

Colour : body deep reddish-brown or yellow, with narrow horizontal blue lines ; numerous dull red spots on head. Caudal fin with a light vertical band.

Geographical Distribution : Widespread and abundant about reefs in the Indo-west Pacific.

Fishery Information : Of minor fishery significance in our area. One of the most abundant and ubiquitous of surgeonfishes, occuring in various reef habitats from protected lagoons to ocean reefs.

Family : Siganidae
[Rabbitfishes]

Perciform fishes with a compressed and oval body, with minute, thin, cycloid scales ; skin slimy, appearing as if naked. Mouth small and terminal, with a single row of incisor-like teeth in jaws ; no vomerine or palatine teeth. Gill openings lateral and restricted ; gill membranes united to isthmus. Dorsal fin with 13 strong spines and 10 soft rays ; an antrorse (procumbent) spine before dorsal fin (sometimes covered by skin) ; anal fin with 7 spines and 9 (rarely 10) soft rays. Pelvic fin with 2 strong spines and 3 soft rays between them.

The siganids, popularly known as rabbitfishes because of the rabbit-like appearance of the mouth and rounded nose, can always be identified by the presence of 2 spines on each pelvic fin, the 2 spines on the margins of the fins are separated by 3 soft rays. In addition, the rabbitfishes have an increased number of anal-fin spines—7 of them-preceding the soft rays. These, as well as the 13 dorsal spines, all have along the sides deep grooves containing venom glands. The slightest contact with one of those spine-tips produces a very painful puncture wound. Because of their morphological uniformity the members of

Siganidae have been notoriously difficult to identity to species. Traditionally, differences in colour pattern have been used to distinguish the species. Dr. D. J. Woodland who is presently revising the family, has been able to find some more durable characters to assist with the identification of preserved specimens. These are small (to about 42 cm), free-swimming, shallow-dwelling fishes. The species are abundant in reef areas, and are among the more important inshore economic fishes in the tropics.

Two genera generally recognised, both in our area.

KEY TO GENERA

1 (a) Snout normal, not especially elongate	...	**Siganus**
(b) Snout slender, elongate, tubular	...	**Lo***

Genus **Siganus** Forsskal

Siganus Forsskal, 1775, *Descript. Animal.* : 25 (type-species : *Scarus rivulatus Forsskal*) ; Woodland, 1972, *Bull. Zool. Nomencl.*, **29** : 190.

For characters, see those of family. Twenty four species, 11 in our area.

KEY TO SPECIES

1 (a) Dorsal and ventral profile of head strongly concave; snout slightly tubiform; body with numerous small dark pinhead-sized spots	...	*S. corallinus**
(b) Dorsal and ventral profile of head not markedly concave	...	2
2 (a) Last dorsal spine equal to or shorter than first dorsal spine; soft dorsal and anal fins low, rounded; greatest body depth 2.4 to 2.8 times in standard length	...	3
(b) Last dorsal fin spine much longer than first dorsal spine; soft dorsal and anal fins high angular; greatest body depth 1.8 to 2.3 times in standard length	...	6

* The genus *Lo* Seale is represented by *L. magnificus* Burgess, 1977, from the Andaman Sea in our area, is of no fishery value.

3 (a) Scale-rows between lateral line and 2nd to 4th dorsal spines 21 to 23; anterior nostril with a low rim, slightly produced into a small dark flap; a large dark brown blotch behind upper part of gill-opening	...	*S. canaliculatus*
(b) Scale-rows between lateral line and 2nd to 4th dorsal spines 17 to 20; anterior nostril with a very short, broad flap running around edge of its posterior margin	...	4
4 (a) Expanded caudal-fin slightly emarginate, almost truncate	...	*S. spinus*
(b) Expanded caudal-fin deeply forked	...	5
5 (a) Head, trunk and caudal peduncle covered with yellow spots, mostly round on sides of head and below lateral line, tending to join into irregular anastomosing pattern above lateral line and nape; spots absent ventrally on abdomen and above base of anal fin	...	*S. puelloides**
(b) Body with scattered dark brown spots on sides, sometimes coalesce to form longitudinal lines on lower flanks	...	*S. rostratus*
6 (a) Scale-rows 30 to 35 between median dorsal fin and lateral line; numerous small grey spots on head and upper flanks, coalesing into pale longitudinal lines on lower flanks	...	*S. javus*
(b) Scale-rows 18 to 24 between median dorsal fin and lateral line	...	7
7 (a) Crossbars on snout, interorbital space and occiput; a broad dark band from chin through eye to dorsal-fin origin, a second band from below spinous dorsal-fin to pectoral-fin base usually present	...	*S. virgatus**
(b) Upper part of head without crossbars; no dark band from chin to origin of dorsal-fin; body deep	...	8
8 (a) Expanded caudal fin very deeply forked	...	9
(b) Expanded caudal fin emarginate or almost truncate	...	10

9 (a) Head and body crowded with numerous golden spots, much larger than interspaces, which form a net-work	...	*S. punctatus**
(b) Head and body with many dark spots, which are much larger than interspaces	...	*S. stellatus**
10 (a) Body with large pale orange spots on sides	...	*S. guttatus**
(b) Body with vermiculating lines; caudal fin spotted	...	*S. vermiculatus**

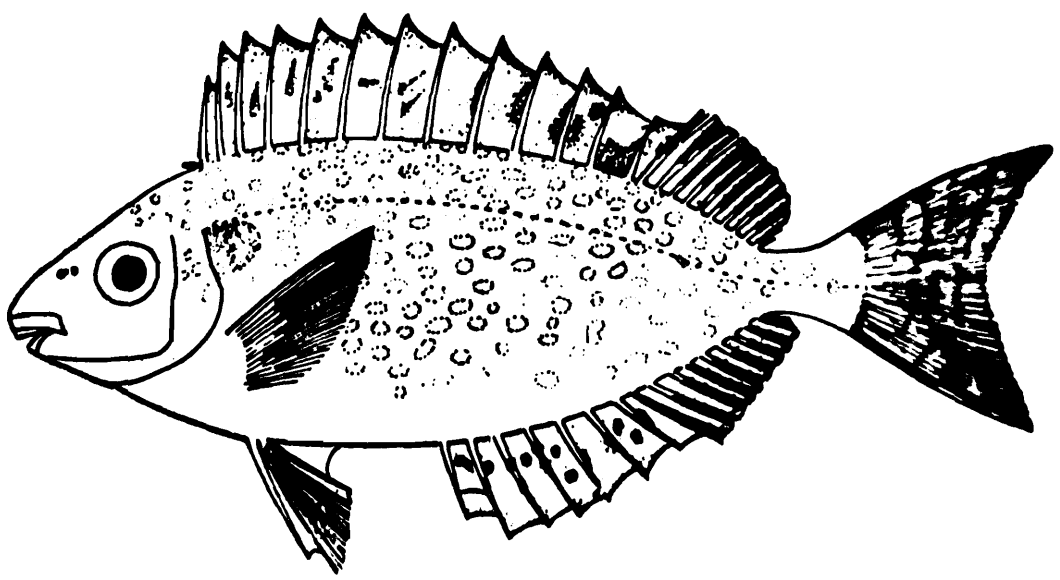
Siganus canaliculatus (Park)

[Text-fig. 314]

Chaetodon canaliculatus Park, 1797, *Trans. Linn. Soc. Lond.*, **3** : 33 (type-locality : Sumatra).

Teuthis oramin (Schneider) : Day, 1875, *Fishes of India* : 168, pl. 40, fig. 6 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 91, fig. 42.

?*Teuthis margaritifera* (Valenciennes) : Day, 1875, *Fishes of India* : 167, pl. 40, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 90.



Text-fig. 314. *Siganus canaliculatus* (Park)

* *Siganus corallinus* (Valenciennes), *S. rostratus* (Valenciennes), *S. spinus* (L), *S. virgatus* (Valenciennes), *S. punctatus* (Bloch & Schneider), *S. stellatus* (Forsskal), *S. guttatus* (Bloch) and *S. vermiculatus* (Valenciennes) do not contribute to any fishery in our area ; *S. puelloides* Woodland & Randall has only recently been described from the Andaman Sea.

Common Names :

Whitespotted spinefoot	...	English
Karadumeen	...	Malayalam
Dhagavir, Kutri	...	Marathi

Distinguishing Characters :

Body oval and compressed, its depth 2.4 to 2.8 times in standard length. Profile of head slightly concave above eye; anterior nostril with a small dark flap. A sharp, forward-projecting spine present in front of dorsal fin; dorsal fin with 13 spines and 10 soft rays, the last spine the shortest. Anal fin with 7 spines and 9 soft rays. Caudal fin trunate (young) or forked (adult). Scales minute and thin; scale-rows between mid-dorsal fin base and lateral line 21 to 23.

Colour : back light brown or greenish, belly silvery; a large dark brown blotch behind upper part of gill opening; numerous pale bluish spots on back and sides; dark cloudy markings (spots or lines) on dorsal, anal and caudal fins; pelvic fins pale, with dark brown blotches and spots; pectoral fins yellowish.

Geographical Distribution : Indo-west Pacific.

Occurs in schools in coastal areas; also in brackish and freshwaters.

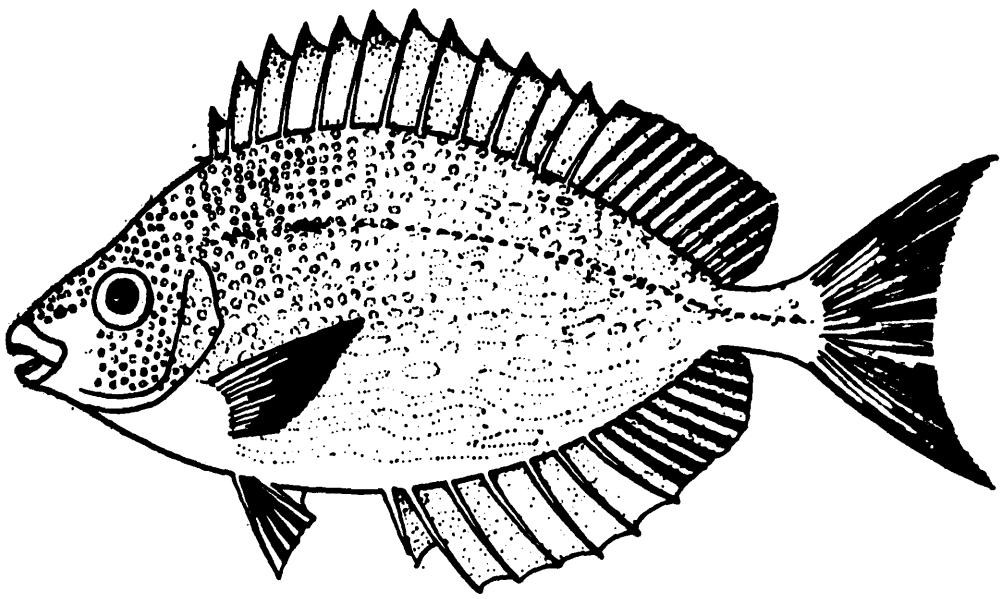
Fishery Information : Taken commercially only occasionally in our area; caught mainly with shore seines and bottom trawls.

Siganus javus (Linnaeus)

[Text-fig. 315]

Teuthis javus Linnaeus, 1766, *Systema Naturae*, (ed. 12), **1** : 507 (type-locality : Java).

Teuthis java : Day, 1875, *Fishes of India* : 165, pl. 39, fig. 5; Day, 1889, *Fauna Br. India*, Fishes, **2** : 88.



Text-fig. 315. *Siganus javus* (Linnaeus)

Common Names

Streaky-Spinefoot	...	English
Ottah	...	Tamil
Warahwah	...	Telugu
Kunar	...	Marathi
Thar-oar-dah	...	Andaman Is.
Vori	...	Lakshadweep Is

Distinguishing Characters :

Body oval and compressed, its depth 2.0 to 2.3 times in standard length. Profile of head slightly concave above eye ; tip of snout blunt ; anterior nostril with a small triangular flap reaching halfway to posterior nostril. A sharp, forward-projecting spine in front of dorsal fin ; dorsal fin with 13 spines and 10 soft rays, the first spine much shorter than the last. Anal fin with 7 spines and 9 soft rays. Caudal fin truncate (young) or emarginate (adults). Scales minute and thin ; scale-rows between mid-dorsal fin base and lateral line 30 to 35.

Colour : back greenish brown, belly silvery ; numerous small grey spots on head and upper flanks, becoming pale elongate undulating (wavy) lines on flanks and belly. Dorsal and anal fins yellow or orange ; fins unmarked except for vertical bars on caudal fin in some specimens.

Geographical Distribution : Arabian Gulf, Pakistan, India, Sri Lanka, the Andaman Is., through the East Indies, to the Philippines and southward to New Hebrides.

Occurs in schools in coastal waters; also in brackish and freshwaters.

Fishery Information : Taken commercially in small quantities in our area.

SUBORDER : SCOMBROIDEI

This order includes species that are probably the world's fastest swimming fish. Sailfish, Swordfish and Bluefin tuna have had speeds between 60 to 100 km/hr attributed to them (for short period of time).

FAMILY : GEMPYLIDAE

[Snake-Mackerels]

Body elongated and compressed, or somewhat fusiform (*Ruvettus*). Mouth large, not protractile, with strong teeth in jaws, those at front, of upper jaw often fang-like; lower jaw projecting beyond tip of upper jaw. Gill openings wide. Two dorsal fins, the second (excluding finlets) shorter than the first; anal fin similar to second dorsal fin in size and shape, or slightly smaller; isolated finlets usually presnt behind dorsal and anal fins. Pectoral fin very short; pelvic fin usually small, often reduced to a single spine with only a few or no soft rays. Caudal fin moderate in size, always forked. No keels on caudal peduncle. Lateral line single or double, ending at caudal-fin base. Scales small or virtually absent, sometimes modified.

Oceanic fishes of tropical and subtropical seas, often in very deep water. Most have oily flesh, thus not too desirable as food fishes even though some are eaten.

KEY TO GENERA

1 (a) A rigid scaly keel on belly; scales interspersed with spinous bony tubercles; lateral line simple, single but obscure	...	**Ruvettus**
(b) No scaly keel on belly; body smooth, scales small, cycloid, not interspersed with tubercles; lateral line well developed	...	2
2 (a) Pelvic fin much reduced in size, with a minute spine and only a few or no soft rays, inserted slightly behind base of pectoral fin	...	3
(b) Pelvic fin well developed, with a spine and 5 soft rays, inserted well behind base of pectoral fin	...	4
3 (a) Body greatly elongate; 5 to 7 dorsal and anal finlets; dorsal-fin spines 30 to 32	...	**Gempylus***
(b) Body moderately elongate; usually 2 dorsal and anal finlets; dorsal-fin spines about 20	...	**Promethichthys***
4 (a) Body semi-fusiform; lateral line bifurcated, its lower branch running near lower contour of body; no dorsal and anal finlets	...	**Neoepinnula***
(b) Body moderately elongate; lateral line bifurcated, its lower branch running mostly along middle of body; 2 to 6 dorsal and anal finlets	...	5
5 (a) Two detached finlets behind dorsal fin	...	**Rexea***
(b) Five to six detached finlets behind dorsal fin	...	**Thyrsitoides***

* The fishes of the genera *Gempylus* Cuvier represented by *G. serpens* Cuvier, *Promethichthys* Gill represented by *P. prometheus* (Cuvier), *Neoepinnula Matsubara* & Iwai represented by *N. orientalis* (Gilchrist & von Bonde), *Rexea* Waite represented by *R. prometheoides* (Bleeker), and *Thyrsitoides* Fowler represented by *T marleyi* Fowler in our region, are of no fishery importance.

Genus **Ruvettus** Cocco

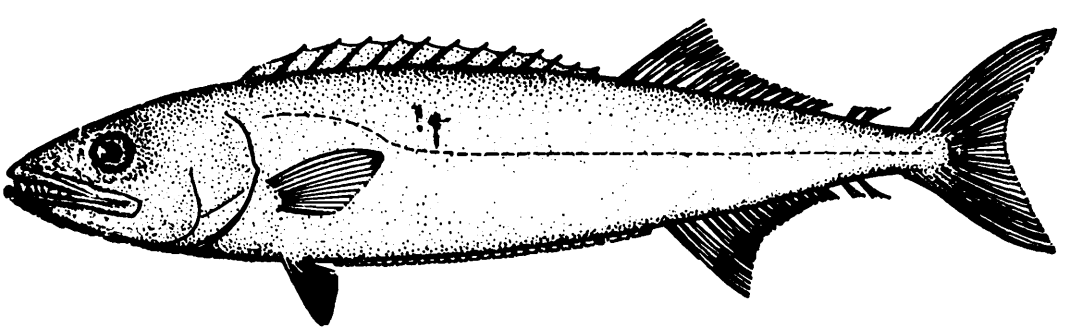
Ruvettus Cocco, 1829, *Giorn. Sci. Sicil.*, **42** : 21 (type-species : *Ruvettus pretiosus* Cocco).

Body moderately elongate and slightly compressed, a rigid scaly keel on belly between pelvic fins and anus. Mouth large; teeth in single row in both jaws, strong with canine-like teeth in front; strong teeth on roof of mouth (vomer and palatines). Two dorsal fins, the first with 13 to 15 spines; second dorsal-fin base shorter than first dorsal-fin base; two detached finlets behind dorsal and anal fins. Pelvic fins well developed, with 1 spine and 5 soft rays. Caudal fin rather small and forked; no keels on caudal peduncle. Lateral line single, often obscure. Scales cycloid, interspered with rows of sharp bony tubercles.

Ruvettus pretiosus Cocco

[Text-fig. 316]

Ruvettus pretiosus Cocco, 1829, *Giorn. Sci. Sicil.*, **42** : 21 (type-locality : Messina, Sicily) ; Silas and Regunathan, 1975, *J. mar. biol, Ass. India*, **16**(1) : 291, fig. 1.



Text-fig. 316. *Ruvettus pretiosus* Cocco

Common Name :

Oilfish ... English

Distinguishing Characters :

Body moderately elongate and slightly compressed; belly keeled between pelvic fins and anus. Mouth large; a single series of strong teeth in both jaws, with canine-like teeth in front. Two dorsal fins; the first low with 13 to 15 spines, and the second with 15 to 18 soft rays followed by 2 finlets. Anal fin with 15 to 18 soft rays, followed by 2 finlets. Pelvic fin well developed, with 1 spine and 5 soft rays. Lateral line single, often obscure. Scales rather coarse-like, the coarse surface of the body very characteristic and the skin also thick.

Colour : body uniform brown to dark brown ; tips of pectoral and pelvic fins black ; margins of second dorsal and anal fins white in young.

Geographical Distribution : Widespread in the tropical and temperate seas of the world.

Pelagic, mostly over the continental shelf, sometimes oceanic, down to depths of 200 m or more.

Fishery Information : The Oilfish has been reported only once from our region but is likely to be caught in greater numbers when the deeper waters of our region are exploited. The species grows to a large size and is said to attain about 2 m in length and weight over 50 kg. The flesh is oily, and when fresh quite good, but the oil when separated and kept is stated to be an intestinal irritant.

FAMILY : TRICHIURIDAE
[Ribbonfishes]

Body very elongate, strongly laterally compressed and ribbon-like. Mouth large, the lower jaw projecting ; strong teeth in jaws, those at the front of upper jaw fang-like. Dorsal fin extremely long, its origin slightly behind head, the anterior portion with spines and sometimes separated from soft portion by a distinct notch ; anal fin with short spinules which may not be visible externally (*Trichiurus*). Pelvic fin reduced to a scale-like spine and one rudimentary ray, or absent altogether. Caudal fin small or absent, if absent tail tapering to a point.

Body naked (without scales). General colour silvery, a little darker on back.

Ribbon-fishes are poor quality foodfish and constitute one of the important commercial fisheries in India, the annual catch was 68,353 tonnes during 1976. These fishes are caught almost all along the Indian coast and form an exclusive fishery of considerable magnitude at several places, especially in the southern peninsula region ; the states of Andhra Pradesh, Tamil Nadu and Kerala account for the greater percentage of annual catches. A limited fishery also exists in the Hooghly-Matlah estuaries in West Bengal. The usual gear for these fishes are the boat-seines. Ribbonfishes, although consumed in the fresh condition to a certain extent, are mostly cured with salt or

sun-dried. The raw material supply could be used by small industrial units for the extraction of fish protein or for the manufacture of fish meal.

KEY TO SUBFAMILIES/GENERA

1 (a) Caudal fin absent, body tapering to a point (subfamily Trichiurinae)	...	2
(b) Caudal fin present, small (subfamily Lepidopinae)	...	4
2 (a) Pelvic fins present, appearing as scale-like structures; lateral line gently sloping from upper angle of operculum to tip of tail; lower hind border of operculum convex	...	**Eupleurogrammus**
(b) Pelvic fins absent; lateral line abruptly descending from upper angle of operculum and running along lower half of body; lower hind margin of operculum concave	...	3
3 (a) Post-anal scute prominent and dagger-like, size about half diameter of eye; soft anal rays pungent spinules; eye-diameter 6 to 10 times in head length	...	**Lepturacanthus**
(b) Post-anal scute not enlarged, less than width of pupil of eye; soft anal rays not visible, buried in skin; eye-diameter 5 to 7 times in head length	...	**Trichiurus**
4 (a) Head profile rising smoothly to dorsal-fin origin, no bony crest present; pelvic fins inserted below the base of pectoral fins, which are narrow	...	**Benthodesmus***
(b) Head profile with a prominent crest on nape; pelvic fins inserted behind the bases of pectoral fins, which are broad	...	**Lepidopus***

* The genus *Benthodesmus* Goode & Bean represented by *B. tenuis* (Gunther), and the genus *Lepidopus* Gouan represented by *L. caudatus* (Euphrasen) in our region, are deep-water species of no fishery importance.

Genus **Eupleurogrammus** Gill

Eupleurogrammus Gill, 1863, *Proc. Acad. nat. Sci. Philad.* : 226 (type-species : *Trichiurus muticus* Gray).

Body elongate ; head length 8 to 12 times in body depth, 14 to 18 times in total length. Upper profile of head oblique, interorbital space convex, eye-diameter 5 to 8 times in head length. Lower hind margin of operculum convex ; operculum partly overlapping the pectoral-fin base and fin ; lacrymal covers two-thirds length of maxilla and premaxilla. Uniseriate palatine teeth. Pelvic fins scale-like structures, triangular or oval. Caudal fin absent, body tapering to a point. Lateral line gently sloping from upper angle of operculum to tip of tail.

KEY TO SPECIES

1 (a) Dorsal fin with 123 to 131 soft rays ; anal-fin origin below 31st to 37th soft dorsal rays ... *E. glossodon*

(b) Dorsal fin with 139 to 147 soft rays ; anal-fin origin below 38th to 43rd soft dorsal rays ... *E. muticus*

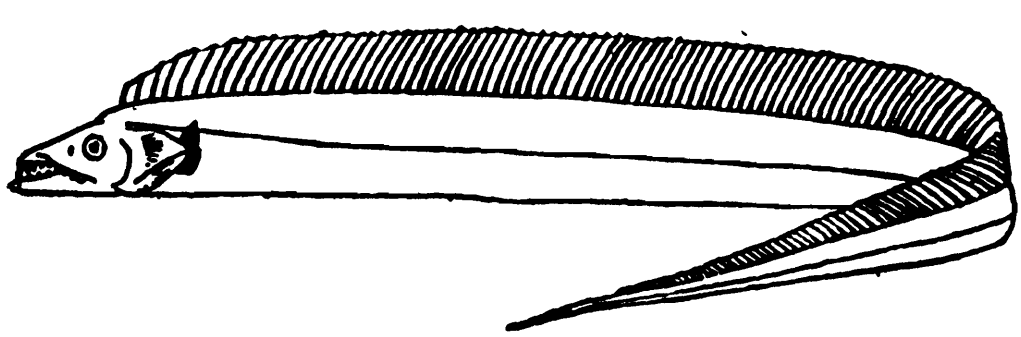
Eupleurogrammus glossodon (Bleeker)

[Text-fig. 317]

Trichiurus glossodon Bleeker, 1860, *Acta Soc. Sci. Indo-Neerl.*, **8**, *Derllende Bijdr. vischf. Borneo* : 38 (type-locality : Java, Sumatra, Singapore, Bintang, Borneo).

Eupleurogrammus intermedius James (*nec* Gray), 1959, *J. mar. biol. Ass India*, **1** : 139, fig. 1.

Eupleurogrammus glossodon : Wheeler, 1971, *J. mar. biol. Ass. India*, **11** : 304.



Text-fig. 317. *Eupleurogrammus glossodon* (Bleeker)

Common Name :

Bleeker's ribbonfish ... English

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon-like, tapering to a point, the postanal portion of body ends abruptly. Mouth large, with fang-like teeth. Eye-diameter 6 to 8 times in head length ; lower hind margin of operculum convex. Dorsal fin with 3 spines and 123 to 131 soft rays, running from behind head almost to end of body. Anal fin reduced to separate spines which are buried in flesh in larger specimens, its origin below 31st to 37th soft dorsal rays. Pelvic fins present but reduced to wing-like structures.

Colour : body purely silvery or silvery white.

Geographical Distribution : India and the East Indies.

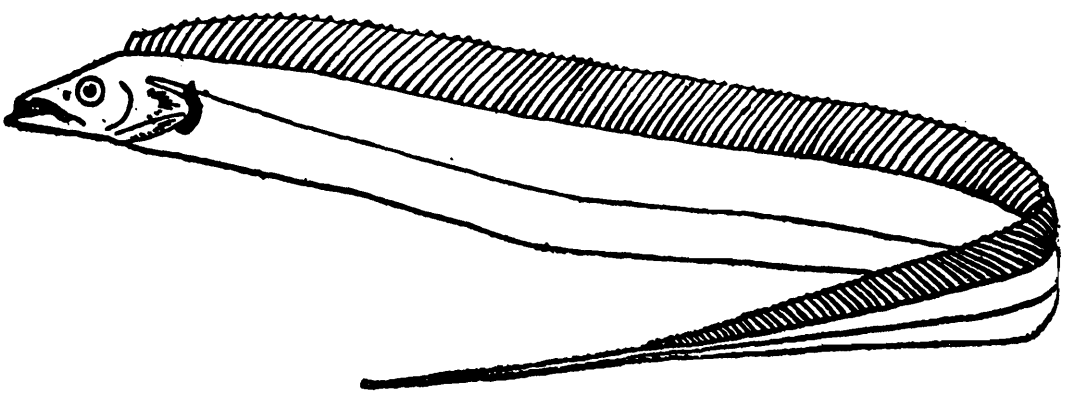
Fishery Information : *Eupleurogrammus glossdon* is comparatively of lesser importance than both *Trihiurus lepturus* and *Lepturacanthus savala*, from the abundance point of view. The species is particularly abundant in Palk Bay, in the vicinity of Mandapam. The total size-range of this species varies from 5 to 50 cm. The life span of the species is about 4 years, attaining maturity at about 30 cm when it is about 2 years old.

Eupleurogrammus muticus (Gray)

[Text-fig. 318]

Trichiurus muticus Gray, 1831, *Zool. Misc.*, **1** : 10 (type-locality : India) ; Day, 1876, *Fishes of India* : 200, pl. 47, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 134.

Eupleurogrammus muticus : James, 1957, *Mem. Mar. Biol. Ass. India*, (1) : 9, fig. 3B.



Text-fig. 318. *Eupleurogrammus muticus* (Gray)

Common Names :

Gray's ribbonfish	...	English
Savallu	...	Telugu
Vada	...	Malayalam
Pambole	...	Kannada
Pitiurkti, Pitiwagti, Bala	...	Marathi

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon-like, tapering to a point. Mouth large, with fang-like teeth. Eye-diameter 6.0 to 8.0 times in head length; lower hind margin of operculum convex. Dorsal fin with 3 spines and 139 to 147 soft rays, running from behind head to almost end of body. Anal fin reduced to separate spines, which are buried in flesh in larger specimens; anal-fin origin below 38th to 43rd soft dorsal rays. Pelvic fins present but reduced to wing-like structures. Pectoral fins about as long as snout. No caudal fin.

Colour : body steely blue, with metallic reflections.

Geographical Distribution : Persian Gulf, India, through the East Indies, to China.

Bottom living as well as pelagic; occurs in depths of 100 m.

Fishery Information : *Eupleurogrammus muticus* is comparatively of lesser importance than the other species of ribbon-fishes from the abundance point of view. This species is particularly abundant along the Orissa and Bombay coasts. The commercial size of this species in our region is from 25 to 75 cm.

Genus **Lepturacanthus** Fowler

Lepturacanthus Fowler, 1905, *Proc. Acad. nat. Sci. Philad.*, [1904] : 770 (type-species : *Trichiurus savala* Cuvier).

Body elongate, its depth about 14 to 22 times in total length. Head length 7 to 10 times in total length; eye-diameter 6 to 10 times in head length; lower hind margin of operculum concave, partly overlapping the pectoral fin; lacrymal striated, fan-like, 1/3 length of maxilla. Lateral line abruptly descending from upper angle of operculum and running along lower half of body. Post-anal scute prominent and dagger-like, its size about half diameter of eye; anal fin

reduced to a series of pungent spinules. Pelvic fins absent. Caudal fin absent.

KEY TO SPECIES

1 (a) Pectoral-fin spine serrated; dorsal fin with 120 to 133 soft rays	...	*L. gangeticus*
(b) Pectoral-fin spine not serrated; dorsal fin with 110 to 117 soft rays	...	*L. savala*

Lepturacanthus gangeticus (Gupta)

Trichiurus gangeticus Gupta, 1966, *Proc. zool. Soc. Calcutta*, **19** : 169 (type-locality : Frasergunj, Hooghly estuary).

Lepturacanthus serratus Dutt and Thankam, 1967, *J. Bombay nat. Hist. Soc.*, **63**(3) : 757 (type-locality : Vizagapatnam).

Lepturacantus gangeticus : Silas and Rajagopalan, 1975, *J. mar. biol. Ass. India*, **16**(1) : 268.

Common Name :

Gangetic ribbonfish ... English

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon like, tapering to a point. Mouth large, with fang-like teeth. Gillrakers 7 to 11 on lower arm of first arrh. Dorsal fin with 120 to 133 rays, running from nape almost to end of body. Anal fin reduced to a series of small spines, all directed backwards. Pectoral fin with 1 serrated spine and 10 soft rays ; pelvic fins absent. Caudal fin absent. Lateral line nearer to ventral profile than to dorsal profile of body.

Colour : body bright silvery white.

Geographical Distribution : North-east coast of India.

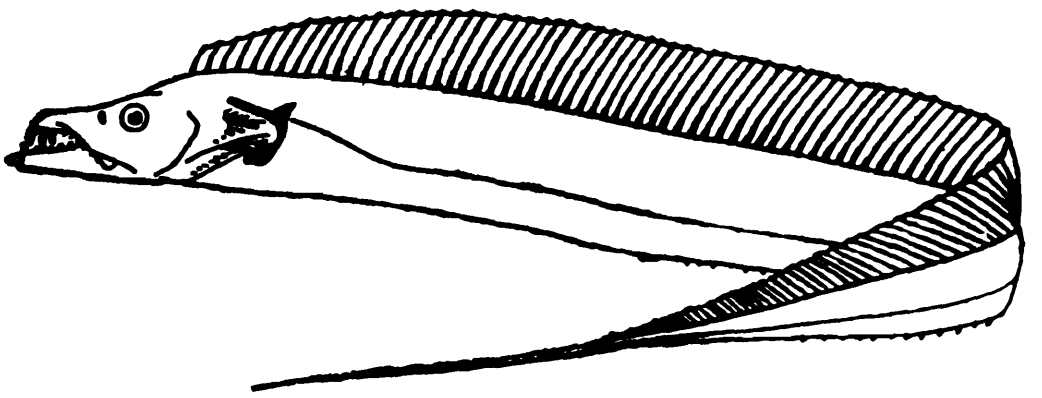
Fishery Information : Taken commercially in small quantities in the Hooghly estuary (West Bengal) and along the coast of Andhra.

Lepturacanthus savala (Cuvier)

[Text-fig. 319]

Trichiurus savala Cuvier, 1829, *Regne Animal*, **2**, ed. 2 : 219 (type-locality : "Merdes Indies" = Bombay and Malabar) ; Day, 1876, *Fishes of India* : 201, pl. 47, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 135, fig. 53.

Lepturacanthus savala : James, 1967, *Mem. Mar. Biol. Ass. India*, (1) : 24, fig. 3D.



Text-fig. 319. *Lepturacanthus savala* (Cuvier)

Common Names :

Small-headed ribbonfish	...	English
Savala	...	Telugu
Savalai	...	Tamil
Wagti, Baia	...	Marathi

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon-like and tapering to a point. Mouth large, with fang-like teeth. Gillrakers 4 to 9 on lower arm of first arch. Dorsal fin with 110 to 117 rays, running from nape almost to end of body. Anal fin reduced to a series of separate visible spines, not buried in skin. Pectoral fin with 1 unserrated spine and 10 soft rays Pelvic and caudal fins absent. Lateral line nearer to ventral profile than to dorsal profile of body.

Colour : body steely blue, with metallic reflections

Geographical Distribution : India, the Andaman Islands, Thailand, the East Indies, China, Japan, the Philippines and north-western Australia.

Bottom living as well as pelagic.

Fishery Information : *Lepturacanthus savala* is next in importance to *Trichiurus lepturus* considering the maximum size it attains, abundance and the contribution to the fishery. It is distributed almost all along the coast of India but does not exclusively form a fishery at any place. In the Hooghly-Matlah estuarine system the commercial

catches include fish of the sixth year class, the fish attaining maturity at about 40 cm. The spawning season appears to be prolonged from about May to September. The commercial size of this species in our region is 25 to 75 cm.

Genus **Trichiurus** Linnaeus

Trichiurus Linnaeus, 1758, *Systema Naturae*, ed. 10 : 246 (type-species ; *Trichiurus lepturus* Linnaeus).

Body elongate ; head length 6 to 8, body depth 12 to 18 times in total length. Eye-diameter 5 to 7 times in head length ; lower margin of operculum concave, partly overlapping pectoral-fin base and fin ; lacrymal striated, fan-like, covers one-third length of maxilla and premaxilla. Soft anal rays buried in skin, postanal scute not enlarged and less than width of pupil of eye. Pelvic and caudal fins absent.

KEY TO SPECIES

1 (a) Fang-like teeth without barbs ; dorsal fin with less than 120 rays ; teeth on palatines in two irregular rows	...	*T auriga**
(b) Fang-like teeth with barbs ; dorsal fin with more than 120 rays ; teeth on palatines multiserial (in 4 to 5 rows)	...	2
2 (a) Head length 2.8 to 3.2 times in snout-vent length, 8.0 to 8.8 times in total length	...	*T pantului*
(b) Head length 2.5 to 3.1 times in snout-vent length, 6.7 to 7.6 times in total length	...	*T lepturus*

Trichiurus lepturus Linnaeus

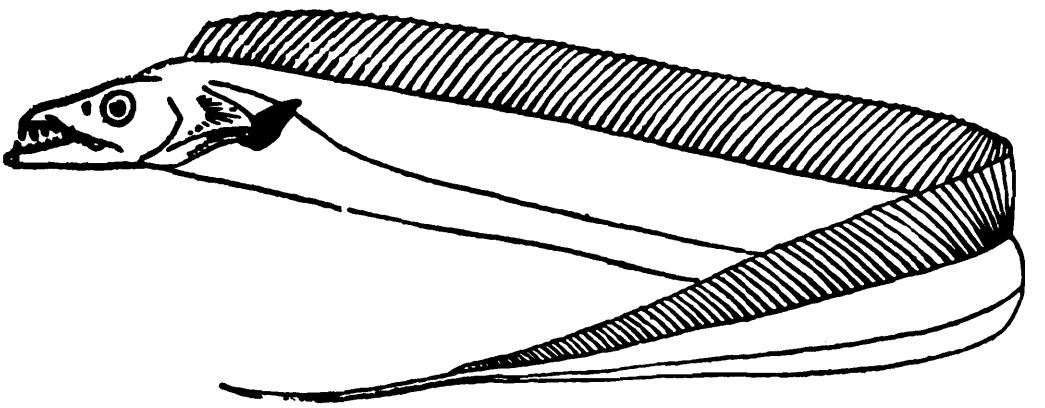
[Text-fig 320]

Trichiurus lepturus Linnaeus (*partim*) (*ex* Artedi), 1758, *Systema Naturae*, ed. 10 : 246 (type-locality : South Carolina) ; Jarnes, 1967, *Memoir Mar. Biol. Ass. India*, (1) : 17, fig. 3C.

Trichiurus haumela (Forsskal) : Day, 1876, *Fishes of India* : 201 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 134.

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* *Trichiurus auriga* Klunzinger is a deepwater species of no fishery importance in our area.



Text-fig. 320. *Trichiurus lepturus* Linnaeus

Common Names :

Large-head ribbonfish	...	English
Puttiah	...	Oriya
Sawala	...	Telugu
Sonaka-wahlah	...	Tamil
Bala	...	Marathi
Papadah	...	Andaman Is.

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon-like, tapering to a point. Head length 2 5 to 3.1 times in snout-vent distance, 6.7 to 7.6 times in total length. Eye-diameter 5 to 7 times in head length. Mouth large, with barbed fang-like canine teeth ; teeth on palatines in 4 to 5 rows. Lower hind margin of operculum concave. Dorsal fin with 3 spines and 131 to 136 soft rays, running from nape to end of body. Anal fin reduced to separate spines, 75 to 80 (not countable), which are buried in skin in larger fish. Pelvic and caudal fins absent. Lateral line descending above pectoral fin, nearer to ventral profile than to dorsal profile of body.

Colour : body steely blue, with metallic reflections.

Geographical Distribution Cosmopolitan in tropical and warm temperate waters.

Bottom living and pelagic, it may occur in depths of 100 m, but usually shallower. Enters estuaries and may be found in extremely shallow water.

Fishery Information : *Trichiurus lepturus* is the most important species of our coast from the fishery point of view. Bulk of the ribbon-fish catches are contributed to by this species at several places along the Indian coast. It appears to move in large shoals in coastal areas, especially during the period August to October, during which time it seems to migrate from east to west around Cape when it is fished in very large quantities. Therefore, the success and fluctuations of the fishery are reported to be attributable to a great extent to migrating shoals of *T lepturus*. This species contributes about 75% of the ribbon-fish catches of the country. The commercial catches have individuals usually in the size range from 50 to 75 cm. and fish of over 1 m. in length are not uncommon.

Trichiurus pantului Gupta

Trichiurus pantului Gupta, 1966, *Proc. zool. Soc., Calcutta*, **19** : 170 (type-locality : Frasergunj, Hooghly estuary) ; Silas and Rajagopalan, 1975, *J. mar. biol. Ass. India*, **16**(1) : 267.

? *Trichiurus russelli* Dutt and Thankam, 1967, *J. Bombay nat. Hist. Soc.*, **63**(3) : 756 (type-locality : Vizagapatnam).

Common Name :

Gangetic-ribbonfish English

Distinguishing Characters :

Body very elongate and strongly compressed, ribbon-like, tapering to a point. Head length 2.8 to 3.2 in snout-vent distance, and 8.0 to 8.8 in total length. Mouth large, with barbed fang-like canine teeth ; teeth on palatines in 4 or 5 rows. Eye-diameter 5.3 to 6.5 in head length ; lower hind margin of operculum concave. Dorsal fin with 3 spines and 120 to 130 soft rays ; running from nape almost to end of body. Anal fin reduced to separate spines, which are buried in skin ; anal-fin origin below vertical from 40th soft dorsal ray. Pectoral fin almost equal to snout length. Pelvic and caudal fins absent. Lateral line descends abruptly over pectoral fin and continued to tail along lower third of the sides of body.

Colour : body silvery white.

Geographical Distribution : Hooghly estuary (West Bengal) and the Andhra coast.

Fishery Information : Taken commercially in small quantities in the Hooghly estuary (West Bengal) and the Andhra coast.

FAMILY : SCOMBRIDAE
[Mackerels and Tunas]

Characteristic torpedo-shaped powerful body, mostly metallic blue or blue-green above. Mouth rather large; teeth in jaws usually feeble, no true canines; roof of mouth and tongue may be toothed. Gill membranes free from isthmus. Two dorsal fins, with finlets behind second dorsal and anal fins; first dorsal fin well behind head; pectoral fins inserted high on body; pelvic fin with 6 rays, placed beneath the pectoral fins. Lateral line simple or branched. Body either uniformly covered with small cycloid scales (eg *Rastrelliger, Scomberomorus*) or restricted to a corselet around the front part of body. The best character for distinguishing the Scombridae from other families of fishes is found in the caudal fin region. The caudal fin rays in the family Scombridae completely cover the hypural plate. In closely related families, such as the Gempylidae (snake mackerels), the caudal-fin rays only overlap the hypural plate for a short distance. This condition in the Scombridae is an adaptation for high-speed swimming. Another characteristic of the Scombridae is the presence of a pair of oblique keels near the end of the caudal fin, which function to direct and accelerate a current of water over the fork of the tail. This is hydrodynamically important and allows scombrid fishes to swim faster.

The Scombridae is a family of epipelagic marine fishes that are important components of both commercial and recreational fisheries all over the world. The flesh of most is oily, rich and tasty, and in some cases reddish. The average annual catch of tunas in India has been 7,800 tonnes during 1970's, but in the recent past the catches have shown signs of improvement. In 1979, the tuna landing of the country has been estimated at 26,000 tonnes. Excepting the Lakshadweep Islands where the Oceanic Skipjack and the Yellowfin Tuna are fished in considerable quantities, there is no organised tuna fishery in India; Kerala accounts for about 50% of tuna catches on the mainland of India. The tuna catches of India are mostly obtained from the inshore waters.

Fifteen genera, 11 in our area.

KEY TO GENERA

1 (a) A single pair of oblique keels near the end of caudal fin; 5 dorsal and 5 anal finlets [True Mackerels] ... 2

(b) Two small keels with an additional midlateral keel on either side of caudal peduncle ... 3

2 (a) Teeth on vomer and palatines; anal-fin spine fairly stiff and strong; vertically zig-zag or wavy lines on back	...	**Scomber***
(b) No teeth on roof of mouth; anal-fin spine thin, rudimentary; two horizontal rows of spots on back	...	**Rastrelliger**
3 (a) Corselet of scales obscure	...	4
(b) Corselet (composed of enlarged scales) well defined	...	6
4 (a) Two lateral lines, one underneath the dorsal fin and another runs along the ventral surface of the fish; inter-pelvic process single	...	**Grammatorcynus**
(b) Single (upper) lateral line only; inter-pelvic process usually double [Spanish mackerels/Seerfishes]	...	5
5 (a) Snout elongated, as long as rest of head; no gill-rakers; 21 to 27 spines in first dorsal fin	...	**Acanthocybium**
(b) Snout much shorter than rest of head; at least 3 gill-rakers present; 14 to 22 spines in first dorsal fin [Seer-fishes]	...	**Scomberomorus**
6 (a) Tongue lacking dorsally projecting lateral cartilaginous ridges [Bonitos]	...	7
(b) Upper surface of tongue with two longitudinal cartilaginous ridges [Tunas and Frigate tunas/mackerels]	...	8
7 (a) Five to ten narrow, dark, longitudinal stripes on upper part of body; no teeth on tongue; swim-bladder absent	...	**Sarda**
(b) Body without a prominent pattern of stripes or spots; two patches of teeth present on tongue; swim-bladder well developed	...	**Gymnosarda**

* The *genus Scomber* Linnaeus is represented by *S. japesaba* Bleeker and probably also *S. japonicus* Houttuyn in our area, but both species are rare in our region.

8 (a) First and second dorsal fins widely separated, the space between them equal to base of first dorsal fin [Frigate mackerels]	...	**Auxis**
(b) First and second dorsal fins contiguous or barely separated, at most by a narrow interspace equal to about eye-diameter	...	9
9 (a) Four to six prominent dark longitudinal stripes on belly ; first dorsal fin with 14 to 16 spines ; gill-rakers on first arch 53 to 63	...	**Katsuwonus**
(b) No dark longitudinal stripes on belly ; first dorsal fin with 11 to 14 spines ; gill-rakers on first arch 19 to 43	...	10
10 (a) Body naked behind corselet (composed of enlarged and thickened scales) ; black spots often present between pectoral and pelvic fin-bases ; 26 or 27 pectoral-fin rays	...	**Euthynnus**
(b) Body fully covered with very small scales behind corselet ; no black spots on body ; 30 to 36 pectoral-fin rays	...	**Thunnus**

Genus **Acanthocybium** Gill

Acanthocybium Gill, 1862, *Proc. Acad. nat. Sci. Philad.* : 125 (type-species : *Cybium sara* Bennett) ; Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes Mar. Biol. Ass. India*, (pt. 1) : 63 (Review).

Body elongate and moderately compressed, covered with minute scales ; snout elongated, as long as rest of head length. Mouth large ; jaws with strong trenchant teeth which are compressed, closely set in a single series and each slightly serrated ; villiform teeth on vomer and palatines. No gill-rakers ; gill-lamellae reticulated. First dorsal fin with 21 to 27 spines ; second dorsal and anal fins small, followed by 8 to 10 and 7 to 9 finlets respectively. Three external caudal keels on each side of caudal peduncle.

Monotypic.

Acanthocybium solandri (Cuvier)

[Text-fig. 321]

Cybium solandri Cuvier, 1832, *Hist. nat. Poiss.*, **8** : 141 (type-locality : Tuamotu Is., Atlantic ; based on MS of Solander).

Acanthocybium solandri : Jones and Silas, 1962, *Indian J. Fish.*, **8**(1) : 192, fig. 1, 5A.



Text-fig. 321. *Acanthocybium solandri* (Cuvier)

Common Names :

Wahoo	...	English
Oria Neemeen, Oria-meen	...	Malayalam
Digu-mas, Akyakkura	...	Lakshadweep Is

Distinguishing Characters :

Body elongate and fusiform. Mouth large ; snout elongated, beak-like. Jaws strong, set with a series of trenchant, closely-set, slightly serrated teeth which increase in size posteriorly ; villiform teeth on vomer and palatines. Two dorsal fins ; first dorsal well-developed, with 23 to 27 spines, second dorsal fin with 3 spines and 9 or 10 soft rays followed by 8 to 10 finlets. Anal fin with 3 spines and 9 or 10 soft rays, followed by 7 to 9 finlets. Pectoral fins small, extending to below 10th to 11th dorsal spine. Caudal fin lunate. Scales very small ; lateral line arched in anterior part, straight behind middle of the first dorsal fin ; short lateral branchings at rt. angles all along the lateral line.

Colour : body steel-blue above and pale ventrally ; sides with 25 to 30 vertical faint bars that fade rapidly after death. Spinous dorsal fin similar to body colour but paler ; second dorsal, pectoral and caudal fins blackish ; pelvic and anal fins dusky.

Geographical Distribution : Primarily in high seas around the world in tropical and subtropical waters.

Fishery Information : The Wahoo is a large oceanic fish known the world over as one of the best marine game fishes ; attains a length of well over 2 m. and weight of 45 kg. or more. This fish is occasionally caught at Vizhinjam (Kerala) in November-March by open sea fishermen usuing hooks baited with sprats, goat-fishes and squids. The 'Wahoo' has nowhere any economic significance.

Genus **Auxis** Cuvier

Auxis Cuvier, 1829, *Regne Animal*, (ed. 2), **2** : 199 (type-species : *Scomber rochei* Risso).

Body robust, elongate and rounded, naked except for an anterior well-developed corselet. Jaws with a single row of minute teeth ; upper surface of tongue with two longitudinal cartilaginous ridges, teeth on vomer but palatines edentulous. Gillrakers long and numerous. Two dorsal fins, widely separated, the first fin with 10 to 12 spines, the second fin small and followed by 8 or 9 finlets ; anal fin followed by 7 finlets. A large single-pointed flap (interpelvic process) between the pelvic fins. Body squamation limited to anterior corselet. Lateral line curved with small undulations. A strong median keel on each side of caudal-fin base between two small keels. No airbladder.

The interpelvic process is large and characteristic of the genus *Auxis* ; it is undivided and reaches almost to tip of pelvic fins. Two species, both in our area. Fishes of this genus are referred to as Frigate mackerels.

KEY TO SPECIES

1 (a) Corselet of scales short, tapering abruptly along the lateral line behind first dorsal fin, not more than 5 scales wide under second dorsal-fin ; pectoral fins reaching to scaleless area above corselet ; dark stripes on back oblique to nearly horizontal ... *A. thazard*

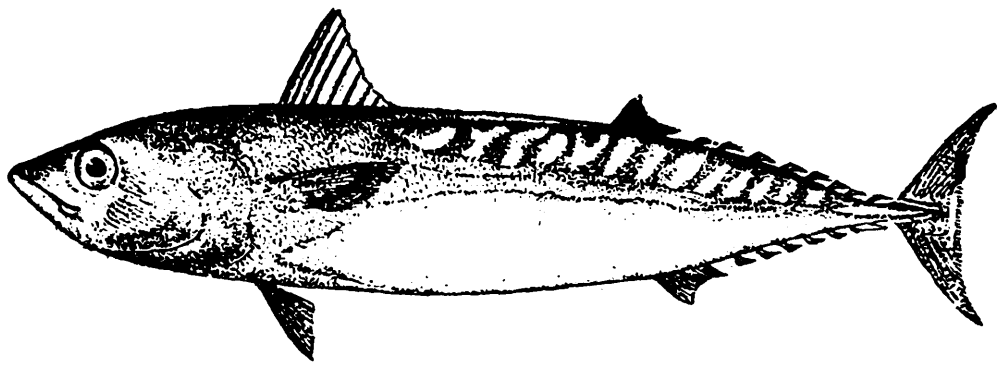
(b) Corselet of scales long, continuing as a wide band along lateral line behind first dorsal fin, more than 6 scales wide under second dorsal fin ; pectoral fins not extending to scaleless area above corselet ; dark stripes on back nearly vertical ... *A. rochei*

Auxis rochei (Risso)

[Text-fig. 322]

Scomber rochei Risso, 1810, *Ichthyol. Nice Hist. nat. Paris* : 165 (type-locality : Nice).

Auxis thynnoides Bleeker : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 378, fig. 3 (*nec* fig. 4).



Text-fig. 322. *Auxis rochei* (Risso)

Common Names :

Bullet-tuna	...	English
Eli-choorai, Kutteli-choorai	...	Tamil
Urulan-choorai	...	Malayalam
Ragondi	...	Lakshadweep Is.

Distinguishing Characters :

Body robust, elongate and rounded. Two dorsal fins, separated by a large interspace ; first fin with 10 or 11 spines and second fin with 13 soft rays, followed by 8 finlets. Anal fin with 13 soft rays, followed by 7 finlets. Body naked except for corselet, which is well developed in its posterior part (more than 6 scales wide under second dorsal fin origin). Caudal peduncle slender, with a strong central keel on each side between two smaller keels.

Colour : back bluish, turning to deep purple or almost black on head ; a pattern of 15 or more fairly broad, nearly vertical dark stripes in the scaleless area ; belly silvery. Pectoral and pelvic fins purple, their inner side black.

Geographical Distribution : Tropical and subtropical parts of the Indian and Pacific Oceans.

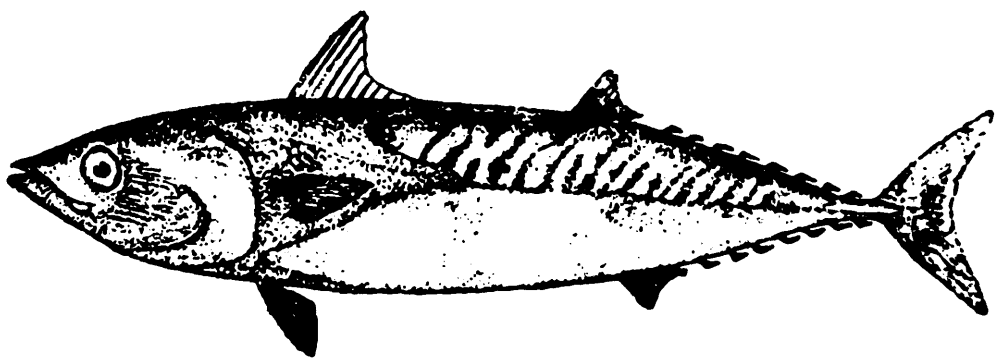
Fishery Information : The species is rarely seen in the commercial catches, but when it occurs it is seen in very large shoals and considerable quantities are landed by shore seines at Vizhinjam (Kerala State).

Auxis thazard (Lacepede)

[Text-fig. 323]

Scomber thazard Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 9 (type-locality : New Guinea).

Auxis thazard : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 377, fig. 4 (*nec* fig. 3).



Text-fig. 323. *Auxis thazard* (Lacepede)

Common Names :

Frigate-tuna	...	English
Churai, Urulan-churai, Kutteli-churai	...	Tamil
Ellichoora	...	Malayalam
Bugudi, Kuppa, Gedar	...	Marathi
Gedara	...	Gujarati
Ragondi	...	Lakshadweep Is

Distinguishing Characters :

Body robust, slightly laterally compressed. Two dorsal fins, widely separated; first fin with 10 to 12 spines and second fin with 11 to 13 soft rays, followed by 8 finlets. Anal fin with 13 soft rays, followed by 7 finlets. Pectoral fin short, extending beyond vertical line from anterior margin of scaleless area above the corselet. Body naked except for corselet, which is well developed and narrow in its posterior part (not more than 5 scales wide under second dorsal-fin

origin). A strong central keel on each side of caudal peduncle between two smaller keels.

Colour : back bluish, turning to deep purple or almost black on head; a pattern of 15 or more narrow, nearly oblique to nearly horizontal dark wavy lines in scaleless area above laterat line; belly silvery. Pectoral and pelvic fins purple, their inner side black.

Geographical Distribution : Tropical and subtropical waters of the Indo-Pacific and Atlantic Oceans.

Fishery Information : A seasonal visitor to coastal waters of India and more common than *Auxis rochei*. On the south-west coast of India the species is caught along with other fishes in shore-seines, boat-seines, gill-nets, and hook and lines from about the close of the south-west monsoons, from August to December. It occurs from Ratnagiri southwards along the west coast of India, the Gulf of Mannar, and Lakshadweep Islands in the Laccadive Sea where a minor fishery exists. Common size 25-40 cms.

Genus **Euthynnus** Lutken

Euthynnus Lutken in : Jordan and Gilbert, 1882, *Bull. U.S. natn. Mus.*, (16) : 428 (type-species : *Thunnus thunnina* Cuvier=*Scomber alletteratus* Rafinesque) ; Silas, Pillai and Muthiah, 1981, *J. mar. biol. Ass. India*, 18(3) : 411 (Review).

Body fairly robust, elongate and fusiform. Body squamation confined to an anterior well-developed corselet and lateral line. Teeth in jaws uniserial, minute and conical; present or absent on vomer and palatines: upper surface of tongue with two longitudinal cartilaginous ridges Two dorsal fins, more or less contiguous or barely separated by only a narrow interspace; first dorsal fin with 11 to 14 spines, second dorsal fin with 11 to 14 soft rays, followed by 8 to 10 finlets; anal fin with 12 to 15 soft rays, followed by 6 to 8 finlets. Two flaps (interpelvic process) between pelvic fins. Caudal peduncle with two small keels and another between them on either side. Gill-rakers well developed, 29 to 43 on first arch. Several characteristic black spots often between pelvic and pectoral fins (may not be very conspicuous).

Four species, 2 in our area.

KEY TO SPECIES

1 (a) Gill-rakers 29 to 34 on first arch ... *E. affinis*

(b) Gill-rakers 43 on first arch .. *E. new species**

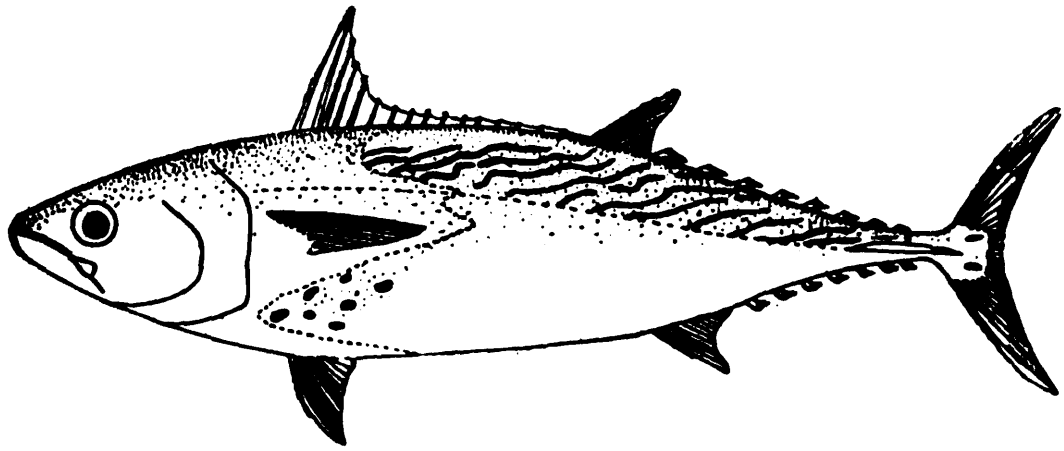
Euthynnus affinis (Cantor)

[Text-fig. 324]

Thynnus affinis Cantor, 1850, *J. Roy. Asiat. Soc. Bengal*, **18** : 1088 (type-locality : Penang).

Thynnus *thunnina* Day (*nec* Cuvier), 1876, *Fishes of India* : 252, pl. 54. fig. 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 205, fig. 72.

Euthynnus affinis affinis : Jones and Silas, 1961, *Indian J. Fish.*, **7** (2) : 289, fig. 15.



Text-fig. 324. *Euthynnus affinis* (Cantor)

Common Names :

Eastern Little-tunny	...	English
Soora	..	Telugu
Suraly, Suraimin		Tamil
Choova	..	Malayalam
Kuppa, Bugudi, Gedai	...	Marathi
Gedara	...	Gujarati
Latti, Latti-chora		Lakshadweep Is.

* This new species of *Euthynnus* based on a single specimen from Mangalore, is yet to be named by Silas, Pillai and Muthiah : the specimen has been earlier described and figured by them (Silas, Pillai & Muthiah, 1981 ; Silas & Pillai, 1982). This species appears to be *E. yaito* Kishinouye.

Distinguishing Characters :

Body robust, elongate and fusiform. Gill-rakers 29 to 34 on first arch. Two dorsal fins, narrowly separated; first fin with 14 spines, second fin with 11 to 14 soft rays, followed by 8 to 10 finlets. Anal fin with 12 to 15 soft rays, followed by 6 to 8 finlets. Pectoral fin short, its tip not extending to interspace between dorsal fins. Caudal peduncle very slender, with a prominent lateral keel between two smaller keels at base of caudal fin.

Colour : back of body bluish black, with a complicated striped pattern which does not extend forward beyond middle of first dorsal fin; lower sides and belly silvery; several (1 to 8) characteristic small dark spots below level of pectoral fin (may be absent either on one or both sides). Pelvic fins blue black, except on inner edges of lighter hue.

Geographical Distribution : Tropical Indo-west Pacific.

Found in coastal waters and along reefs; enters estuaries.

Fishery Information : The species occurs at several places along the coast of India and forms a fishery of some magnitude at Vizhinjam (Kerala), Lakshadweep Islands, Gulf of Mannar and the Andaman Sea. At Vizhinjam the season starts by October-November and lasts till about May. Common size 40-60 cms.

Genus **Grammatorcynus** Gill

Grammatorcynus Gill, 1862, *Proc. Acad. nat. Sci. Philad.* : 125 (type-species : *Thunnus bilineatus* Ruppell=*Thynnus bicarinatus* Quoy and Gaimard) ; Jones and Silas, 1964, *Proc. Symp. Scombroid. Fishes, Mar. Biol. Ass. India,* (pt. 1) : 16 (Review).

In addition to the lateral line that runs underneath the dorsal fin, there is another lateral line that runs along the ventral surface of the fish. The functional significance of this additional lateral line is not known.

Monotypic.

Grammatorcynus bicarinatus (Quoy & Gaimard)

Thynnus bicarinatus Quoy and Gaimard, 1824, *Voyage Uranie et Physic., Zool.* : pl. 61, fig. 1 (type-locality : Sharks Bay, Western Australia).

Grammatorcynus bicarinatus : Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes, Mar. Biol. Ass. India,* (part I) : 16, pl. 4c.

Common Name :

Double-lined mackerel ... English

Distinguishing Characters :

Body spindle-shaped. A row of strong pointed teeth in jaws; villiform teeth on vomer, palatines and tongue. Two dorsal fins; first dorsal fin depressed in a deep groove and with 11 or 12 weak spines, the second fin with 10 to 12 soft rays. Anal fin with 11 to 13 soft rays; 6 or 7 finlets behind each dorsal and anal fins. Scales small, deciduous; no corselet; scaly process (inter-pelvic process) between pelvic-fin bases single. Two lateral lines, the lower joining the upper behind pectoral-fin base and at base of caudal fin. Two small keels and another between them on either side of caudal peduncle.

Colour : body yellowish-green, whitish silvery below; some scattered dark spots or a series of round, dark blotches on belly.

Geographical Distribution : Tropical Indo-Pacific, especially near coral reefs.

Fishery Information : The species has been reported only once from the Andaman Sea in our region but is likely to found in greater numbers when these waters are exploited.

Genus **Gymnosarda** Gill

Gymnosarda Gill, 1862, *Proc. Acad. nat. Sci. Philad.*, **14** : 125 (type-species : *Thynnus unicolor* Ruppell) ; Collette and Chao, 1975, *U.S. Fish. Wildlife Serv. Fish. Bull.*, **73** (3) : 612 (Revision).

Body fusiform; snout rather pointed. Jaw teeth very large and conspicuous; fine teeth on palatines, two patches of teeth on tongue, no teeth on vomer. Body completely naked posterior to corselet except for the lateral line, dorsal-fin base and caudal keel; corselet (with elongate scales) small but well defined. Two dorsal fins, almost contiguous, separated by a distance shorter than half eye-diameter. Inter-pelvic process single. Caudal peduncle with two small keels and another between them on either side of caudal peduncle. Swimbladder well developed. Body without a prominent pattern of stripes or sports.

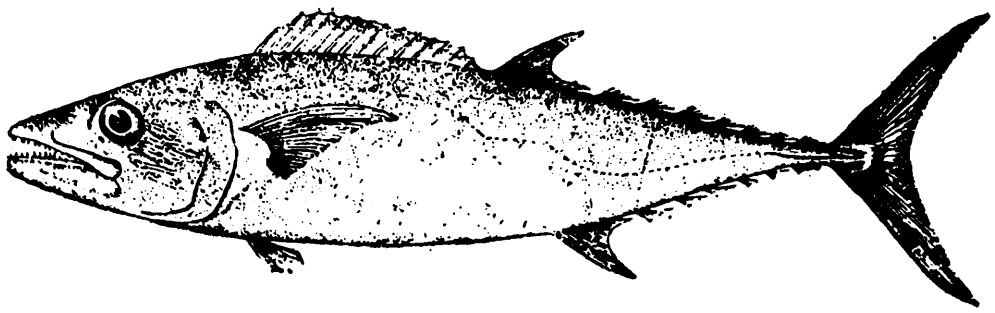
Monotypic.

Gymnosarda unicolor (Ruppell)

[Text-fig. 325]

Thynnus (Pelamys) unicolor Ruppell, 1838, *Neue Wirbelt., Fische Rothen Meeres* : 40, pl. 12, fig. 1 (type-locality : Jiddah, Red Sea).

Gymnosarda unicolor : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 380, fig. 7.



Text-fig. 325. *Gymnosarda unicolor* (Ruppell)

Common Names :

Dogtooth-tuna	...	English
Vori-Kannali, Pallan-choora	...	Lakshadweep Is

Distinguishing Characters :

Body robust and fusiform. Gill-rakers 1 on upper arm and 11 or 12 on lower arm of first arch. Two dorsal fins, almost contiguous; first dorsal fin with 13 or 14 spines, and the second fin with 3 spines and 10 soft rays, followed by 7 finlets. Anal fin with 3 or 4 spines and 10 soft rays, followed by 6 finlets. Lateral line prominent, curved over pectoral fin, wavy posteriorly.

Colour : body dark blue on back and along sides above the level of pectoral fins, silvery on belly. Spinous dorsal fin bluish green, other fins and finlets dusky blue, except distal parts of soft dorsal and anal fins which are white.

Geographical Distribution : Tropical Indo-west Pacific.

Fishery Information : It occurs in the Andaman Sea and the Laccadive Sea around coral reefs where it is taken by hook and line.

Genus **Katsuwonus** Kishinouye

Katsuwonus Kishinouye, 1915, *Proc. Sci. Fish. Ass. Tokyo*, **1**(1) : 21 (type-species : *Scomber pelamis* Linnaeus) ; Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes, Mar. Biol. Ass. India*, (pt. 1) 44 (Review).

Body robust, fusiform and rounded. Gill-rakers numerous, 53 to 63 on first arch. Teeth in jaws minute; upper surface of tongue with

two longitudinal cartilaginous ridges; roof of mouth edentulous. Body naked except for corselet and lateral line, the corselet well developed. Two dorsal fins, almost contiguous, the first fin with 14 to 16 spines, the second dorsal with 14 to 16 spines, followed by 7 to 9 finlets. Anal fin with 13 or 14 soft rays, followed by 7 or 8 finlets. Interpelvic process a double flap. Strong keel on each side of base of caudal fin between two smaller keels. Four to six conspicuous dark longitudinal bands on lower half of body; no dark markings on back.

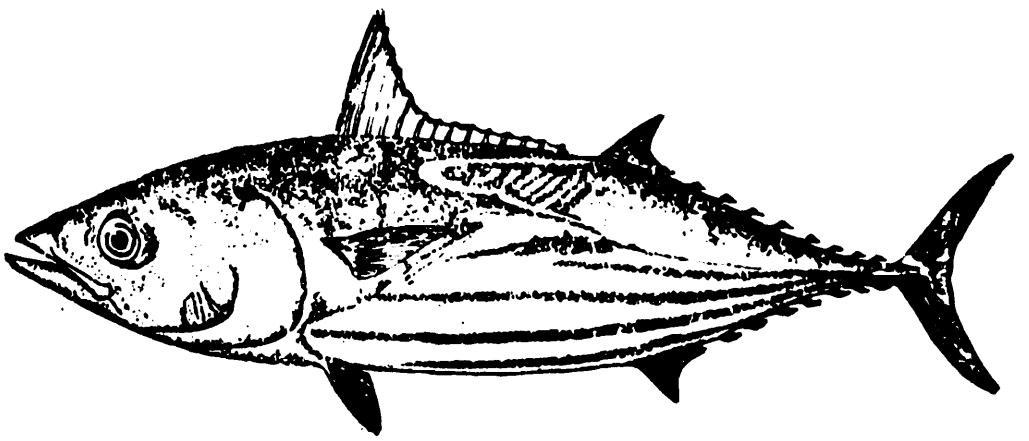
Monotypic.

Katsuwonus pelamis (Linnaeus)

[Text-fig. 326]

Scomber pelamis Linnaeus, 1758, *Systema. Naturae*, **1** (ed. 10) ; 297 (type-locality : Tropical pelagic).

Thynnus pelamys : Day, 1889, *Fauna Br. India*, Fishes, **2** : 206.



Text-fig. 326. *Katsuwonus pelamis* (Linnaeus)

Common Names :

Skipjack-tuna	...	English
Gedar	...	Gujarati
Gedar, Kuppa	...	Marathi
Choora, Metti, Kalibilamas	...	Lakshadweep Is.

Distinguishing Characters :

Body robust, elongate and rounded. Teeth in a single row in both jaws. Gill-rakers 53 to 63 on first arch. Two dorsal fins, separated by a small interspace ; first fin with 14 to 16 spines and second fin with 13 or 14 soft rays, followed by 7 to 9 finlets. Anal fin with 13 or 14

soft rays, followed by 7 or 8 finlets. Lateral line curved below second dorsal fin, then passing straight to caudal-fin base.

Colour : back metallic blue tinged with violet, lower sides and belly silvery, with 4 to 6 conspicuous dark longitudinal bands which in live specimens may appear as discontinuous line of dark blotches.

Geographical Distribution : Cosmopolitan in tropical and subtropical waters of the Indo-Pacific and Atlantic oceans.

Fishery Information : The most important tuna forming a valuable fishery in Lakshadweep Islands in our region and schools may stray into coastal waters as evidenced from occasional catches at Vizhinjam, Ratnagiri and other centres on the west coast of India, and at Tuticorin in the Gulf of Mannar. It has a maximum weight of about 20 kg at a length of 100 cm ; common size 40-80 cm.

Genus **Rastrelliger** Jordan & Starks

Rastrelliger Jordan and Starks, in : Jordan and Dickerson, 1908, *Proc. U.S. natn. Mus.*, **34** : 607 (type-species : *Somber brachysoma* Bleeker), Matsui, 1967, *Copeia* : 71 (Review).

Body fusiform and moderately compressed. Teeth small in jaws ; no teeth on vomer and palatines. Body and cheeks with minute scales. Spinous dorsal fin separated from the soft-rayed second dorsal fin by a distance equal to length of base of spinous dorsal fin ; anal fin spine thin, rudimentary ; 5 (rarely 6) finlets present behind each dorsal and anal fins. Caudal fin deeply forked ; two small keels on either side of caudal peduncle. *Rastrelliger* species are greenish above, with two horizontal rows of spots on each side of back.

Three species, all in our area.

KEY TO SPECIES

1 (a) Gillrakers 20 to 25 on lower arm of first arch, short and shorter than snout ... *R. faughni*

(b) Gillrakers 30 to 48 on lower arm of first arch, very long, clearly visible when mouth is opened, the mouth looking as if full of feathers ... 2

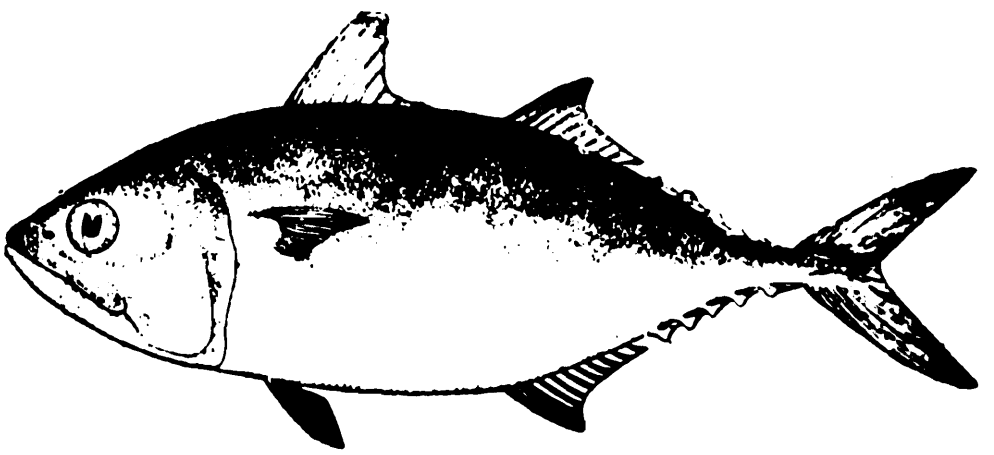
2 (a) Body depth (at margin of gill-opening) 4.0 to 4.8 times in standard length; head length about equal to or more than greatest body depth; dark longitudinal stripes often clear on upper half of body .. *R. kanagurta*

(b) Body depth (at margin of gill-opening) 3.7 to 4.0 times in standard length; head length distinctly smaller than greatest body depth; body without longitudinal stripes but often with 1 or 2 rows on back ... *R. brachysoma*

Rastrelliger brachysoma (Bleeker)

[Text-fig. 327]

Scomber brachysoma Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **1** : 350 (type-locality : Batavia. Java) ; Day, 1876, *Fishes of India* : 251 ; Day. 1889, *Fauna Br. India*, Fishes, **2** : 204.



Text-fig. 327. *Rastrelliger brachysoma* (Bleeker)

Common Name :

Short-bodied mackerel ... English

Distinguishing Characters :

Body very deep, its depth (at gill cover) 3.7 to 4.0 times in standard length; head equal to or less than body depth. Gill-rakers very long, visible when mouth is opened, 30 to 48 on lower arm of first arch. Teeth minute, in a single series in both jaws; absent on vomer and palatines. Two dorsal fins, distinctly separated; first dorsal fin with 8 to 10 weak spines, and second dorsal fin with 1 spine and 11 soft rays. Anal fin with 1 rudimentary spine and 11 soft rays; second

dorsal and anal fins each followed by 5 (rarely 6) finlets. Scales small, ctenoid.

Colour : back bluish green, belly silvery with a yellowish tinge; often 1 or 2 rows of dark spots on back. Spinous dorsal fin yellowish, with a black edge; pectoral and pelvic fins dusky, other fins yellowish; a faint dark blotch behind the pectoral-fin base. In fresh individuals two glistening whitish spots visible on the head above and behind each eye.

Geographical Distribution : Andaman Sea, Indonesia, Thailand, the Philippines and eastwards to Fiji Islands.

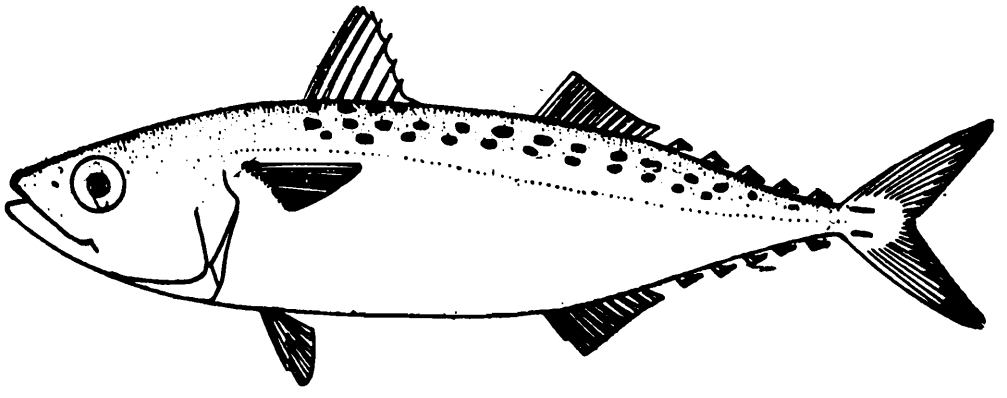
Lives in large schools in coastal waters, usually at depths between 10 and 50 m.

Fishery Information : This species is usually included together with *R. kanagurta,* in a single statistical category. Marketed fresh; also dried-salted, smoked, canned and fermented. The species forms a fishery of local importance in the Andaman Sea in our region.

Rastrelliger faughni Matsui

[Text-fig. 328]

Rastrelliger faughni Matsui, 1967, *Copeia* : 74, fig. 1 (type-locality : Philippines and Taiwan) ; Gnanamuttu, 1972, *Indian J. Fish.*, **18** : 170, fig. 1.



Text-fig. 328. *Rastrelliger faughni* Matsui

Common Names :

Faughn's mackerel	...	English
Kumla, Kanangeluthi	...	Tamil

Distinguishing Characters :

Body fusiform, its depth (at margin of gill cover) about 5.0 times in standard length; head longer than body length. Gill-rakers very short, shorter than snout, when mouth is opened wide the rakers do not extend far into mouth; 20 to 25 rakers on lower arm of first arch. Teeth in a single series, minute and pointed in both jaws; absent on vomer and palatines. Two dorsal fins, widely separated; first dorsal fin with 8 to 10 weak spines, second dorsal fin with 1 spine and 11 soft rays. Anal fin with 1 rudimentary spine and 11 soft rays; dorsal and anal fins each followed by 5 finlets. Scales small, ctenoid.

Colour : back bluish-green, belly yellowish silvery; two rows of black spots on back below dorsal-fin base from origin of first dorsal fin to caudal peduncle; 2 to 6 large spots at base of first dorsal fin, visible from above, two faint stripes at level of lateral line in some; a black blotch behind pectoral-fin base; outer margins of dorsal and pectoral fins dark.

Geographical Distribution : South-east coast of India, Malayasia, Indonesia, Taiwan and the Phillipines.

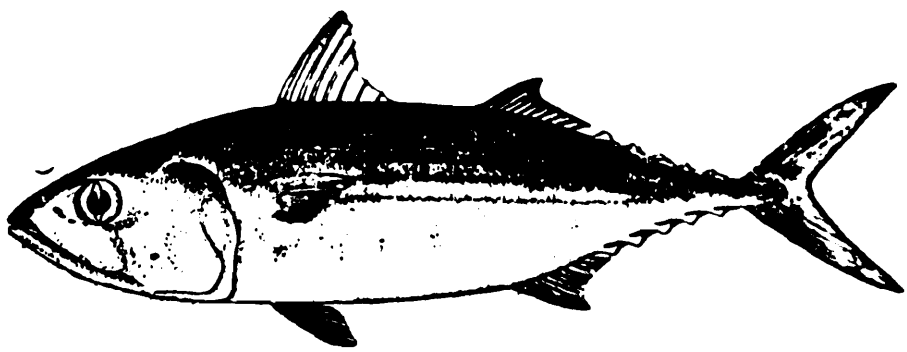
A pelagic and migratory fish found in large schools in coastal waters.

Fishery Information : The species supports a minor fishery at Madras during January-March when fish above 22 cm SL form the bulk of the catches; juveniles of this species below 10 cm, form a good percentage of mackerel in April and May at Madras.

Rastrelliger kanagurta (Cuvier)

[Text-fig. 329]

Scomber kanagurta Cuvier, 1817, *Regne Animal*, **2** : 313 (based on Russell, 1802, *Fishes of Vizagapatnam* : pl. 136) (type-locality : Vizagapatnam).
Scomber microlepidotus Ruppell : Day, 1876, *Fishes of India* : 250. pl. 54, figs. 3, 4 & 5; Day, 1889, *Fauna Br. India*, Fishes, **2** : 203, fig. 71.



Text-fig. 329. *Rastrelliger kanagurta* (Cuvier)

Common Names :

Indian mackerel	...	English
Karan-kita	...	Oriya
Kanagurta, Kannangadatha	...	Telugu
Kumla, Kanangeluthi	...	Tamil
Ayila, Ayla	...	Malayalam
Bangda	...	Kannada
Kaulagedar, Bangada	...	Marathi
Bangada	...	Gujarati

Distinguishing Characters :

Body fusiform, its depth (at margin of gill cover) 4.0 to 4.8 times in standard length; head length longer than body depth. Gill-rakers very long, visible when mouth is opened, 30 to 46 on lower arm of first arch. Teeth minute and pointed, in a single row in both jaws, often disappearing with age; vomer and palatines edentulous. Two dorsal fins, widely separated; first dorsal fin with 8 to 10 weak spines, the second dorsal fin with 1 spine and 11 soft rays. Anal fin with 1 rudimentary spine and 11 soft rays; 5 (rarely 6) finlets behind each dorsal and anal fins. Scales small, ctenoid.

Colour : back blue-green, flanks silvery with golden tint; two rows of small dark spots on sides of dorsal-fin bases, narrow dark longitudinal bands on upper part of body (golden in fresh specimens) and a black spot on body near lower margin of pectoral fin. Dorsal fins yellowish with black tips; caudal and pectoral fins yellowish; other fins dusky.

Geographical Distribution : Widespread in the Indo-Pacific.

Fishery Information : The mackerel is a pelagic shoaling fish and its fishery nowhere else is of such high magnitude as on our coast. Its average annual landing during 1950-80 was around 70,000 tonnes varying largely from year to year from 16,431 tonnes in 1956 to 2,04,575 tonnes in 1971. On an average it accounts for about 8% of the country's marine fish landings. The bulk of the catches (90%) are obtained from the west coast off Ratnagiri—Quilon region. The landings of mackerel on the east coast in general are low but in some parts of Tamil Nadu, Andhra Pradesh and Orissa they are often heavy. The fishing season on the west coast begins in July-August and ends by April, the peak season being October-December. The aerial and accoustic surveys carried out along the southwest coast



Rastrelliger kanagurta (Cuvier)

have indicated an average stock size of about 2,80,000 tonnes particularly between 24 and 72 m The fishery is supported largely by the sizes ranging between 160-229 mm. The mackerel is mostly exploited by indigneous crafts and gears employing traditional methods, but mechanisation of the exploitation of this pelagic fishery resource is slowing selling in.

Genus **Sarda** Cuvier

Sarda Cuvier, 1829, *Regne Animal*, (ed. 2), **2** : 199 (type-species : *Scomber sarda* Bloch) ; Collette and Chao, 1975, *U.S. Fish. Wildlife Serv. Fish. Bull.*, **73**(3) : 597 (Revision).

Body fusiform, completely covered with fine scales posterior to the corselet, caudal keels naked. Jaw teeth conical; palatines with a strong row of teeth, no teeth on vomer and tongue Two dorsal fins, almost contiguous. Interpelvic process with a double flap. Prominent keel between two smaller keels on each side of caudal peduncle. Swimbladder absent. Several (5 to 10) stripes along the back, ranging from horizontal to oblique in orientation.

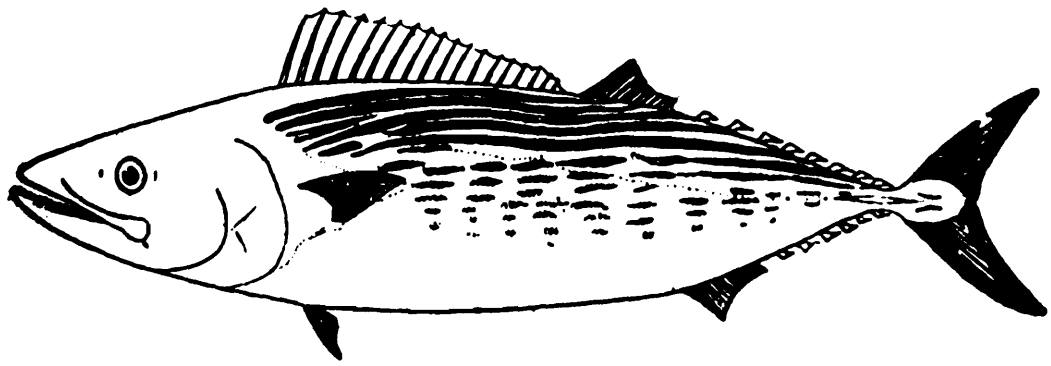
Four species known, only one in our area.

Sarda orientalis (Temminck & Schlegel)

[Text-fig. 330]

Pelamys orientalis Temminck and Schlegel, 1844, In : Von Siebold, *Fauna Japonica Pisces* : 99, pl. 52 (type-locality : Japan).

Pelamys chilensis (*nec* Cuvier) Day, 1876, *Fishes of India* : 253, pl. 56. fig. 1; Day, 1889, *Fauna Br. India*, Fishes. **2** : 208. fig. 73.



Text-fig. 330. *Sarda orientalis* (Temminck & Schlegel)

Common Names :

Oriental-bonito	...	English
Vari-choora	...	Malayalam

Distinguishing Characters :

A comparatively small tuna, with a relatively slender body. Gill-rakers 8 to 13 on first arch. Two dorsal fins, almost contiguous, the first dorsal fin with 17 to 19 spines, and the second dorsal fin with 14 to 16 soft rays, followed by 7 to 9 finlets. Anal fin with 13 to 16 soft rays, followed by 6 or 7 finlets. Pectoral fins short. Body with minute scales except on the well defined corselet.

Colour : back and upper sides of body steel blue, with 5 to 11 (usually 8) dark bluish stripes, running forward and downward; lower sides and belly silvery; younger juveniles with varying number of dark transverse bands which in older individuals get divided into narrow longitudinal stripes which ultimately join in the dorsal aspect to give rise to stripes characteristic of adults. First dorsal fin black.

Geographical Distribution : Indo-west Pacific.

Inhabits coastal waters.

Fishery Information : Along the south-west coast of India, the fishing season for adults of *S. orientalis* is from about June and lasts till about September, although stray specimens may be caught during other months, especially March to June. Juveniles are caught mostly during October-November. Good fishing may be often restricted to the duration of a fortnight only during the whole year. This species is also caught in stray numbers at Madras. Common size 30-50 cms.

Genus **Scomberomorus** Lacepede

Scomberomorus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : 296 (type-species : *Scomberomorus plumieri* Lacepede) ; Collette and Russo, 1979, *Proc. Mackerel Colloquium, Gulf of Mexico* : 3 (Review).

Body torpedo-shaped, apparently naked with minute scales and without corselet. Mouth large, with strong uniserial compressed cutting teeth; fine teeth on roof of mouth. Gill-rakers on first arch at most few, poorly developed. Dorsal fin long and low, with 14 to 19 spines in front and with 8 to 12 detached finlets behind. Anal fin with 12 to 20 soft rays, followed by 8 to 10 detached finlets. Pectoral and pelvic fins short. Caudal fin deeply lunate; three external caudal keels on each side.

Eighteen species, 4 in our area.

Seerfishes or Spanish mackerels constitute an important coastal pelagic fishery along most parts of the Indian coast. These fishes are

excellent food, the average annual catch is about 15,000 tonnes which represents about 1% of the total marine fish landings of the country. The fishing season extends from October to March. The major portion of the catch comes from Madras, Andhra and Kerala, although fair quantities are landed in Maharashtra and Karnataka. In the remaining maritime states they are landed in small quantities only. Seerfishes are caught in types of gear used for other fishes, but they form a high proportion in the landings by driftnets, and hooks and lines. They are consumed fresh or cured (salted and dried or wet-cured) and the demand for them is very high as they are considered the tastiest among marine fishes.

KEY TO SPECIES

1 (a) Pattern of spots and dashes on sides of body; distance from origin of second dorsal fin to base of caudal fin greater than the distance from second dorsal-fin origin to tip of snout	...	*S. lineolatus*
(b) Either vertical bars or spots on sides of body	...	2
2 (a) Lateral line abruptly curving downward under second dorsal fin; numerous wavy vertical bars on sides of body	...	*S. commerson*
(b) Lateral line straight or gradually descending posteriorly; dark prominent spots on sides of body	...	3
3 (a) Greatest body depth greater than head length; lower arm of preoperculum equal to or slightly longer than upper arm; interstine with four loops; first dorsal fin uniformly black	...	*S. koreanus*
(b) Greatest body depth equal to or less than head length; lower arm of preoperculum prominently projecting backwards as a much longer process than upper; interstine with three loops; first dorsal fin black only up to 8th spine, the rest white		*S. guttatus*

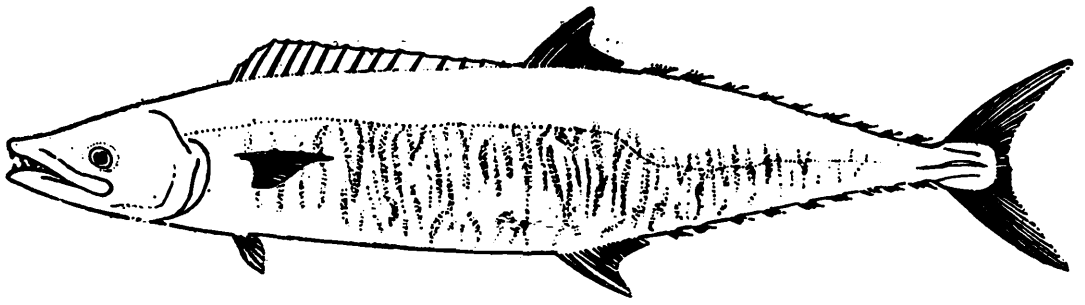
Scomberomorus commerson (Lacepede)

[Text-fig. 331]

Scomber commerson Lacepede, 1800, *Hist. nat. Poiss.*, **2** : 598, pl. 20(1) (based on MS drawing by Commerson) (type-locality : Mauritius).

Cybium commersonii : Day, 1876, *Fishes of India* : 255, pl. 56, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 211, fig. 74.

Scomberomorus commerson : Jones and Silas, 1962, *Indian J. Fish.*, **8**(1) : 194,



Text-fig. 331. Scomberomorus commerson (Lacepede)

Common Names :

Narrow-barred Spanish mackerel	..	English
Konema	...	Telugu
Mah-wu-laachi, Ah-ku-lah	...	Tamil
Chumbum	...	Malayalam
Surmai, Anjari	...	Marathi
Surmai, Chhapri	...	Gujarati
?Digumas	...	Minicoy Is.

Distinguishing Characters :

Body elongate and rather strongly compressed Jaw teeth strong and compressed, serrated along their edges ; fine teeth on vomer and palatines. Gill-rakers 0 to 1 on upper arm, 3 to 6 on lower arm (total 3 to 6) on first arch. Two dorsal fins, the first dorsal fin with 14 to 17 spines and second dorsal fin with 14 to 19 soft rays, followed by 8 to 10 finlets. Anal fin with 14 to 18 soft rays, followed by 8 to 10 finlets Pectoral fins somewhat falcate. Lateral line with a prominent dip under the second dorsal fin. Interstine with two folds and three distinct limbs.

Colour : back of body iridescent blue-grey, sides below lateral line silvery with bluish reflections, with large black blotches in juveniles which merge to form 20 to 50 wavy narrow grey bars in adults.

Geographical Distribution : Widespread throughout the Indo-west Pacific ; Mediterranean.

A pelagic species, inhabiting coastal waters, at depths between 15 to 200 m ; found in small shoals.

Fishery Information : A very large species (reaching 2.2 m. fork length) attaining a weight of 45 kgm. Caught all along the Indian coast and Andaman Sea. This is the largest *Scomberomorus* species.

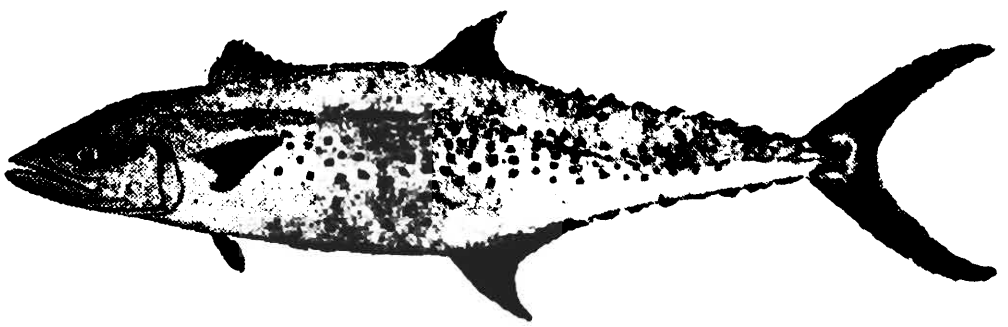
Scomberomorus guttatus (Bloch and Schneider)

[Text-fig. 332]

Scomber guttatus Bloch and Schneider, 1801, *Syst. Ichth.* : 23, pl. 5 (type-locality : Tranquebar).

Cybium guttatum : Day, 1876, *Fishes of India* : 255, pl. 55, fig. 1 & pl. 56, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 210.

Scomberomorus guttatus : Jones and Silas, 1962, *Indian J. Fish.*, **8** : 195, fig. 3.



Text-fig. 332. *Scomberomorus guttatus* (Bloch & Schneider)

Common Names :

Indo-Pacific Spanish mackerel	...	English
Mackerel	...	Bengali
Vanjaramu, Wingram	...	Telugu
Vanjiram, Wantasaran, Cheela, Katta-cheela, Kattayan-Seela	...	Tamil
Ney-meen, Arrakeeah, Varimeen, Seela Nammeen	...	Malayalam
Khullkul	...	Kannada
Towar, Touri, Kargan, Surmai, Surma-hadra	...	Marathi
Surmai, Chhapri	...	Gujarati

Distinguishing Characters :

Body elongate and strongly compressed, its greatest depth less than or equal to head length. Lower arm of preoperculum prominently projecting backwards as a much longer process than the upper arm. Jaw teeth moderately compressed, those in lower jaw longer. Gill-rakers 1 to 4 on upper arm, 6 to 9 on lower arm of first arch. Two dorsal fins ; first dorsal fin with 15 to 17 spines, second fin with 19 to 23 soft rays, followed by 8 or 9 finlets. Anal fin with 20 to 22 soft rays, followed by 8 to 10 finlets. Lateral line without a prominent dip under the second dorsal fin, with auxillary branches off the anterior part of the lateral line. Interstine with two folds and three distinct limbs.

Colour : back of body iridescent blue, sides below lateral line silvery ; usually 3 irregular rows of dark round spots (equal in size to eye) along the sides of body. Spinous dorsal fin black up to the eighth dorsal spine, and the rest white and tipped with black.

Geographical Distribution : Continental Indo-west Pacific, from Hong Kong, south to the Gulf of Thailand and west to the Persian Gulf.

Fishery Information : A medium-sized (reaching 760 mm FL) species and the most common seer-fish along the Indian coast and the Andaman Sea where it forms a minor fishery.

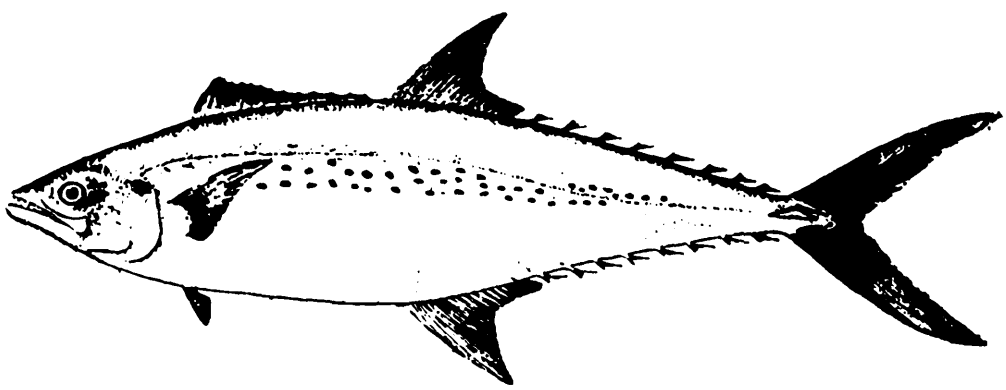
Scomberomorus koreanus (Kishinouye)

[Text-fig. 333]

Cybium kuhlii (*nec* Cuvier) Day, 1876, *Fishes of India* : 254, pl. 56, fig. 2 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 209.

Cybium koreanum Kishinouye, 1915, *Suisan Gakkai Ho,* **1**(1) : 1 (type-locality : Japan).

Scomberomorus koreanus : Devaraj, 1976, *Jap. J. Ichthyol.*, **23**(2) : 81, figs. 2a, b & c.



Text-fig. 333. *Scomberomorus koreanus* (Kishinouye)

Common Names :

Korean-Seerfish	...	English
Vellura	...	Tamil

Distinguishing Characters :

Body elongate and strongly compressed, its greatest depth greater than head length. Lower arm of preoperculum as long as or slightly longer than upper arm. Jaw teeth flattened, those in lower jaw longer; fine teeth on vomer and palatines. Gill-rakers 2 or 3 on upper arm, 8 or 9 on lower arm of first gill arch (total 11 or 12). Two dorsal fins; first dorsal fin with 14 or 15 spines, second dorsal fin with 19 to 23 soft rays, followed by 7 to 9 finlets. Anal fin with 20 to 24 soft rays, followed by 7 to 9 finlets. Lateral line almost straight to below middle of second dorsal fin and gradually descending posteriorly to middle of caudal peduncle, with auxillary branches off the anterior part of lateral line. Interstine with three folds and four distinct limbs.

Colour : blue on back, silvery on sides, with usually 3 irregular rows of dark round spots (smaller in size to eye) along sides of body. Spinous dorsal fin uniformly black.

Geographical Distribution : Continental Indo-west Pacific, from Japan and China, south to Singapore and Sumatra, and west to Bombay (India).

Fishery Information : A medium-sized (reaching 750 mm FL) species which contributes a fishery on the Rameswaram Island (Tamil Nadu).

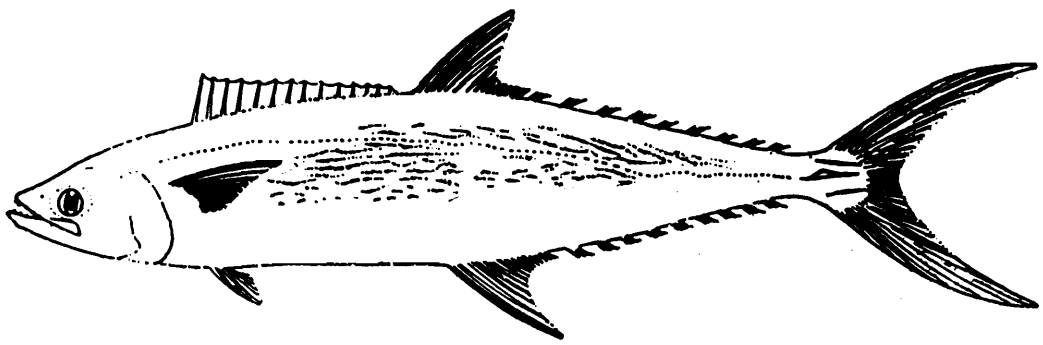
Scomberomorus lineolatus (Cuvier)

[Text-fig 334]

Cybium lineolatum Cuvier, 1831, *Hist. nat. Poiss.*, **8** : 170 (type-locality : Malabar) ; Day, 1876, *Fishes of India* : 256 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 212.

Cybium interruptum Cuvier : Day, 1876, *Fishes of India* : 254, pl. 56, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 210.

Scomberomorus lineolatus : Jones and Silas, 1962, *Indian J. Fish.*, 8(1) 197, fig. 4, 5c.



Text-fig. 334. *Scomberomorus lineolatus* (Cuvier)

Common Names :

Streaked Spanish mackerel	...	English
Wingeram, Vanjaramu	...	Telugu
Towar, Iswan, Anjari	...	Marathi
Surmai, Chhapri	...	Gujarati

Distinguishing Characters :

Body elongate and strongly compressed. Jaw teeth pointed and strongly compressed; fine teeth on vomer and palatines. Gill-rakers 2 to 4 on upper arm, 8 to 12 on lower arm of first gill arch. Two dorsal fins; first dorsal with 15 to 17 spines, second dorsal fin with 19 or 20 soft rays, followed by 8 to 10 finlets; distance from origin of second dorsal fin to base of caudal fin greater than the distance from second dorsal-fin origin to tip of snout. Anal fin with 18 to 20 soft rays, followed by 8 to 10 finlets. Lateral line with a wavy pattern to below second dorsal fin and then gradually bent downward towards caudal keel. Interstine with two folds and three distinct limbs.

Colour : bluish-grey on back of body, the sides silvery, with a pattern of spots and dashes on the sides.

Geographical Distribution : Found in the Gulf of Thailand and Java, west to Sri Lanka and India.

A pelagic migratory fish, inhabiting coastal waters at depths between 30 and 200 m.

Fishery Information : A medium-sized (reaching 800 mm. FL) species which is an important element in the seer-fishery of India.

Genus **Thunnus** South

Thunnus South, 1845, In : Smedley, Rose and Rose. *Encyclop. Metorpolitana*, **25** : 620 (type-species : *Scomber thynnus* Linnaeus) ; Gibbs and Collette, 1967, *U. S. Fish. Wildl. Serv. Fish. Bull.*, **66**(1) : 97 (Revision).

Body fusiform and fully covered with very small scales, with a well defined corselet of large scales in pectoral region. Gill-rakers 19 to 43 on first arch. Jaw teeth slender and conical; vomer and palatines with fine teeth; upper surface of tongue with two longitudinal cartilaginous ridges. Two dorsal fins, separated by a narrow space; first dorsal fin with 12 to 14 spines. Pectoral fin with 30 to 36 rays. Inter-pelvic process with a double flap. Caudal peduncle with a strong lateral keel between two smaller keels. Body usually iridescent dark blue dorsally and silvery ventrally.

Seven species. 5 in our area.

KEY TO SPECIES

1 (a) Pectoral fin very long, its tip extending beyond the end of second dorsal-fin base; caudal fin with a prominent narrow white posterior margin	...	*T alalunga*
(b) Pectoral fin short to moderately long, its tip not extending to end of second dorsal-fin base; caudal fin without white posterior margin	...	2
2 (a) Origin of second dorsal fin nearer to posterior end of caudal keel than to hind edge of orbit	...	3
(b) Origin of second dorsal-fin nearer to hind edge of orbit than to posterior end of caudal keel	...	4
3 (a) Pectoral fin short, less than 80% of head length; posterior margin of preoperculum rounded	...	*T thynnus orientalis*
(b) Pectoral fin moderately long, more than 80% of head length; posterior margin of preoperculum more or less angular	...	*T obesus*
4 (a) Gill-rakers 26 to 35 on first arch, of which 19 to 21 on lower arm; gasbladder present; belly with pale markings oriented vertically	...	*T albacares*

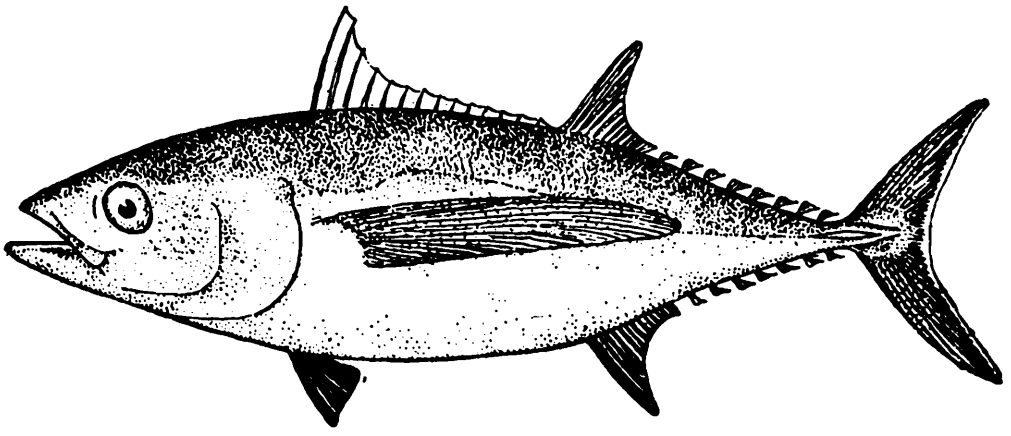
(b) Gill-rakers 19 to 26 on first arch, of which 13 to 19 on lower arm; gasbladder absent; pale markings on belly oriented mostly horizontally or without specific orientation ... *T tonggol*

Thunnus alalunga (Bonnaterre)

[Text-fig. 335]

Scomber alalunga Bonnaterre, 1788, *Tableau Encyl. Ichth.* : 139 (type-locality : Mediterranean).

Thunnus alalunga : Jones and Silas, 1961, *Indian J. Fish.*, 7(2) : 382, fig. 9.



Text-fig. 335. *Thunnus alalunga* (Bonnaterre)

Common Name :

Albacore ... English

Distinguishing Characters :

Body torpedo-shaped, its depth greatest near level of dorsal fin. Gill-rakers 25 to 32 on first arch. Two dorsal fins, separated by a narrow interspace; first dorsal fin with 13 or 14 spines and second dorsal fin with 13 to 15 soft rays, followed by 7 to 9 finlets. Anal fin with 13 to 15 soft rays, followed by 7 or 8 finlets. Pectoral fins remarkably long, about 30% of fork length or longer, usually reaching nearly or quite to second dorsal finlet. Caudal peduncle very slender, bearing on each side a strong lateral keel between two smaller keels. Liver with striations on ventral surface; gasbladder present, running full length of body cavity.

Colour : blue-black on back of body, silvery below; an iridescent blue lateral band runs along sides. Spinous dorsal fin hyaline, dusky

tipped; soft dorsal and anal fins light yellow, anal finlets silvery or dusky; posterior margin of caudal fin white.

Geographical Distribution : Cosmopolitan in tropical, subtropical and temperate waters of the Indo-Pacific and Atlantic Oceans.

Oceanic, young often in large schools.

Fishery Information : This species (as *Thunnus germo*) has figured in the Japanese tuna catches from parts of the Indian Seas. The season lasts from May-June to October; esteemed as a premium fish. Common size 40-100 cms.

Thunnus albacares (Bonnaterre)

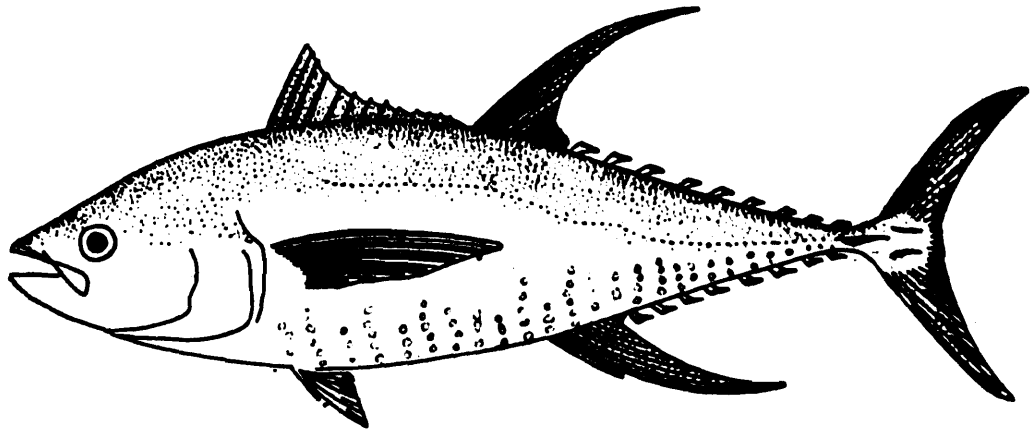
[Text-fig. 336]

Scomber albacares Bonnaterre, 1788, *Tab. Encyclop. Ichthyologie* : 140 (based on a drawing by Sloane) (type-locality : Madiera).

Thynnus macropterus Schlegel : Day, 1876, *Fishes of India* : 253; Day, 1889, *Fauna Br. India,* Fishes, **2** : 207.

Neothunnus macropterus : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 385, fig. 12.

Neothunnus itosibi Jordan and Evermann : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 387, fig. 13.



Text-fig. 336. *Thunnus albacares* (Bonnaterre)

Common Names :

Yellowfin-tuna	...	English
Soccer	...	Tamil
Pimp, Kuppa, Gedar	...	Marathi
Gedara	...	Gujarati
Kannalimas, Poovan-choora	...	Lakshadweep Is.

Distinguishing Characters :

Body fusiform, slightly compressed laterally. Gill-rakers 26 to 35 on first arch. Two dorsal fins, separated by a narrow interspace; first dorsal fin with 13 or 14 spines and second fin with 14 soft rays, followed by 9 finlets; origin of second dorsal fin nearer to hind edge of orbit than to posterior end of caudal keel. Anal fin with 14 or 15 soft rays, followed by 7 to 10 finlets; large specimens have very long dorsal and anal fins. Pectoral fins moderately long, usually reaching beyond second dorsal-fin origin but not beyond the end of its base, usually 22 to 31% of fork length. Caudal peduncle very slender, bearing on each side a strong lateral keel between two smaller keels. No straiations on ventral surface of liver; gasbladder narrow and elongate, not divided anteriorly.

Colour : most brilliantly coloured species, with a shining golden lateral band; silvery on belly and frequently crossed by about 20 broken, nearly vertical pale lines. Dorsal and anal fins, and finlets bright yellow, the finlets with a narrow black border.

Geographical Distribution : World-wide, in tropical and sub-tropical seas.

Oceanic.

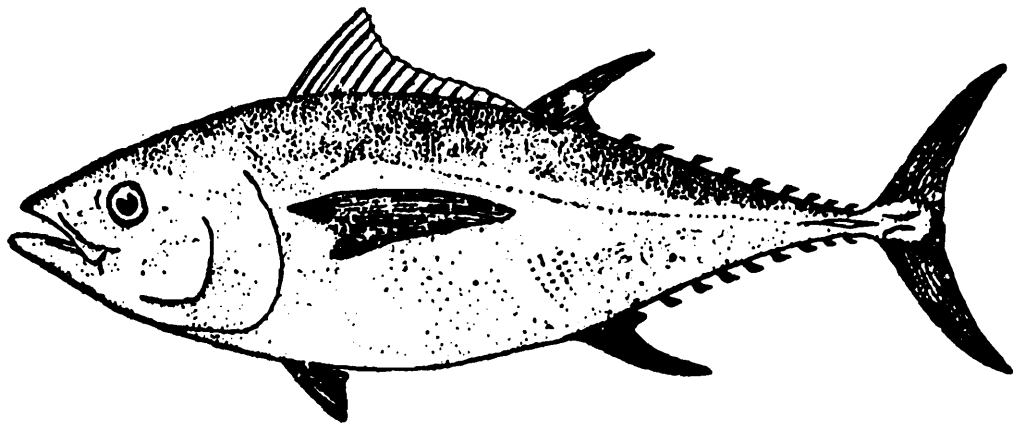
Fishery Information : Common in the Laccadive Sea, the Andaman Sea, Gulf of Mannar and off Ratnagiri (Maharashtra) in our area. Japanese reports indicate excellent fishing grounds in several parts of the Indian Ocean extending close to the Indian coast. The Yellowfin-tuna is fished in considerable quantities in the Lakshadweep Islands. The fishing season lasts from October to January. Common size 50-150 cms.

Thunnus obesus (Lowe)

[Text-fig. 337]

Thynnus obesus Lowe, 1839, *Proc. zool. Soc. Lond.*, **7** : 78 (type-*locality* : Medeira).

Parathunnus obesus mebachi (Kishinouye) : Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 383, fig. 10.



Text-fig. 337. *Thunnus obesus* (Lowe)

Common Names :

Bigeye-tuna	...	English
Valiya-choora	...	Lakshadweep Is.

Distinguishing Characters :

Body stout and fusiform, slightly compressed laterally. Gill-rakers 23 to 31 on first arch. Two dorsal fins, separated by a narrow interspace; first dorsal fin with 13 or 14 spines and second fin with 14 or 15 soft rays, followed by 8 to 10 finlets; origin of second dorsal fin nearer posterior end of caudal keel than to hind edge of orbit. Anal fin with 13 or 14 soft rays, followed by 7 to 10 finlets Pectoral fins moderately long, 22 to 31% of fork length in large specimens (over 110 cm.), very long in smaller specimens, extending to first dorsal finlet. Caudal peduncle very slender, with a strong lateral keel between two smaller keels. Ventral surface of liver striated, but striations few and peripheral in position—a precise identifying factor from the Bluefin-tuna; gasbladder well developed, divided anteriorly into two globular dorsal heads.

Colour : back metallic dark blue; lower sides and belly silvery, with a iridescent blue lateral band along sides. Spinous dorsal fin deep yellow, soft dorsal and anal fins yellow, finlets bright yellow and edged with black.

Geographical Distribution : Cosmopolitan in the tropical and subtropical waters of the Pacific, Atlantic and Indian Ocens.

A pelagic oceanic species.

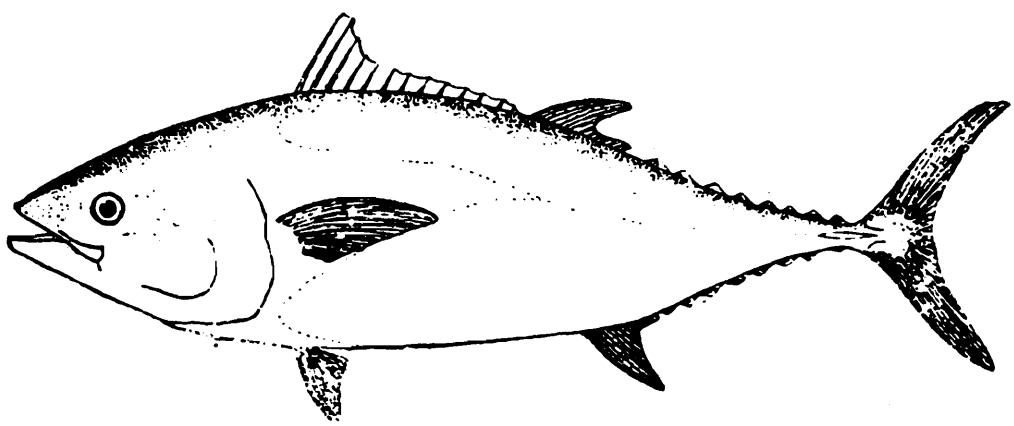
Fishery Information : Japanese records indicate its common occurrence in our waters. Common size 60-180 cms.

Thunnus thynnus orientalis (Temminck & Schlegel)

[Text-fig. 338]

Thynnus orientalis Temminck and Schlegel, 1844, *Fauna Japonica, Pisces* : 94 (type-locality : Nagasaki, Japan).

Thunnus thynnus orientalis : Jones and Silas, 1961, *Indian J., Fish.* 7(2) : 381, fig. 8.



Text-fig. 338. *Thunnus thynnus orientalis* (Temminck & Schlegel)

Common Names :

Oriental Bluefin-tuna	...	English
Choora	...	Malayalam

Distinguishing Characters :

Body robust and fusiform; eyes small. Gill-rakers 34 to 43 on first arch. Two dorsal fins, separated by a narrow interspace; first dorsal fin with 13 or 14 spines and second fin with 14 to 16 soft rays, followed by 8 or 9 finlets; origin of second dorsal-fin nearer to posterior end of caudal keel than to hind edge of orbit. Anal fin with 13 or 14 soft rays, followed by 7 or 8 finlets. Pectoral fins short, not reaching the interspace between dorsal fins, less than 80% of head length. Caudal peduncle with a strong lateral keel between two smaller keels. Liver densely striated on ventral surface, its three lobes subequal in length; gasbladder present.

Colour : back bluish black, the abdomen silvery with a faint pattern of paler lines alternating with rows of dots. Spinous dorsal fin grey, soft dorsal fin blue-black, tips yellowish, finlets yellowish; pelvic fins dusky; caudal keel yellowish, occasionally dark.

Geographical Distribution : Indo-Pacific.

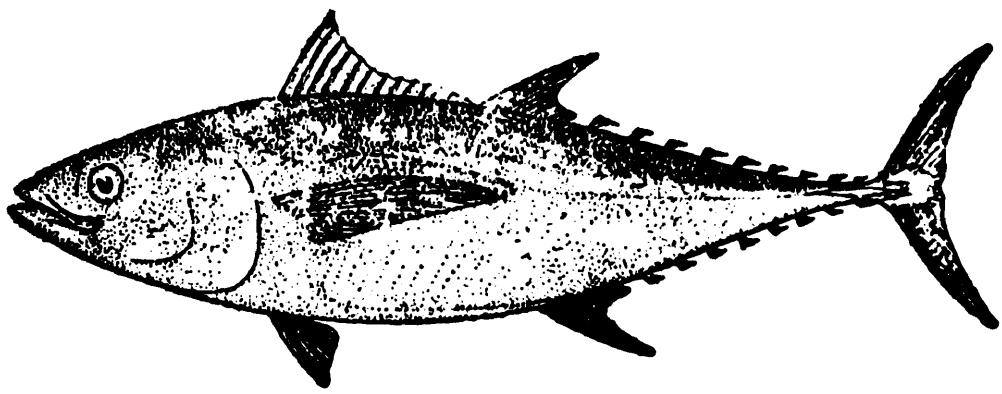
Fishery Information : Japanese tuna catches indicate the occurrence of this species in parts of the Indian Seas. Common size 200-300 cms.

Thunnus tonggol (Bleeker)

[Text-fig. 339]

Thynnus tonggol Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **1** : 365 (type-locality : Batavia Sea).

Kishinoella tonggol Jones and Silas, 1961, *Indian J. Fish.*, **7**(2) : 384, fig. 11.



Text-fig. 339. *Thunnus tonggol* (Bleeker)

Common Names :

Longtail-tuna	...	English
Kerachoora, Kethal	...	Malayalam
Gethal, Gethar	...	Kannada
Khavalya-gedar	...	Marathi

Distinguishing Characters :

Body fusiform and rounded. Gill-rakers 19 to 26 on first arch. Two dorsal fins, separated by a narrow interspace; first dorsal fin with 12 or 13 spines and second fin with 14 soft rays, followed by 9 finlets; origin of second dorsal fin nearer to hind edge of orbit than to posterior end of caudal keel. Anal fin with 14 soft rays, followed by 8 finlets. Pectoral fins moderately long, 22 to 31% of fork length in smaller specimens (under 66 mm. fork length) and 16 to 22% in larger specimens Caudal peduncle with a strong lateral keel between two smaller keels. Ventral surface of liver without striations; gasbladder absent or rudimentary.

Colour : back of body bluish black, lower sides and belly silvery with pale elongated oval spots arranged in horizontally oriented rows. Dorsal, pectoral and pelvic fins blackish; tip of soft dorsal and anal fins tinged with yellow; anal fin silvery; dorsal and anal finlets yellow, with greyish margins; caudal fin blackish, with streaks of yellowish green.

Geographical Distribution : Gulf of Aden, India, the East Indies, the Philippines, Japan and Australia.

A largely coastal species but avoids low salinity areas near mouth of large rivers.

Fishery Information : Common on the west coast of India from Ratnagiri to Cape Comorin, the Gulf of Mannar and the Andaman Sea. On account of the relatively long dark pectoral fins which generally reach to below the origin of the soft dorsal fin, the species is often confused with the Yellowfin tuna, *Thunnus albacares* (Bonnaterre). Common size 40-70 cms.

Family : Xiphiidae
[Swordfish]

Elongate robust body, rough in young, but smooth and scaleless in adult. Snout long and sword-like, depressed in cross-section view; jaws toothless in adult. Gill membranes free from isthmus; no gill-rakers Two dorsal fins in adult, the base of first fin short and well separated from second dorsal fin. Two anal fins in adult. Pectoral fins falcate, inserted low on body; no pelvic fins. Caudal peduncle in adult with a single median keel on each side. Vertebrae 26.

Only one monotypic genus. Swordfish are a valuable commercial species.

Genus **Xiphias** Linnaeus

Xiphias Linnaeus, 1758, *Systema Naturae*, ed. 10 : 248 (type-species : *Xiphias gladius* Linnaeus) ; Nakamura, 1974, *NOAA Tech. Rep. NMFS SSRF-675*, (pt. 2) : 45 (Review).

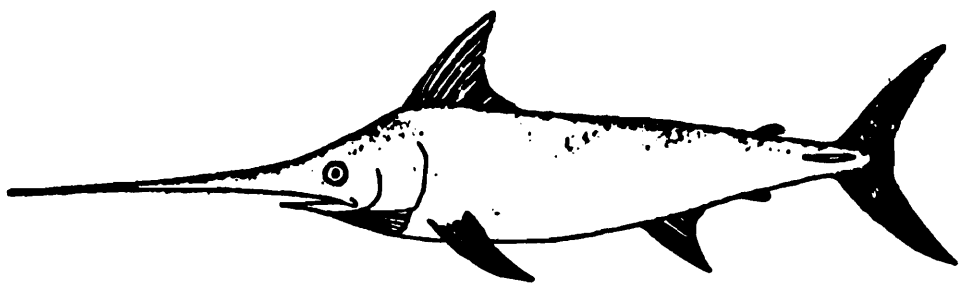
For characters, see those of family.

Monotypic.

Xiphias gladius Linnaeus

[Text-fig. 340a]

Xiphias gladius Linnaeus, 1758, *Systema Naturae*, (ed. 10) : 248 (type-locality : 'Habitat in Oceano Europae') : Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes. Mar. Biol. Ass. India*, (pt. 1) : 88, fig. 15.



Text-fig. 340a. *Xiphias gladius* Linnaeus

Common Names :

Swordfish	...	English
Kattichepa	...	Telugu
Vallimeen	...	Malayalam
Tadmasa	...	Marathi
Tadmachhi	...	Gujarati

Distinguishing Characters :

Large and very distinctive fish of rounded body, robust in front; snout long and sword-like in shape. First dorsal-fin base short, well separated from second dorsal fin. Anal fins with growth become divided; large specimens with high but short first dorsal and first anal fins, and smaller second dorsal and second anal fins. Caudal fin lunate in adults, emarginate to forked in young. Scales absent in adults but peculiar scale-like structures in young, gradually disappearing with growth.

Colour : brown black dorsally, light brown on ventral side. First dorsal fin dark brown, other fins brown to dark brown.

Geographical Distribution : World-wide, in all tropical and temperate oceans.

Fishery Information : The flesh of swordfish is greatly esteemed and the liver oil of this fish is exceedingly rich in vitamin A. This species usually occurs in deep water beyond the limit of the continental shelf of the east and west coasts of India. Attains well over 135 lbs.

Common size 100-220 cms. At the present time utilization is very low.

FAMILY : ISTIOPHORIDAE
[Billfishes : Spearfishes, Marlins and Sailfishes]

Body elongate, robust and more or less compressed. Upper jaw prolonged into a long spear which is rounded in cross-sectional view. Mouth with fine, rasp-like teeth in both jaws. Gill membranes united but free from isthmus; no rakers on gill arches. Dorsal fins two, close together, the first much larger than the second; anal fins two, the second much smaller than the first and similar in size and shape to second dorsal fin; the first dorsal and anal fins can be folded back into grooves; pectoral fins falcate, inserted low on body; pelvic fins elongate which from external appearance are reduced to a single ray (actually 3 elements closely appressed). Caudal fin large, strong and forked, with a pair of keels in either side at base. Lateral line always well visible. Body covered with more or less embedded, narrow and pointed scales. Vertebrae 24.

Billfishes are primarily inhabitats of warm seas, usually the upper layers of water above the thermocline. Being among the largest and swiftest fishes of the oceans, they perform considerable, sometimes transoceanic, migrations. All billfishes are of some commercial value and provide excellent food. Liver oils of these fishes are probably the richest of all in Vitamin A. Most of the fishery for these fishes from various parts of the Indian Ocean is carried out by the Japanese and the catch statistics published from Japan indicate the occurrence of rich fishing grounds even within a few miles off the Indian coast during certain seasons. These fishes are keenly sought after by sport fishermen and also commercial longliners. Their distribution and general habits indicate that fishing activities threaten their continued abundance of fish whose biology and ecology are little understood. The bill is used to stun prey by slashing back and forth.

Three genera, all in our area.

KEY TO GENERA

1 (a) First dorsal fin remarkably high and 'sail-like', with the anterior rays markedly shorter than middle rays; longest middle rays 2.5 times of body depth at level of mid-body; pelvic-fin rays very long, with well developed membrane (Sailfishes) ... **Istiophorus**

(b) First dorsal fin only slightly higher to slightly lower than body depth at level of mid-body, not sail-like in shape; anterior rays usually higher to much higher than middle rays; pelvic fins not as long, with a moderately developed membrane ... **2**

2 (a) Height of anterior part of first dorsal fin about as high as body depth; body strongly compressed; spear (snout) short (Spearfishes) ... **Tetrapturus**

(b) Height of anterior part of first dorsal fin lower than body depth; body not well compressed; spear longer (Marlins) ... **Makaira**

Genus **Istiophorus** Lacepede

Istiophorus Lacepede, 1802, *Hist. nat. Poiss.*, **2** : 374 (type-species : *Xiphias platypterus* Shaw & Nodder) ; Morrow and Harbo, 1969, *Copeia* : 34 (Revision).

Body elongate and laterally compressed. Snout long and round in cross-section. First dorsal fin extremely high, sail-shaped with the middle rays decidedly the longest. Pelvic-fin rays very long, almost reaching the vent, the fin membrane well developed, Two dorsal and anal fins. Lateral line easily distinguishable, composed of a single row of pores. Sides of body with 10 or 11 rows of striped crest patterns consisting of many light blue dots.

Sailfishes are fairly large fishes found in surface waters of tropical seas, in parts abundant, and among the best known and most esteemed of the larger game fishes, affording magnificient sport on light or moderate tackle.

Two species, one in our area only.

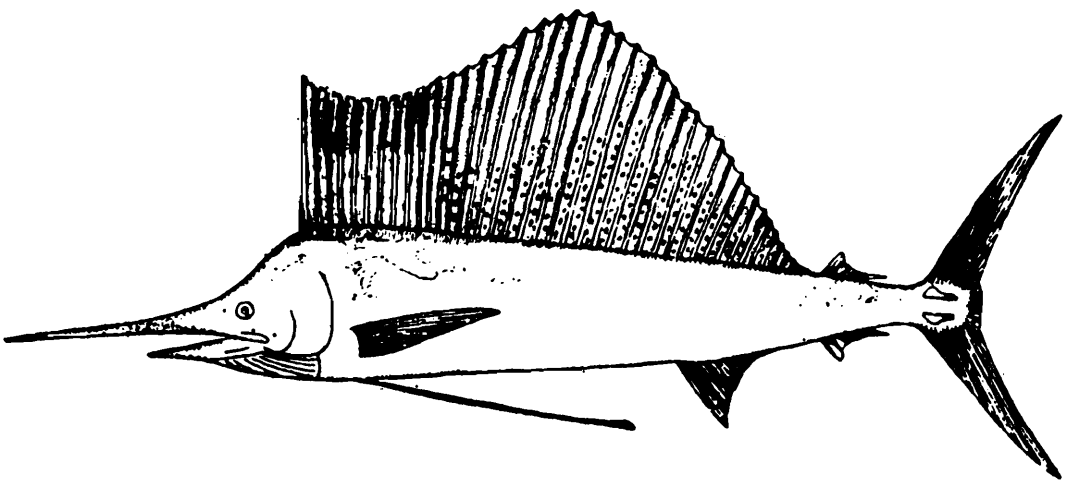
Istiophorus platypterus (Shaw & Nodder)

[Text-fig. 340b]

Xiphias platypterus Shaw and Nodder, 1791, *Natural. Misc.*, **10** : 28, pl. 8 (type-locality : Indian Ocean).

Histiophorus gladius (Broussonet) : Day, 1876, *Fishes of India* : 198 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 131.

Histiophorus immaculatus Ruppell : Day, 1876, *Fishes of India* : 199 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 132.



Text-fig. 340b. *Istiophorus platypterus* (Shaw & Nodder)

Common Names :

Pacific Sailfish	...	English
Thalapathu, Mayilmin, Yemungolah	...	Tamil
Olameen	...	Malayalam
Tadmasa	...	Marathi
Kunga, Tadmachhi	...	Gujarati
Fung-hibaru, Olameen	...	Lakshadweep Is.

Distinguishing Characters :

Body elongate and laterally compressed. Snout long, round in cross-section, lower jaw slender and pointed, its tip nearer front of eye than tip of upper jaw. Fine teeth in jaws and palatines. Two dorsal fins, the first fin extremely high, sail-like, its central rays longest, its area much greater than that of body below, with 40 to 50 rays; second dorsal fin with 6 or 7 rays. Two anal fins, the first fin with 6 or 7 rays. Pectoral fins low on body, falcate. Pelvic fin with 1 spine and 2 soft rays. Caudal fin deeply forked. Fine elongate scales in skin.

Colour : generally dark steely blue dorsally, fading to white or silvery on ventral side; a varying number of paler vertical bars, sometimes made up of rows of pale spots. Vertical fins bright cobalt blue.

Geographical Distribution : Tropical waters of the Indian and Pacific Oceans.

Fishery Information : The most common of all billfishes caught along the Indian coast. At Vizhinjam (Kerala) the fishery commences

during October-November and lasts till March-April of the following year, the average annual yield is about 42 tonnes. At Madras it is caught during the cold months. Common size 100-240 cms.

Genus **Makaira** Lacepede

Makaira Lacepede, 1803, *Hist. nat. Poiss.*, 4 : 688 (type-species : *Makaira nigricans* Lacepede) ; Nakamura, Iwai and Matsubara, 1968, *Misaki mar. biol. Inst. Kyoto Univ., Spec. Rep.*, (4) : 8 (Review).

Body stout, slightly compressed laterally. Two dorsal fins, the first slightly elevated in front but less than body depth at origin of dorsal fin, otherwise long and low. Two anal fins. Pelvic fins short, with poorly developed membrane. Fine elongate scales in skin. Lateral line obscure, single or complex. Flesh pale. Maximum weight more than 682 kg, often weighing more than 182 kg.

Three species, all in our area.

KEY TO SPECIES

1 (a) Pectoral fins rigid, cannot be folded flat against side of body without breaking the joint	...	*M. indica*
(b) Pectoral fins normally pliable (flexible), can be easily folded back against side of body without breaking the joint	...	2
2 (a) Lateral line system with loops or reticulations; chambers of swimbladder arranged in a single layer	...	*M. mazara*
(b) Lateral line system simple, without loops or reticulations; chambers of swimbladder arranged in several tiers	...	*M. tenuirostratus**

Makaira indica (Cuvier)

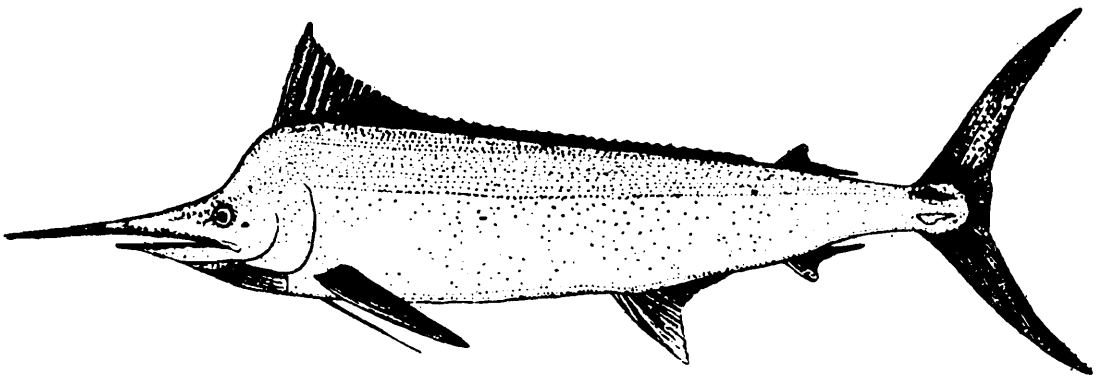
[Text-fig. 340c]

Tetrapturus indicus Cuvier, 1831, *Hist. nat. Poiss.*, 8 : 286 (type-locality : Sumatra).

Histiophorus brevirostris (*nec* Playfair) Day, 1876, *Fishes of India* : 199, pl. 47, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 132, fig. 52.

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* Devaraj (1980) considers *Makaira tennuirostratus* (*Deraniyagala*, 1951) a valid species ; Silas and Pillai (1982), however, state that the validity of this species is yet to be established. The species is reported from Sri Lanka, Gulf of Mannar and south-west coast of India.



Text-fig. 340c. *Makaira indica* (Cuvier)

Common Names :

Black-marlin	...	English
Kopparan, Kopparaikulla	...	Tamil
Tadmasa	...	Marathi

Distinguishing Characters :

Body elongate, slightly compressed laterally Two dorsal fins, the first slightly elevated in front; second dorsal fin nearly equal to second anal fin in size and shape, its origin about opposite each other. Pectoral fin long, extends stiffly away from the body, rigid and cannot be folded back against the side of body without breaking the joint. Pelvic fin shorter than pectoral fin. Lateral line obscure but consists of a single line.

Colour : body blackish or dark blue on dorsal part, ventral part silvery white (body colour fades after death). Membrane of first dorsal fin dark blue, other fin membranes brownish black.

Geographical Distribution : Throughout the warm waters of the Indo-Pacific; few doubtful records from the Atlantic Ocean.

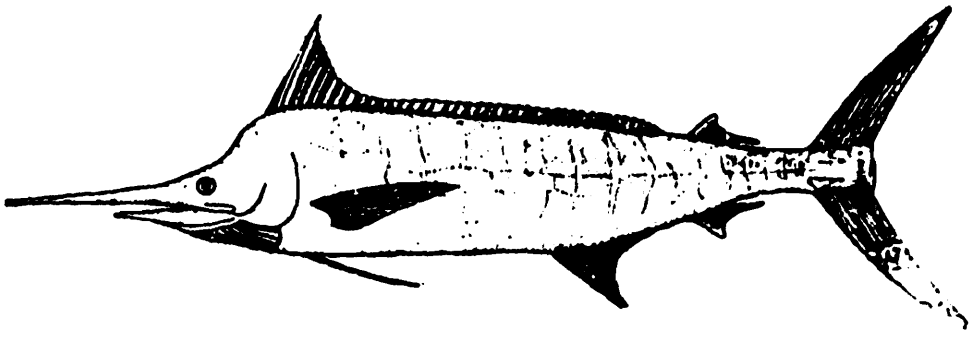
Fishery Information : This species has been taken in the Gulf of Mannar, sout-west coast of India and off Bombay in stray numbers. Common size 120-150 cms.

Makaira mazara (Jordan & Snyder)

[Text-fig. 340d]

Tetrapturus mazara Jordan and Snyder, 1901, *Jour. College Sci. Univ. Tokyo*, **15** : 305, pl. 2 (type-locality : Masaki, Japan).

Makaira nigricans (*nec* Lacepede) Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes Mar. Biol. Ass. India*, (pt. 1) : 85, pl. 8, fig. 3; Silas and Pillai, 1982, *Bull. cent. mar. Fish. Res, Inst.*, (32) : 19, fig. 32.



Text-fig. 340d. *Makaira mazara* (Jordan & Snyder)

Common Name :

Indo-Pacific Blue-marlin ... English

Distinguishing Characters :

Body elongate, nearly cylindrical in anterior part before first anal fin, and does not show the high elevated 'hump' seen in the Black-marlin. Anterior height of first dorsal fin about equal to or longer than distance between origin of first dorsal fin and insertion of pectoral fin. Pectoral joint flexible, can be adpressed to side of body without any difficulty. Lateral line not visible externally, forming a reticulate pattern covering sides of body.

Colour : dark steely blue dorsally, fading to white or silvery on ventral side; sides of body usually marked with a series of lighter bars. First dorsal fin dark blue, other fins blackish brown to dark blue.

Geographical Distribution : Indo-Pacific.

Fishery Information : The Blue-marlin is reputed to be the largest member of the family; individuals weighing over 500 kg. are not uncommon in the Japanese and Hawaiian fisheries of the Central Pacific. These giants appear, however, to be largely creatures of the high seas and grow to about 4 to 4.3 m.; common size 120-300 cms. This species is likely to occur in greater numbers in our area when we exploit our high seas.

Genus **Tetrapturus** Rafinesque

Tetrapturus Rafinesque, 1810, *Caratt. animal Piante Sicilia* : 54 (type-species : *Tetrapturus belone* Refinesque) ; Nakamura, Iwai and Matsubara, 1968, *Misaki mar. biol. Inst. Kyoto Univ., Spec. Rep.*, (4) : 12 (Review).

Body markedly slender and well compressed. Two dorsal fins, the height of anterior part of first fin about as high as the body depth.

Pelvic fin rather long, its fin-membrane not well developed. Fine elongate scales in skin, not visible with naked eye.

In open water of all warm seas. Six species of which only two species certainly identified in the Indian Ocean, both in our area.

KEY TO SPECIES

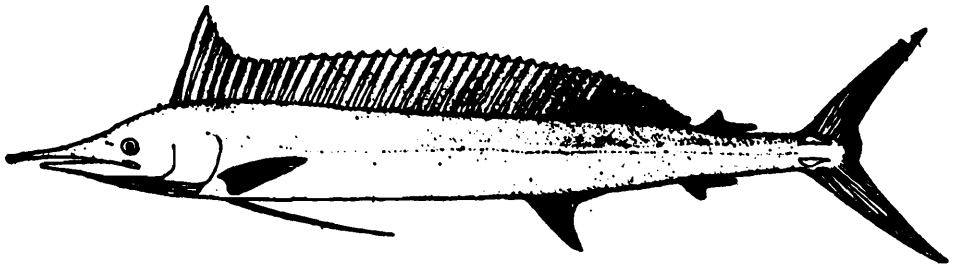
1 (a) Snout (bill) very short, its length (from anterior margin of eye to tip) about 1.6 times in head length; second anal fin situated anterior to second dorsal fin ... *T angustirostris*

(b) Snout (bill) long, its length 1.2 to 1.5 times in head length; second anal fin and second dorsal fin placed nearly opposite ... *T audax*

Tetrapturus angustirostris Tanaka

[Text-fig. 341]

Tetrapturus angustirostris Tanaka, 1914, *Figures and Descriptions of Fishes of Japan*, (18) : 324, fig. 285 (type-locality : Sagami Sea, Japan) ; Silas and Pillai, 1982, *Bull. cent. mar. Fish. Res, Inst*., (32) : 21, fig. 36.



Text-fig. 341. *Tetrapturus angustirostris* Tanaka

Common Name :

Shortbill-Spearfish ... English

Distinguishing Characters :

Snout (spear) very short, scarcely longer than lower jaw in adults; in young the snout is much longer than lower jaw. Two dorsal fins; first fin long and rather high at anterior part, the greatest height of fin more than greatest body depth, and the fin maintains this height (or nearly so) in its posterior portion, with 46 to 50 rays; second dorsal fin with 6 rays. Two anal fins; first fin with 12 to 15 rays, and second fin

with 6 or 7 rays and placed anterior to the second dorsal fin. Pectoral fin short and narrow, markedly shorter than pelvic fin. Vent far anterior to origin of first anal fin. Lateral line single and prominent.

Colour : body dark greenish or brilliant blue dorsally, fading through silvery to white or silvery on ventral side ; no spots or bars on the body. Fins dark.

Geographical Distribution : Western Indian Ocean, the Philippines, Taiwan, Japan, California and Chile ; three specimens have recently been caught in the South Atlantic.

Fishery Information : The species is not particularly important in the fisheries of India due to its scarcity. The Shortbill spearfish looks like a sailfish whose dorsal fins have been shortened with a pair of scissors. This species is largely oceanic and does not enter coastal waters ; common size 100-180 cms.

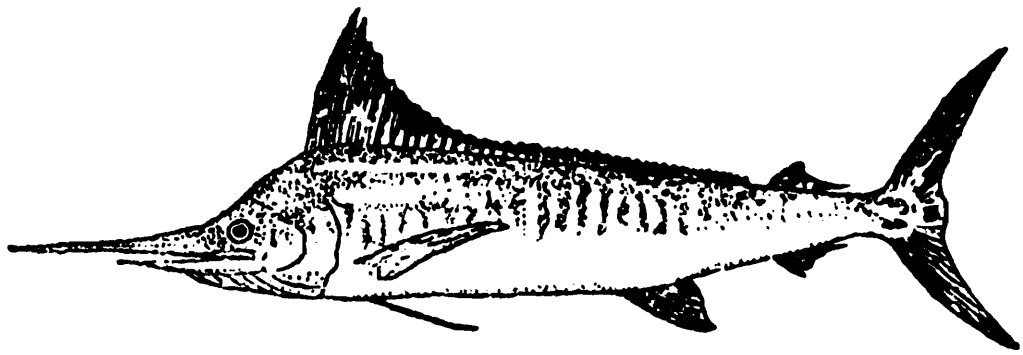
Tetrapturus audax (Philippi)

[Text-fig. 342]

Histiophorus audax Philippi, 1887, *Anales Universiaded Chile*, **71** : 35, pl. 8, figs. 2-3 (type-locality : Iquique, Chile).

Makaira mitsukurii (Jordan & Snyder) : Munro, 1955, *Marine and Fresh Water Fishes Ceylon* : 223.

Tetrapturus audax : Jones and Silas, 1964, *Proc. Symp. Scombroid Fishes Mar. Biol. Ass. India*, (pt. 1) : 74, fig. 13.



Text-fig. 342. *Tetrapturus audax* (Philippi)

Common Name :

Striped-marlin

Distinguishing Characters :

Body elongate and rather thick. Snout long, its length 1.5 times or more in lower jaw Two dorsal fins ; height of anterior portion of

first fin about same height or greater than body depth and not sail-like but slopes abruptly posteriorly, the middle rays being much shorter than anterior; second dorsal fin and second anal-fin in parallel position. Pectoral fin narrow, its tip pointed. Vent placed very close to origin of first anal fin. Lateral line single, not prominent.

Colour : body dark steely blue dorsally and on snout, fading to white on ventral side; sides of body marked with a variable number (about 10) of prominent, pale bluish or whitish vertical stripes. Fins dark, except for first dorsal and anal fins which in life are bright cobalt blue.

Geographical Distribution : Widely distributed throughout the warmer waters of the Indian and Pacific Oceans.

Fishery Information : Good fishing is reported from the Andaman Sea in our region. Common size 80-210 cms.

SUBORDER : STROMATEOIDEI

This marine perciform suborder is diagnosed by the possession of toothed saccular outgrowths in gullet (pharyngeal sacs) behind last gill arch and small uniserial teeth in the jaws.

FAMILY : ARIOMMIDAE

[Ariomma]

Body slender or moderately deep, rounded to compressed. Mouth small; teeth in jaws minute, no teeth on roof or floor of mouth, but toothed pharyngeal sacs present. Two distinct but scarcely separated dorsal fins, the first with 11 or 12 long slender spines, and second fin with 14 to 18 soft rays. Anal fin with 3 short spines and 13 to 16 soft rays. Pectoral fin with 20 to 24 soft rays. Pelvic fins thoracic, inserted below pectoral fins or behind. Caudal peduncle square in cross-section, its least depth less than 5% of standard length, with two low, fleshy, lateral keels on each side near base of caudal fin, Scales large, cycloid, thin, easily detached; lateral line high, following upper body profile. Silvery fishes, with a purple tinge. Vertebrae 30 to 32.

Schooling fishes generally found in offshore waters in the proximity of muddy bottoms, sometimes more than 100 m depth.

Only one genus, *Ariomma*.

Genus **Ariomma** Jordan & Snyder

Ariomma Jordan and Snyder, 1904, *Proc. U. S. natn, Mus.*, **27** : 942 (type-species : *Ariomma lurida* Jordan & Snyder) ; Haedrich and Horn, 1972, *WHOI-72-15 Tech. Rep.* : 20 (Review).

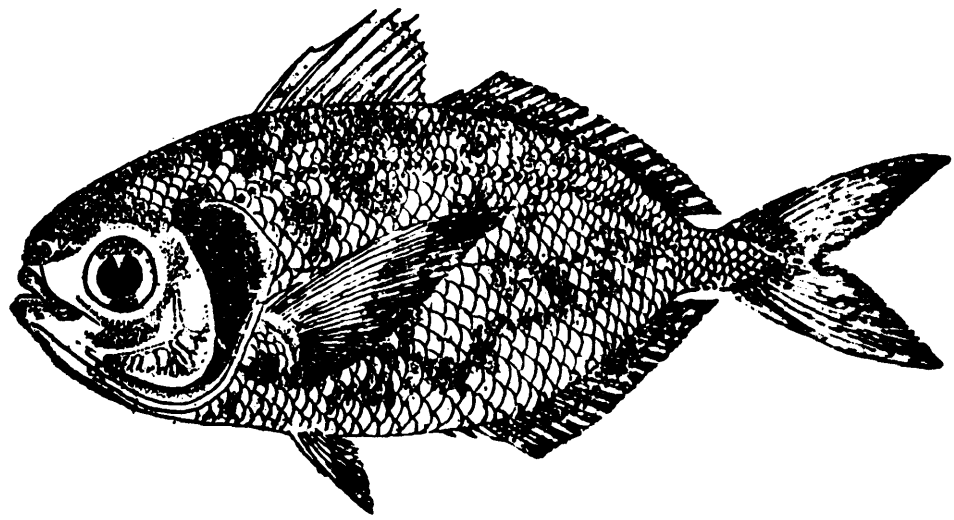
For characters, see those of family.

Six species, one in our area.

Ariomma indica (Day)

[Text-fig. 343]

Cubiceps indicus Day, 1870, *Proc. zool. Soc. Lond.* : 690 (type-locality : Madras).
Psenes indicus : Day, 1876, *Fishes of India* : 237, pl. 54, fig. 2 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 185 ; Silas and Prasad, 1970, *Indian J.* Fish., **13** (1) : 190, fig. 1.
Psenes maculatus (*nec* Lutken) Rao and Sen, 1967, *Sci. & Cult.*, **33** : 144.



Text-fig. 343. *Ariomma indica* (Day)

Common Name :

Indian ariomma English

Distinguishing Characters :

Body oval, moderately deep and compressed. Top of head rounded, without scales, head covered by thick adipose tissue. Mouth small ; teeth minute, their bases covered by a membrane. Two dorsal fins, scarcely separated, the first fin with 10 to 12 long and slender spines, and second fin with 1 spine and 13 to 16 soft rays. Anal fin with 3 spines and 14 to 16 soft rays. A median groove along belly for reception of folded pelvic fins. Caudal peduncle square in cross-section, with 2 low fleshy keels on each side. Scales cycloid (smooth), very thin and easily detached.

Colour : body silvery, with purple tinge; fins greyish.

Geographical Distribution : Indo-west Pacific.

Inhabits muddy bottoms of the continental shelf, down to about 100 m.

Fishery Information : The species occurs in small shoals in the mid-waters of the continental shelf and is taken commercially off the Kerala and Andhra coasts. The flesh, rich in fat, is esteemed.

FAMILY STROMATEIDAE
[Pomfrets]

Body deep and compressed. Teeth in jaws laterally compressed, either simple or with 3 to 5 cusps; no teeth on roof of mouth. Gill membranes normal or broadly united to isthmus, the gill-opening not reaching to under throat. Single dorsal fin, the rays not preceded by stout spines, but in some species 2 to 10 small blade-like spines are present ahead of the fin. Anal fin usually with 2 to 6 spines and 30 to 50 soft rays. Median fins often falcate, their bases about equal in length. Pelvic fins absent in adults (present in some young *Stromateus*—pelvic bones present in all). Branchiostegal rays 5 to 6. Vertebrae 30 to 48.

Three genera, one in our area.

Genus **Pampus** Bonaparte

Pampus Bonaparte, 1841, *Icongr. Fauna Ital., Pisces*, **3**(9) : 48 (type-species : *Stromateus candidus* Cuvier = *S. argenteus* Euphrasen) ; Pati, 1983, *J. mar. biol. Ass. India*, **20** : 51 (Review).

Body very deep and compressed. Gill-membranes broadly united to isthmus, the gill-opening restricted to a vertical slit on side of body. Single dorsal fin, with or without spines. Pelvic fins absent. Five branchiostegal rays.

Three species, two in our area.

KEY TO SPECIES

1 (a) Dorsal and anal fins falcate, preceded by 5 to 10 flat, bladelike spines; caudal fin strongly forked ... ***P. argenteus***

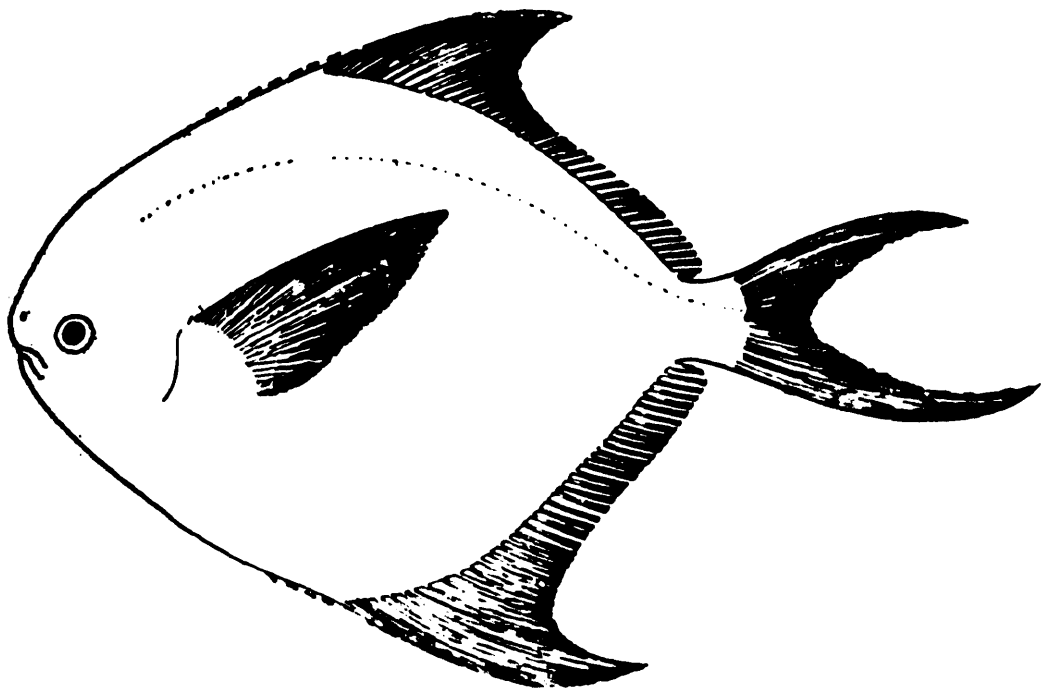
(b) Dorsal and anal fins not falcate, but finrays gradually diminish in length posteriorly; no spines preceding the median fins; caudal fin emarginate ... *P. chinensis*

Pampus argenteus (Euphrasen)

[Text-fig. 344]

Stromateus argenteus Euphrasen, 1788, *Kongl. Vetensk. Acad. Handl, Stockholm*, 9 : 49 (type-locality ' "Castellum Chinese Bocca Tigris dictum").

Stromateus cinereus Bloch : Day, 1876, *Fishes of India* : 247, pl. 53, fig. 3; Day, 1889, *Fauna Br. India*, Fishes, 2 : 198, fig. 68.



Text-fig. 344. *Pampus argenteus* (Euphrasen)

Common Names :

Silver pomfret	...	English
Chandi, Pomfret	...	Bengali
Chandee, Ghia	...	Oriya
Chanduva	...	Telugu
Vavval, Vella-vavval	...	Tamil
Avoli, Velutha-avoli	...	Malayalam
Manji, Thondrette	...	Kannada
Chandava, Saranga, Paplet	...	Marathi

Distinguishing Characters :

Body very deep and compressed, with firm flesh. Eye with feeble adipose lid. Teeth small, in a single row in both jaws. Single dorsal fin, falcate; anal fin falcate; median fins preceded by a series of 5 to 10 blade-like spines with anterior and posterior points. No pelvic fins. Caudal fin deeply forked, the lower lobe longer.

Colour : back grey, merging to silvery white towards belly; very small black dots all over body. Dorsal, anal and caudal fins with dark edges, and all fins faintly yellow.

Geographical Distribution : Persian Gulf to Japan.

Inhabits waters over muddy bottoms, down to 100 m.

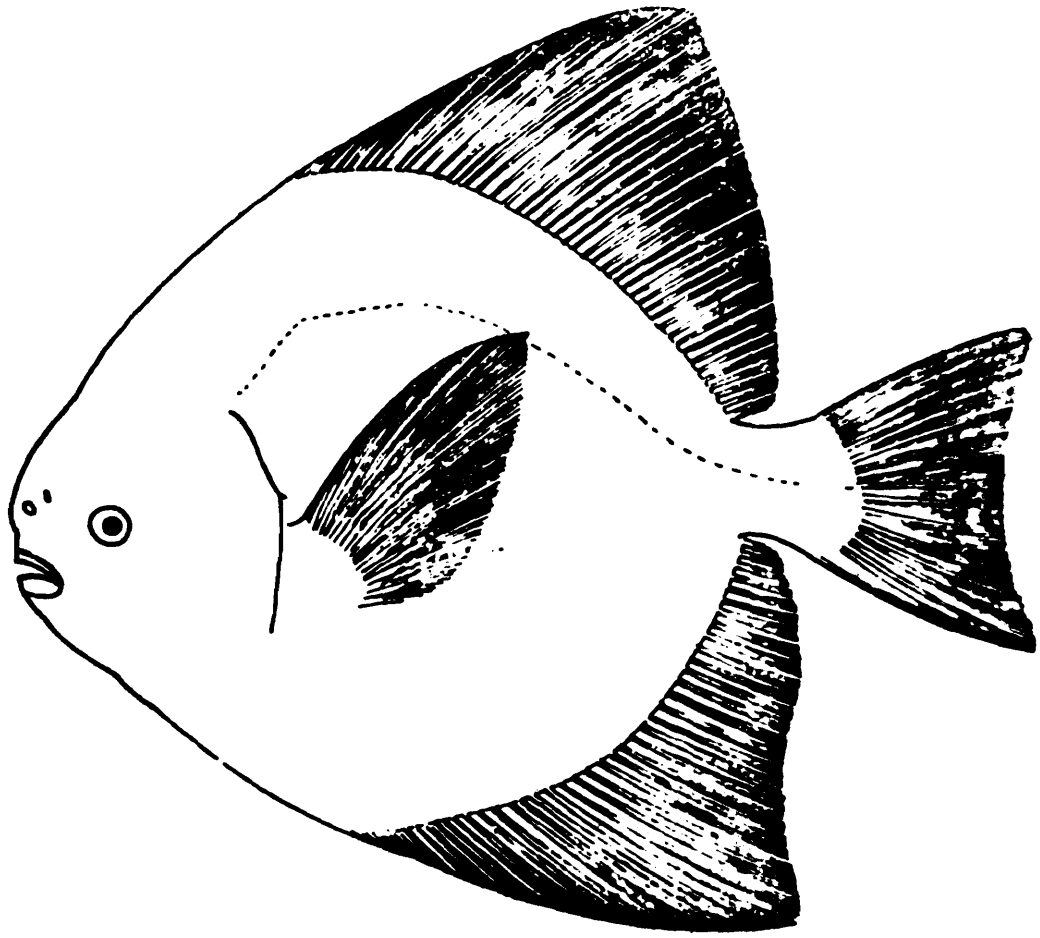
Fishery Information : This pomfret is among the best of the table fishes, and occurs in shoals usually away from the shore in comparatively deepwaters. It grows to a length of 31 cm. and mature fish are more relished than the juveniles. They are best obtained in the fourth quarter of the year in Gujarat, Maharashtra and Kerala. In Andhra Pradesh there is a gradual decline of the catch from the first to last quarters; in West Bengal and Orissa the variation in catches is not marked from quarter to quarter. The spawning season of this species extends from February to August and intensive spawning is during the months of April-June.

Pampus chinensis (Euphrasen)

[Text-fig. 345]

Stromateus chinensis Euphrasen, 1788, *Kongl. Vetensk. Acad. Handl. Stockholm*, **9** : 53, fig. 9 (type-locality : "Castellum Chinese Bocca Tigris dictum").

Stromateus sinensis Euphrasen : Day, 1876, *Fishes of India* : 246, pl. 51C, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, **2** : 197.



Text-fig. 345. *Pampus chinensis* (Euphrasen)

Common Names :

Chinese pomfret	...	English
Chandi, Pomfret	...	Bengali
Dhala-chandi	...	Oriya
Chanduva	...	Telugu
Mogang-vaval, Karu-vaval	...	Tamil
Avoli, Velutha-avoli	...	Malayalam
Balimanji, Manji	...	Kannada
Chandava, Khalwad	...	Marathi
Vichuda	...	Gujarati

Distinguishing Characters :

Body very deep and compressed, with firm flesh. Eye with narrow adipose lid. Small teeth in a single row in both jaws. Single dorsal fin; dorsal and anal fins not falcate, but gradually diminishing in height posteriorly; no spines before the median fins. Caudal fin emarginate in young, slightly forked in adults.

Colour : body grey-brown on back, merging to silvery white towards belly. Fins dusky.

Geographical Distribution : Pakistan and India to China.

Inhabits waters over muddy bottoms of the continental shelf, down to 100 m.

Fishery Information : This pomfret is abundant in the coastal waters of our area when it migrates to spawn. The fishing season in West Bengal and Bombay is March, and along the coast of Kerala from June to September; fairly common in the catches along the coast of Orissa, Andhra, Tamil Nadu and Karnataka.

ORDER : PLEURONECTIFORMES
[Flatfishes]

A group of rather specialised and distinctive fishes found in most seas, which are characterised by asymmetry, primarily that of the eyes, for in the adult these lie on one side of the head, either right or left. Body highly compressed, somewhat convex on ocular (eyed) side and flat on blind side. Dorsal and anal fins usually long. Eyes side is always pigmented, whereas the blind side is usually white. Six or seven branchiostegal rays, rarely eight. Body cavity small; adults almost always without swimbladder.

Included among the flatfishes are many of the world's most valuable food species, such as the halibut, flounder, plaice, turbot and sole. These fishes are chiefly marine and carnivorous in their food habits.

KEY TO SUBORDERS/FAMILIES

1 (a) Dorsal fin not extending onto head (to or past eye) ; anterior dorsal-fin rays spinous (suborder Psettodoidei)	...	Psettodidae
(b) Dorsal fin extending onto head at least to eyes; dorsal fin without spines	...	2
2 (a) Preopercular margin free and visible, not covered by skin; lower jaw generally prominent (suborder Pleuronectoidei)	...	3
(b) Preopercular margin not entirely free, hidden beneath skin; lower jaw never prominent (suborder Soleoidei)	...	5

3 (a) Pelvic fins with one spine and 5 soft rays; vomer with teeth	...	Citharidae*
(b) Pelvic fins without a spine, only soft rays; vomer usually without teeth	...	4
4 (a) Eyes on left side (sinistral)	...	Bothidae
(b)) Eyes on right side (dextral)	...	Pleuronectidae*
5 (a) Eyes on right side	...	Soleidae
(b) Eyes on left side	...	Cynoglossidae

Suborder : Psettodoidei

Family : Psettodidae

[Indian Halibuts]

Body oval and flat. Eyes sinistral (left side) or dextral, upper eye very close to dorsal edge of body. Mouth large, with large strong teeth; maxilla (upper jaw) extends well beyond hind edge of eye. Preopercular margin distinct (free), not covered with skin. Dorsal-fin rays spinous. Pelvic fins nearly symmetrical.

This family contains a single genus, of moderate-sized shallow-dwelling, benthic flatfishes.

Genus **Psettodes** Bennett

Psettodes Bennett, 1831, *Proc. zool. Soc. Lond.* : 147 (type-species : *Psettodes belcheri* Bennett) ; Staunch and Cadenat, 1965, *Cashiers O.R.S.T.O.M., Oceanographiae,* 3(4) : 19 (Revision).

For characters of the genus, see those of family.

Three species, one in our area.

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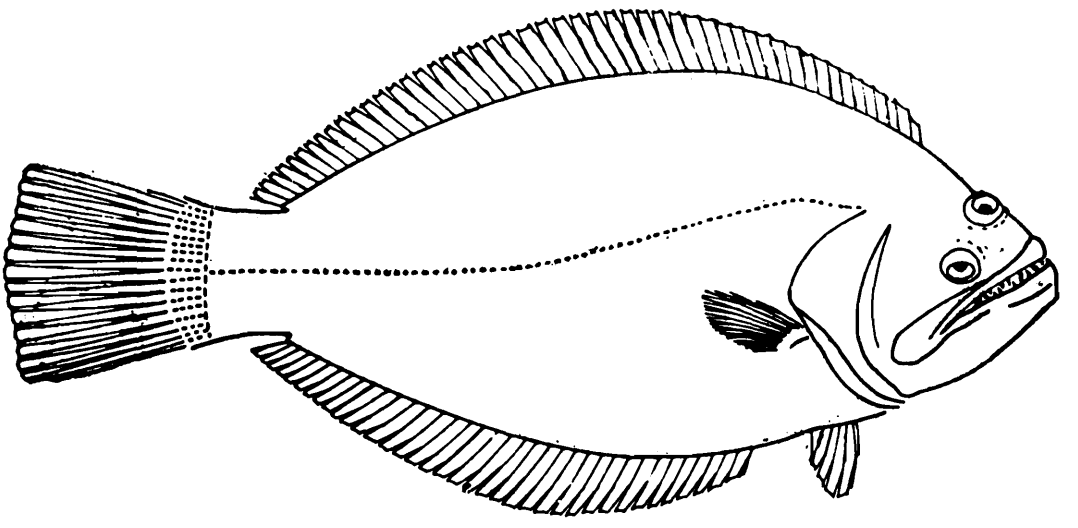
* *Brachypleura novazeelandiae* Gunther of the family Citharidae, recorded from the Bay of Bengal, is of no fishery value in our area; the fishes of the family Pleuronectidae do not at the present time play any role in the commercial fisheries of our region.

Psettodes erumei (Schneider)

[Text-fig. 346]

Pleuronectes erumei Schneider, 1801, *Syst. Ichth. Bloch.* : 150 (type-locality : not given).

Psettodes erumei : Day, 1877, *Fishes of India* : 422, pl. 91, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 439, fig. 155.



Text-fig. 346. *Psettodes erumei* (Schneider)

Common Names :

Indian Halibut	...	English
Noree-nalaka	...	Telugu
Erumei-nakku	...	Tamil
Bhakas	...	Marathi

Distinguishing Characters :

Body oval and flat, but thicker than in most other flatfishes. Both eyes on either left or right side, the upper eye very close to dorsal edge of body. Mouth large, the maxillary extends well beyond hind edge of lower eye. Gill-rakers not developed, in the form of groups of minute spines. Teeth in jaws strong, barbed. Single long dorsal fin, its origin well behind eyes ; anterior fin rays spinous. Lateral line almost straight, with 70 to 75 scales.

Colour : uniformly dark brown ; young with 4 broad dark cross-bars ; blind side occasionally partly coloured.

Geographical Distribution : Indo-west Pacific.

Lives on muddy and sandy bottoms of the continental shelf down to about 100 m.

Fishery Information : *Psettodes erumei* is an important food fish and occurs in small quantities on both the east and west coasts of India, and also occurs in deeper waters. It forms an important fishery at Bombay and Madras where it is much valued as a food fish. It grows to a length of 60 cm. being the largest flatfish of our area ; the zero, one and two year-classes constitute the fishery.

SUBORDER : PLEURONECTOIDEI

FAMILY : BOTHIDAE

[Lefteye Flounders]

Flatfishes with eyes on left side of head (sinistral) (except for rare 'abnormal' individuals) ; spines sometimes present before eyes in males. Mouth protractile, asymmetrical, the jaw moderately prominent ; teeth in jaws sometimes canine-like. Preopercle exposed, its hind margin free and visible. Dorsal fin long, its origin above or in front of lower eye. Pectoral and pelvic fins present ; pelvic fins without any spine. Single lateral line, occasionally forked behind upper eye, sometimes faint or absent on blind side ; scales generally small.

The left-eyed flounders are of moderate size and are found from the shallow to deep ocean waters. Thirty-six genera, 9 in our area, of little fishery value.

KEY TO GENERA

1 (a) Pelvic-fin base of eyed side equal to that of blind side (subfamily Paralichthinae)	...	2
(b) Pelvic-fin base of eyed side normally much longer than that of blind side (subfamily Bothinae)	...	4
2 (a) Head length about 2.5 times in standard length ; eye-diameter about 4 times in head length	...	**Cephalopsetta***
(b) Head length at least 3.0 times in standard length ; eye-diameter more than 4.0 times in head length	...	3
3 (a) Lateral line absent on blind side ; maxilla more than 3 times in head length	...	**Taenlopsetta***
(b) Lateral line equally developed on both sides ; maxilla less than 3 times in length of head	...	**Pseudorhombus**

4 (a)	Mouth small; length of maxilla 3.4 to 4.6 times in head length; hardly any teeth on eyed side of jaws	...	**Laeops***
(b)	Mouth larger; teeth on both sides of jaws	...	5
5 (a)	Length of maxilla less than 2 times in head length; lower jaw very prominent	...	**Chascanopsetta***
(b)	Length of maxilla more than 2 times in head length; lower jaw not prominent	...	6
6 (a)	Lateral line equally developed on both sides; 3 prominent blotches forming a triangle on eyed side	...	**Grammatobothus***
(b)	Lateral line absent or feebly developed on blind side	...	7
7 (a)	Eyes close together, separated by a bony ridge or narrow concave space, equally developed in males and females	...	8
(b)	Eyes separated by a more or less concave space, larger in males	...	9
8 (a)	Scales of eyed side cycloid or feebly ctenoid	...	**Arnoglossus***
(b)	Scales of eyed side strongly ctenoid	...	**Psettina***
9 (a)	Distance between eyes 0.5 to 1.0 times eye-diameter; males without distinct spines on snout	...	**Parabothus***
(b)	Distance between eyes more than eye-diameter; males with distinct spine(s) on snout	...	10
10 (a)	Scales of eyed side strongly ctenoid	...	**Crossorhombus***
(b)	Scales of eyed side feebly ctenoid	...	11
11 (a)	Lateral line with a forked branch behind upper eye	...	**Bothus**
(b)	Lateral line without a forked branch behind upper eye	...	**Engyprosopon**

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* The fishes of the genera *Cephalopsetta* Dutt & Rao, *Laeops* Gunther, *Chascanopsetta* Alcock. *Arnoglossus* Bleeker, *Psettina* Hubbs and *Crossorhombus* Regan are of no commercial importance in our area; the fishes of the genera *Taeniopsetta* Gilbert, *Grammatobothus* Norman and *Parabothus* Norman recorded from adjacent seas are likely to occur in our area also.

Genus Bothus Rafinesque

Bothus Rafinesque, 1810, *Caratt. animal. Piante Sicilia* : 23 (type-species : *Bothus rumulo* Rafinesque)

Body ovate or rather deep, strongly compressed. Eyes on left side; interorbital wide and more than eye-diameter. Males with distinct spine(s) on snout. Mouth fairly small, the lower jaw not prominent; length of maxilla 2.8 to 4.0 times in length of head. Teeth small, pointed, without distinct canines, in 2 or more series in both jaws. Dorsal-fin origin above or just in advance of nostrils of blind side and well in front of eye. Pelvic fin of ocular side with longer base, median. Scales small, feebly ctenoid on ocular side, cycloid on blind side. Lateral line developed only on ocular side of body, with a distinct curve above pectoral fin, a forked branch behind upper eye.

Mainly small fishes which occur in all warm seas; 10 species from the Indo-Pacific, 4 in our region.

KEY TO SPECIES

1 (a) Lower gill-rakers 9 to 11 on first arch, rather slender; anterior edge of upper eye above or behind posterior edge of lower eye ... *B. mancus**

(b) Lower gill-rakers 6 to 8 on first arch, rather short; anterior edge of upper eye above or in front of posterior edge of lower eye ... 2

2 (a) Scales mostly cycloid on ocular side, ctenoid at edges of body ... *B. myriaster*

(b) Scales all ctenoid on ocular side ... 3

3 (a) Anterior profile of head distinctly notched in front of eyes; maxilla 3.3 to nearly 4.0 times is head length ... *B. leopardinus**

(b) Anterior profile of head more or less evenly convex; maxilla about 3.0 times in head length ... *B. pantherinus*

Bothus myriaster (Temminck & Schlegel)

Rhombus myriaster Temminck and Schlegel, 1846, in : Siebold, *Fauna Japan* (Pisces) : 181, pl. 42, fig. 2 (type-locality : Japan)

Bothus ovalis Regan : Norman (*partim*), 1927, *Rec. Indian Mus.*, **29** : 32, fig. 7; Norman 1934, *Monograph Flatfishes*, **1** : 238, fig 180

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* *Bothus mancus* (Broussonet) and *B. leopardinus* (Gunther) are rare in our region.

Common Name :

Oval flounder ... English

Distinguishing Characters :

Body oval and flat, its depth about 1.4 times in standard length. Profile of head distinctly convex in front of upper eye, concave in front and just above lower eye. Both eyes on left side; wide inter-orbital space about an eye-diameter. Maxilla (upper jaw) length 3.4 to 3.7 times in length of head. Gill-rakers short, 6 or 7 on lower arm of first arch. Scales cycloid on ocular side, except at extreme upper and lower edges of body where they are ctenoid; those of blind side cycloid; 95 to 100 scales in lateral line. Males with a strong spine on snout.

Colour : ocular side greyish brown, clouded and marked with darker; head and body with transverse lines, a large ocellus just behind curve of lateral line, and 3 or 4 similar but less distinct ocelli on upper and lower halves of body, becoming fainter with age; a diffuse dark blotch on middle of straight part of lateral line, and generally a faint blotch near base of caudal fin. Dorsal and anal fins with dark brown spots; distal part of caudal fin dark brown.

Geographical Distribution : Indo-west Pacific.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery importance on the Andhra coast.

Bothus pantherinus (Ruppell)

[Text-fig. 347]

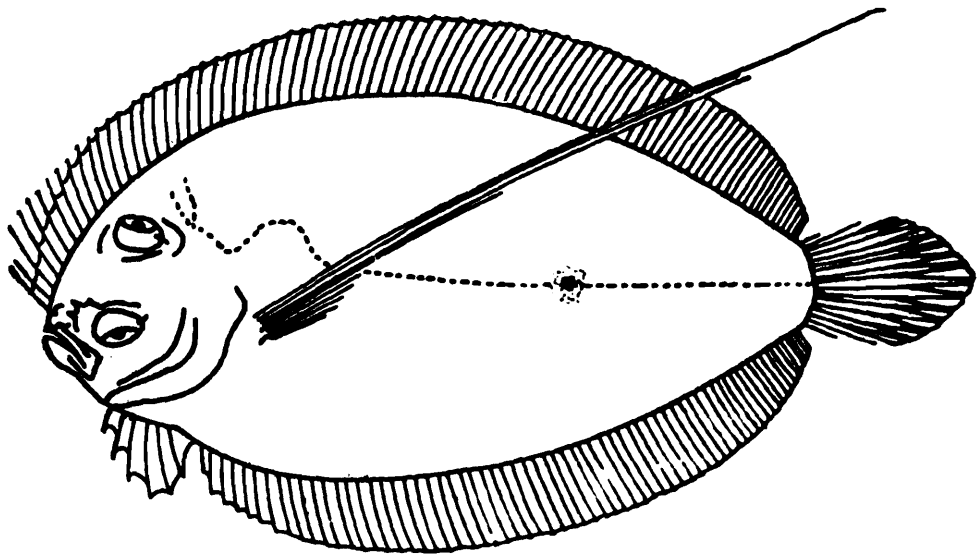
Rhombus pantherinus Ruppell, 1828, *Atlas Reise Nordl. Afrika,* Fische *Rothen Meeres* : 121, pl. 3, fig. 1 (type-locality : Mohila, Red Sea).

Platophrys pantherinus : Day, 1877, *Fishes of India* : 425, pl. 92, figs. 3 & 4.

Platophrys pantherina : Day, 1889, *Fauna Br. India,* Fishes, **2** : 443, fig. 158.

? *Citharichthys aureus* Day, 1877, *Fishes of India* : 422, pl. 90, fig. 3 (type-locality : Madras); Day, 1889, *Fauna Br. India,* Fishes, **2** : 440, fig. 156.

Bothis pantherinus : Norman, 1934, *Monograph Flatfishes,* **1** : 233, fig. 177.



Text-fig. 347. *Bothus pantherinus* (Ruppell)

Common Names :

Leopard flounder	...	English
Mas-madi, Lamman, Palaka	..	Lakshadweep Is.

Distinguishing Characters :

Body oval and flat, its depth 1.6 to 2.0 times in standard length. Upper profile of head convex, sometimes with a slight notch in front of lower eye. Both eyes on left side ; a wide interorbital space (larger than eye-diameter). Maxilla (upper jaw) length about 3.0 times in length of head. Gill-rakers very short, 6 to 8 on lower arm of first arch. Scales ctenoid on ocular side, cycloid on blind side ; 80 to 92 scales in lateral line. Males with spines near eyes ; a larger space between eyes and much shorter pectoral fins in males than females which have extremely long pectoral fins extending to the tip of tail.

Colour : Ocular side reddish brown, with paler and darker markings (spots, blotches, rings or ocelli) ; generally a large dark blotch on middle of straight portion of lateral line. Dorsal, anal and caudal fins similarly coloured and marked.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance in our area.

Genus **Engyprosopon** Gunther

Engyprosopon Gunther, 1862, *Cat. Fishes Br. Mus.*, **4** : 31 (type-species : *Rhombus mogkii* Bleeker).

Body ovate, strongly compressed. Eyes on left side; interorbital space flat or concave, fairly to very wide. Males usually with one or more spines on snout and the orbital margins. Mouth rather small, lower jaw not prominent, maxilla (upper jaw) length 2.2 to 3.5 times in head length. Teeth on both sides of jaws, no distinct canines; vomer toothless. Dorsal-fin origin above or slightly in advance of nostrils of blind side. Pelvic fin of eyed side with longer base. Scales of moderate size or rather large, feebly ctenoid on ocular side, cycloid on blind side. Lateral line developed only on ocular side of body, with a distinct curve above pectoral fin, without a forked branch behind upper eye.

About 15 species in the Indo-Pacific, 2 in our area.

KEY TO SPECIES

1 (a) Caudal fin with 2 distinctive large, dark spots ... *E. grandisquamis*

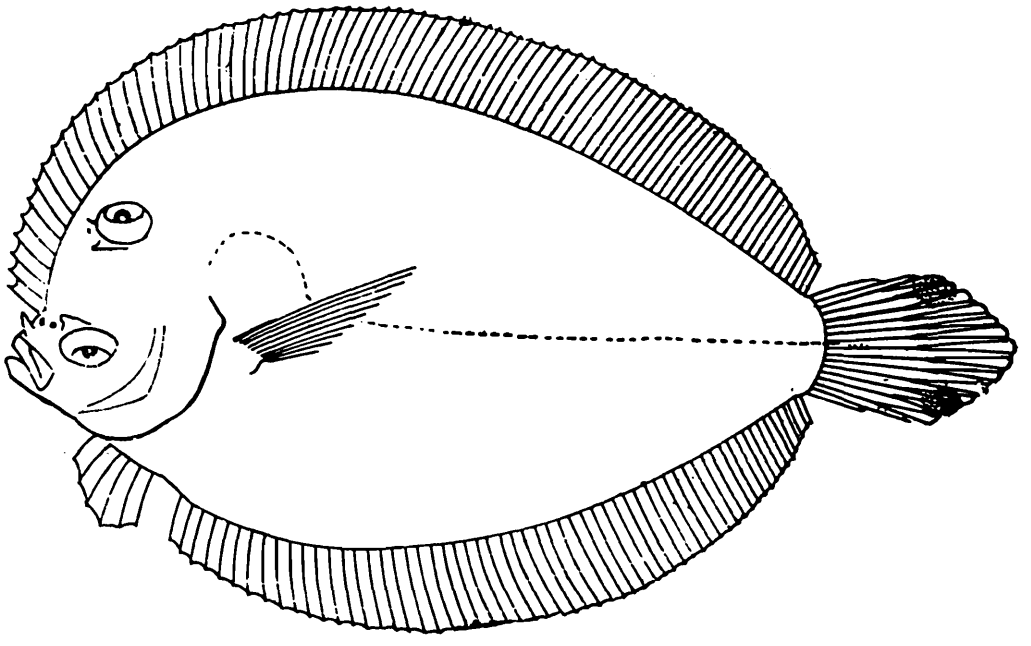
(b) Caudal fin lack the two distinct spots ... *E. cocosensis**

Engyprosopon grandisquamis (Temminck & Schlegel)

[Text-fig. 348]

Rhombus grandisquama Temminck and Schlegel, 1846, *Fauna Japan., Pisces* : 183, pl. 92, figs 3 & 4 (type-locality : Nagasaki, Japan).

Engyprosopon grandisquama : Norman, 1927, *Rec. Indian Mus.*, **29** : 25, fig. 5.



Text-fig. 348. *Engyprosopon grandisquamis* (Temmnick & Schlegel)

* *Engyprosopon cocosensis* (Bleeker) is of no fishery importance in our area.

Common Name :

Largescale flounder ... English

Distinguishing Characters :

Body oval and flat. Both eyes on left side; in adults interorbital space more or less concave, wider than eye-diameter. Mouth small; upper jaw (maxilla) length 3.0 to 3.5 times in length of head, ending just in front of lower eye. Gill-rakers short, 5 to 7 on lower arm of first arch. Lateral line curved above pectoral-fin and absent from head. Scales of ocular side weakly ctenoid, those of blind side cycloid; 36 to 48 scales in lateral line. Adult males with spines on snout and near eyes.

Colour : Ocular side light brownish, with some irregular dark spots and markings; caudal fin with 2 distinctive large, dark spots. Dorsal, anal and caudal fins usually with small brown spots.

Geographical Distribution : Indo-west Pacific.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance in our area.

Genus **Pseudorhombus** Bleeker

Pseudorhombus Bleeker, 1862, *Versl. Akad. Wet. Amsterdam*, **13** : 426 (type-species : *Rhombus polyspilus* Bleeker).

Body oval and flat, with eyes on left side which are separated by a bony ridge. Teeth in jaws in one row, rather strong, sometimes caninoid; no teeth on palate. Dorsal fin beginning on snout, none of its rays enlarged. Pelvic fins with equal short bases, symmetrical. Scales small, ctenoid or partly cycloid on left side, generally cycloid on blind side. Lateral line equally developed on both sides, lateral line with distinct supratemporal branch above upper eye running upwards towards anterior part of dorsal fin. Gill membranes united, free from isthmus.

An Indo Pacific genus with numerous species, 8 in our region.

KEY TO SPECIES

1 (a) Gill-rakers palmate (short, strongly spinulate), as broad as long	...	*P. dupliciocellatus*
(b) Gill-rakers lanceolate, longer than broad	...	2
2 (a) Anterior rays of dorsal fin longer than those that follow; 23 to 25 gill-rakers on lower arm of first arch	...	*P. triocellatus*
(b) Anterior rays of dorsal fin not prolonged; 8 to 15 gill-rakers on lower arm of first arch	...	3
3 (a) Scales on blind side of body ctenoid	...	*P. malayanus*
(b) Scales on blind side of body cycloid	...	4
4 (a) Teeth strong, rather widely set, canines large; 6 to 13 teeth on blind side of lower jaw	...	*P. arsius*
(b) Teeth smaller, more close-set, not much enlarged anteriorly; usually more than 24 teeth on blind side of lower jaw	...	5
5 (a) Origin of dorsal fin above posterior nostril or above space between nostrils	...	6
(b) Origin of dorsal fin above or a little in advance of anterior nostril	...	7
6 (a) Scales in lateral line 58; body with conspicuous darker rings more or less regularly arranged	...	*P. natalensis**
(b) Scales in lateral line 65 or more; body without rings, but with 3 or 4 ocelli	...	*P. microgmathus*
7 (a) Scales ctenoid on ocular side; upper profile of head notched	...	*P. elevatus*
(b) Scales of ocular side more or less ctenoid anteriorly, mostly cycloid posteriorly; upper profile of head scarcely notched, usually evenly curved	...	*P. javanicus*

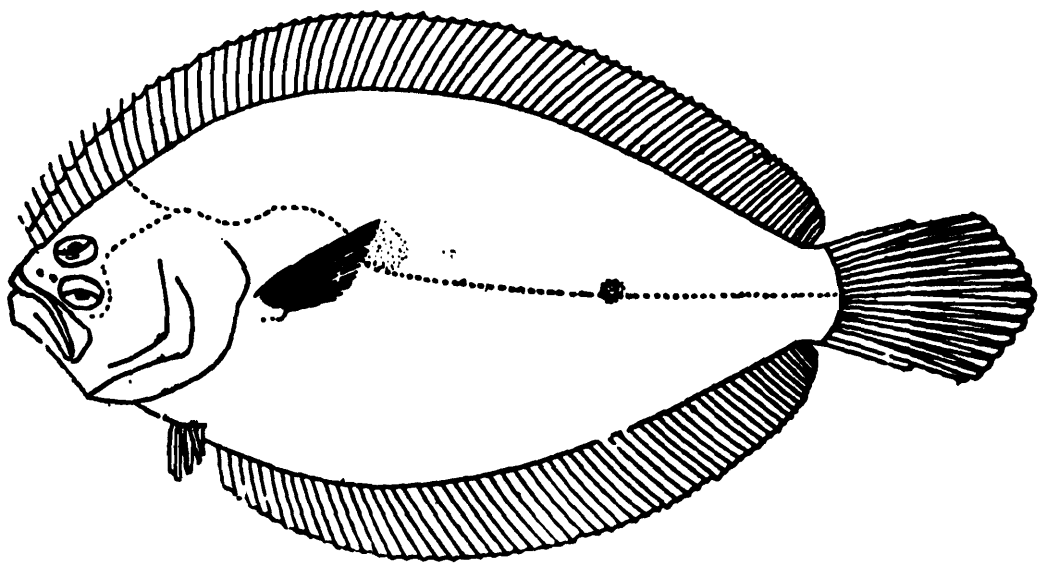
* *Pseudorhombus natalensis* Gilchrist is rare in the catches of our region.

Pseudorhombus arsius (Hamilton-Buchanan)

[Text-fig. 349]

Pleuronectes arsius Hamilton-Buchanan, 1822, *Fishes of Ganges* : 128 (type-locality : Ganges estuary, below Calcutta).

Pseudorhombus arsius : Day, 1877, *Fishes of India* : 423, pl. 91, fig. 5 ; Day, 1889, *Fauna Br. India*, Fishes, 2 : 441, fig. 157.



Text-fig. 349. *Pseudorhombus arsius* (Hamilton-Buchanan)

Common Names :

Large-toothed flounder	...	English
Noree-nalaka	...	Telugu
Nakku	...	Tamil
Lep	...	Marathi

Distinguishing Characters :

Body oval and flat. Both eyes on left side, separated by a narrow bony ridge. Maxilla (upper jaw) ending below posterior edge of lower eye. Gill-rakers lanceolate, 9 to 13 on lower arm of first arch. Canine teeth present anteriorly, 6 to 13 in lower jaw of blind side. Dorsal-fin origin in front of upper eye. Scales of ocular side ctenoid, those of blind side cycloid. Lateral line curved above pectoral fin, forming 2 branches on head, the upper ending between 8th to 12th dorsal rays.

Colour : brownish on ocular side, with a varying pattern of dusky spots and blotches, but always a distinctive larger blotch on anterior end of straight part of lateral line and a smaller blotch halfway to caudal-fin base.

Geographical Distribution : Indo-west Pacific.

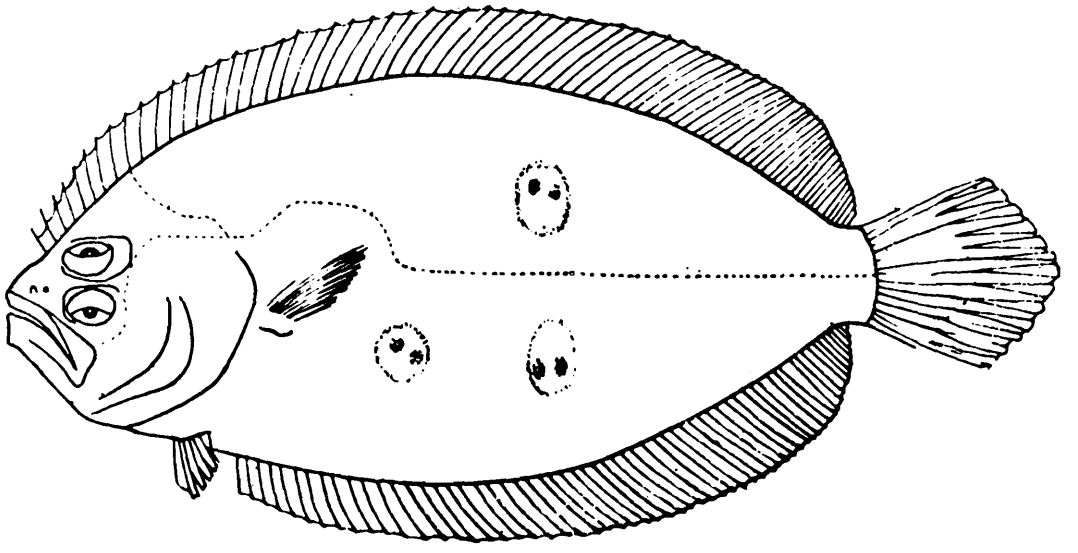
Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Taken commercially in the Hooghly estuary and also along the coast of India. Maximum size 30 cm.

Pseudorhombus dupliciocellatus Regan

[Text-fig. 350]

Pseudorhombus dupliciocellatus Regan, 1905, *Ann. Mag. nat. Hist.*, (7) **15** : 25 (type-locality : Inland Sea of Japan) ; Norman, 1934, *Monograph Flatfishes*, **1** : 94, fig. 55.



Text-fig. 350. *Pseudorhombus dupliciocellatus* Regan

Common Name :

Ocellated flounder ... English

Distinguishing Characters :

Body oval and flat, with a strong notch in upper profile of head. Both eyes on left side, separated by a very narrow elevated bony ridge. Maxilla (upper jaw) extending below middle of lower eye. Gill-rakers palmate, as broad as long. Pointed, rather weak, distant canines in both jaws ; 13 to 22 canine teeth in lower jaw of blind side. Scales ctenoid on ocular side, cycloid on blind side covering the head excepting the snout. Lateral line curved above pectoral fin, forming 2 branches on head, the upper ending between 8th to 9th dorsal rays.

Colour : ocular side of body brownish with numerous indistinct darker spots and rings, and with 3 (rarely 4) large paired spots, each

pair surrounded by a ring of white spots; when 4, these pairs of spots form a square. Caudal and pectoral fins variegated with dark brown.

Geographical Distribution : From the Nicobar Islands, through most of the Indo-Australian archipelago, northward to Japan and southward to north-eastern coast of Australia.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

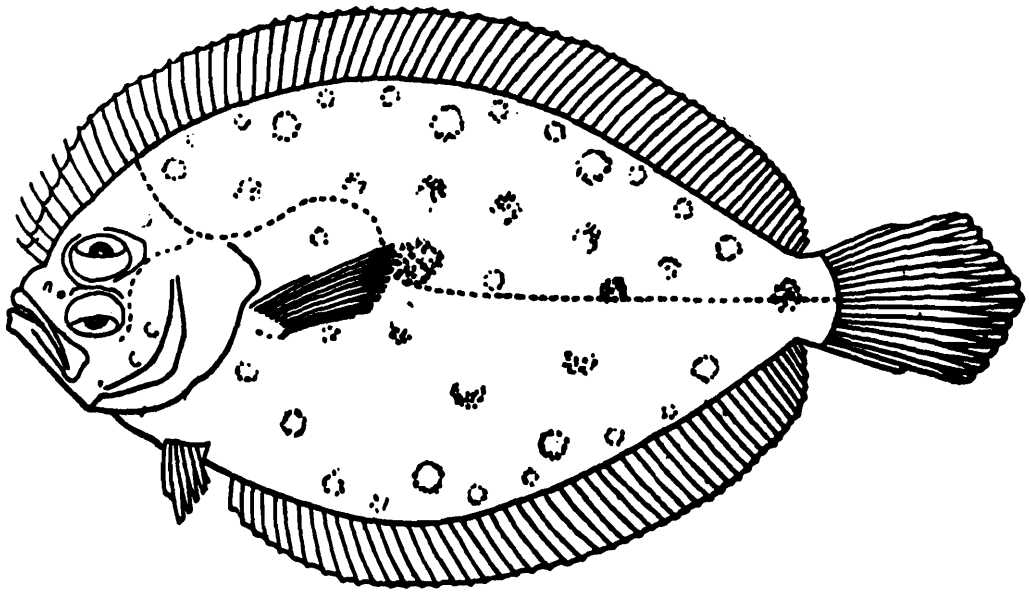
Fishery Information : Of minor fishery significance in the Andaman Sea in our region.

Pseudorhombus elevatus Ogilby

[Text-fig. 351]

Pseudorhombus javanicus Day (*nec* Bleeker) (*partim*), 1877, *Fishes of India* : 424, pl. 92, fig. 2.

Pseudorhombus elevatus Ogilby, 1912, *Mem. Queensland Mus.*, **1** : 45 (type-locality : Queensland, Australia) ; Norman, 1927, *Rec. Indian Mus.*, **29** : 15.



Text-fig. 351. *Pseudorhombus elevatus Ogilby*

Common Name :

Deep flounder ... English

Distinguishing Characters :

Body oval and flat, its depth 1.8 to 2.0 times in standard length ; dorsal profile of head slightly notched in front of eyes. Eyes on left side. Maxilla (upper jaw) extending below middle of lower eye, 2.2 to 2.5 times in head length. Gill-rakers lanceolate, 11 to 15 on lower

arm of first arch. Teeth small in both jaws, scarcely enlarged anteriorly, 23 to 32 teeth on blind side of lower jaw. Dorsal-fin origin above anterior nostril of blind side. Scales ctenoid on eyed-side and cycloid on blind side. Lateral line curved above lateral line and forming 2 branches on head, the upper ending between 9th to 11th dorsal rays.

Colour : ocular side pale brown, with numerous faint blotches arranged in 5 irregular rows along body, and 3 large distinct blotches along straight part of lateral line; often 2 additional smaller blotches, one above curve of lateral line and the other below tip of pectoral fin. Median fins with brown spots and markings.

Geographical Distribution : The Red Sea, the Persian Gulf, Pakistan, India, the Andaman Is., Mergui Archipelago to north-eastern coast of Australia.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

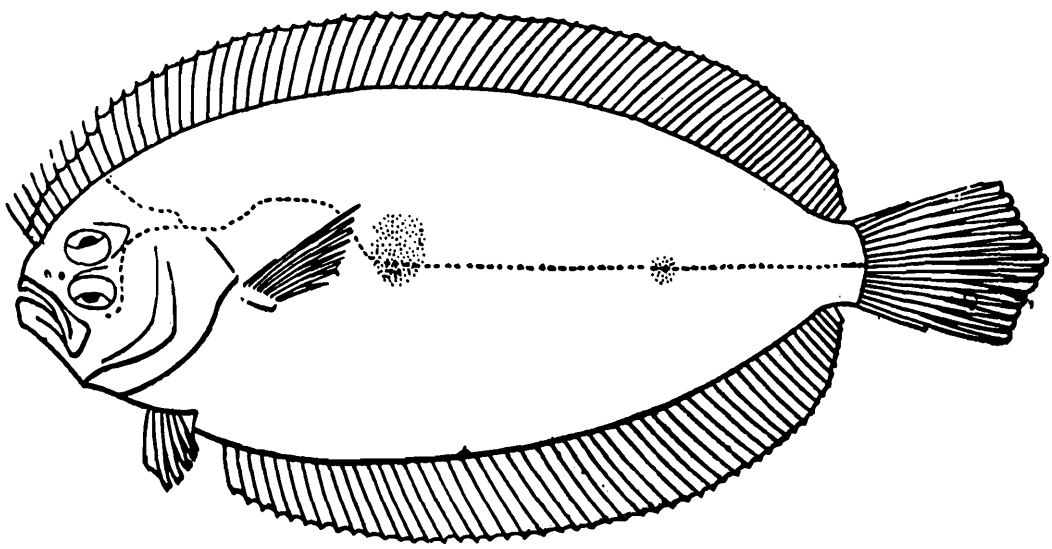
Fishery Information : Of minor fishery significance in our area.

Pseudorhombus javanicus (Bleeker)

[Text-fig. 352]

Rhombus javanicus Bleeker, 1853, *Nat. Tijdschr. Ned.-Indie,* **4** : 502 (type-locality : Batavia, Java).

Pseudorhombus javanicus : Day (*partim*), 1877, *Fishes of India* : 424; Day, 1889, *Fauna Br. India,* Fishes, **2** : 442; Norman, 1927, *Rec. Indian Mus.,* **29** : 16.



Text-fig. 352. *Pseudorhombus javanicus* (Bleeker)

Common Names :

Javanese flounder	...	English
Lep	...	Marathi

Distinguishing Characters :

Body oval and flat, its depth 2.2 to 2.3 times in standard length. Dorsal profile of head evenly convex or very slightly notched in front of eyes; both eyes on left side. Maxilla (upper jaw) extending to below middle of lower eye. Gill-rakers lanceolate, 12 to 14 on lower arm of first arch. Teeth small in both jaws, scarcely enlarged anteriorly, 15 to 25 teeth in lower jaw of blind side. Dorsal-fin origin in advance of upper eye and in front of nostrils of blind side. Scales of ocular side mostly ctenoid on anterior half and mostly cycloid on posterior half; scales of blind side cycloid. Lateral line curved above pectoral-fin and forming 2 branches on head, the upper ending between 9th to 11th dorsal rays.

Colour : ocular side brownish, with or without small paler spots and ocelli which extend on to vertical fins; a large, round blotch at anterior end of straight part of lateral line and a smaller blotch halfway to caudal-fin base.

Geographical Distribution : East coast of India, the East Indies and the Philippines.

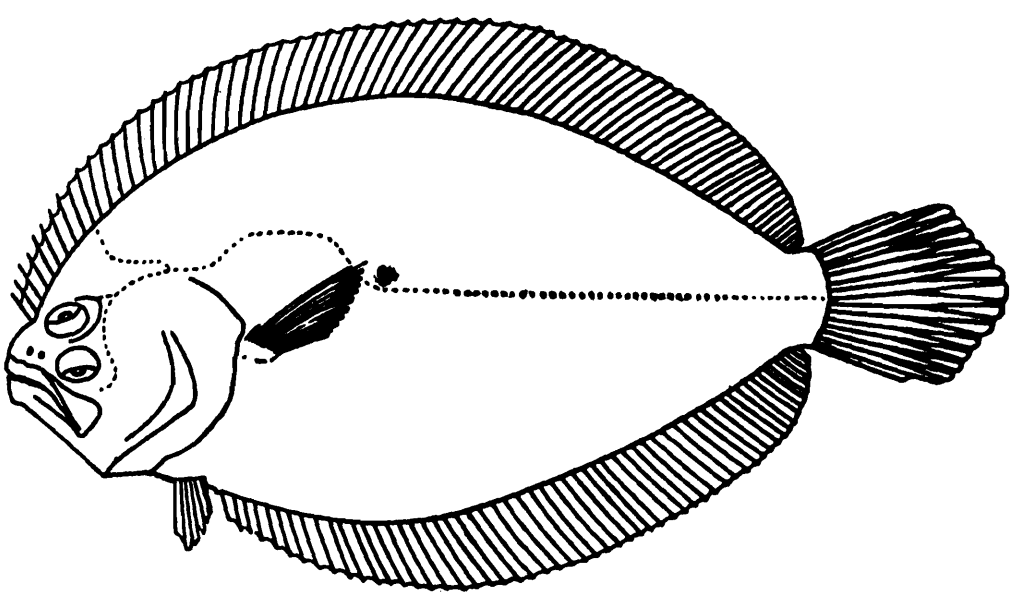
Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance in our area.

Pseudorhombus malayanus Bleeker

[Text-fig. 353]

Pseudorhombus malayanus Bleeker, 1866, *Ned. Tijdschr. Dierk.*, **3** : 43 (type-locality : East Indian Archipelago) ; Norman, 1927, *Rec. Indian Mus.*, **29** : 12.



Text-fig. 353. *Pseudorhombus malayanus* Bleeker

Common Name :

Malayan flounder .. English

Distinguishing Characters :

Body oval and flat, its depth 1.8 to 2.0 times in standard length. Dorsal profile of head slightly notched in front of eyes; both eyes on left side. Maxilla (upper jaw) extending below posterior margin of lower eye. Gill-rakers of moderate length or rather short, 8 to 10 on lower arm of first arch. Teeth small in both jaws, teeth of lower jaw stronger and wider apart than those of upper, 7 to 11 teeth on blind side of lower jaw. Dorsal-fin origin well in advance of upper eye. Scales on both sides ctenoid. Lateral line curved above pectoral fin and forming 2 branches on head, the upper ending between 9th to 11th dorsal rays.

Colour : ocular side brownish, with or without indistinct groups of small white spots near lateral line. A dark blotch anteriorly on straight part of lateral line; sometimes a small blotch halfway to caudal-fin base.

Geographical Distribution : East coast of India, Burma, the Celebes and the Philippines, but not to South China Sea, New Guinea or Australia.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance on the east coast of India.

Pseudorhombus micrognathus Norman

Pseudorhombus javanicus Day (*nec* Bleeker) (*partim*), 1877, *Fishes of India* : 424.

Pseudorhombus micrognathus Norman, 1927, *Rec. Indian Mus.*, **29** : 16, pl. 3 (type-locality : Puri, Orissa).

Common Name :

Norman's flounder ... English

Distinguishing Characters :

Body oval and flat, its depth 1.8 to 2.0 times in standard length. Dorsal profile of head notched in front of eyes; eyes on left side,

Maxilla (upper jaw) barely extending to middle of lower eye, 2.7 to 3.0 times in head length. Gill-rakers long and slender, about 13 on lower arm of first arch. Teeth minute in both jaws. Dorsal-fin origin above anterior nostril of blind side. Scales ctenoid on ocular side, cycloid on blind side. Lateral line curved above lateral line and forming 2 branches on head, the accessory (upper) branch ending between 7th to 8th dorsal rays.

Colour : ocular side brownish, with numerous small dark spots; 3 or 4 fairly conspicuous ocelli, a pair above and below anterior third of straight part of lateral line, a third below junction of straight and curved parts, and occasionally an indistinct 4th ocellus above the curved part of lateral line; sometimes a faint blotch at junction of straight and curved parts of lateral line. Vertical fins with small brown dots.

Geographical Distribution : North-east coast of India

Fishery Information : Of minor fishery significance on the north-east coast of India.

Pseudorhombus triocellatus (Bloch)

Pleuronectes triocellatus Bloch, 1801. *Syst. Ichth.* : 145 (type-locality : East Indian Seas).

Pseudorhombus triocellatus : Day, 1877, *Fishes of India* : 424, pl. 92, fig. 1; Day, 1889. *Fauna Br. India*, Fishes, 2 : 442.

Common Names :

Threespot flounder	...	English
Lep	..	Marathi

Distinguishing Characters :

Body oval and flat, its depth 1.5 to 1.8 times in total length. Dorsal profile of head sometimes slightly notched in front of eyes; both eyes on left side. Maxilla (upper jaw) extending to nearly below middle of eye. Gill-rakers long and slender, about 23 on lower arm of first arch. Teeth minute in both jaws. Dorsal fin commencing above anterior nostril of blind side. Lateral line curved above pectoral fin, forming 2 branches on head, the upper (accessory) ending between 10th to 13th ray of dorsal fin. Scales ctenoid on ocular side, cycloid on blind side except anteriorly and near the bases of vertical fins where they are ctenoid.

Colour : ocular side brownish, with indistinct darker spots and markings; 3 large and conspicuous dark ocelli arranged in the form of a triangle; dorsal. anal and caudal fins with dark spots and blotches.

Geographical Distribution : East coast of India, Sri Lanka to the Malay Archipelago.

Inhabits the shallower muddy and sandy bottoms of the continental shelf.

Fishery Information : Taken commercially in small quantities in our region.

SUBORDER : SOLEOIDEI

FAMILY : SOLEIDAE

[Soles]

Flatfishes with eyes dextral (on right side of body). Margin of preoperculum not entirely free, embedded in skin and scales of the head. Mouth small and asymmetrical, terminal or slightly inferior; snout sometimes hook-shaped. Teeth small, villiform, better developed on blind side. Dorsal fin extends on head to above eye or beyond; dorsal and anal fins free or confluent with caudal fin; pectoral fin usually absent in adult; pelvic fins sometimes asymmetrical, either free of joined to anal fin. Scales moderately large, cycloid or ctenoid, sometimes modified into skin flaps fringed with sensory filaments. Lateral line single on body, but sometimes branched on head.

Mostly small fishes found in all but the coldest seas, from the shore to fairly deep-water. Many are of importance, highly esteemed as food. The 9 genera of our region belong to the subfamiy Soleinae which is characterised in having the preopercular margin of the gill cover completely concealed and the pelvic fins free from the anal fin.

KEY TO GENERA

1	(a)	Snout forming a distinct hook ...	**Heteromycteris***
	(b)	Snout not forming a distinct hook ...	2
2	(a)	Caudal fin separate from dorsal and anal fins ...	3
	(b)	Caudal fin confluent with dorsal and anal fins ...	6
3	(a)	Pectoral fins well developed ...	4
	(b)	Pectoral fins abseent ...	5

4 (a) Body and head with numerous transverse wavy lines; anterior nasal tube on ocular side long	...	**Soleichthys***
(b) Body and head without wavy lines but with more or less distinct black blotches; anterior nasal tube on ocular side short	...	**Solea**
5 (a) Pelvic fin of ocular (eyed) side with a long base, joined to genital papilla or anal fin	...	**Pardachirus***
(b) Pelvic fin of ocular side short-based, separate from genital papilla and anal fin	...	**Aseraggodes**
6 (a) Opercular membrane not joined to pectoral fins	...	7
(b) Opercular membrane on both sides of body joined to upper rays of pectoral fins	...	8
7 (a) Body elongate; a bony process on snout	...	**Synaptura**
(b) Body oblong; no bony process on snout	...	**Euryglossa**
8 (a) First ray of dorsal fin enlarged and free	...	**Aesopia**
(b) First ray of dorsal fin not modified	...	**Zebrias**

Genus Aesopia Kaup

Aesopia Kaup, 1858, *Archiv. Naturgesch.*, **24**(1) : 97 (type-species : *Aesopia cornuta* Kaup).

Body oval; snout not forming a distinct hook; nasal tube rather short. Eyes contiguous, the upper scarcely in advance of the lower. Opercular membrane on both sides of body joined to upper rays of pectoral fins. Dorsal and anal fins confluent with caudal fin; first ray of dorsal fin enlarged and free. Scales cycloid on both sides of body, some of those on blind side produced into barbel-like processes.

Probably 2 species, one in our area.

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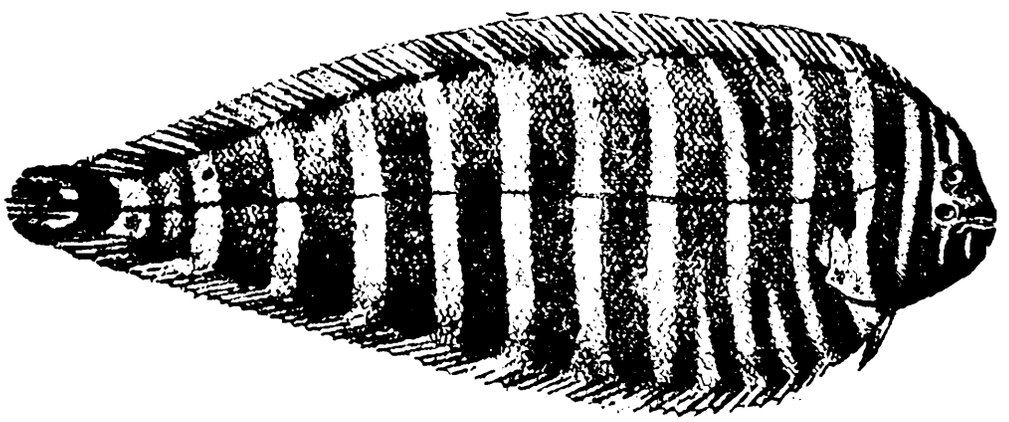
* The fishes of the genera *Heteromycteris* Kaup, *Soleichthys* Bleeker, *Pardachirus* Gunther and *Aseraggodes* Kaup, do not at the present time play any major role in the commercial fisheries of our area.

Aesopia cornuta Kaup

[Text-fig. 354].

Aesopia cornuta Kaup, 1858, *Archiv. Naturgesch.*, **24**(1) : 98 (type-locality : Coromandel coast).

Synaptura cornuta : Day, 1877, *Fishes of India* : 430, pl. 94, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 450.



Text-fig. 354. *Aesopia cornuta* Kaup

Common Names :

Horned Sole	...	English
Jerree-potoo	...	Telugu
Vari-allu	...	Tamil
Indi	...	Marathi

Distinguishing Characters :

Body oblong and compressed, its depth about 3 times in total length. Eyes contiguous ; nasal tube short. Dorsal and anal fins confluent with caudal fin ; dorsal fin with 69 to 79 soft rays, the first ray swollen and large.

Colour : body (ocular side) grey or brown, with 13 dark brown cross-bands extending on to vertical fins. Caudal fin dark brown.

Geographical Distribution : Tropical Indo-west Pacific.

Inhabits shallow and sand/mud bottoms in coastal waters.

Fishery Information : Of minor fishery value on the east coast of India.

Genus **Euryglossa** Kaup

Euryglossa Kaup, 1858, *Archiv. Naturgesch.*, **24**(1) : 79 (type-species : *Pleuronectes orientalis* Bloch) ; Menon and Joglekar, 1983, *J. mar. biol. Ass. India*, **20** : 14 (Review).

Body oblong, with no bony prominence on the snout. Gill membranes united, free from isthmus. Dorsal and anal fins confluent with caudal fin. Pectoral fins well developed or of one side rudimentary; opercular membrane not joined to pectoral fins. Pelvic fins free from anal fin. Scales ctenoid on both sides; lateral line scales cycloid.

Several species known, 4 in our area.

KEY TO SPECIES

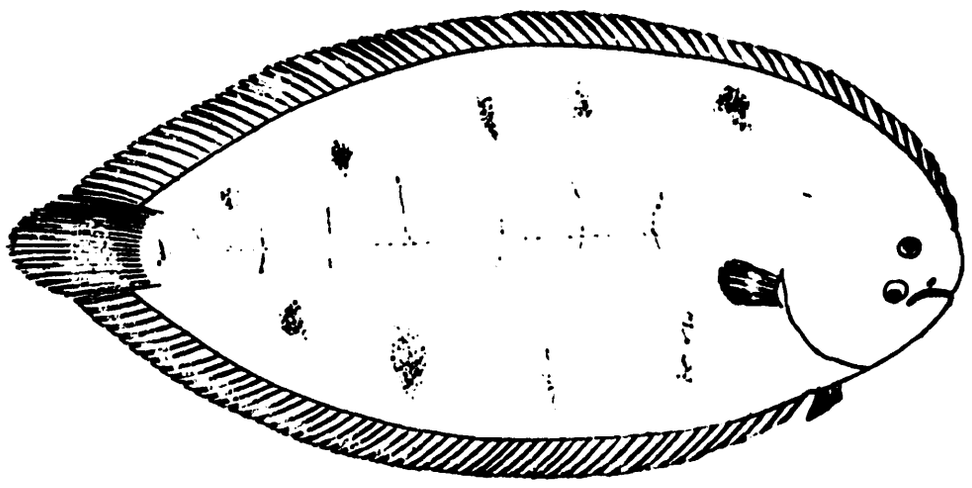
1 (a) Pectoral fins of both sides well developed	...	2
(b) Pectoral fin of right side rudimentary	...	3
2 (a) Scales on upper part of head and nape distinctly enlarged; caudal fin with 16 or 17 rays	...	*E. pan*
(b) Scales on head and nape of same size as others; caudal fin with 18 to 20 rays	...	*E. orientalis*
3 (a) Eyes contiguous, without scaly interorbital space	...	*E. macrolepis**
(b) Eyes separated by a scaly interspace	...	*E. panoides**

Euryglossa orientalis (Bloch)

[Text-fig. 355]

Pleuronectes orientalis Bloch, 1801, *Syst. Ichthyol.* : 157 (type-locality : Tranquebar).

Synaptura orientalis : Day, 1877, *Fishes of India* : 429, pl. 93, fig. 4 and pl. 94, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, 2 : 449.



Text-fig. 355. *Euryglossa orientalis* (Bloch)

**Euryglossa macrolepis* (Bleeker) and *E. panoides* (Bleeker) known only from the east coast of India in our area, are of no fishery value.

Common Names :

Oriental-sole	...	English
Sappatee	...	Malayalam
Lep	...	Marathi

Distinguishing Characters :

Body oblong, both its contours equally arched. Eyes separated by a scaly interspace. Mouth small, its cleft extending to below middle of eye ; lower lip feebly fringed. Dorsal fin with 62 to 72 rays ; anal fin with 47 to 57 rays. Pectoral fins well developed, the left fin somewhat shorter than the right. Pelvic fins moderately symmetrical, united basally. Scales ctenoid on both sides of body, head scales on blind side modified into cutaneous sensory processes.

Colour : body grey or brown with cloudy indistinct patches on eyed side, tinged yellow on blind side ; right pectoral fin darker.

Geographical Distribution : From Persian Gulf, through India, the East Indies, to China and Australia.

Inhabits shallow sandy and muddy bottoms of coastal waters.

Fishery Information : Of minor fishery value in our region. Grows upto 220 mm.

Euryglossa pan (Hamilton-Buchanan)

Pleuronectes pan Hamilton-Buchanan, 1822, *Fishes of Ganges* : 130, 373, pl. 29, fig. 42 (type-locality : Eastern estuaries of Ganges R.).

Synaptura pan : Day, 1877, *Fishes of India* : 429, pl. 93, fig. 3 ; Day, 1889, *Fauna Br. India, Fishes*, **2** : 449.

Common Name :

Pan-sole	...	English

Distinguishing Characters :

Body oblong, both its contours equally arched. Eyes separated by a scaly interspace of moderate width, the upper eye in advance of lower. Mouth small, its cleft extending to below anterior part of eye ; lower lip feebly fringed. Dorsal fin with 57 to 61 rays ; anal fin with 43 to 46 rays. Pectoral fins well developed, the left somewhat smaller. Scales ctenoid on both sides of body, those on upper part of head and nape distinctly enlarged.

Colour : body (ocular side) greyish or brownish, spotted and blotched with darker, generally some short dark vertical streaks crossing the lateral line ; margin of right pectoral fin blackish.

Geographical Distribution : India, Burma and Malaysian Archipelago.

Inhabits estuaries and tidal rivers.

Fishery Information : Taken commercially in small quantities in the Hooghly estuary (West Bengal). Grows upto 90 mm.

Genus **Solea** Quensel

Solea Quensel, 1806. Kong. *Vet. Acad. Nya Handl.*, **27** : 53, 229 (type-species : *Pleuronectes solea* Linnaeus).

Body ovate and flat, with ctenoid scales on both sides. Eyes on right side ; anterior nasal tube on ocular side short. Mouth curved, asymmetrical ; snout not forming a distinct hook. Minute teeth in left jaws, in right jaws absent or poorly developed. Dorsal fin beginning on snout ; dorsal and anal fins free from caudal fin. Pectoral fins on both sides equally well developed. Pelvic fins symmetrical or nearly so, not united with anal fin. Gill membranes confluent, free from isthmus. Body and head with more or less distinct black blotches.

Several species known, 3 in our area.

KEY TO SPECIES

1 (a) Body ovate, its depth 2.0 to 2.2 times in total length ; dorsal fin with 58 to 67 rays ; anal fin with 41 to 51 rays ... *S. ovata*

(b) Body elongate, its depth 2.5 to 3.0 times in total length ; dorsal fin with 67 to 77 rays ; anal fin 52 to 63 rays ... 2

2 (a) Depth of body 2.6 to 3.0 times in total length ; dorsal fin with 72 to 77 rays ; anal fin with 59 to 63 rays ... *S. elongata*

(b) Depth of body 2.5 to 2.6 times in total length; dorsal fin with 68 to 71 rays; anal fin with 54 to 58 rays ... *S. heinii**

Solea elongata Day

Solea elongata Day, 1877, *Fishes of India* : 426, pl. 90, fig. 4 (type-locality : Madras) ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 445 ; Norman, 1928, *Rec. Indian Mus.*, **30** : 175, fig. 1.

Common Name :

Elongate-Sole ... English

Distinguishing Characters :

Body elongate and flat, its depth 2.6 to 3.0 times in total length. Eyes on right side of body, separated by a narrow scaly space. Snout obtusely pointed, with series of short cutaneous sensory processes on blind side. Mouth small, curved, its cleft extending to below anterior half of lower eye. Dorsal fin with 72 to 77 rays; anal fin with 59 to 63 rays. Pectoral fin on ocular side longer than that of blind side; both pelvic fins present. Scales ctenoid on both sides of body.

Colour : olive-brown, with spots and black blotches on ocular side of body, the markings more distinct near the edges of body and often tend to form irregular vertical bands; a black blotch on distal part of pectoral fins.

Geographical Distribution : Persian Gulf, Pakistan, India and Sri Lanka.

Inhabits shallow and muddy bottoms in coastal waters.

Fishery Information : Of minor fishery significance in our region.

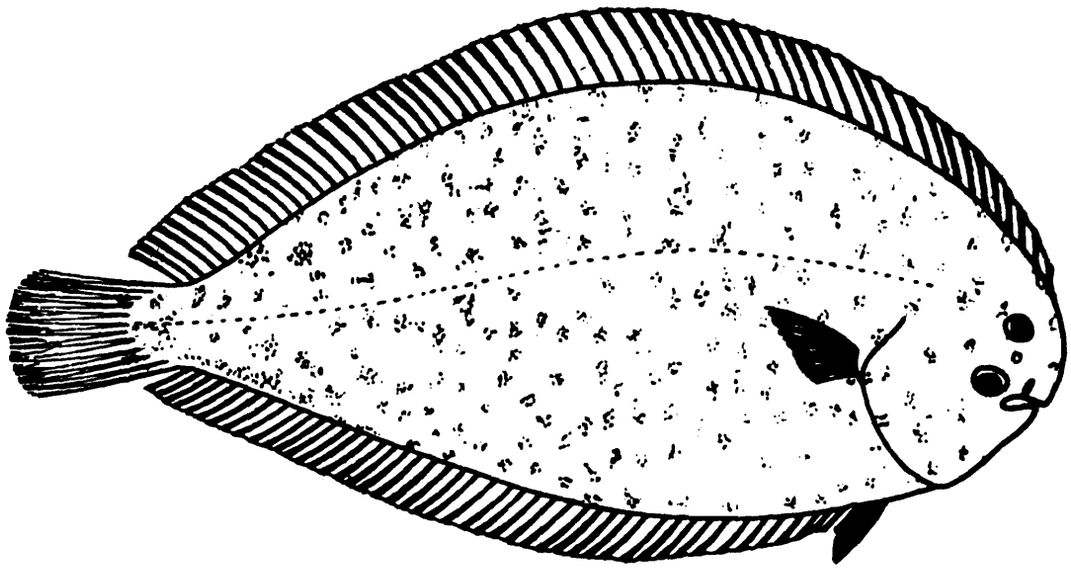
Solea ovata Richardson

[Text-fig. 356]

Solea ovata Richardson, 1846, *Rep. Br. Assoc. Adv. Sci.* : 279 (type-locality : China) ; Day, 1877, *Fishes of India* : 426, pl. 93, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 445 ; Norman, 1928, *Rec. Indian Mus.*, **30** : 176, fig. 2.

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* Solea heinii Steindachner reported from Pakistan, is likely to be found in our waters also.



Text-fig. 356. *Solea ovata* Richardson

Common Names :

Ovate-Sole	...	English
Lep	...	Marathi

Distinguishing Characters :

Body ovate and flat, its depth 2.0 to 2.2 times in total length. Eyes on right side, separated by a small concave scaly space of moderate width. Snout obtusely pointed, with series of short cutaneous sensory processes on blind side. Mouth small, curved, its cleft extending to below anterior half of eye. Dorsal fin with 58 to 67 rays, anal fin with 41 to 51 rays. Pectoral fin on ocular side about twice as long as that of blind side; both pelvic fins present. Scales ctenoid on both sides of body.

Colour : olive-brown, with spots and black blotches on ocular side of body and fins; deep black blotches on outer two-thirds of pectoral fins.

Geographical Distribution : India, through the East Indies, to China.

Inhabits shallow sandy and muddy bottoms in coastal waters.

Fishery Information : Of minor fishery value in our region.

Genus **Synaptura** Cantor

Synaptura Cantor, 1850, *J. Asiat. Soc.* Bengal, **18**(2) : 1204 (type-species : *Solea commersonien* Cuvier = *Pleuronectes commersionanus* Lacepede) ; Menon and Joglekar, 1983, *J. mar. biol. Ass. India,* **20** : 11 (Review).

Body elongate, broad anteriorly and tapering posteriorly. Eyes separated by a scaly interspace. Anterior part of snout with a bony process. Dorsal and anal fins confluent with caudal fin. Pectoral fins well developed, symmetrical; opercular membrane not joined to pectoral fins. Pelvic fins short, connected to anal fin. Scales ctenoid on both sides; lateral line scales cycloid.

Three species in the Indo-Pacific, 2 in our area.

KEY TO SPECIES

1 (a) Scales on head and nape of ocular (eyed) side larger than those on body; body without white spots; no tentacle between the nostrils ... *S. commersoniana*

(b) Scales on head and body similar in size; 2 or 3 rows of white spots on ocular side of body; a tentacle between the nostrils ... *S. albomaculata*

Synaptura albomaculata Kaup

Synaptura albomaculata Kaup, 1858, *Archiv. Naturgesch.*, **24**(1) : 96 (type-locality : Coromandel coast) ; Day, 1877, *Fishes of India* : 429, pl. 93, fig. 5 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 448, fig. 161.

Common Name :

Kaup's sole ... English

Distinguishing Characters :

Mouth small, its cleft extending to slightly behind middle of eye; lower lip fringed. A small barbel present between the tubular nostrils on ocular side of body. Dorsal fin with 72 to 80 rays; anal fin with 57 to 63 rays. Pectoral fin 2.5 to 3 times in head length. Scales on head and body similar in size; scales on blind side of head modified into cutaneous sensory processes.

Colour : brownish, with 2 to 3 rows of white spots on ocular side of body; vertical fins blackish towards their edges on both sides, with a narrow white margin; right pectoral fin dusky.

Geographical Distribution : East coast of India and Burma.

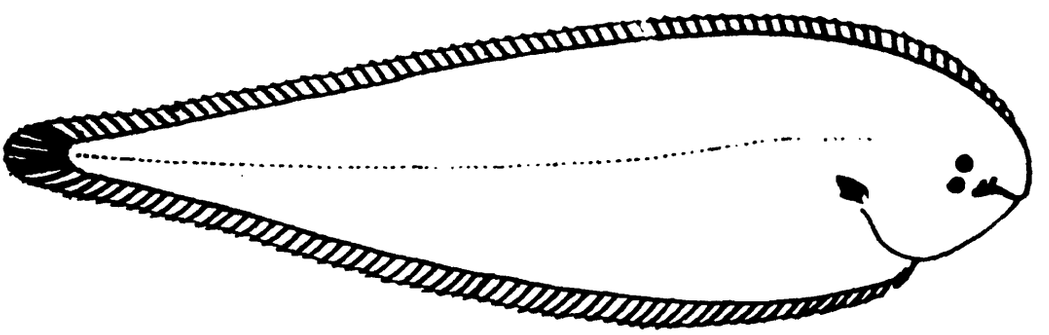
Fishery Information :Taken commercially in small quantities on the east coast of India. Grows to 200 mm.

Synaptura commersoniana (Lacepede)

[Text-fig. 357]

Pleuronectes commersonianus Lacepede, 1802, *Hist. nat. Poiss.*, **3** : pl. 12, fig. 2 (type-locality : Mauritius).

Synaptura commersoniana : Day, 1877, *Fishes of India* : 428, pl. 94, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 448.



Text-fig. 357. *Synaptura commersoniana* (Lacepede)

Common Names :

Commerson's sole	...	English
Jerree-potoo	...	Telugu
Erumi-naaku	...	Tamil

Distinguishing Characters :

Mouth small, its cleft extending to middle of upper eye; lower lip distinctly fringed. Dorsal fin with 72 to 81 rays; anal fin with 57 to 68 rays. Pectoral fin 5 to 6 times in head length. Scales on head and nape of eyed-side larger than those on body, and scales on blind side of head modified into cutaneous sensory processes.

Colour : grey-brown on ocular side of body; dorsal, anal and caudal fins dusky towards edges of both sides and with a conspicuous white margin; right pectoral fin dusky.

Geographical Distribution : Indo-west Pacific.

Inhabits mainly sandy/muddy bottoms in coastal waters.

Fishery Information : Taken commercially in small quantities on the Tamil Nadu and Kerala coasts of India. Grows to 300 mm.

Genus **Zebrias** Jordan & Snyder

Zebrias Jordan and Snyder, 1900, *Proc. U.S. natn. Mus.*, **23** : 380 (type-species : *Solea zebrina* Temminck & Schlegel).

Body elongate and flat, with ctenoid scales on both sides. Anterior nostril of ocular side tubular, posterior one covered by a flap. Mouth curved, the snout not forming a distinct hook. Minute teeth in jaws of blind side. Eyes separated by a scaly orbital space. Gill membranes united, but free from isthmus. Dorsal and anal fins confluent with caudal fin ; dorsal fin beginning on snout. Pectoral fins well developed, attached to opercular membrane. Pelvic fins short, broad-based, free from each other and from anal fin. Body usually with several dark brown cross-bands continued on to fins.

Several species from the Indo-Pacific, 8 in our area.

KEY TO SPECIES

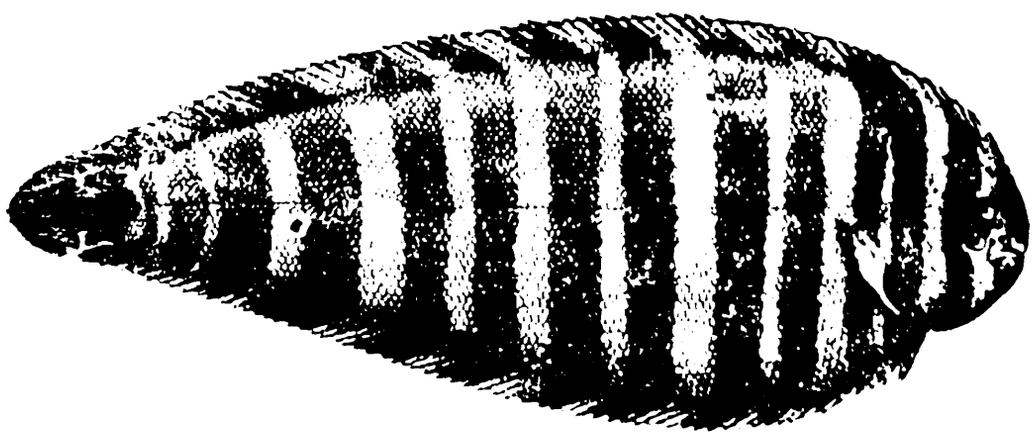
1 (a) Posterior rays of dorsal and anal fins completely confluent to caudal fin, the outline of fins continuous around caudal fin	...	2
(b) Posterior rays of dorsal and anal fins only partly confluent with caudal fin, joined only to basal half of caudal fin, leaving the latter distinct ; outline of fins not continuous around caudal fin ; eyes without tentacles	...	5
2 (a) Body with a number of dark patches and spots, no cross-bands	...	*Z. maculosus**
(b) Body with several dark brown cross-bands, no patches or spots	...	3
3 (a) Body with 14 unpaired cross-bands on ocular side ; eyes without tentacles	...	*Z. altipinnis**
(b) Body with 10 to 12 paired cross-bands on ocular side	...	4
4 (a) Eyes with small tentacles ; 10 or 11 dark cross-bands on ocular side of body	...	*Z. quagga*
(b) Eyes without tentacles ; 12 paired cross-bands on ocular side of body	...	*Z. zebra**

5 (a) Anterior nasal tube on ocular side long, backward, reaches anterior border of lower eye; eyes separated by a scaly interspace	...	*Z. japonicus**
(b) Anterior nasal tube on ocular side short, does not reach anterior border of lower eye; eyes more or less contiguous		6
6 (a) Upper two rays of right pectoral fin abruptly produced; 102 to 105 scales in longitudinal series; 22 to 24 dark cross-bands on body	...	*Z. annandalei**
(b) Upper rays of right pectoral fin not produced; 61 to 90 scales in longitudinal series	...	7
7 (a) Third cross-band on body normal	..	*Z. synapturoides*
(b) Third cross-band on body spindle-shaped	...	*Z. keralensis**

Zebrias quagga (Kaup)

[Text-fig. 358]

Aesopia quagga Kaup, 1858, *Archiv. Naturges.* : 98 (type-locality : not known).
Synaptura zebra Day (*nec.* Bloch), 1877, *Fishes of India* : 430, pl. 94, fig. 3 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 450.
Zebrias quagga : Norman, 1928, *Rec. Indian Mus.*, **30** 184, pl. 6



Text-fig. 358. *Zebrias quagga* (Kaup)

* *Zebrias maculosus* Oommen, *Z. altipinnis* (Alcock), *Z. zebra* (Bloch), *Z. annandalei* Talwar & Chakrapani, *Z. keralensis* Joglekar and *Z. japonicus* (Bleeker) are of no fishery importance in our region.

Common Names :

Quagga-Sole	...	English
Jerree-potoo	...	Telugu
Varri-amler	...	Tamil
Lep	...	Marathi

Distinguishing Characters :

Body elongate and flat, with scales moderately ctenoid on both sides. Eyes on right side, practically contiguous; each eye with a small tentacle. Mouth curved, its cleft reaching to below anterior part of eye. Dorsal and anal fins completely confluent with caudal fin, the outline of fins continuous around caudal fin. Upper rays of right pectoral fin produced, left pectoral fin rather smaller.

Colour : brownish, with 10 or 11 dark cross-bars on ocular side of body and extending on to vertical fins. Caudal fin irregularly marked with yellowish white and black.

Geographical Distribution : Persian Gulf, India, through the East Indies, to China.

Fishery Information : Of minor fishery significance in our region.

Zebrias synapturoides (Jenkins)

Synaptura synapturoides Jenkins, 1910, *Mem. Indian Mus.*, **3** : 28, pl. 3, fig. 4 (type-locality : Off Ganjam coast, Orissa).

Zebrias synapturoides : Norman, 1928, *Rec. Indian Mus.*, **30** : 83, pl. 5.

?*Zebrias cochinensis* Rao, 1968, *J. zool. Soc. India*, **19** : 99 (type-locality : Cochin).

Common Name :

Jenkin's sole	...	English

Distinguishing Characters :

Body elongate and flat, with strongly ctenoid scales on both sides. Eyes on right side, nearly contiguous, without tentacles. Mouth curved, its cleft reaching to below nearly middle of eye. Posterior rays of dorsal and anal fins joined only to basal half of caudal fin, leaving the latter distinct, outline of fins not continuous around caudal fin. Right pectoral fin shorter than eye, the upper rays not produced. Scales ctenoid, 61 to 71 in longitudinal series.

Colour : body brownish, with 13 dark cross-bands on ocular side.

Geographical Distribution : South-west and east coast of India.

Fishery Information : Of minor fishery significance in our region.

FAMILY : CYNOGLOSSIDAE
[Tongue Soles]

Tongue-shaped flatfishes, with eyes sinistral (left side of head) Mouth asymmetrical, lips sometimes fringed, rostral hook present below mouth. Teeth minute and on blind side only. Preopercle margin not free, covered with skin and scales. Dorsal fin originates on head ; both dorsal and anal fins confluent with caudal fin ; pectoral fins absent ; only left pelvic fin present ; no spiny rays in dorsal and pelvic fins. Scales small, ctenoid or cycloid ; lateral line variable, 0 to 3 on ocular side, 0 to 2 on blind side.

Three genera, all in our region.

KEY TO GENERA

1 (a) No lateral line on ocular side of body ; mouth terminal	...	**Symphurus***
(b) Two or three lateral lines on eyed-side of body ; mouth inferior	...	2
2 (a) Lips smooth, not fringed	...	**Cynoglossus**
(b) Lips with row of fringed tentacles	...	**Paraplagusia**

Genus **Cynoglossus** Hmilton-Buchanan

Cynoglossus Hamilton-Buchanan, 1822, *Fishes of Ganges* : 32 (type-species : *Cynoglossus lingua* Hamilton-Buchanan) ; Menon, 1977, *Smithsonian contributions to zoology*, (238) : 1 (Revision).

Body lanceolate ; eyes on left side. Pectoral fins absent ; pelvic fin of blind side present only, with 4 rays, all inserted ventrally in front of anal fin and connected to it by a membranous extension of its last ray. Ocular side of body with 1, 2 or 3 lateral lines ; blind side with 1 or 2 lateral lines, often absent. Scales generally ctenoid on ocular side, ctenoid or cycloid on blind side. Mouth rather narrow, the snout

* The fishes of the genus *Symphurus* Rafinesque occur in depths of 400 to 1500 m. and are rare in our area.

hooked and overhanging mouth opening; jaws strongly asymmetrical; jaws of blind side only armed with teeth. Gill-opening narrow, gill membranes united.

Forty-nine species, 15 in our area.

KEY TO SPECIES

1	(a) Caudal fin with 12 rays	...	2
	(b) Caudal fin with 8 to 10 rays	...	3
2	(a) One lateral line on blind side	...	*C. dubius*
	(b) Two lateral lines on blind side	...	*C. bilineatus*
3	(a) Caudal fin with 8 rays	...	*C. itinus**
	(b) Caudal fin with 10 rays	...	4
4	(a) Two lateral lines on blind side	...	5
	(b) No lateral line on blind side	...	6
5	(a) Scales 16 to 18 between lateral lines	...	*C. lachneri**
	(b) Scales 18 to 20 between lateral lines	...	*C. dispar*
6	(a) Both nostrils situated before eyes; eyes pedunculate	...	*C. monopus**
	(b) Posterior nostrils situated in inter-orbital space or between anterior part of eyes; eyes non-pedunculate	...	7
7	(a) Scales cycloid on blind side of body	...	8
	(b) Scales ctenoid on blind side of body	...	10
8	(a) Three lateral lines on ocular side ot body	...	*C. carpenteri**
	(b) Two lateral lines on ocular side of body	...	9
9	(a) Scales 11 or 12 between lateral lines on ocular side of body	...	*C. lingua*
	(b) Scales 7 to 9 between lateral lines on ocular side of body	...	*C. arel*
10	(a) Angle of mouth distinctly nearer to gill-opening than to tip of snout	...	*C. lida*
	(b) Angle of mouth nearer to tip of snout than to gill-opening	...	11

11	(a)	Cleft of mouth extending far back to posterior margin of fixed eye	... *C. macrostomus*
	(b)	Cleft of mouth extending to only middle or about posterior border of fixed eye	... 12
12	(a)	Eyes contiguous	... *C. kopsi**
	(b)	Eyes not contiguous	... 13
13	(a)	Scales 16 to 19 between lateral lines	... *C. puncticeps*
	(b)	Scales 11 to 14 between lateral lines	... 14
14	(a)	Snout rounded and short, about 27 percent of head length	... *C. semifasciatus*
	(b)	Snout somewhat pointed and longer, about 32 percent of head length	.. *C. cynoglossus*

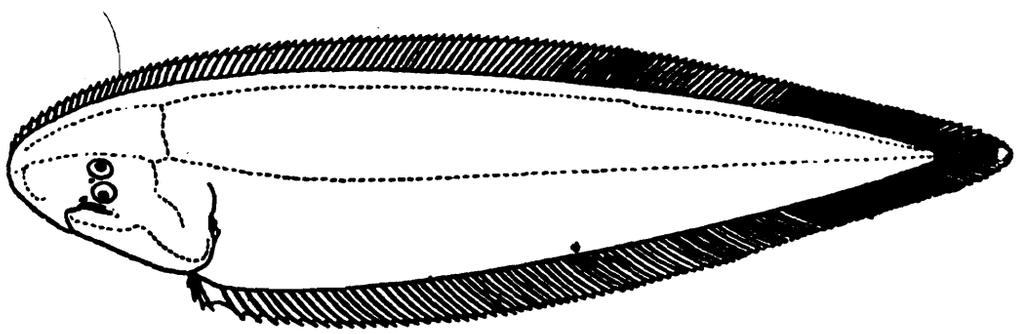
Cynoglossus arel (Schneider)

[Text-fig. 359]

Pleuronectes arel Schneider, 1801, *Syst. Ichth. Bloch.* : 159 (type-locality : Tranquebar).

Cynoglossus macrolepidotus (Bleeker) : Day, 1877, *Fishes of India* : 434, pl. 96, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 455.

Cynoglossus oligolepis (Bleeker) : Day, 1877, *Fishes of India* : 433, pl. 95, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 455.



Text-fig. 359. *Cynoglossus arel* (Schneider)

Common Names :

Largescale tongue-sole	...	Bengali
Lep	...	Marathi

* *Cynoglossus itinus* (Snyder) and *C. lachneri* Menon have recently been recorded from our region by Murthy & Srinivasa—Rao (in press) ; *C. monopus* (Bleeker) and *C. kopsi* (Bleeker) are of no fishery value in our region.

Distinguishing Characters :

Body flat and elongate. Two nostrils on ocular side, the anterior one tubular in front of lower eye, posterior simple in anterior half of interorbital space. Snout obtusely pointed ; rostral hook short ; angle of mouth reaching or almost extending beyond lower eye, about midway between tip of snout and gill-opening. Two lateral lines on ocular (eyed) side, medium lateral line with 56 to 70 scales, 7 to 9 rows of scales between them. No lateral line on blind side. Scales large, ctenoid on ocular side, on blind side cycloid. Dorsal fin fin with 116 to 130 rays ; anal fin with 85 to 98 rays ; caudal fin with 10 rays.

Colour : ocular side of body uniform brown, with a dark patch on gill cover ; blind side white.

Geographical Distribution : From Persian Gulf, through sea of India, the East Indies, to the Philippines and Taiwan.

Inhabits muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance in our area.

Cynoglossus bilineatus (Lacepede)

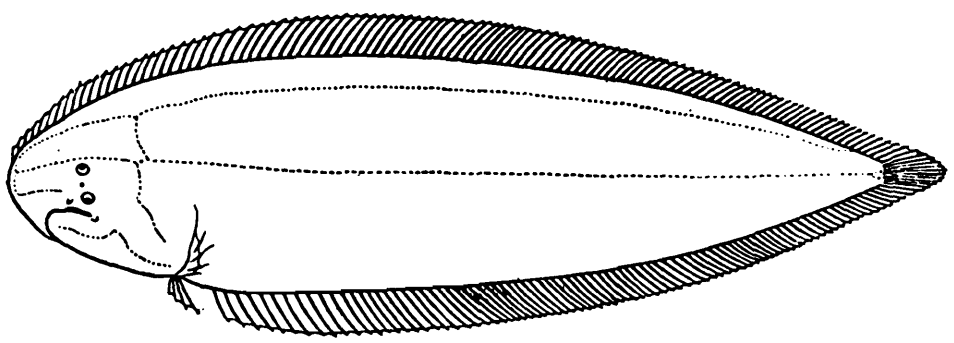
[Text-fig. 360]

Achirus bilineatus Lacepede, 1802, *Hist. nat. Poiss.*, **4** : 659, 663 (type-locality : China ; East Indies).

Cynoglossus quadrilineatus (Bleeker) : Day (*partim*), 1877, *Fishes of India* : 435 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 457.

Cynoglossus quinquelineatus Day, 1877, *Fishes of India* : 432, pl. 98, fig. 1 (type-locality : Madras) ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 453.

Cynoglossus sindensis Day, 1877, *Fishes of India* : 434, pl. 90, fig. 6 (type-locality : Sind through the seas of India) ; Day, 1889, *Fauna Br. India, Fishes,* **2** : 455.



Text-fig. 360. *Cynoglossus bilineatus* (Lacepede)

Common Names :

Fourlined tongue-sole	...	English
Lep	...	Marathi

Distinguishing Characters :

Body flat and elongate. Two nostrils on ocular side, the anterior one tubular, in front of lower eye ; posterior nostril in anterior half or middle of interorbital space. Snout rounded ; rostral hook short, reaching hardly before vertical through front border of anterior nostril ; angle of mouth reaching to below vertical from posterior border of lower eye, slightly nearer to gill-opening than to tip of snout. Two lateral lines on ocular side ; 88 to 96 scales on median lateral line, 13 to 16 rows of scales between lateral lines. Two lateral lines on blind side. Scales ctenoid on ocular side except those on lateral line ; scales of blind side and those on lateral lines of ocular side cycloid. Dorsal fin with 107 to 113 rays ; anal fin with 80 to 88 rays ; caudal fin with 12 rays.

Colour : ocular side brown, with irregular dark blotch on operculum, blind side white.

Geographical Distribution : From Malay Archipelago to the coasts of India and Pakistan, and to New Guinea and Queensland (Australia), Taiwan and Japan.

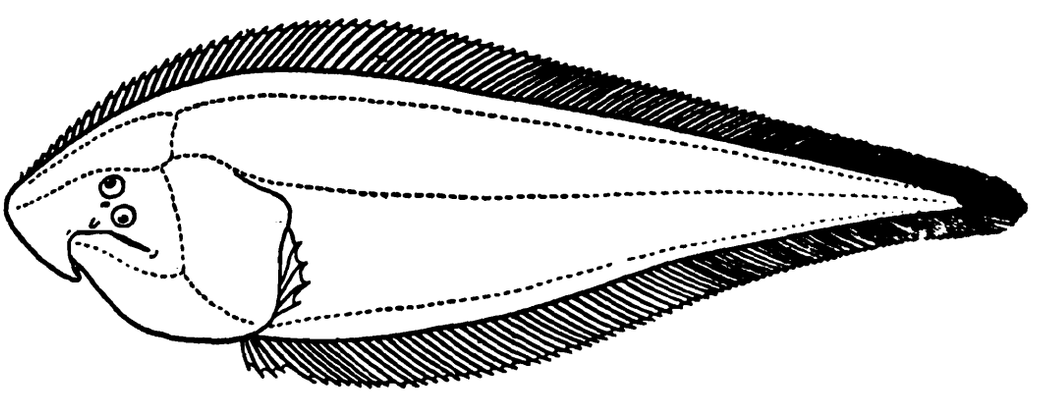
Inhabits muddy and sandy bottoms of the continental shelf, down to about 80 m.

Fishery Information : Taken commercially in small quantities on the south-west coast of India.

Cynoglossus carpenteri Alcock

[Text-fig. 361]

Cynoglossus carpenteri Alcock, 1889, *J. Asiat. Soc. Beng.*, **58**(2) : 287, pl. 18, fig. 1 (type-locality : Orissa coast).



Text-fig. 361. *Cynoglossus carpenteri* Alcock

Common Name :

Alcock's tongue-sole ... **English**

Distinguishing Characters :

Body flat and elongate. Eyes small, with a moderate interspace. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, posterior nostril simple and in front of interorbital space. Snout obtusely pointed; rostral hook rather short; angle of mouth extending to below vertical from posterior border of fixed eye or slightly beyond it, either slightly nearer to gill-opening than to tip of snout, or midway between these two. Three lateral lines on ocular side, midlateral line with 75 to 96 scales, 15 to 19 rows of scales between them. No lateral line on blind side. Dorsal fin with 101 to 110 rays; anal fin with 80 to 89 rays; caudal fin with 10 rays.

Colour : ocular side uniformly brownish, opercular region rather blackish, blind side whitish.

Geographical Distribution : Persian Gulf and seas of India; 140 to 300 m.

Fishery Information Of minor fishery significance in our region.

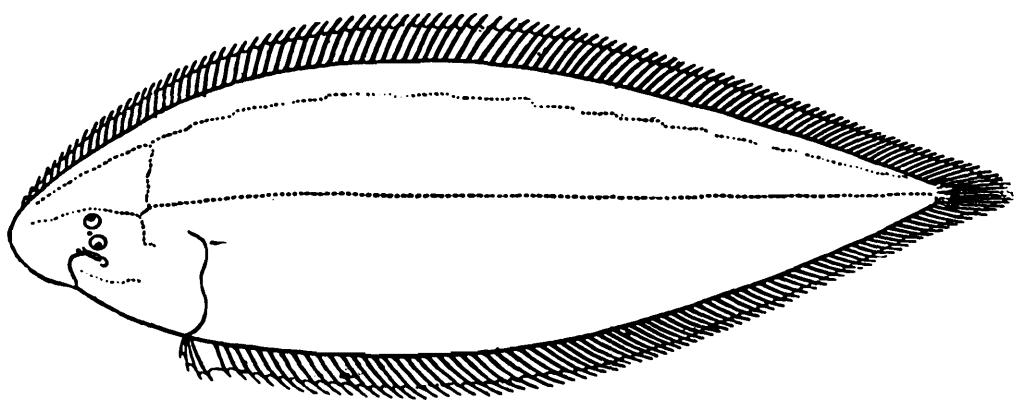
Cynoglossus cynoglossus (Hamilton-Buchanan)

[Text-fig. 362]

Achirus cynoglossus Hamilton-Buchanan, 1822, *Fishes of Ganges* : 132 (type-locality : Ganges R. mouth).

Cynoglossus bengalensis (Bleeker) : Day, 1877, *Fishes of India* : 435, pl. 97, fig. 4.

Cynoglossus deltae Jenkins, 1910, *Rec. Indian Mus.*, **5** : 130 (type-locality : Khulna, Bangladesh).



Text-fig. 362. *Cynoglossus cynoglossus* (Hamilton-Buchanan)

Common Name :

Gangetic tongue-sole	...	English

Distinguishing Characters :

Body flat and elongate. Two nostrils on ocular side, the anterior nostril tubular, in front of lower eye, posterior nostril simple and either infront of interorbital space or in anteror half of it. Snout obtusely pointed; rostral hook rather short; angle of mouth not reaching beyond lower eye, nearer to tip of snout than to gill-opening. Two lateral lines on ocular side; midlateral line with 70 to 90 scales, 12 to 14 rows of scales between lateral lines; no lateral line on blind side. Scales ctenoid on both sides. Dorsal fin with 95 to 102 rays; anal fin with 72 to 78 rays; caudal fin with 10 rays.

Colour : ocular side brown-grey, with vague marblings; blind side whitish.

Geographical Distribution : Coast of India, Bangladesh, through the East Indies, to the Philippines; not to New Guinea or Australia.

Inhabits muddy and sandy bottoms, often in shallow areas including estuaries and brackish waters.

Fishery Information : Of minor fishery significance in our area.

Cynoglossus dispar Day

Cynoglossus dispar Day, 1877, *Fishes of India* : 434, pl. 96, fig. 2 (type-locality : Bombay) ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 456.

Common Names :

Day's tongue-sole	...	English
Lep	...	Marathi

Distinguishing Characters :

Body flat and elongate. Eyes large, widely separated. Two nostrils on ocular side. Snout rounded; rostral hook short; angle of mouth extending to about or almost below vertical from hind border of fixed eye, much nearer to tip of snout than to gill-opening. Two lateral lines on ocular side; 102 to 119 scales on median lateral line, 18 to 20 rows of scales between them; two lateral lines on blind side. Scales ctenoid on ocular side except those on lateral line; scales on blind side and those of lateral line of ocular side cycloid. Dorsal fin

with 109 to 113 rays; anal fin with 90 to 92 rays; caudal fin with 10 rays.

Colour : ocular side brownish, with somewhat darker irregular blotches; blind side whitish.

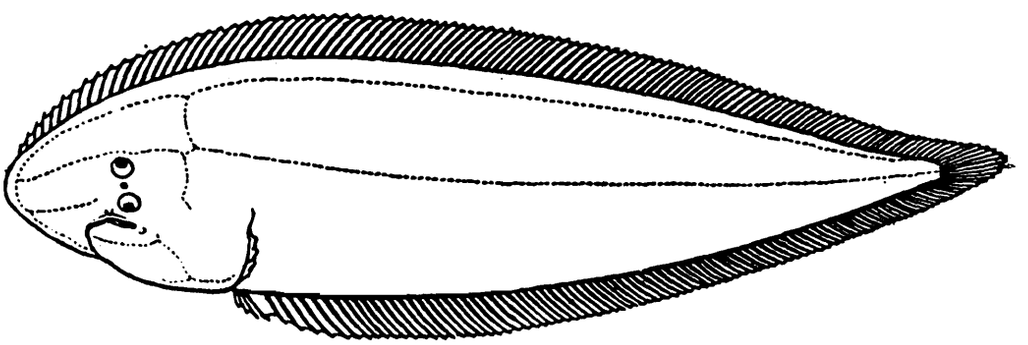
Geographical Distribution : Pakistan and India.

Fishery Information : Of minor fishery significance in our area.

Cynoglossus dubius Day

[Text-fig. 363]

Cynoglossus dubius Day, 1873, *J. Linn. Soc., Zool.*, **11** : 525 (type-locality : Gwadur) ; Day, 1877, *Fishes of India* : 435, pl. 95, fig. 2; Day, 1889, *Fauna Br. India,* Fishes, **2** : 456.



Text-fig. 363. *Cynoglossus dubius* Day

Common Names :

Large tongue-sole	...	English
Lep	...	Marathi

Distinguishing Characters :

Body flat and elongate. Eyes large, interorbital width pronounced. Anterior nostril of eyed side tubular, on upper lip in front of fixed eye, the posterior nostril in anterior half of interorbital space or in the middle of it. Snout obtusely pointed; rostral hook rather short; angle of mouth extending below vertical from posterior border of fixed eye, or a little beyond, nearer to gill-opening than to tip of snout. Two lateral lines on ocular side ; median line with 98 to 104 scales, 17 to 21 rows of scales between the two lateral lines; one lateral line on blind side. Scales cycloid on both sides, except along both dorsal and anal fins towards the posterior side of ocular side where the scales are weakly ctenoid. Dorsal fin with 111 to 114 rays; anal with 88 to 91 rays; caudal fin with 12 rays.

Colour : ocular side uniformly brown, blind side whitish.

Geographical Distribution : West coast of India and Pakistan.

Fishery Information : This flatfish came into some prominance in the fishery only after the introduction of mechanised fishing (trawling) along the Kerala coast. This species grows to more than three times the normal adult size of the Malabar Sole.

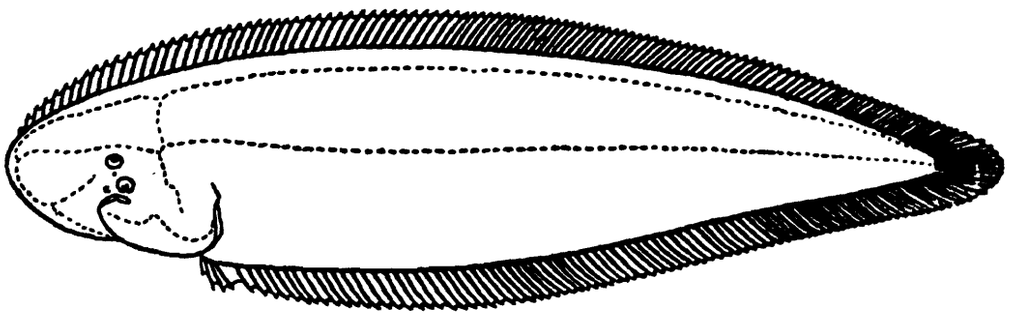
Cynoglossus lida (Bleeker)

[Text-fig. 364]

Plagusia lida Bleeker, 1851, *Nat. Tijdschr. Ned.-Indie*, **1** : 413 (type-locality : Batavia).

Cynoglossus lida : Day, 1877, *Fishes of India* : 436, pl. 97, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 458.

Cynoglossus intermedius Alcock, 1890, *J. Asiat. Soc. Beng.*, **58** (2) : 288 (type-locality : off Orissa coast).



Text-fig. 364. *Cynoglossus lida* (Bleeker)

Common Name :

Shoulderspot tongue-sole ... English

Distinguishing Characters :

Body flat and elongate. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, posterior nostril simple and in anterior half of interorbital space. Snout broadly rounded; rostral hook rather long; angle of mouth extending to below vertical from posterior half of lower eye, distinctly nearer to gill-opening than to tip of snout. Two lateral lines on ocular side; median line with 72 to 90 scales, 12 to 15 rows of scales between the two lines; no lateral line on blind side. Scales ctenoid on both sides of body. Dorsal fin with 99 to 108 rays; anal fin with 77 to 85 rays; caudal fin with 10 rays.

Colour : ocular side light brownish, blind side whitish.

Geographical Distribution : Indo-west Pacific.

Inhabits mainly shallow muddy and sandy bottoms of the continental shelf.

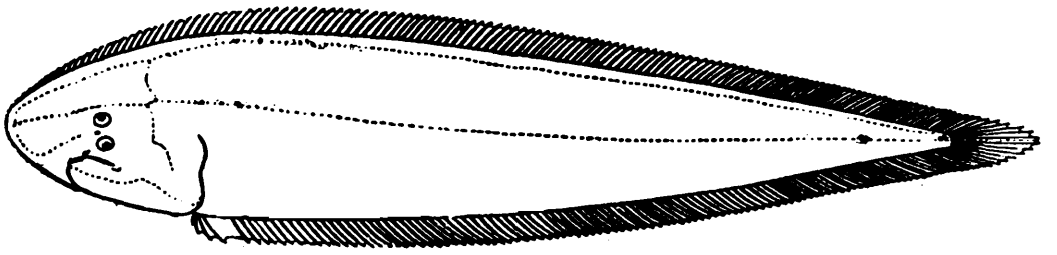
Fishery Information : Taken commercially in small quantities on the east coast of India and the Kerala coast.

Cynoglossus lingua Hamilton-Buchanan

[Text-fig. 365]

Cynoglossus lingua Hamilton-Buchanan, 1822, *Fishes of Ganges* : 32 (type-locality : Gangetic estuaries) ; Day, 1877, *Fishes of India* : 433, pl. 96, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 454, fig. 163.

Cynoglossus acinaces Jenkins, 1910, *Rec. Indian Mus.*, **5** : 130 (type-locality : Khulna, Bangladesh).



Text-fig. 365. *Cynoglossus lingua* Hamilton-Buchanan

Common Names :

Long tongue-sole	...	English
Kukurjibh	...	Bengali
Vari-allu, Kotaralu	...	Tamil
Lep	...	Marathi

Distinguishing Characters :

Body flat and very elongate. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, on upper lip, posterior nostril simple and in anterior half of interorbital space. Snout obtusely pointed; rostral hook short; angle of mouth reaching well beyond lower eye, much nearer gill-opening than to tip of snout. Two lateral lines on ocular side; midlateral line with 90 to 101 scales; no lateral line on blind side. Scales ctenoid on ocular side, with cycloid scales on head and on lateral lines; cycloid scales on blind side, fairly large, 11 or 12 rows between lateral lines on blind side. Dorsal fin with 126 to 138 rays, anal fin with 97 to 114 rays; caudal fin with 10 rays.

Colour : ocular side reddish brown, sometimes with irregular brown-black patches, with a large black blotch on operculum.

Geographical Distribution : From the western coast of India to Indonesia and the Philippines; not to New Guinea and Australia.

Inhabits mainly shallow muddy and sandy bottoms of the continental shelf, entering estuaries.

Fishery Information : Taken commercially in small quantities on the north-east coast of India and probably also on the Kerala coast.

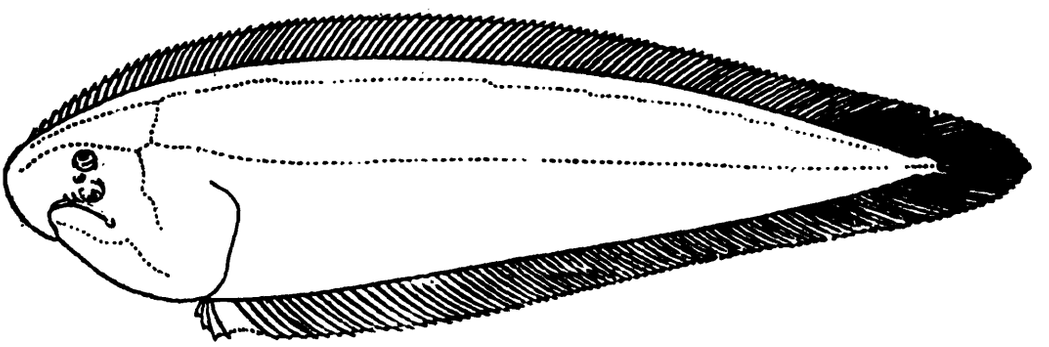
Cynoglossus macrostomus Norman

[Text-fig. 366]

Cynoglossus hamiltonii Day (*nec Gunther*), 1877, *Fishes of India* : 436, pl. 95, fig. 3; Day, 1889, *Fauna Br. India,* Fishes, **2** : 458.

Cynoglossus macrostomus Norman, 1928, *Rec. Indian Mus.*, **30**(2) : 204, fig. 20 (type-locality : Hooghly estuary, near Calcutta) ; Menon, 1971, *J. mar. biol. Ass. India,* **11** : 311

Cynoglossus luctosus Chabanaud, 1947, *Ann. Mag. nat. Hist.*, (11) **14** : 813 (type-locality : Tanur, Malabar coast).



Text-fig. 366. *Cynoglossus macrostomus* Norman

Common Names :

Malabar Sole	...	English
Manthal	...	Malayalam
Nangu		Kannada

Distinguishing Characters :

Body flat and elongate. Eyes nearly contiguous, with no space between them. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, posterior nostril simple and in anterior half of interorbital space. Snout obtusely pointed; rostral hook short; angle of mouth reaching well beyond lower eye, nearer to tip of snout than to gill-opening. Two lateral lines on ocular side; median line with

80 to 92 scales, 14 to 16 rows of scales between them; no lateral line on blind side. Dorsal fin with 100 to 106 rays; anal fin with 78 to 84 rays; caudal fin with 10 rays.

Colour : light brown on ocular side with dark brown mottling forming diffuse, irregular cross-bands; blind side whitish; dorsal and anal fins grey-black.

Geographical Distribution : Coast of India.

Inhabits shallow muddy and sandy bottoms of the continental shelf, down to 25 m; also found in midwaters in certain seasons of the year.

Fishery Information : Common on the south-west coast of India where it is the object of an important fishery. This is the most valuable flat-fish commercially in Indian waters. The fishing season is from late August or September to December and the heaviest landings are in the region between Edakad and Kadapuram on the Kerala coast. The bulk of the catches are obtained at the commencement of the season. The sudden appearance of the tongue-soles in the surface and subsurface waters of the inshore region is phenomenal and is known in Kerala as Manthayilakom, when they are captured in huge quantities in boat-seines (*Thattum vala, Paithu vala*), cast-nets and shore-seines (*Noona vala*). In the peak of the fishery, 75 to 80% of the fish are fully mature potential spawners. After the peak fishery the tongue-soles begin to disappear as suddenly as they appeared at the commencement of the season.

Cynoglossus puncticeps (Richardson)

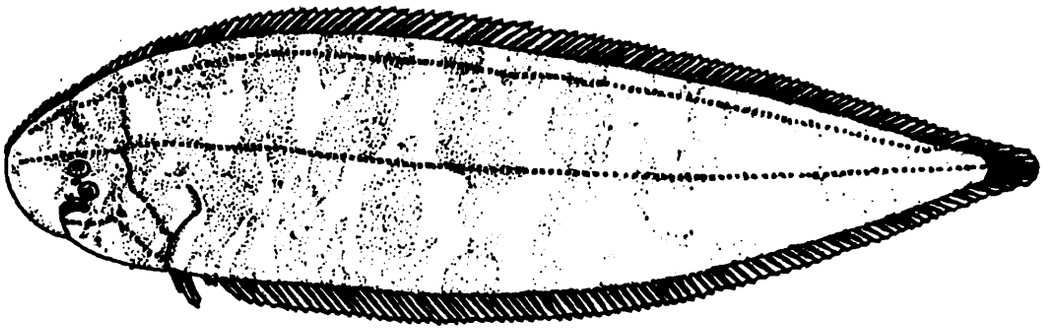
[Text-fig. 367]

Plagusia puncticeps Richardson, 1846, *Rept. Br. Assoc. Adv. Sci.* : 280 (type-locality : China).

Cynoglossus puncticeps : Day, 1877, *Fishes of India* : 437, pl. 97, fig. 1 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 459.

Cynoglossus brachyrhynchus (Bleeker) : Day, 1877, *Fishes of India* : 435, pl. 96, fig. 4 ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 457.

Cynoglossus brevis Gunther : Day, 1877, *Fishes of India* : 437, pl. 97, fig. 2.



Text-fig. 367. *Cynoglossus puncticeps* (Richardson)

Common Names :

Speckled tongue-sole	...	English
Lep	...	Marathi

Distinguishing Characters :

Body flat and elongate. Eyes with a narrow interspace between them. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, posterior nostril simple and immediately in front of interorbital space. Snout rounded or obtusely pointed; rostral hook short; angle of mouth not reaching beyond lower eye, slightly nearer to tip of snout than to gill-opening. Two lateral lines on ocular side; median line with 78 to 99 scales, 15 to 19 rows of scales between them; no lateral line on blind side. Scales ctenoid on both sides of body. Dorsal fin with 90 to 100 rays; anal fin with 72 to 78 rays; caudal fin with 10 rays.

Colour : ocular side yellow-brown with very distinct irregular dark brown blotches, often forming irregular cross-bars that disappear with age; lower side whitish; some rays of dorsal and anal fins dashed with dark brown.

Geographical Distribution : Seas of India, through the East Indies, to the Philippines, Taiwan and southwards to the northwestern coast of Australia.

Inhabits muddy and sandy bottoms on the continental shelf; known from brackish waters as well.

Fishery Information : Taken commercially in small quantities on the Kerala coast.

Cynoglossus semifasciatus Day

Cynoglossus semifasciatus Day, 1877, *Fishes of India* : 346, pl. 97, fig. 5 (type-locality : Madras) ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 458.

Cynoglossus brevirostris Day, 1877, *Fishes of India* : 437, pl. 97, fig. 6 (type-locality : Madras) ; Day, 1889, *Fauna Br. India,* Fishes, **2** : 459.

Common Name :

Indian tongue-sole ... English

Distinguishing Characters :

Body flat and elongate. Eyes small, separated by a small inter-orbital space. Two nostrils on ocular side, the anterior nostril tubular and in front of lower eye, posterior nostril simple and in the anterior half of interorbital space. Snout rounded or posteriorly pointed; rostral hook rather short; angle of mouth extending a little beyond vertical from fixed eye, nearer to tip of snout than to gill-opening. Two lateral lines on ocular side; mid-lateral line with 70 to 78 scales, 11 to 14 between them; no lateral line on blind side. Scales ctenoid on both sides of body. Dorsal fin with 99 to 107 rays; anal fin with 75 to 83 rays; caudal fin with 10 rays.

Colour : ocular side light brownish, with a number of irregular vertical dark bands; blind side whitish.

Geographical Distribution : East coast of India and Sri Lanka

Inhabits muddy and sandy bottoms on the continental shelf.

Fishery Information : Of minor fishery importance on the east coast of India.

Genus **Paraplagusia** Bleeker

Paraplagusia Bleeker, 1865, *Ned. Tijds. Dierk.,* **2** : 274 (type-species : *Pleuronectes bilineata* Bloch) ; Menon, 1980, *Matsya,* (5) : 13 (Review).

Body flat and elongate, with the dorsal and anal fins confluent with caudal fin. Eyes on left side of head, with a scaly space between them. Mouth asymmetrical, lips with row of fringed tentacles; snout strongly hooked and overhanging the mouth opening, the tip reaching almost below hind border of lower eye or beyond. Pectoral fins absent; only left pelvic fin present, connected with anal fin. Scales ctenoid on both

sides. Two or three lateral lines on ocular side; no lateral line on blind side.

Three species recognised, 2 in our area.

KEY TO SPECIES

1 (a) Scales 16 to 19 between upper and middle lateral lines; rostral hook long and usually reaching beyond lower eye ... *P. bilineata*

(b) Scales 13 to 15 between upper and middle lateral lines; rostral hook shorter, usually not reaching beyond lower eye ... *P. blochii*

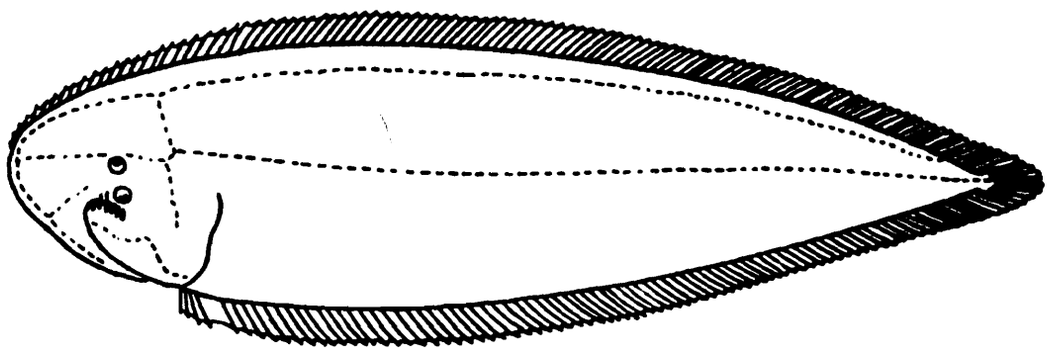
Paraplagusia bilineata (Bloch)

[Text-fig. 368]

Pleuronectes bilineata Bloch, 1784, *Naturges Ausland. Fische*, **3** : 29, pl. 188 (type-locality : Chinese waters).

Plagusia marmorata Bleeker : Day, 1877, *Fishes of India* : 431, pl. 95, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, **2** : 451, fig. 162.

Paraplagusia bilineata : Norman, 1928, *Rec. Indian Mus.*, **30** : 191, fig. 9



Text-fig. 368. *Paraplagusia bilineata* (Bloch)

Common Names :

Doublelined tongue-sole	...	English
Nahiah-ku, Arabu	...	Telugu
Nedu-nakka	...	Tamil
Lep	...	Marathi

Distinguishing Characters :

Body flat and elongate; snout rounded or obtusely pointed, the rostral hook long and usually extending beyond lower eye; angle of

mouth not reaching beyond lower eye, much nearer to gill-opening than to snout-tip. Two or three lateral lines on ocular (eyed) side, no lateral line on blind side. Scales ctenoid on both sides of body; 16 to 19 scales between upper and middle lateral lines. Dorsal fin with 100 to 114 rays; anal fin with 72 to 89 rays.

Colour : ocular side brownish, sometimes spotted or marbled with darker patches; blind side tinged with yellow.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Inhabits muddy and sandy bottoms of the continental shelf, often found in shallow and estuarine waters.

Fishery Information : Of minor fishery significance in our area.

Paraplagusia blochii (Bleeker)

Plagusia blochii Bleeker, 1851, *Nat. Tijdschr. Ned-Indie,* **1** : 411 (type-locality : Malay Archipelago).

Plagusia bilineata Day (*nec* Bloch), 1877, *Fishes of India* : 431; Day, 1889, *Fauna Br. India,* Fishes, **2** : 452.

Paraplagusia blochii : Norman, 1928, *Rec. Indian Mus.,* **30** : 192.

Common Names :

Bloch's tongue-sole	..	English
Ierre-potoo	...	Telugu
Aralu	...	Tamil

Distinguishing Characters :

Body flat and elongate; snout rounded; rostral hook rather short and usually not reaching below middle or posterior part of lower eye; angle of mouth below posterior part of lower eye, nearer gill-opening than to tip of snout. Two lateral lines on ocular side, no lateral line on blind side. Scales ctenoid on both sides of body; 13 to 15 scales between upper and middle lateral lines. Dorsal fin with 77 to 94 rays; anal fin with 76 to 82 rays.

Colour : ocular side uniformly brownish, blind side whitish tinged with yellow.

Geographical Distribution : Coast of India, Pakistan, through the Malay Archipelago, to Australia.

Inhabits muddy and sandy bottoms of the continental shelf.

Fishery Information : Of minor fishery significance in our area.

ORDER : TETRAODONTIFORMES

Gill openings restricted (small). Mouth small with strong teeth : maxillae usually firmly united or fused with premaxillae. A few have scales (not true scales) ; others have bony plates, spines or a leathery skin. Pelvic fins, if present, thoracic or reduced to spines, occasionally with a single soft ray. Either two dorsal fins, the first spinous, the second soft, or the first dorsal fin absent or reduced to a thread-like filament. Anal fin opposite to second dorsal fin. Lateral line present or absent, sometimes multiple.

A large number of these fishes have poisonous organs and flesh, but in spite of this, they are eaten regularly in some parts of the world, occasionally with fatal results.

KEY TO SUBORDERS

1 (a) Jaws with distinct teeth (i.e. teeth not fused)	...	*Balistoidei*
(b) Teeth incorporated into or indistinguishably fused with the jaw bones to form a parrot-like beak ; no pelvic fin of any kind ; no spiny dorsal fin	...	Tetraodontoidei*

SUBORDER : BALISTOIDEI

Body usually compressed and fairly deep. Jaws with distinct teeth i.e. not coalesed (united). Gill-openings restricted. Fin-spines mostly rudimentary or reduced, but usually a separate anterior dorsal fin of 1 to 3 spines, the first always much the largest, usually able to be locked erect by a special mechanism. Scales absent or modified, frequently enlarged and marginally coalesed to form a hard covering.

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* Fishes of the suborder Tetraodontoidei comprising the families Tetraodontidae, Triodontidae, Diodontidae and Molidae, are of no commercial value in our region.

Most of these fishes have feeble swimming powers and are mainly of warm seas, few in deep water.

KEY TO FAMILIES

1 (a)	No spiny dorsal fin ; body completely encased in a shell or cuirass formed of enlarged, thickened, usually hexagonal plates secured to one another ...	Ostraciontidae*
(b)	Spiny dorsal fin present ; body not encased in a bony carapace ...	2
2 (a)	No large, obvious pelvic-fin spines ...	Balistidae
(b)	Pelvic fins with a large spine ...	3
3 (a)	Dorsal-fin rays 12 to 18 ; caudal fin rounded to truncate ...	Triacanthodidae*
(b)	Dorsal-fin rays 20 to 26 ; caudal fin deeply forked ...	Triacanthidae*

FAMILY : BALISTIDAE

[Filefishes, Triggerfishes, Leather-jackets]

Small or medium-sized fishes, with usually deep, compressed bodies encased in a tough armour of minute to moderate rough scales. Mouth small, terminal ; teeth strong, not fused together, the upper jaw with 2 rows of protruding incisor-like teeth. Gill-opening a small slit in front of pectoral-fin base. Two dorsal fins, the first reduced to 1 to 3 spines, the first spine with locking mechanism (the small second spine forms the locking mechanism).

The flesh of many species is poisonous, but a few are regularly eaten in some parts of the country.

KEY TO SUBFAMILIES/GENERA

1 (a)	First dorsal fin with 2 spines, the second may be small or absent ; scales small, not in regular series ; all soft fins with unbranched rays (subfamily Monocanthinae) ...	2

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* The fishes of the families Ostraciontidae, Triacanthodidae and Triacanthidae are of no commercial value in our region,

(b) First dorsal fin with 3 spines; scales in regular series, plate-like; all soft fins with branched rays (subfamily Balistinae)	..	5
2 (a) A fleshy barbel on chin; snout pointed, the mouth dorsal	...	**Psilocephalus***
(b) No fleshy barbel on chin	...	3
3 (a) Pelvic fin absent and without any obvious enlarged encasing scales; anal fin with more than 40 rays	...	**Aluterus**
(b) Pelvic fin present as a rudiment at end of pelvis, mostly obscured from external view by a series of enlarged scales encasing it, appearing as a spinous process in the midline at end of pelvis; anal fin with less than 40 rays	...	4
4 (a)) Mouth terminal; snout not elongated	...	**Monacanthus***
(b) Mouth dorsal; snout elongated	...	**Oxymonacanthus***
5 (a) Caudal peduncle round in cross-section	...	**Abalistes**
(b) Caudal peduncle laterally compressed, deeper than wide	...	6
6 (a) No osseus plates behind gill-slit, not forming a flexible tympanum	...	**Canthidermis***
(b) Scales above pectoral-fin base and just behind gill-slit much enlarged and partially separate, forming a flexible tympanum	...	7
7 (a) Teeth notched, uneven, of distinctly increasing length toward the middle teeth; scales of posterior body without keels forming longitudinal ridges	...	**Balistes**
(b) Teeth not notched, at least in large individuals and adults, with relatively even distal edges, not of distinctly increasing length toward the middle teeth; scales of posterior body with keels at the centre forming longitudinal ridges; body blackish	...	**Melichthys***

* The fishes of the genera *Psilocephalus* Swainson, *Monacanthus* Oken, *Oxymonocanthus* Bleeker, *Canthidermis* Swainson and *Melichthys* Swainson, are of no commercial value in our region.

Genus **Aluterus** Oken

Aluterus Oken, 1817, *Isis* : 1183 (type-species : *Balistes monoceros* Osbeck).

Body deep and strongly laterally compressed, with velvety skin, no visible scales, the skin smooth to touch. First dorsal fin of 2 spines, the first prominent and erectile, locked by the second; dorsal-fin spine over eye centre; second dorsal fin with 43 to 50 soft rays; anal fin with 47 to 53 soft rays; all soft rays simple (unbranched) and feebly articulated. Pelvic fins absent and without any obvious enlarged encasing scales. Caudal fin rounded.

Several species recognised, two in our area.

KEY TO SPECIES

1 (a) Caudal fin much shorter than snout length; profile of snout convex ... *A. monoceros*

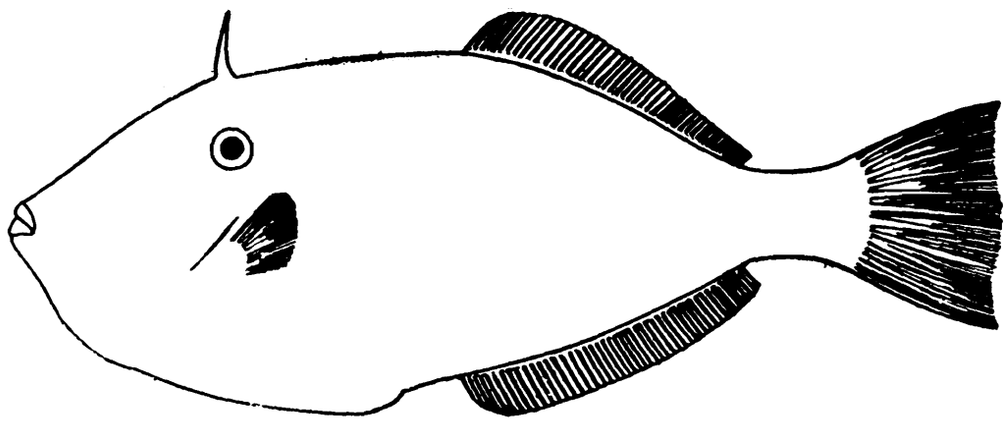
(b) Caudal fin much longer than snout length; profile of snout concave ... *A. scripta**

Aluterus monoceros (Osbeck)

[Text-fig. 369]

Balistes monoceros Osbeck, 1757, *Iter Chinensis* : 144 (type-locality : China).

Monacanthus monoceros : Day, 1878, *Fishes of India* : 693, pl. 179, fig. 2; Day, 1889, *Fauna Br. India*, Fishes, **2** : 482.



Text-fig. 369. *Aluterus monoceros* (Osbeck)

Common Name :

Unicorn filefish ... English

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* *Aluterus scripta* (Osbeck) is stated not to be edible.

Distinguishing Characters :

Body deep and strongly laterally compressed, with leathery armour of small irregular scales. Mouth small; teeth notched. Gill-openings very oblique, their posterior end below middle of eye. First dorsal fin with 2 spines, situated above middle of eye, only a single spine visible, the second spine (minute) embedded; soft dorsal and anal fin rays simple (not branched), with 46 to 50 and 47 to 52 soft rays respectively. Caudal fin slightly rounded, much shorter than snout length.

Colour : body uniform light grey, with scattering of dark brown dots on back. Fins yellowish.

Geographical Distribution : Widespread in the tropical Indo-west Pacific.

Fishery Information : This species is reported to be excellent eating when skinned. Taken commercially only occasionally in our area.

Genus **Abalistes** Jordan & Seale

Abalistes Jordan and Seale, 1906, *Bull. U. S. Bur. Fish.*, **25** : 364 (type-species : *Balistes stellaris* Bloch).

Body moderately deep and laterally compressed, with leathery armour of scales in regular rows and the scales of the cheek in an even, relatively complete covering. Scales enlarged over the pectoral-fin base and just behind the gill-slit to form flexible tympanum. Small groove in the skin in front of eye to below the nasal apparatus. First dorsal fin with 3 stout spines, the first being locked erect by second; soft dorsal and anal fin rays branched. Caudal peduncle almost rounded in cross-section, as broad as deep. Caudal fin emarginate, upper and lober lobes filamentous in large adults.

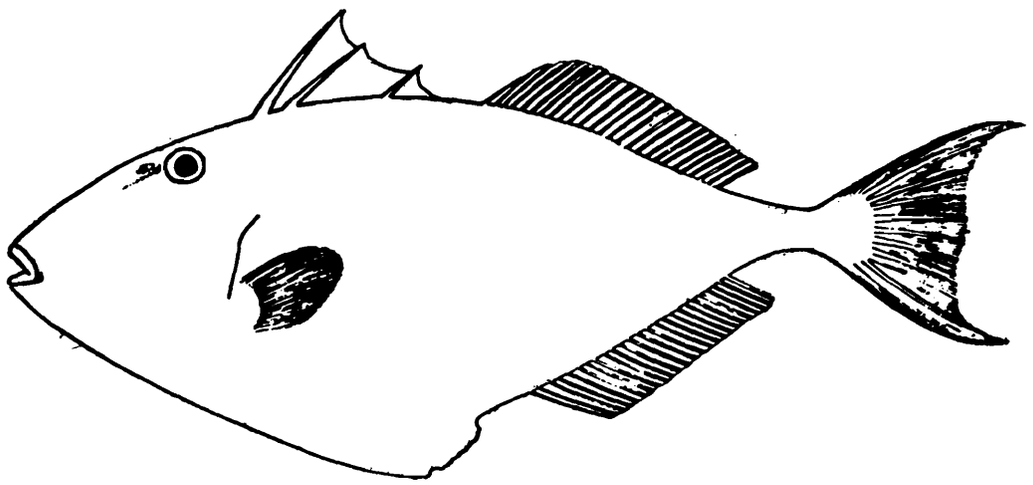
Monotypic.

Abalistes stellaris (Bloch)

[Text-fig. 370]

Balistes stellaris Bloch, 1801, *Syst. Ichth.* : 476 (type-locality : Indian Seas) ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 473, fig. 171.

Balistes stellatus Ruppell : Day, 1878, *Fishes of India* : 687, pl. 177, fig. 1.



Text-fig. 370. *Abalistes stellaris* (Bloch)

Common Names :

Starry triggerfish	...	English
Somdrum-yellakah	...	Telugu

Distinguishing Characters :

Body deep and laterally compressed, with leathery armour of scales in regular rows. A deep, narrow groove in front of eye to below the nostrils. Mouth small. Two enlarged rounded and one smaller bony plates behind the gill slit; cheeks totally scaly. Two dorsal fins; first dorsal fin with 3 stout spines, the first compressed, its anterior side covered with small spinules and tubercles, first spine being locked erect by the second; second dorsal fin with 26 or 27 branched soft rays. Anal fin with 23 to 26 branched soft rays. Caudal peduncle rounded in cross-section (sometimes depressed, its width greater than its breath).

Colour : body grey dashed with olive-green; 3 large white blotches on back with numerous small blue spots; belly white; 3 to 4 yellow lines from mouth to pectoral-fin base. Pectoral fins yellowish with a dark base; other fins banded with black, yellow and olive.

Geographical Distribution : Tropical Indo-west Pacific.

Shallow waters down to 30 m; coral reefs and also over sandy bottoms.

Fishery Information : This species is caught mainly with bottom trawls. The flesh of this species is reported to resemble chicken. The fish attains at least 60 cm in length and yields a kind of oil used by

some fishermen for painting their boats. There is an important seasonal fishery at Vizhinjam (Kerala) lasting only for a brief period of 3 to 4 months, commencing from December-January to March-April.

Genus **Balistes** Linnaeus

Balistes Linnaeus, 1758, *Systema Naturae*, ed. 10, 1 : 326 (type-species : *Balistes vetula* Linnaeus).

Body moderately deep and laterally compressed, with the large rectilinear scale-plates of the thick skin forming regular rows, and the scales of the cheek in an even, relatively complete covering. Scales enlarged over the pectoral-fin base and just behind the gill slit to form a flexible tympanum; scales of body without prominent keels, not forming longitudinal ridges. Small groove in the skin in front of eye to below the nasal apparatus. Mouth terminal; teeth notched. Two dorsal fins, the first with 3 spines, the first spine srong and the second spine locking the first when erect; soft-dorsal and anal-fin rays branched. Caudal peduncle laterally compressed, deeper than wide.

KEY TO SPECIES

1	(a)	A deep groove in front of eye to below the nasal apparatus	... 2
	(b)	Groove before eye shallow or wanting; teeth white, uneven, notched	... 7
2	(a)	Teeth red; two upper lateral teeth produced, fang-like; scales large	... *B. erythrodon*
	(b)	Teeth not red, not greatly produced; scales moderate or small	... 3
3	(a)	Scales of body and tail with no enlarged tubercles or spines	... *B. vetula**
	(b)	Scales, at least on tail, with large tubercles or spines	... 4
4	(a)	Profile convex; caudal fin round	... 5
	(b)	Profile straight; caudal fin truncate or slightly emarginate	... 6
5	(a)	A dark band over interorbital space, continued below eye over gill-opening to pectoral-fin base	... *B. viridescens**
	(b)	Lower half of sides and tail with large round white blotches	... *B. conspicillum**

6 (a) Scales of middle of cheeks rectangular	...	*B. fraenatus*
(b) Scales of cheeks rhomboid; body dark	...	*B. chrysopterus**
7 (a) Cheeks completely scaled; sides of tail with 2 to 5 straight parallel rows of forward directed spines; soft dorsal and anal fins not elevated	...	8
(b) Cheeks largely naked anteriorly, at least in adults, posteriorly with scales smaller than those of body, in horizontal lines; soft dorsal and anal fins elevated	...	10
8 (a) Third dorsal spine well developed; body dark, with parallel more or less undulating bands	...	*B. undulatus**
(b) Third dorsal spine minute; light stripes over interorbital space and from below eye to pectoral-fin base	...	9
9 (a) Four to five rows of spines on caudal peduncle and posterior part of tail; a dark band from eye to gill-opening and pectoral-fin base, continued as very broad band to anus and anal-fin base	...	*B. echarpe**
(b) Three rows of spines, the lower one short and on caudal peduncle only; 4 light oblique bands from middle of sides to anal-fin base	...	*B. aculeatus**
10 (a) No spines or tubercles on caudal peduncle and tail	...	*B. fuscus**
(b) Five to six rows of spines on caudal peduncle and posterior part of tail	...	*B. flavimarginatus**

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* *Balistes ellioti* Day, an insufficiently characterised species is not included in this Key; *B. vetula L.*, *B. viridescens* Bloch, *B. conspicillum* Bloch, *B. chrysopterus* Bloch, *B. undulatus* Mungo Park, *B. echarpe* (Lacepede), *B. aculeatus* Linnaeus, *B. fuscus* Bloch and *B. flavimarginatus* Ruppell, do not contribute any fishery in our region.

Balistes erythrodon Gunther

Balistes erythrodon Gunther, 1870, *Cat. Fishes Br. Mus.*, **8** : 228 (type-locality : Zanzibar ; Mauritius) ; Day, 1878, *Fishes of India* : 692, pl. 175, fig. 4 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 480.

Common Name :

Red-toothed filefish ... English

Distinguishing Characters :

Upper profile of head slightly convex. Mouth somewhat superior, the chin prominent. A well-developed groove, longer than eye, in front of eye. A few bony plates behind gill-opening, smaller than scales of sides of body. Teeth distinctly red ; two upper lateral teeth produced, fang-like. Two dorsal fins, the first fin with 3 spines and second fin with 34 to 36 soft rays. Anal fin with about 30 soft rays. Cheeks entirely scaly ; scales along middle of body and caudal peduncle with an elevated tubercle, but no prominent spines.

Colour : body deep brown, with black stripe from mouth to pectoral-fin base. Dorsal, anal and caudal fins black ; caudal fin with a white margin.

Geographical Distribution : Tropical Indo-Pacific.

Fishery Information : The species forms an important seasonal fishery at Vizhinjam (Kerala) for a brief period of 3 to 4 months commencing from December-January to March-April ; an average of 56,033 kg are landed during the season at this centre. The bulk of the fishery is supported by a single age group.

Balistes fraenatus Latreille

Balistes fraenatus Latreille, 1804, *Nouv. Diet. Hist. Nat.*, (ed 1), **24** (Poissons) : 74 (type-locality : East Indies).

Balistes mitis Bennett : Day, 1878, *Fishes of India* : 689, pl. 177, fig. 3 ; Day, 1889, *Fauna Br. India*, Fishes, **2** : 475.

Common Names :

Masked filefish English

Rahtee-yellakah ... Telugu

Distinguishing Characters :

Upper profile of head from origin of first dorsal fin to snout almost straight. A narrow but rather deep groove before eye. A rather large bony plate behind gill-opening and a row of about 5 smaller ones immediately behind it. Teeth white ; median teeth in jaws longer than the ones on sides. Two dorsal fins ; first fin with 3 spines, the second fin with 29 to 31 soft rays. Anal fin with 26 to 28 soft rays. Cheeks totally scaly, those of middle of cheeks rectangular. Scales moderate, covered with regular rows of short, blunt tubercles ; most scales of tail and caudal peduncle each with a short, blunt, conical spine, the spines forming 8 to 10 longitudinal rows. Caudal peduncle laterally compressed.

Colour : body dull yellow-brown. Pectoral and pelvic fin-spines straw-coloured, rest of fins black with light bases. A yellow band passes around mouth towards pectoral-fin base.

Geographical Distribution : Widespread in the tropical Indo-Pacific.

Fishery Information : The species contributes a seasonal fishery at Vizhinjam (Kerala), commencing from December-January to March-April with an average landing of 44,270 kg. The fishery appears to be mainly composed of 0 and 1 year-class individuals.

ADDENDA

The manuscript of this Handbook was completed in November 1978 and the first proofs were received in May 1981. As far as possible all information known up to the time the relevant pages of the manuscript were sent to the press, have been incorporated in the final Ms. However, subsequent to the start of final printing some additional data relevant to this book have come to my notice which are given in the following pages. Further, some pertinent synonyms inadvertently earlier overlooked, have also been given here.

Page 114

Myliobatis nieuhofii var. *conifera* Annandale, 1909 (*Mem. Indian Mus.*, **2** : 52) described from the Orissa coast, is a junior synonym of *Aetomylaeus nichofii* (Schneider).

Page 118

Ceratoptera orissa Lloyd, 1908 (*Rec. Indian Mus.*, **2** : 176) described from the Orissa coast, is a junior synonym of *Manta birostris* (Donndorff). This species is referred to as 'karaj' in Gujarati.

Page 138

The new species of *Sardinella* from Vizhinjam (Kerala) has been recently described and figured as *Sardinella jonesi* by Lazarus (1983). It is known as 'keerimeen' in Malayalam.

Page 149

Sardinella sirm (Walbaum) is also referred to as 'kerimeen' in Malayalam.

Page 151

Ilisha sladeni (Day) known from the freshwaters of Burma, may be distinguished from other species of *Ilisha* in having the anal-fin origin below or in advance of middle of dorsal-fin base.

Page 178

Coilia coomansi Hardenberg reported by Babu Rao & Jayaswal (1968, *Adv. Abstr. Contr. Fish. aquat. Sci. India*, **2**(4) : 2) from the

Hooghly estuary, is clearly a misidentification of *Coilia reynaldi* Valenciennes.

Page 180

Misra (1976a) has erroneously listed *Setipinna breviceps* (Cantor) from the Indian region. According to Whitehead (1973) its occurrence in Burma even is also doubtful.

Page 186

Anchoviella baganensis bengalensis Dutt & Babu Rao, 1959 (*Curr. Sci.*, **28** : 160) described from the Andhra coast, is a junior synonym of *Stolephorus baganensis* Hardenberg.

Page 194

Nelson (1982) has recently recognised a second species of the anchovy genus *Thrissina*, viz. *T encrasicholoides* (Bleeker) which is known from Sri Lanka, India, Indonesia, Celebes, Queensland and the Philippines. The two species may be distinguished by the following key :

1 (a) Pre-pectoral scutes one or sometimes two	...	*T encrasicholoides*
(b) No pre-pectoral scutes	...	*T baelama*

Page 200

Engraulis kempii Chaudhuri, 1916 (*Mem. Indian Mus.*, **5** : 421) and *Engraulis rambhae* Chaudhuri, 1916 (*Mem. Indian Mus.*, **5** : 423) described from the Chilka Lake (Orissa), are both junior synonyms of *Thryssa malabarica* (Bloch).

Page 202

Engraulis annandalei Chaudhuri, 1916 (*Mem. Indian Mus.*, **5** : 419) described from the Chilka Lake, and *Engraulis hornelli* Fowler, 1924 (*J. Bombay nat. Hist. Soc.*, **30**(1) : 41) from Calicut, are both junior synonyms of *Thryssa purava* (Hamilton-Buchanan).

Page 256

The undetermined species of *Arius* which is fairly common in the catches at Kerala, is clearly *Arius dayi* Dmitrenko, 1974, described from the Arabian Sea. This species also contributes a good fishery on the Gujarat coast.

Page 277

The fishes of the genus *Plotosus* have recently been revised by Gomon and Taylor (1982). According to them there are five species in this genus, four marine or estuarine and one freshwater—three marine species occur in our region.

Page 331 Footnote

The authorship of the genus *Ostichthys* is Jordan and Evermann and not Cuvier as stated. Further, this genus is represented by *O. acanthorhinus* Randall, Shimizi & Yamakawa, 1982, and *O. japonicus* (Cuvier) in our region; *O. kaianus* (Gunther) reported from the Kerala coast by earlier workers is a misidentification, the specimens are identical with *O. acanthorhinus*.

Page 364

The genus *Plectropoma* (Cuvier) Oken is more often spelt *Plectropomus* (and perhaps rightly) in recent works. In this genus the opercular spines are poorly developed in comparison with other epinepheline fishes and the lowest of the usual three is rudimentary or absent. The anal spines are only feebly evident but are quite typically spinous—the first two buried, but not very flexible. Three species recognised in our area, viz. *P. maculatus* (Bloch), *P. leopardus* (Lacepede) and probably *P truncatus* Fowler & Bean. *P. leopardus* (Lacepede) is probably a junior synonym of *P. maculatus* (Bloch) according to Morgans (1982).

Page 365 Footnote

The genus *Dinoperca* Boulenger is now considered by Morgans (1982) to comprise two species.

Page 366

Day (1888, 1889) followed by Morgans (1982), have doubtfully listed *Cephalopholis polleni* (Bleeker) from Madras of our region. Further, Morgans (1982) has also listed *Cephalopholis urodelus* (Schneider) in our area. These two species bring to a total of nine species of *Cephalopholis* in our region for which a revised key is given below :

1 (a) Anal fin with 8 soft rays ... 2

(b) Anal fin with 9 soft rays ... 3

2 (a)	Scale-rows 18 to 22 between the spinous dorsal fin and lateral line; body reddish brown, with blue (dark on preservation) longitudinal lines	...	*C. boenack*
(b)	Scale-rows 8 to 10 between the spinous dorsal fin and lateral line; body dark chocolate brown to a very pale red brown, often with obscure dark vertical bars	...	*C. pachycentron*
3 (a)	Caudal fin truncate	...	*C. polleni*
(b)	Caudal fin rounded	...	4
4 (a)	Lateral line with more than 110 scales, 12 or more between last dorsal spine and lateral line	...	5
(b)	Lateral line with less than 110 scales, 11 or less between last dorsal spine and lateral line	...	6
5 (a)	Body brilliant vermilion, with or without leprous ('whitish') blotches; scale-rows 11 to 14 between dorsal-fin origin and lateral line	...	*C. sonnerati*
(b)	Body dark reddish brown, with often yellow or blue spots on head and front of body; scale-rows 15 between dorsal-fin origin and lateral line	...	*C. nigripinnis*
6 (a)	Scale-rows 6 or 7 between dorsal-fin origin and lateral line; caudal fin with oblique bars (usually 2), usually two blotches on caudal peduncle	...	*C. leopardus*
(b)	Scale-rows 8 to 10 between dorsal-fin origin and lateral line	...	7
7 (a)	Caudal fin with oblique white bars (usually 2)	...	*C. urodelus*
(b)	Caudal fin without oblique bars	...	8
8 (a)	Underside of lower jaw fully spotted including lower lip; second anal spine slightly longer than third anal spine	...	*C. argus*
(b)	Underside of lower jaw devoid of spots but lower lip spotted; second and third anal spines subequal	...	*C. miniatus*

Page 368

In *Cephalopholis boenack* (Bloch) there are 18 to 22 (*nec* 8 to 10 as stated) scale-rows between the spinous dorsal fin and lateral line.

Page 375

Morgans (1982 : 20) has listed *Epinephelus longispinis* (Kner, 1865) from Madras based on the original account of the species. Earlier Day (1876) followed by subsequent workers, considered *E. longispinis* a junior synonym of *E. maculatus* (Bloch). Morgans (1982) considers *E. longispinis* a valid species which may be separated from *E. maculatus* in the spotting on the body and in having a spiniform process on the anterior edge of the maxilla. Colour, in life, of *E. longispinis* is yellow-brown (turning to purplish brown on prolonged exposure to light) with rich red-brown spots of unique shape and arrangement ; on the head and anterior part of body they are rounded, but halfway along flank they progressively become obliquely oval, and in the region of caudal peduncle they become crescentric ; anteriorly spots widely separated, roughly arranged in obliquely transverse rows, but spots become progressively closer to one another in posterior region of body ; anteriorly they are clearly marked, progressively becoming indistinct posteriorly.

The status of *E. longispinis* clearly needs still further work and is presently under study by me.

Page 375

In the genus *Epinephelus* the scales are either cycloid or ctenoid.

Page 382/395

In *Epinephelus coeruleopunctatus* (Bloch) the opercular flap is acute in that a line from most prominent part of lower margin to posterior tip makes less than a right angle with a line from most prominent part of upper margin to posterior tip. In the shape of opercular flap this species may be easily distinguished from the closely related *E. summana* (Forsskal) where the opercular flap is obtuse in that a line from most prominent part of lower margin to posterior tip makes an angle greater than 90° with a line from most prominent part of upper margin to posterior tip.

Page 385

The maxilla in *Epinephelus flavocaeruleus* (Lacepede) extends to below centre or beyond hind margin of eye ; three opercular spines, highest rudimentary ; the middle one slightly nearer lowest, acute and projecting, the lower may or may not project.

Page 386

Epinephelus fuscoguttatus (Forsskal) is characteristically with a concavity in the dorsal profile just behind interorbital, and with a great depth of head/body in front of dorsal fin.

Page 387

Day's (1875) plate 2, figure 3 of *Serranus hexagonatus* (Schneider) is clearly *Epinephelus merra* Bloch described on page 392.

Page 389

In *Epinephelus malabaricus* (Schneider) the maxilla extends beyond the hind border of eye, scales are ctenoid, and the body is brownish with orange (blackish on preservation) small spots (with diffuse margins) which are spaced apart at distances less than their diameters (sometimes confluent on checks).

Page 398

The genus *Promicrops* Gill is characteristic in having cycloid scales; interorbital space exceptionally broad and flat; spinous dorsal fin with 11 strong spines; and the lateral-line tubes branched, with 4 to 6 strong radiating ridges.

Page 427

Lactarius burmanicus Lloyd, 1907, described from Akyab (Burma), is a junior synonym of *Lactarius lactarius* (Schneider).

Page 431

Bapat *et al* (*Bull. cent. mar. Fish. Res. Inst.*, **33** : 49 ; 1982) have recently listed *Trachurus trachurus* Linnaeus from the Bombay region. The genus *Trachurus* Linnaeus may be distinguished from all other carangid genera of our region in having scutes present along the entire lateral line. *Trachurus indicus* Necrassov probably occurs in our area also.

Page 454

In *Carangoides malabaricus* (Bloch) there are 23 to 27 gill-rakers on lower arm of the first arch and 32 to 38 rakers on the entire arch.

Page 559

Pristipomoides typus Bleeker referred to as 'velameen' on the south-west coast of India, is erroneously listed as *Pristipomoides argyrogrammicus* (Valenciennes) in the fishery literature.

Page 561

Srinivasa Rao (pers comm.) has recently recorded *Nemipterus peronii* (Valenciennes) from Vizagapatnam. This species may be distinguished from other species of our region in the following characters : from *N. luteus, N. metopias, N. japonicus* and *N. mesoprion* in having the upper lobe of caudal fin normal and without any prolongation ; from *N. tolu* in having the inter-spinous dorsal fin membrane entire ; from *N. delagoae, N. bleekeri* and *N. hexodon* in the absence of bright stripes or bands on head, body or fins (but faint, indistinct yellow lines along flanks present).

Page 753

Girija Kumari *et al* (in press) have recently reported *Polynemus sheridani* Macleay from the Andhra coast in our region. Dr. R. M. Feltes (pers. comm.) is, however, most skeptical at the presence of this species in our area.

Page 764

The genus *Acanthurus* contains about 35 species (28 in the Indo-Pacific) of which 13 species in our area.

Page 770

The genus *Ctenochaetus* comprises 6 species of which 2 in our area.

GLOSSARY

[See drawings for illustrations of external features]

Abdomen : Belly.

Adipose fin : A small and fleshy fin, without rays, located behind the dorsal fin on the back of some fishes.

Air-bladder or gasbladder : A gas filled sac located in the body cavity below the vertebrae.

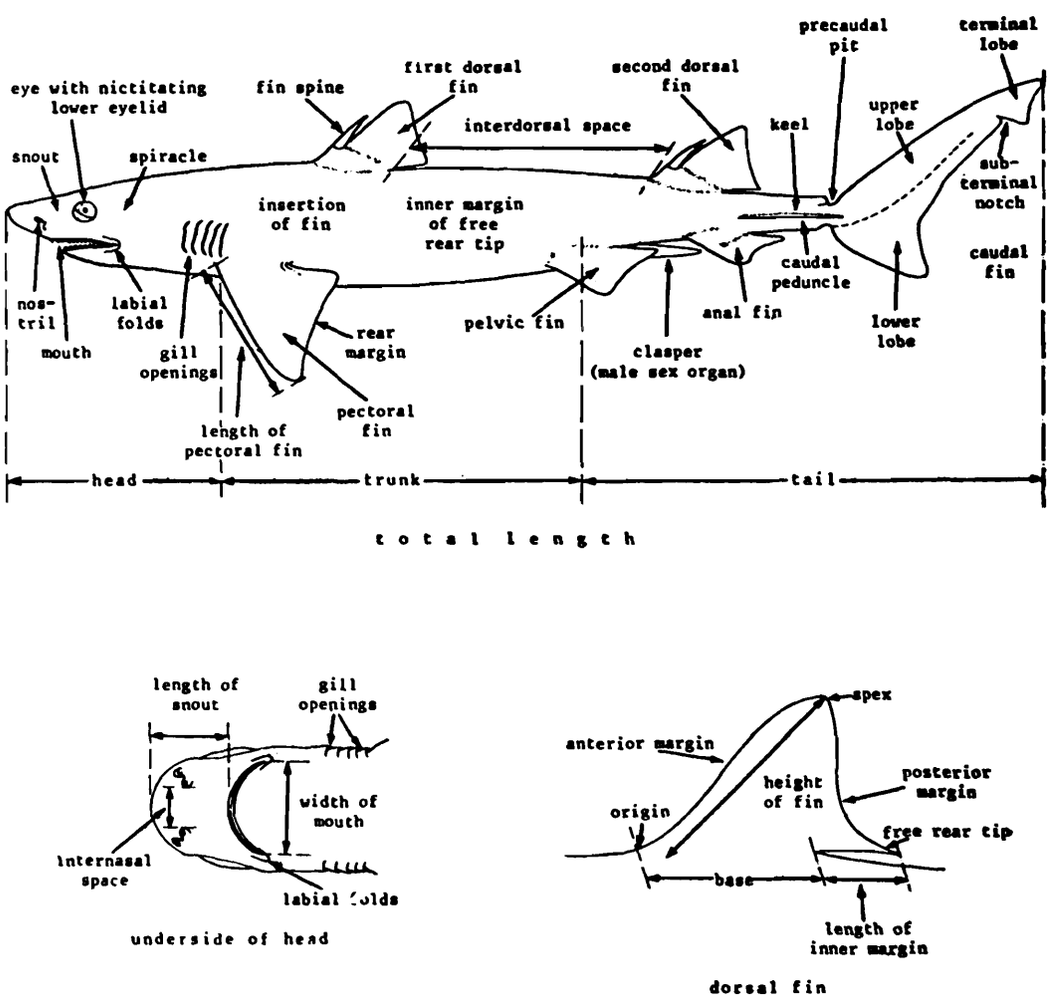
Anal fin : The unpaired fin on the mid-line of the underside of the body, just behind the vent.

Anterior : In front of, or towards the head end.

Antrorse : Pointing forward.

Anus or Vent : The opening at the posterior end of the digestive tract

Axilla : Space behind base of a fin.



Text-fig. 371. Example of a Shark

Axillary : Pertaining to the Axilla.

Axillary Process : Small process or appendage situated in several species of fishes at the axil of the pectoral/pelvic fins.

Barbel : A slender, tactile, whisker-like projection extending from the head of some fishes and which functions primarily as a sensory organ for locating food.

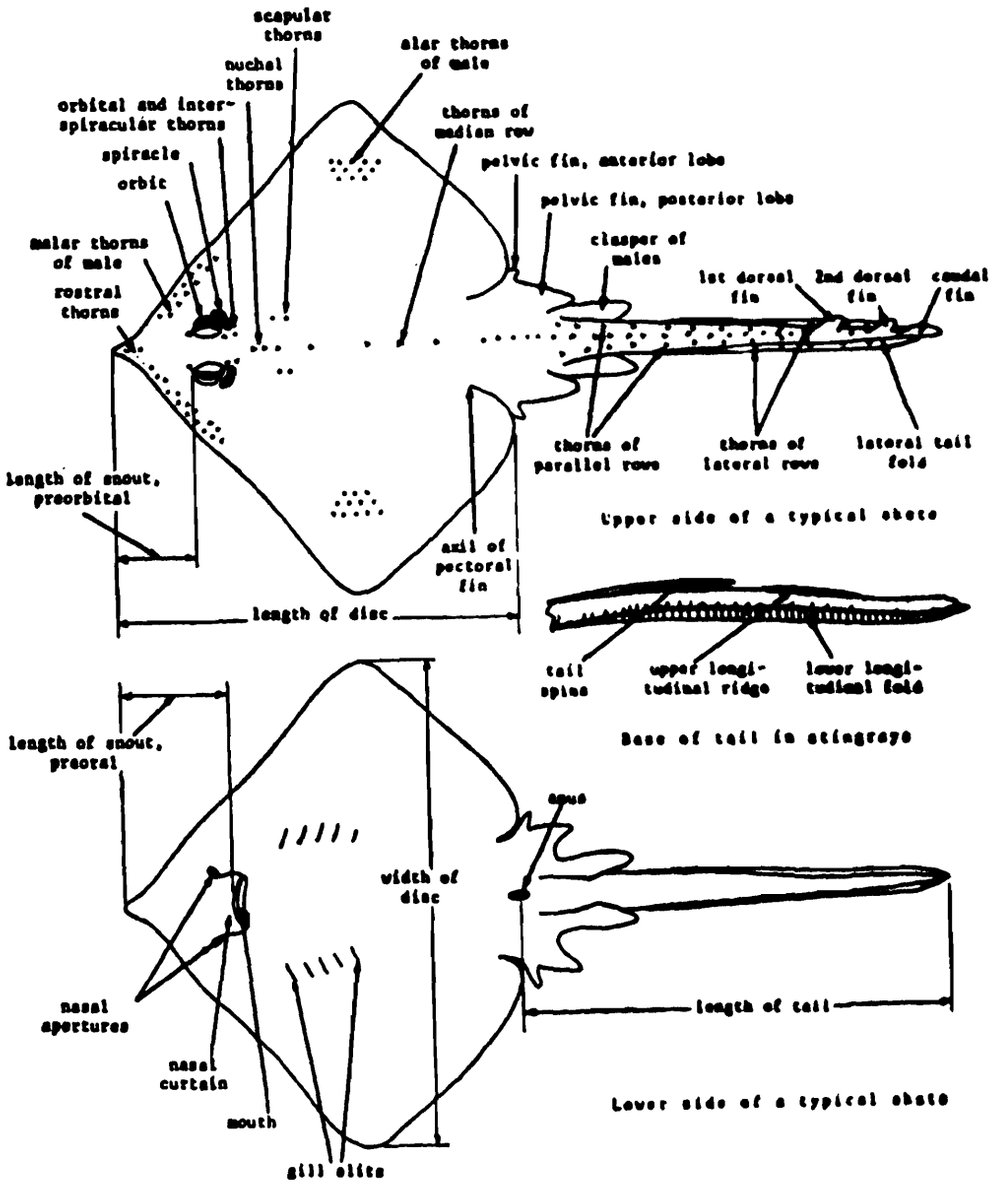
Branchial : Pertaining to the gills.

Branchiostegal rays : Bones in a fish's throat region, usually elongate and connected by a membrane, and folded like a fan beneath the opercles.

Breast : The part of body situated between head and pectoral fin.

Canine teeth : Elongated conical teeth.

Cartilage : Firm elastic tissue, softer than bone, which forms the skeletal structure of sharks and rays.



Text-fig. 372. Example of a Ray/Skate

Caudal fin : The tail fin.

Caudal peduncle : The tapered, posterior part of the fish's body just in front of the tail fin.

Cirri : Fringe-like tendrils, whiskers, or tufts of skin usually found in the head region.

Claspers : A pair of elongated reproductive organs on the pelvic fins of male sharks and rays.

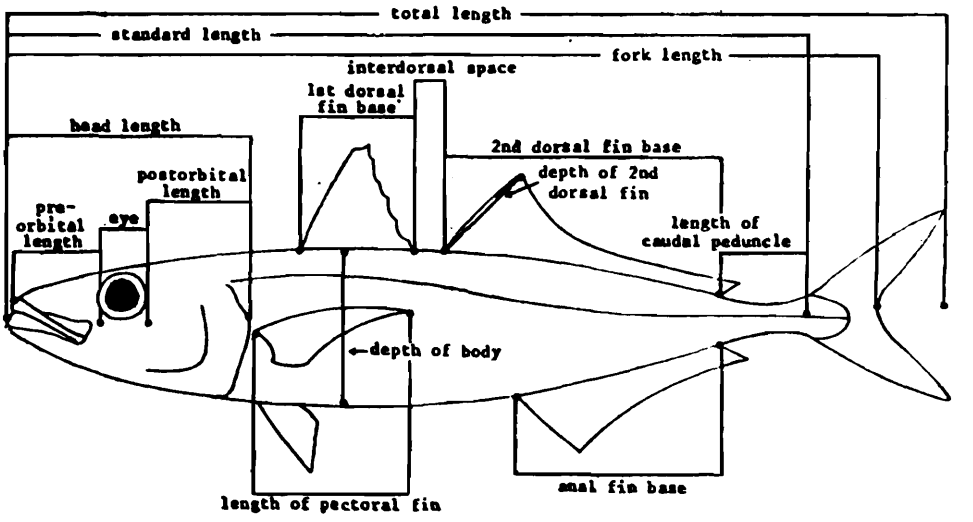
Ctenoid scale : A scale with a rough, comb-like or toothed margin.

Cycloid scale : A smooth edged, more or less circular scale with concentric striations.

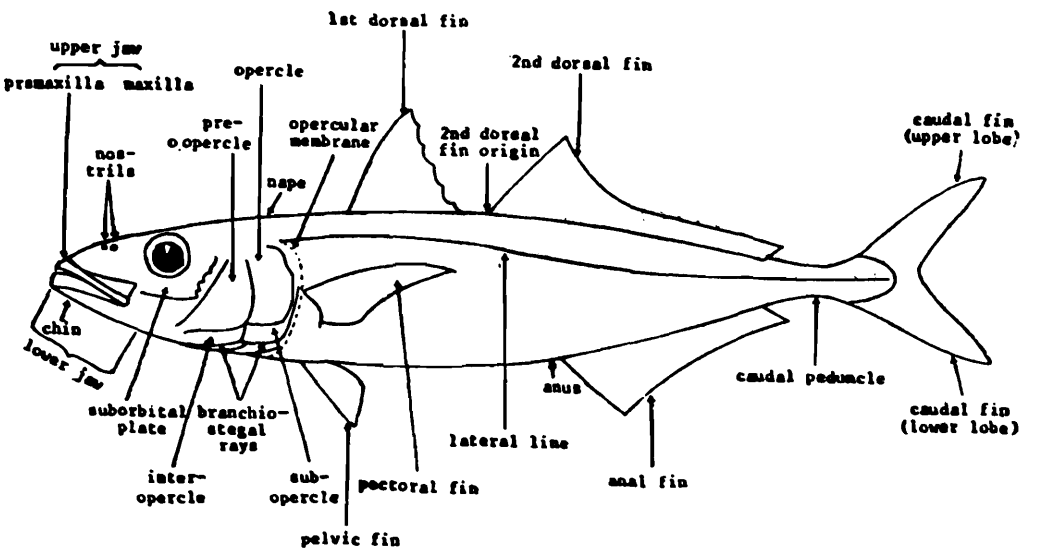
Depth : The greatest vertical diameter of a fish.

Disc : The flat, more or less round part of rays, with consists of the body and pectoral fins.

Dorsal : The back or upper part of the body. Opposite to 'Ventral'



General Nomenclature of the External Morphology



Text-fig. 373. Example of a Bony Fish

Dorsal fin : The unpaired fin or fins on the mid-line of the back.

Elasmobranchs : Fishes having cartilaginous skeletons, namely sharks, skates and rays.

Finlets : A series of small, usually separate fin rays located behind the main dorsal or anal fin.

Frontal ridges : Bony ridges on the frontal bones (above the eyes) of some fishes.

Fry : The young of fishes.

Gill arches : The bony supports to which the gills are attached.

Gas-bladder : Air-bladder or swim-bladder.

Gill filaments : The threadlike structures of which the gills are composed.

Gill-opening : The opening leading from the gills.

Gill-rakers : A series of bony structures along the anterior edge of a gill arch, used to strain food from the water in many fishes.

Gills : The respiratory apparatus of fishes, found within the gill openings.

Gill slits : The external openings leading to and from the gills.

Gular plate : A hard plate covering the under part of the throat, present in some fishes.

Incisors : Front teeth flattened to form a cutting edge.

Isthmus : The fleshy interspace below the head and between the gill openings.

Jugular : Pertaining to the neck or throat.

Keel : Sharp, ridge-like projections on the caudal peduncle.

Lateral : Pertaining to the side.

Lateral line : Longitudinal line on each side of fish's body, composed of pores opening into sensory organs.

Mandible : The lower jaw.

Maxilla : The upper jaw.

Molars : Grinding teeth.

Mouth :

inferior—on the underside of the fish.
oblique—at an angle of 45° or greater when closed.
subterminal—slightly overhung by snout.
terminal—upper and lower jaws meet to form anteriormost part of head.

Opercle or operculum : The gill cover.

Opercular flap : A fleshy extension of the rear edge of the opercle.

Osseus : Bony.

Oviparous : Egg—laying.

Ovoviviparous : Spoken of fish which produce eggs that have a well—developed covering or shelf but which hatch within the body of the female, so that the young are born alive.

Pectoral fins (also called Pectorals) : The paired fins attached to the shoulder girdle.

Pelagic : Living in open water in contrast to bottom or inshore.

Pelvic fins : The paired fins placed behind or below the pectoral fins, sometimes also referred to as ventral fins.

Photophores : Luminous or light-producing organs or spots, usually found on sides, heads and bellies of deep-sea fishes.

Premaxillaries : The paired bones forming the front of the upper jaw in fishes.

Preopercle : The anterior cheek bones.

Protractile : Capable of being thrust forward.

Scattering layer : Any concentration of living organisms (fish, crustaceans, medusae and others) that forms a layer at any depth beneath the sea surface and above the bottom; signals transmitted by sonar are reflected back to the surface from organisms in a scattering layer.

Pseudobranchiae : Small gill-like structures (false gills) found on the inner side of the gill cover in most bony fishes.

Scute : An external horny or bony plate or scale.

Snout : That part of the head in front of the eyes.

Spiracles : Small (respiratory) openings behind the eyes in sharks, skates and rays.

Spiral valve : A cockscrew-like partition in the digestive tract.

Taxonomy : The science of classification at all levels starting with the individual and arranging or grouping according to relationships.

Thoracic : Pertaining to the thorax or chest.

Teleosts : Fishes having ossified skeletons as opposed to Elasmobranchs which have cartilaginous skeletons.

Vent or anus : The opening at the posterior end of the digestive tract.

Ventral : Relating to the underside of the body. The opposite of 'Dorsal'

Ventral fins : Pelvic fins.

Vestigial : Small and imperfectly developed; rudimentary.

Viviparous : Spoken of fish which give forth living young (instead of eggs) from within the body, as nearly all mammals do

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