

**Fauna of India  
and  
the Adjacent Countries**

**PISCES  
Perciformes : SCIAENIDAE**

**P. K. TALWAR**

**Zoological Survey of India  
Calcutta**



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*By*

**P. K. TALWAR**  
*Zoological Survey of India, Calcutta*



*Edited by the Director*

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## EDITOR'S PREFACE

**F**ishes belonging to the family Sciaenidae commonly known as croakers, mainly inhabit seawaters and have been recorded from the Bay of Bengal and Arabian Sea. These are also found occasionally in estuaries but rarely in freshwaters. Because of their food value, these economically important fishes forms 6% of the total marine fishery on both the coasts of India. The insinglass (a geletine substance) which is prepared out of their dried air-sacs is used in the distilleries, confectionery and in the manufacture of certain types of cement.

The author Dr. P. K. Talwar, includes in the present volume of the *Fauna of India* series, 40 species (including one new species) under 20 genera and 8 tribes of family Sciaenidae. All additional information reported so far on Indian sciaenid fishes, since the publication of the classical work of Francis day (1889) in the *Fauna of British India* have been incorporated in this volume. The present volume not only provide an upto-date taxnomical account of these fishes, but also supplements fishery information available for each species. It is expected to be useful to the fish investigators and to the marine fishery workers who need proper identification of the sciaenid species of India.

December, 1994  
Calcutta

A. K. GHOSH  
*Director*  
*Zoological Survey of India*



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## INTRODUCTION

Fishes of the family Sciaenidae occur throughout the world in tropical and subtropical seas and are found from shallow inshore areas to depths of over 300m. Most species live on or near the bottom and are largely confined to continental shelves and slopes but some enter estuaries and even freshwater. They form important items in the fisheries in the warm shallow seas and estuaries of the world, especially where great rivers enter the sea from the great land masses. They have therefore received considerable attention from fishery biologists of the countries involved and in recent years attempts have been made to produce taxonomic syntheses of the knowledge so obtained, the most notable in the Indo-Pacific region is the work of Chu, Lo and Wu (1963), Trewavas (1977) and Talwar (1984). The current concepts of sciaenid classification are largely based on the morphology of the snout (rostral) and mental (mandibular) pores and/or barbels, otoliths (sagittae) and the gasbladder.

Sciaenid fishes are represented by 49 species, belonging to 22 genera, in the Indian Ocean of which 40 species belonging to 20 genera, inhabit the seas of India. These fishes form one of the important constituents of demersal fish landings in India, forming about 6% of the total marine fish production. While the larger marine sciaenids like *Protonibea diacanthus* (Lacepede) and *Otolithoides biauritus* (Cantor) which attain a length of more than a metre and are commercially important, occur in large shoals on the north-west coast, smaller sciaenids form a seasonal fishery of varying magnitude along the entire coast of India and also in the Andaman Sea. Two large-size species, *Macropsinosa cuja* (Hamilton-Buchanan) and *Daysciaena albida* (Cuvier) contribute to significant fisheries in Indian estuarine waters, while two fairly small species, *Pama pama* (Hamilton – Buchanan) and *Johnius gangeticus* sp.n. form a fishery in Ganga river.

Good taxonomic keys are notoriously hard to construct. This is particularly true for the various species of the genera *Johnius* and *Johnieops*. However, the keys and the supporting text and figures should provide information adequate to identity all specimens in both field and laboratory situations. The geographical coverage is conventional. The classification adopted is after Trewavas (1977). External distinguishing features of sciaenid fishes are given and are also keyed out from other fish families of the suborder Percoidei occurring in the Indian region. The scope of the present study is alpha – and beta – taxonomical; no attempt was made to discuss evolutionary relationships (that shall be the theme when other similar fish groups are taken up). Therefore, species have been arranged according to the order they have been keyed out.

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The majority of the line drawings were executed by Shri Dhanojoy Pyne under my supervision. Several of the illustrations are based on figures from *FAO fish identification sheets* or from regional works. For dedicated typing of the manuscript I am thankful to Shri Himadri Majumdar.

Finally, I thank my wife Saroj for appreciating her immense patience with my work and for making it all worthwhile - a work I dedicate to her.

## METHODS

The standard methods of Hubbs and Lagler (1958) and Trewavas (1977) were used for all counts and measurements :

The *depth of body* is the greatest depth.

The *length of head* is measured from the anterior point of the snout, including the upper lip if this is terminal to the hind edge of the operculum (including the membranous margin).

The *snout* is measured directly from its most anterior point to the edge of the eye.

The *eye diameter* is measured horizontally.

The *upper jaw* (maxillary length) is measured directly from the middle of the upper lip to the posterior edge of the maxilla, which gave the relative size of the maximum mouth opening.

The *lower jaw* is measured from the front of the symphysis or lower lip to the end of the retroarticular.

The *pectoral fin* is measured from the most anterior base of a ray to the posterior tip.

Gill-rakers were counted on the external side of first gill-arch including the number of 'obvious' rakers (where length of raker is greater than maximum thickness) and tubercles. The raker usually found at the articulation of the ceratobranchial and epibranchial is delineated separately in the formula.

The small scales perforated by the lateral line tubule were counted as lateral scales from the upper end of the gills slit to end of the hypurals.

Morphological terminology used in describing these sciaenid species follows Chu, Lo and Wu (1963) and Trewavas (1977).

#### ABBREVIATIONS

The following abbreviations have been used in the text to denote the names of museums and other institutions where the types referred to by the author are present :

AM : Australian Museum, Sydney. ANSP : Academy of Natural Sciences, Philadelphia. BMNH : British Museum (Natural History), London. CMFRI : Central Marine Fisheries Research Institute, Mandapam Camp (S. India). MNHN : Museum National d'Histoire Naturelle Paris. NHMW : Naturhistorisches Museum, Vienna. PBS : Philippine Bureau of Sciences, Manila. RMNH : Rijksmuseum van Natuurlijke Historie, Leiden. USNM : United States National Museum, Washington, D. C. ZMB : Zoologisches Museum der Humboldt Universitat, Berlin. ZSI : Zoological Survey of India, Calcutta.

#### SYSTEMATIC ACCOUNT

Order PERCIFORMES  
Suborder PERCOIDEI

#### Key to families of suborder PERCOIDEI

- 1(a) Lateral line high on body, close to dorsal fin base; colour of body red or pink.....2
- (b) Lateral line not high on body .....3
- 2(a) Dorsal and anal fins very long and confluent with caudal fin.....  
.....CEPHOLIDAE
- (b) Last ray of dorsal and anal fins not connected to caudal fin by a membrane.....OWSTONIIDAE
- 3(a) Dorsal fin without spines; anal fin long, with one spine.....  
..... BATHYCLUPEIDAE
- (b) Dorsal fin (often notched) with spines, anal fin with 2 to 4 spines.....4
- 4(a) Single nostril on each side, lateral line incomplete or interrupted.....5
- (b) Double nostril on each side.....6

- 5(a) Anal fin with 2 spines; subocular shelf present.... POMACENTRIDAE  
 (b) Anal fin with 3 to 16 spines; no subocular shelf..... CICHLIDAE
- 6(a) Lower 5 to 8 rays of pectoral fin unbranched, usually thickened; cirri on interspinous membrane of dorsal fin; small and richly coloured fishes..... CIRRHITIDAE  
 (b) Lower rays of pectoral fin branched, not thickened; no cirri on interspinous dorsal membrane..... 7
- 7(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..... 8
- 8(a) Two long chin barbels present; dorsal fins widely separated..... MULLIDAE  
 (b) No barbels on chin (except in some Sciaenidae where it is either a single mental barbel or if two then very minute and the dorsal fin is continuous..... 9
- 9(a) Dorsal fin with 6 to 9 short, isolated (not connected by membrane) spines; three dark stripes on side of body ..... RACHYCENTRIDAE  
 (b) Dorsal fin with no free spines..... 10
- 10(a) Anterior two anal spines detached from rest of anal fin (those spines partially or completely embedded in large adults); scutes on straight part of lateral line usually present..... CARANGIDAE  
 (b) First two anal spines not detached from rest of fin; no scutes on caudal peduncle..... 11
- 11(a) Dorsal fin in posterior-half of body; body deep and compressed; mouth large and highly protractile..... TOXOTIDAE  
 (b) Dorsal fin placed in both anterior and posterior parts of body..... 12
- 12(a) Head flattened, with a characteristic sucking disc; dorsal and anal fins lacking spines ..... ECHENEIDIDAE  
 (b) No sucking disc on head..... 13
- 13(a) Anterior rays of soft dorsal and anal fins markedly elongated, giving both a sickle shape; body very deep and strongly compressed; pelvic fins very small ..... MONODACTYLIDAE  
 (b) Anterior rays of soft dorsal and anal fins not usually elongated, but when elongated they do not give either fin a sickle shape..... 14
- 14(a) Body very deep, its maximum depth more than half the total length; one dorsal fin, spines clearly distinguishable ..... 15

- (b) Body oblong or moderately deep, its maximum depth less than half total length; when deep-bodied and with a single dorsal fin there are either no spines or the spinous rays are hard to distinguish from the soft rays..... 18
- 15(a) Pelvic fins unusually large, each with a long, strong spine and 5 soft rays; head encased in exposed, rough, striated bone ..... PENTACEROTIDAE
- (b) Pelvic fins of moderate size or small, the spine is neither strong or thick..... 16
- 16(a) No procumbent spine in dorsal fin; spinous portion of dorsal fin continuous with soft portion; body thin, deep and discus-shaped, usually bright coloured.....CHAETODONTIDAE
- (b) First spine of dorsal fin pointing forward (distinct only in juveniles); spinous portion of dorsal fin distinctly notched from soft-rayed portion (except in Platacinae)..... 17
- 17(a) Anal fin with 3 spines ..... EPHIPPIDIDAE
- (b) Anal fin with 4 spines ..... SCATOPHAGIDAE
- 18(a) Single dorsal fin with no spinous rays, or else the spinous rays difficult to distinguish from the soft rays, or finally, the spinous rays are thin and flexible and similar to soft rays ..... 19
- (b) One or two dorsal fins, with well-developed spinous rays..... 24
- 19(a) Pelvic fins absent in adults (over 9 cm); dorsal and anal fins very long; dorsal fin with 2 to 6 rudimentary spines..... APOLECTIDAE
- (b) Pelvic fins present..... 20
- 20(a) Body deep, strongly compressed, its depth greater than length of head.... 21
- (b) Body oblong or elongate, moderately compressed, its depth about equal to or less than head length ..... 23
- 21(a) No spines in dorsal and anal fins; body disc-like, with sharp breast; first pelvic ray in adult prolonged.....MENIDAE
- (b) Dorsal and anal fins with spinous rays; first pelvic ray not prolonged.... 22
- 22(a) Dorsal fin long-based, its base equal to or longer than anal-fin base..... BRAMIDAE
- (b) Dorsal fin short-based, its base much shorter than anal-fin base ..... PEMPHERIDIDAE
- 23(a) Dorsal fin originating on head; no spines in dorsal and anal fins..... CORYPHAENIDAE

- (b) Dorsal fin inserted behind head; dorsal and anal fins with spines and soft rays.....MALACANTHIDAE
- 24(a) Lateral line interrupted or divided into upper and lower parts, or absent ..  
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- (b) Lateral line complete ..... 27
- 25(a) Pelvic fin with one spine and four soft rays; lateral line in two parts.....  
.....PLESIOPIDAE
- (b) Pelvic fin with one spine and five soft rays..... 26
- 26(a) Dorsal fin with 1 to 3 spines.....PSEUDOCROMIDAE
- (b) Dorsal fin with 12 to 14 spines; head usually fairly large.....  
.....NANDIDAE
- 27(a) Two dorsal fins, well separated, but if close together then not joined by  
membrane..... 28
- (b) One dorsal fin, often deeply notched between spinous and soft parts of  
the fin and in such cases the membrane joining the two parts is intact...  
..... 34
- 28(a) Anal-fin base considerably longer than second dorsal-fin base; mouth  
large and oblique, with two small canine teeth at front of each jaw .....  
.....LACTARIIDAE
- (b) Anal-fin base as long as or shorter than second dorsal-fin base ..... 29
- 29(a) Mouth small; upper jaw (maxilla) ending far short of eye and even  
before nostrils; body elongate.....SILLAGINIDAE
- (b) Mouth moderate or large; upper jaw extending to nostrils and often  
beyond anterior margin of eye..... 30
- 30(a) A scaly pelvic axillary process present ..... 31
- (b) No scaly pelvic axillary process..... 33
- 31(a) Jaws toothless or nearly so; mouth very protractile.....  
.....EMMELICHTHYIDAE
- (b) Jaws with small teeth; mouth may be slightly protractile ..... 32
- 32(a) Caudal fin rounded or truncate; scales ctenoid..... CENTROPOMIDAE
- (b) Caudal fin forked; scales cycloid..... AMBASSIDAE
- 33(a) Anal fin with 2 spines; vent nearer to anal fin than to origin of pelvic  
fins ..... APOGONIDAE
- (b) Anal fin with 3 spines .....PERCICHTHYIDAE
- 34(a) Scaly process usually in pelvic axis..... 35

- (b) No scaly process in pelvic axis; anal fin with 3 spines..... 47
- 35(a) Teeth setiform (comb-like) but no canine teeth; body strongly compressed ..... 36
- (b) Setiform teeth absent but if present, then canine teeth also present ... 37
- 36(a) Strong spine at angle of preopercle.....POMACANTHIDAE
- (b) No spine at angle of preopercle.....CHAETODONTIDAE
- 37(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 not extending to hind margin of caudal fin..... 38
- 38(a) Rounded lobes on anal and second dorsal fins so that with tail give the fish the appearance of having three tails..... LOBOTIDAE
- (b) Not as above..... 39
- 39(a) Mouth highly protrusible ..... 40
- (b) Mouth at the most moderately protrusible..... 41
- 40(a) Head naked, its upper surface with bony ridges; gill membranes united with isthmus..... LEIOGNATHIDAE
- (b) Head scaly, its upper surface smooth; gill membranes free from isthmus.....GERREIDAE
- 41(a) Distal end of premaxillae overlapping maxillae externally; maxilla covered by a sheath when mouth closed; molariform teeth at sides of jaws; no teeth on roof of mouth..... SPARIDAE
- (b) Maxilla exposed, not overlapped by tip of premaxilla..... 42
- 42(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 the mouth.....KYPHOSIDAE
- (b) Typical scalpriform teeth absent..... 43
- 43(a) Suborbital process well-developed, often forming a spine posteriorly ....  
..... 44
- (b) Suborbital process either absent or weakly developed ..... 46
- 44(a) No teeth on roof of mouth; dorsal and anal spines weak.....  
..... NEMIPTERIDAE
- (b) Small teeth on palatines and usually on vomer; dorsal and anal spines moderately strong or slender ..... 45
- 45(a) Mouth terminal, moderate to large; most with enlarged canine teeth on jaws .....LUTJANIDAE

- (b) Mouth upturned, small; jaw teeth small .....CAESIONIDAE
- 46(a) No pores on chin; scales on cheek absent or beginning considerably behind hind end of maxilla.....LETHRINIDAE
- (b) Chin with 2 to 6 conspicuous pores; scales extending on to entire head (except snout tip).....HAEMULIDAE
- 47(a) Inner ray(s) of pelvic fins attached to abdomen by membrane..... 48
- (b) Inner ray of pelvic fins not attached to body by membrane ..... 49
- 48(a) Dorsal fin with 2 to 9 spines; chin usually with terminal appendage; eyes moderate-sized.....GRAMMISTIDAE
- (b) Dorsal with 10 spines; no terminal appendage on chin; eyes very large.. .....PRIACANTHIDAE
- 49(a) Dorsal and anal fins each with a well-developed scaly sheath; dorsal fin deeply notched..... KUHLIIDAE
- (b) Dorsal and anal fins with at most a low basal scaly sheath; dorsal fin continuous or with a low notch ..... 50
- 50(a) Opercle with three spines; branchiostegal rays usually seven .....SERRANIDAE
- (b) Opercle with two spines; branchiostegal rays six.....TERAPONIDAE

#### Family SCIAENIDAE

Body fairly elongate and moderately compressed. Head with large cavernous canals (part of the lateral line system); snout rounded or bluntly pointed; sensory pores (of the lateral line system of head) often conspicuous on tip of snout (rostral pores), on lower edge of snout (marginal pores) and on chin (mental pores); usually 3 to 5 rostral pores on tip of snout, 5 near anterior margin of mouth and 3 pairs on lower jaw; bottom feeders have well-developed rostral and mental pores whereas in midwater feeders the pores are indistinct; one or two mental barbels often present on chin, solid or with a pore. Mouth terminal, subterminal, inferior or lower jaw projecting. Teeth generally villiform, usually differentiated in size in upper jaw; well-developed canines may be present in both jaws; teeth in lower jaw may be in a villiform band, with a slightly enlarged inner row, or with well-developed enlarged teeth; vomer and palatines without teeth. Operculum ending in two points with an embayment between them; the points ("spines") are usually soft and beyond them the thinly ossified edge of the operculum passes imperceptibly into the membranous margin; preopercular bone edged with weak serrae, usually sheathed except at the angle where a few may be pungent. Post-temporal bone with a fimbriate edge. Dorsal fin long, with a notch between the last and penultimate spines, the longer spines are usually flexible distally (but not articulated); anterior portion with 8 to 10 spines (usually 10), and posterior portion with one spine and 21 to 45 soft rays. Anal fin with two spines and 7 to 12 (usually 7) soft rays; first

anal spine very short, the second of varying length characteristic of the species. Caudal fin usually rhomboid or truncate; often feebly emarginate (usually pointed in juveniles). Head covered with scales except at extreme tip of snout; scales cycloid on head and usually ctenoid on body; lateral line scales extending to end of caudal fin. Otolith (sagitta) with a tadpole-shaped impression on its inner side. Gasbladder simple, or with one to numerous pairs of diverticula (appendages) of which the anterior pair may extend into the head. Vertebrae usually 24.

## Key to Tribes

- 1(a) Gasbladder without appendages ..... Sciaenini
- (b) Gasbladder with appendages..... 2
- 2(a) Gasbladder appendages with one unbranched pair ..... 3
- (b) Gasbladder appendages branched ..... 5
- 3(a) Otolith (sagitta) with a broad, deep, strongly curved 'cauda'; gillrakers on lower arm of first arch 19 to 23 ..... Kathalini
- (b) Otolith (sagitta) with the 'cauda' bent nearly at a right angle, its tip tapering, not reaching the ventral edge; lower gillrakers 8 or 9 ..... 4
- 4(a) Gasbladder appendages extending into the head ..... Macrospinosini
- (b) Gasbladder appendages abdominal, not extending into head ..... Bahabini
- 5(a) Gasbladder appendages including a cephalic portion which is either the anterior end of a long abdominal tube arising from the posterior end of the bladder or a division of an anteriorly arising tube whose other part is either a single abdominal tube or one of a cluster of abdominal tubes arising close together from the anterior part of the bladder .....  
..... Otolithoidini
- (b) Gasbladder with several pairs of arborescent tubules arising along length of bladder ..... 6
- 6(a) Main gasbladder hammer-shaped ..... Johniini
- (b) Main gasbladder carrot-shaped ..... 7
- 7(a) Anterior pair of mental pores on front of chin separated by the symphysis; no cephalic gasbladder appendage ..... Otolithini
- (b) Anterior pair of mental pores close together behind symphysis or opening by a single pore; first gasbladder appendage wholly or partly cephalic (except in *Protonibea*) ..... Nibeini

## Synopsis analytical Key to Genera

- 1(a) Gasbladder simple, without appendage; a barbel on chin with a pore at its tip; mouth ventral ..... *Umbrina*

- (b) Gasbladder with appendages; barbel on chin, when present without a pore at its tip ..... 2
- 2(a) Gasbladder with one or two pairs of simple or branched appendages .... 3
- (b) Gasbladder with more than two pairs of diverticula, almost all arborescent..... 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 very robust, 16 to 21 % of standard length; gillrakers on lower arm of first arch 8 ..... *Macropsinosa*
- (b) Second anal spine fairly strong but not robust; lower gillrakers 19 to 23 ..... *Kathala*
- 5(a) Gasbladder appendages simple tubes, without extensions into the head, beside the bladder; dorsal fin with 24 to 26 soft rays ..... *Bahaba*
- (b) Gasbladder with branches in the head; dorsal fin with 27 to 45 soft rays ..... 6
- 6(a) Gasbladder appendages arising from anterior end of bladder and immediately dividing into branches, each side dividing into a cephalic and an abdominal branch, the former branching in front of transverse septum ..... *Panna*
- (b) Gasbladder appendages arising from posterior end of bladder..... 7
- 7(a) Dorsal fin with 27 to 29 soft rays ..... *Otolithoides*
- (b) Dorsal fin with 40 to 45 soft rays ..... *Pama*
- 8(a) Gasbladder hammer-shaped ..... 9
- (b) Gasbladder carrot-shaped ..... 10
- 9(a) Teeth of lower jaw subequal; outer row of teeth of upper jaw enlarged but not widely spaced; mouth inferior; mental barbel often present ..... *Johnius*
- (b) Teeth of lower jaw differentiated in size, the inner lateral row enlarged; outer upper row of teeth enlarged and widely spaced; mouth usually subterminal; no mental barbel ..... *Johnieops*
- 10(a) Anterior pair of arborescent appendages of gasbladder branching on posterior surface of transverse septum, but not entering the head ..... 11
- (b) Anterior pair of appendages of gasbladder extending into the head and branching under the skull..... 17

- 11(a) Outer row of teeth in upper jaw enlarged and spaced, but no outstanding canines ..... 12
- (b) One or two pairs of outstanding canine teeth (near symphysis) in upper or both jaws..... 15
- 12(a) Pores on chin of the “false five” pattern, those of first pair close together behind tip of jaw and united by a groove; lower fins dark .....  
.....*Protonibea*
- (b) First pair of pores small, on front of chin, one on each side of tip of jaw, not united by a groove, one or two pairs behind them; second anal spine weak..... 13
- 13(a) Gasbladder appendages wing-like, without a well-developed dorsal limb, the posterior ones parallel to wall of bladder; ‘tail’ of tadpole-shaped impression of otolith (sagitta) only slightly curved...*Pennahia*
- (b) Gasbladder appendages each with a distinct short or long branched dorsal limb as well as a ventral limb; posterior appendages simple, very short, at right angles to wall of bladder ..... 14
- 14(a) Pectoral fin 15 to 22.5% of standard length; interorbital width 5 to 6.8% of standard length; ‘tail’ of tadpole-shaped impression of otolith (sagitta) strongly curved, J - shaped .....*Argyrosomus*
- (b) Pectoral fin 25.5 to 29% of standard length; interorbital width 7.7 to 9.1% of standard length; ‘tail’ of tadpole-shaped impression of otolith (sagitta) only slightly curved.....*Atrobucca*
- 15(a) Canine teeth in upper jaw only; mouth inferior.....*Chrysochir*
- (b) Canine teeth in both jaws; mouth terminal or lower jaw projecting .....  
..... 16
- 16(a) Gasbladder appendages set in an oblique plane in the wedge of tissue flanking the bladder, not wrapped around the main bladder; anal fin inserted behind middle of soft dorsal fin; soft anal rays 7 or 8 .....  
.....*Otolithes*
- (b) Some or all of the gasbladder appendages ramifying on dorsal surface of bladder; anal fin inserted either before middle of soft dorsal fin and then 7 or 8 soft rays, or behind middle of soft dorsal fin and then 10 to 12 soft rays.....*Pterotolithus*
- 17(a) Lower jaw with a single mental barbel or with two minute barbels.....  
..... 18
- (b) No barbels on chin..... 19
- 18(a) Lower jaw with a single mental barbel; lower jaw teeth uniform.....  
.....*Dendrophysa*

- (b) Lower jaw with two minute barbels; lower jaw teeth differentiated in size ..... *Daysciaena*
- 19(a) Lower jaw teeth uniformly small ..... *Paranibeia*
- (b) Lower jaw teeth well-differentiated in size, the lower inner row enlarged..... *Nibeia*

Tribe (i) SCIAENINI

Gasbladder simple (without appendages) and wholly abdominal.

Genus 1. *Umbrina* Cuvier, 1816

1816. *Umbrina* Cuvier, *Le Regne Animal* (ed. 1), 2 : 297 (type-species : *Sciaena cirrosa* Linnaeus) (See Opinion 988, *Bull. zool. Nom.*, 29 [1972] : 123).
1848. *Attilus* Gistel, *Naturgesch. Thierreichs* : 109 (type-species : *Sciaena cirrosa* Linnaeus).
1863. *Sciaena* (nec. Linnaeus) Bleeker, *Ned. Tijdschr. Dierk.*, 1 : 66 (type-species : *Sciaena cirrosa* Linnaeus but see Opinion 93 of International Commission Zoological Nomenclature, 1926).
1896. *Asperina* Ostroumoff, *Zool. Anz.*, 19 : 30 (type-species : *Asperina improvisa* Ostroumoff = *Sciaena cirrosa* Linnaeus).

*Defination* : Sciaenid fishes with simple and wholly abdominal gasbladder. Mouth ventral, edge of snout lobed; a median barbel perforated at its tip by a small pore. Teeth differentiated in size in upper jaw only. Otolith (sagitta) with a tadpole-shaped impression on its inner side, with the 'tail' (cauda) bent sharply, not reaching the ventral edge.

Several species; one in Indian region.

1. *Umbrina canariensis* Valenciennes, 1843

(Text-fig. 1)

1843. *Umbrina canariensis* Valenciennes, *Hist. nat. des Iles Canaries*, 2 : 24 (type-locality : Canaries); Dardignac, 1958, *Revue Trav. Off. Pech. marit.*, 22 : 441; Dardignac, 1961, *Revue Trav. Off. Pech. marit.*, 25 : 266, figs. 3, 5B, 6-13, 15; Trewavas, 1964, *Copeia* : 115; Palmer, 1966, *Ann. Mag. nat. Hist.*, (13)9 : 425, pl. 7b; Trewavas 1977, *Trans. zool. Soc. Lond.*, 33 : 279; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Umbr 6.
1876. *Umbrina sinuata* Day, *Fishes of India* : 182, pl. 46, fig. 1 (type-locality: Karachi, Pakistan); Day, 1888, *Fishes of India Suppl.* : 788; Day, 1889, *Fauna Br. India*, Fishes, 2 : 109, fig. 48; Gilchrist and Thompson, 1908, *Ann. S. Afr. Mus.*, 6 : 182; Gilchrist and Thompson, 1917, *Ann. S. Afr. Mus.*, 11 : 351; Barnard, 1927, *Ann. S. Afr. Mus.*, 21 : 577; Trewavas, 1964, *Copeia*: 115; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 279; Mohan, 1981, *Indian J. Fish.*, 28 : 1.
1888. *Umbrina striata* Boulenger, *Proc. zool. Soc. Lond.* : 660 (type-locality : Muscat); Gilchrist and Thompson, 1908, *Ann. S. Afr. Mus.*, 6 : 181; Gilchrist and Thompson, 1917, *Ann. S. Afr. Mus.*, 11 : 351; Barnard, 1927, *Ann. S. Afr. Mus.*, 21 : 577.
1949. *Sciaena sinuata* : Smith, *Sea Fishes of Southern Africa* : 228.

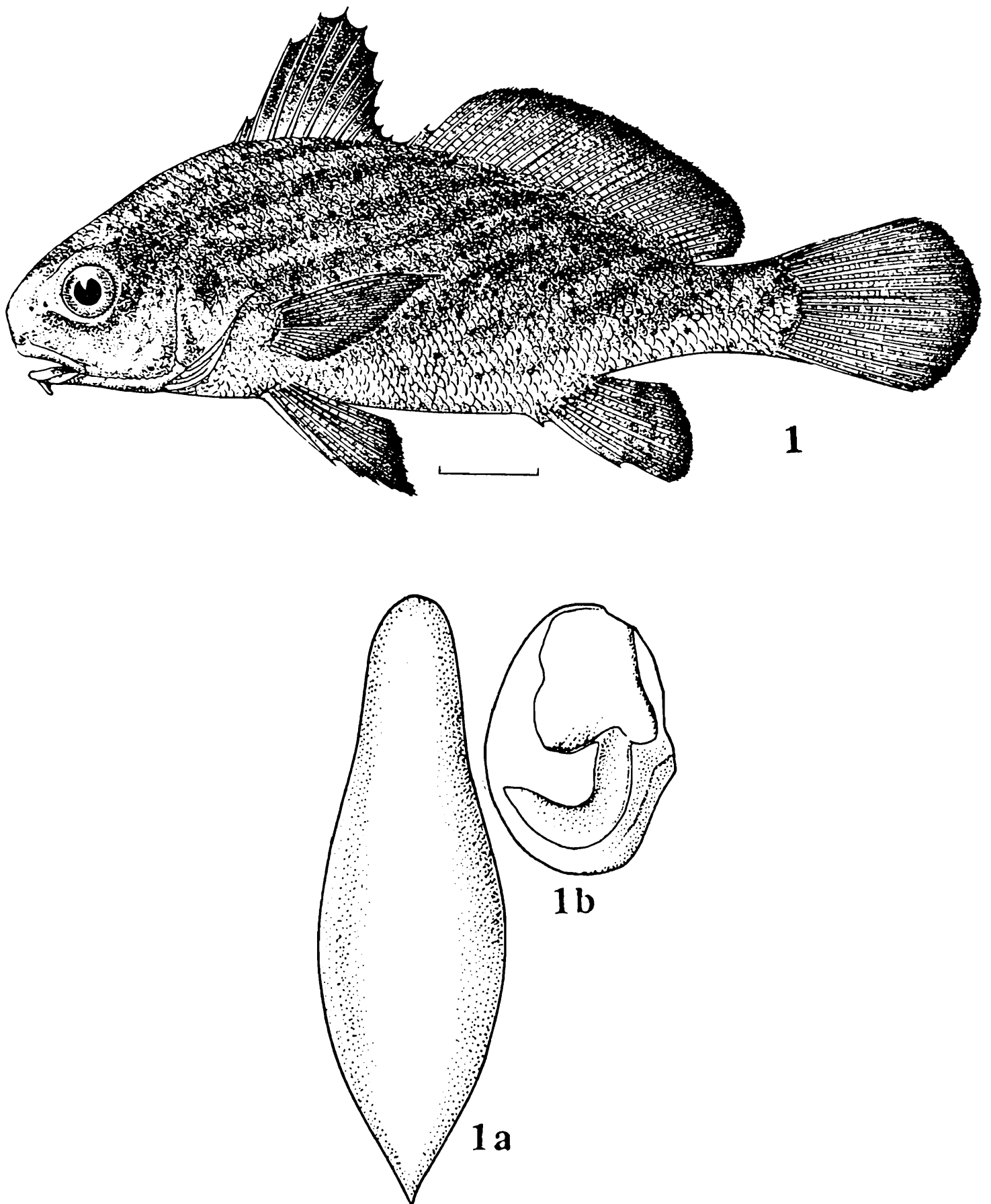


Fig. 1. *Umbrina canariensis* Valenciennes (after Day). 1a. Systematic view of gasbladder. 1b. Sagitta (inner surface) (after Trewavas).

*Types* : Holotype : MNHN No. A 5669. Syntype of *Umbrina sinuata* : ZSI 939; completely disintegrated. Holotype of *Umbrina striata* : BMNH 1887. 11.11.164; Stuffed specimen.

*Common name* : Canary drum .... English.

*Description* : D IX + I 27-29; A II 7; P i 16; V I 5.

A small-sized species with a fairly deep body, its depth 35-42% of Standard length. Snout rounded; head length 32-39% of Standard length. Mouth inferior; maxilla reaching to middle of eye. Operculum with two flat spines; edge of interopercle serrated, most coarsely at angle, becoming blunt with age.

Rostral pores 3; marginal pores 5. Mental pores 5, the median pore at tip of mental barbel.

Teeth differentiated in size upper jaw only, the outer row enlarged; lower jaw with uniform villiform teeth, in a broad band; no canines.

Scales cycloid on snout, ctenoid on body; scales present on base of anal fin.

Dorsal fin deeply notched; dorsal spines weak, third and fourth longest. Second anal spine moderately strong, about half of head length. Pectoral fins moderate, about 3/4ths of head length. Caudal fin wedge-shaped.

Gasbladder (Text-fig. 1a) oblong, without appendages.

Otolith (sagitta) (Text-fig. 1b) with a tadpole-shaped impression on its inner side, of which the 'tail' (cauda) is bent sharply, tapering, not reaching the ventral edge.

Colour : In life, brownish-silvery with about nine sinuous brown bands; a dark blotch at axilla. Spinous dorsal fin black; a black band along the length of second (soft) dorsal and anal fins; pelvic fins dusky.

*Geographical distribution* : Eastern Atlantic, east coast of Africa, northwards to Somalia and the northeastern Arabian Sea.

Inhabits shallow coastal waters.

*Remarks* : *Umbrina sinuata* Day was described from two young specimens from Karachi by Day (1876) of which one syntype is in ZSI collections. The syntype is in a disintegrated state. I was not able to obtain any further specimens of *U. canariensis* and hence the above description was drawn up from the literature.

#### Tribe (ii) BAHABINI

Gasbladder carrot-shaped, with one pair of simple, tubular appendages arising from anterior end of bladder and directed backwards. Otolith (sagitta) with the 'cauda' ('tail' of the tadpole-pattern) bent nearly at a right angle, its tip tapering, not reaching the ventral edge. Gill-rakers 8 or 9 on lower arm. Second anal spine strong. Anterior pair of mental pores small, on front of chin; second pair small slits or absent; third pair intraspecifically variable or absent.

Genus 2. *Bahaba* Herre, 1935

1935. *Otolithes (Bahaba)* Herre, *Lingnan Sci. J.*, **14** (4) : 603 (type-species : *Otolithes (Bahaba) lini* Herre = *Nibea taipingensis* Herre).  
 1972. *Bahaba* Trewavas and Talwar, *J. Fish. Biol. Lond.*, **4** : 12 (generic status recognised).

**Definition** : Sciaenid fishes having a carrot-shaped gasbladder (Text-fig. 2a) with a pair of unbranched tubular appendages arising from its anterior end and extending backwards beside the main bladder for about half of its length. Mouth large and terminal. Interorbital width narrow, 13.7-14.3% length of head. No pores on snout, five marginal pores on rostral flap; a pair of small mental pores on front of chin. Teeth differentiated in size in both jaws, but without specialised caniniform teeth. Gillrakers few, 8 or 9 on lower arm of first arch. Second anal spine strong. Otolith (sagitta) with a tadpole-shaped impression on its inner side having an asymmetrical pouch 'head', and a 'tail' or 'cauda' bent at a right angle and not reaching the edge of the macular surface. Vertebrae 10 + 15.

Three species, only one in our area.

2. *Bahaba chaptis* (Hamilton-Buchanan, 1822)  
 (Text-fig. 2)

1822. *Bola chaptis* Hamilton-Buchanan, *Fishes of Ganges* : 77, 368, pl. 10, fig. 25 (type-locality : estuaries of Ganges).  
 1830. *Corvina chaptis* : Cuvier, *Hist. nat. Poiss.*, **5** : 130 (after Hamilton-Buchanan).  
 1860. *Sciaena diacanthus (nec Lacepede)* Gunther (*partim*) *Cat. Fishes Br. Mus.*, **2** : 290; Day (*partim*), 1876, *Fishes of India* : 189; Day (*partim*) 1889, *Fauna Br. India, Fishes*, **2** : 118; Weber and de Beaufort (*partim*), 1936, *Fishes Indo-Australian archipelago*, **7** : 515.  
 1972. *Bahaba chaptis* : Trewavas and Talwar, *J. Fish. Biol. Lond.*, **4** : 13, pl.1 and text-figs 1, 2 (Burma); Talwar and Datta, 1972, *J. Fish. Biol. Lond.*, **4** : 171 (Hooghly estuary; neotype designated); Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, **3** : SCIAEN Baha 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : 287, fig. 51; Mohan, 1981, *Indian J. Fish.*, **28** : 1; Jayaram, 1982, *Handbook zool. Surv. India*, (2) : 330.

**Type** : Neotype : ZSI F6229/2; loc. Hooghly estuary; designated by Talwar and Datta (1972); Hamilton-Buchanan's (1822) type was not preserved.

**Common name** : Chaptis bahaba .... English.

**Description** : D X + I 24-26; A II 7; P i 17-18; V I5.

Body oblong and fairly compressed laterally, the back arched more than the ventral profile. Mouth large; lower jaw projecting slightly and with a straight symphysis forming a slight chin, its length more than half of head length; upper jaw extending to below vertical from posterior border of eye. Operculum with two flat weak spines; preoperculum margin weakly serrated.

**Proportions as % Standard length** : Depth of body 28.0-31.0; length of head 29.7-31.8; length of pectoral fin 19.2-22.0; and length of second anal spine 12.5-16.0.

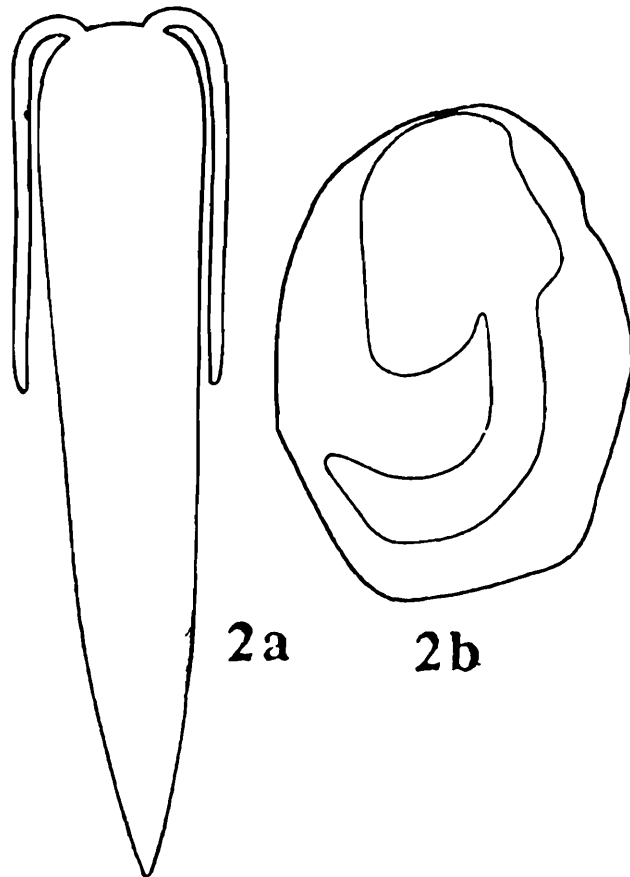
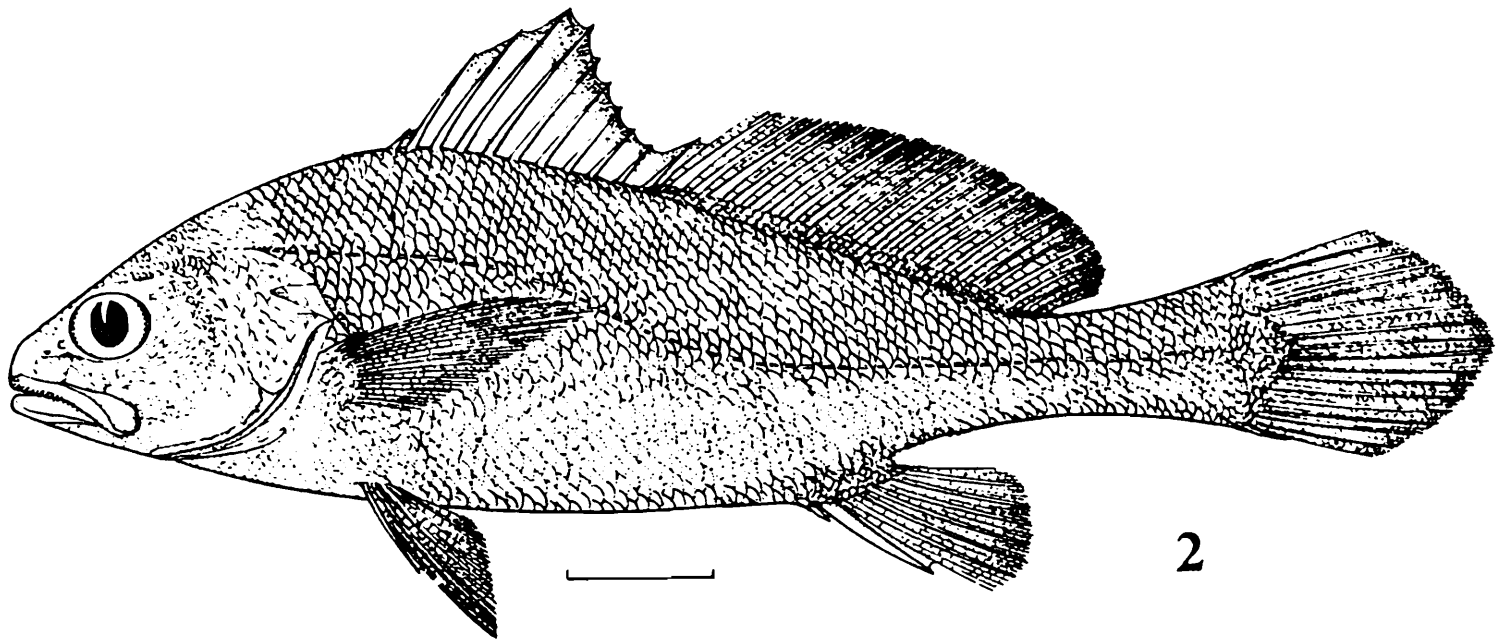


Fig. 2. *Bahaba chaptis* (Hamilton-Buchanan); (Neotype : ZSI Regd.No. F 6229/2).  
2a. Systematic view of gasbladder. 2b. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 22.0-27.3; length of snout 20.0-22.7; depth of preorbital bone 9.6-11.0; interorbital width 13.7-16.7; length of upper jaw 40.0-44.0; length of lower jaw 51.0-53.3; and length of second anal spine 45.7-50.0.

No upper pores on snout; those of marginal series 5, a small median one just above edge of rostral flap and two pairs at the edge which are almost without indentations; lower jaw with a pair of small pores, followed by a pair of small slits.

Gillrakers on first arch (4-5) + 1 + (7-8), with some flat dentate plates on either end of series and between them.

Teeth differentiated in size in both jaws; outer upper row of enlarged teeth, diminishing posteriorly; lower jaw with a group of subequal teeth in front, then an inner series of larger, increasing in size posteriorly; no specialised caniniform teeth.

Scales cycloid on snout, below and behind eyes, and extreme anterior part of breast, elsewhere ctenoid; a series of very small ctenoid scales forming a narrow sheath at base of dorsal fin, and one or two series at base of anal fin; lateral line scales 51 or 52.

Dorsal fin notched; dorsal spines moderately strong, third longest. Second anal spine strong and stout,  $\frac{2}{3}$  rds to  $\frac{3}{4}$  ths the length of the longest soft finray. Pectoral fins rather short. Caudal fin cuneate, tapering in young.

Gasbladder (text-fig. 2a) carrot-shaped with a pair of appendages, each a simple tube, arising from anterior end and extending backwards along side of main bladder for about half its length.

Otolith (sagitta) (text-fig. 2b) with a tadpole-shaped pattern on its inner side having an asymmetrically pouched 'head' and a J-shaped 'tail' (or cauda).

*Colour* : In life, unknown; in alcohol, pale, slightly darker above; margins of dorsal and caudal fins black; pectoral, pelvic and anal fins hyaline.

*Geographical distribution* : India : Hooghly estuary; and Burma.

Inhabits coastal waters and lower parts of rivers.

*Remarks* : This species is presently known only from the estuaries around the Bay of Bengal. It appears to be a very rare species being known only from eight specimens of which four are in the Zoological Survey of India, Calcutta.

### Tribe (iii) MACROSPINOSINI

Gasbladder carrot-shaped, with one pair of unbranched cephalic appendages arising from the anterior end and extending into the head. Otolith (sagitta) with the 'cauda' ('tail' of the tadpole pattern) bent nearly at a right angle, its tip tapering, not reaching the ventral edge. Gill-rakers 8 on lower arch. Second anal spine long and strong. Mental pores three pairs, those of anterior pair immediately behind symphysis, close together or opening by a single median pore.

Genus 3. *Macrospinosa* Mohan, 1969

1969. *Macrospinosa* Mohan, *Curr. Sci.*, **38** (12) : 295 (type-species : *Bola cuja* Hamilton-Buchanan) (Spelt *Macrospinos*, a topographical error).  
 1970. *Cantor* Talwar, *Proc. zool. Soc., Calcutta*, **23** : 68 (type-species : *Bola cuja* Hamilton-Buchanan).

*Definition* : Sciaenid fishes having a carrot-shaped gasbladder (text-fig. 3a), with one pair of unbranched appendages arising from the anterior end and which pierce the transverse septum and extend into the head below the skull. Otolith (sagitta) (text-fig. 3b) 'Sciaena-form', the head of the tadpole-shaped impression (on lower surface) upright in position and in contact with the anterior edge, and the 'tail' or 'cauda' sharply curved and tapering, J-shaped, ending without reaching the edge. Mouth terminal, lower jaw slightly included; teeth differentiated in size in both jaws, but without specialised caniniform teeth. Snout with three indistinct pores, five well developed pores at edge of rostral flap; mental pores three pairs, those of the anterior pair immediately behind the symphysis, close together or opening by a single median pore. Second anal-fin spine long and robust, 16 to 21% of standard length. Occipital crest high and back highly arched. Vertebrae 25 (10 + 15 or 11 + 14).

Monotypic.

3. *Macrospinosa cuja* (Hamilton-Buchanan, 1822)  
 (Text-fig. 3)

1822. *Bola cuja* Hamilton-Buchanan, *Fishes of Ganges* : 81, 369, pl.12, fig. 27 (type- locality : estuaries of Ganges).  
 1829. *Corvina cuja* : Cuvier, *Le regne animal* (ed. 2), **2** : 173 Cuvier, 1830, *Hist. nat. Poiss.*, **5** : 96 (after Hamilton-Buchanan); Gunther, 1860, *Cat. Fishes Br. Mus.*, **2** : 300; Blyth, 1861, *J. Asiat. Soc. Beng.*, **29** : 141.  
 1861. *Sciaenoides asper* Blyth, *J. Asiat. Soc. Beng.*, **29** : 140 (type-locality : Gangetic estuary).  
 1876. *Sciaena cuja* : Day, *Fishes of India* : 187; Day, 1889, *Fauna Br. India*, Fishes, **2** : 115.  
 1969. *Macrospinosa cuja* : Mohan, *Curr. Sci.*, **38** (12) : 295 (name only); Murthy, 1969, *Bull. cent. mar. Fish. Res. Inst.*, (10) : 21; Mohan, 1972, *Indian J. Fish.*, **16** : 88; Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : 290, fig. 50; Mohan, 1981, *Indian J. Fish.*, **28** : 2, fig. 1; Jayaram, 1982, *Handbook Zool. Surv. India*, (2) : 328.  
 1970. *Cantor cuja* : Talwar, *Proc. zool. Soc., Calcutta*, **23** : 68, fig.

*Types* : Neotype herewith designated; ZSI Regd. No. F 7243/2; a specimen 262 mm Standard length, *loc.* Hooghly estuary at Calcutta, 3 August 1975, *coll.* P.K. Talwar.

? Syntypes of *Sciaenoides asper* : ZSI Regd. No. Cat. 142-4 (registered as *Corvina cuja*). Lost.

*Common name* : Cuja bola ..... English.

*Description* : D X-XI + I 27-29; A II 6-7; P i 17; V I 5.

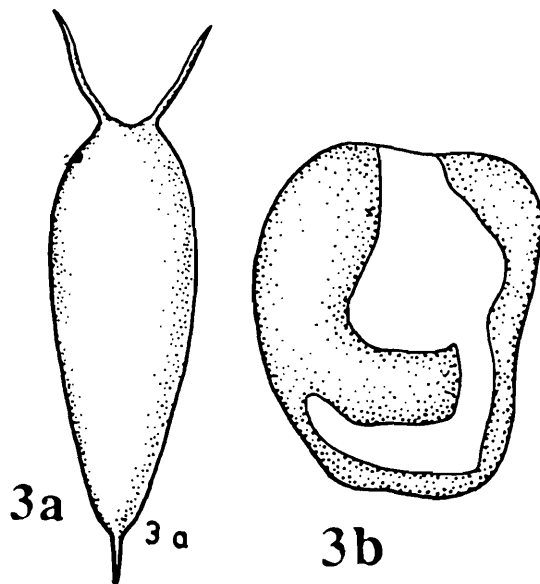
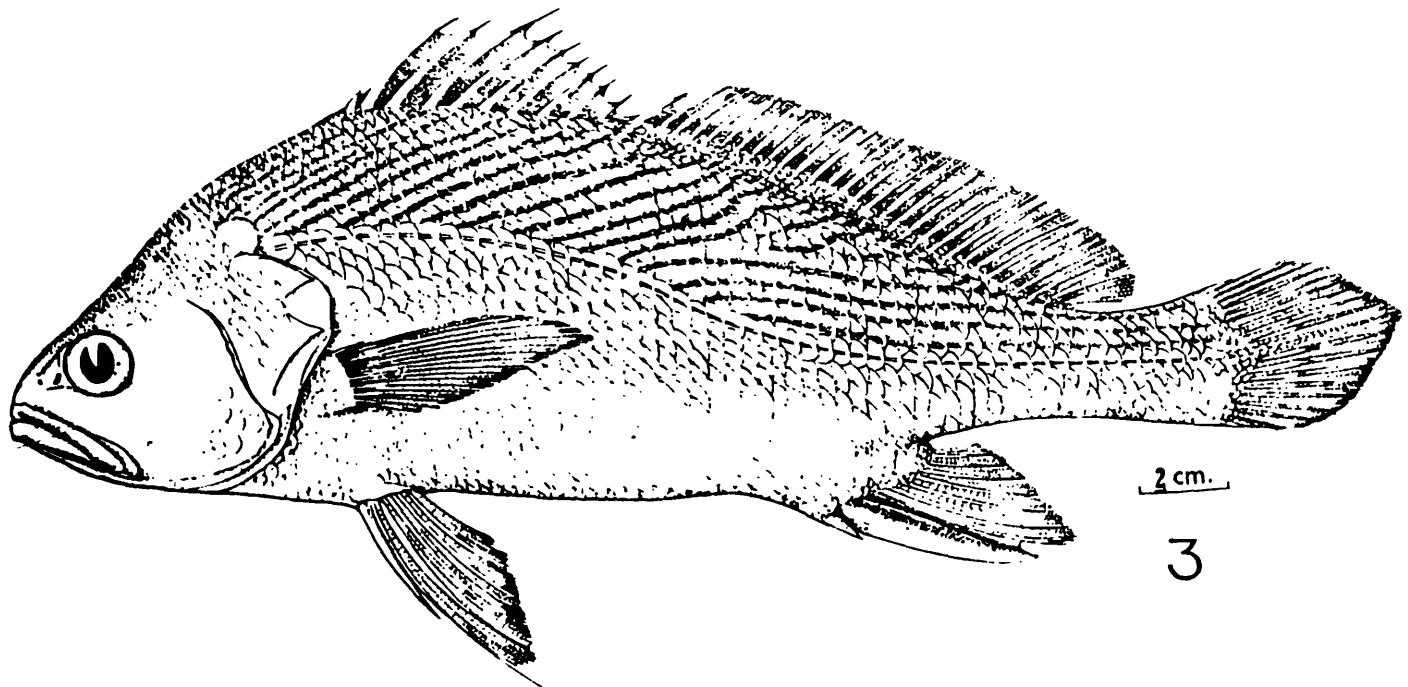


Fig. 3. *Macropsinosa cuja* (Hamilton-Buchanan); (Neotype : ZSI Regd. No. F 7243/2). 3a. Systematic view of gasbladder. 3b. Sagitta (inner surface).

A fairly large species with a rather blunt snout; snout profile evenly decurved in young specimens, flatter over eye with age, profile then rising steeply to occiput and highly arched back. Mouth terminal, at low angle with horizontal; jaws nearly equal or the lower jaw slightly longer; maxillary ending below hind edge of pupil or of eye. Operculum with two flat weak spines; preoperculum weakly serrated at angle.

*Proportions as % Standard length* Depth of body 31.5.-35.6; length of head 29.2-32.0; length of pectoral fin 20.0-22.5; and length of second anal spine 18.2-21.0.

*Proportions as % length of head* : Diameter of eye 22.0-28.0; length of snout 21.3-24.5; depth of preorbital bone 11.2-15.0; interorbital width 18.1-22.0; length of upper jaw 37.5-45.5; length of lower jaw 47.7-53.0; and length of second anal spine 59.3-66.7.

Pores at edge of rostral flap well developed, 5 in number, the median just above the edge, the paired under it; upper snout pores 3 and inconspicuous. Mental pores three pairs, the anterior pair immediately behind symphysis, close together or in a pit opening by a single pore.

Gillrakers on first arch (3-4) + 1 + 8, with flat tooth-plates above and below.

Teeth differentiated in size in both jaws, the upper moderately enlarged and spaced with a narrow band of small inner teeth; in posterior part of lower jaw an inner row of moderately enlarged and 1 or 2 irregular outer rows of small teeth, near symphysis outer teeth larger.

Scales cycloid on snout and immediately behind eye, finely ctenoid on preoperculum and operculum and from above middle of eye backwards over whole body; lateral line scales 47 to 51. A narrow scaly sheath at bases of soft dorsal and anal fins.

Dorsal fin deeply notched; second to fourth spines with stout bases, first spine shortest and third longest. Anal fin inserted below vertical from 10 to 12th soft dorsal finray; second anal spine robust, nearly as long as soft rays. Pelvic-fin spine fairly long first soft ray slightly filamentous. Caudal fin rhomboid.

Gasbladder (Text-fig. 3a) carrot-shaped, extending whole length of body cavity upto anal fin, with one pair of unbranched appendages arising at extreme anterior end and wholly directed forward and entering head at dorsal side of transverse septum.

Otolith (sagitta) (Text-fig. 3b) broad and thick, with truncated anterior and posterior ends; inner surface with a tadpole-shaped impression of which the 'head' is upright in position and truncated by the anterior edge, the 'tail' sharply curved and tapering and ending abruptly close to posterior-outer edge.

Colour : In life, greyish above, silvery below; oblique dark series of spots following row of scales above lateral line, and faint horizontal streaks below lateral line. Dorsal fin with 3 or 4 longitudinal rows of large dusky spots; other fins pale.

*Geographical distribution* : India : Gangetic estuary and probably also Bay of Bengal.

**Remarks** : The record from the west coast of India still needs confirmation.

**Fishery information** : This species contributes a good fishery in the Hooghly estuary (West Bengal) during the winter months. It is a large fish growing to 150 cm. It is not classed with the 'Bolas' (sciaenids) by the fishermen but with the 'Bhekti' (*Lates calcarifer* Bloch).

#### Tribe (iv) KATHALINI

Gasbladder carrot-shaped with one pair of diverticula arising at the anterior end and entering the head. Otolith (sagitta) with a broad, deep, strongly curved 'cauda' Gillrakers 19 to 23 on lower arm of first arch.

#### Genus 4. *Kathala* Mohan, 1969

1969. *Kathala* Mohan, *Curr. Sci.*, 38 (12) : 295 (type-species : *Corvina axillaris* Cuvier).

1970. *Dhoma* Talwar and Joglekar, *J. mar. biol. Ass. India*, 10 (2) : 361 (type-species : *Corvina axillaris* Cuvier).

**Definition** : Sciaenid fishes with a carrot-shaped gasbladder (Text-fig. 4a) with one pair of short, horn-like, simple diverticula arising at its broad anterior end, wholly directed forward in front of transverse septum into the head below base of skull. Mouth terminal, jaws about equal. Pores on snout very small, 3 upper pores and 5 at edge of rostral flap, the outer marginal feebly indenting edge; mental pores three pairs, the first on either side of symphysis, on front of chin. Teeth differentiated in size in both jaws but with only moderate enlargement, the small teeth in very narrow bands. Gillrakers on first arch slender, 19 to 23 on lower arm. Dorsal fin deeply notched; second anal spine 11 to 16% of Standard length. Otolith (sagita) (Text-fig 4b) with a tadpole-shaped impression on its inner side having an asymmetrical pouched 'head' and broad, deeply excavated, strongly curved 'tail' ending close to edge.

Monotypic.

#### 4. *Kathala axillaris* (Cuvier, 1830) (Text-fig. 4)

1830. *Corvina axillaris* Cuvier, *Hist. nat. Poiss.*, 5 : 113 (type-locality : Malabar and Pondicherry, India); Valenciennes, 1834, *Voyage aux Indes Orientales, Poissons*; 356; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 302.

1876. *Sciaena axillaris* : Day, *Fishes of India*; 188, pl. 43, fig. 6; 1889, *Fauna Br. India, Fishes*, 2 : 116.

1917. *Bola axillaris* : Jordan and Starks, *Ann. Carneg. Mus.*, 11(3/4) : 452.

1955. *Johnius axillaris* : Munro, *Marine and Freshwater Fishes of Ceylon* : 155, pl. 30, fig. 454; Dutt and Thankam, 1968, *J. Bombay nat. Hist. Soc.*, 65 (2) : 339, fig.

1962. *Pseudosciaena axillaris* : Misra, *Rec. Indian Mus.*, 57 : 267.

1969. *Kathala axillaris* : Mohan, *Curr. Sci.*, 38(12) : 295, fig. 1a, Mohan, 1972, *Indian J. Fish.*, 16 : 88; Fischer and Whitehead, 1974, *FAO species*

*identification sheets for fishery purposes*, 3 : SCIAEN Kath 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 293, fig. 50; Mohan, 1981, *Indian J. Fish.*, 28 : 2, fig. 2; Talwar, 1984, *Handbook Zool. Surv. India*, (4): 656, fig. 261; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Kath 1.

1970. *Dhoma axillaris* : Talwar and Joglekar, *J. mar. biol. ass. India*, 10(2) : 362; Talwar, 1972, *Rec. Zool. Surv. India*, 67 : 215.

1971. *Wak axillaris* : Talwar and Sen, *Rec. zool. Surv. India*, 65 : 248.

*Types* : Syntypes : MNHN 7484, four exs from Pondicherry (Tamil Nadu); MNHN 7682, two exs. from Malabar; MNHN 5314, one ex. from Malabar.

*Common name* : Kathala croaker .... English.

*Description* : D IX-X + I 26-29; A II 7; P i 16-17; V I 5.

A medium-sized sciaenid with a fairly deep body. Snout rounded but not projecting. Mouth terminal and oblique; jaws nearly equal. Interorbital region broad and convex. Operculum with two flat weak spines; edge of preoperculum weakly serrated, with a short pungent spine at its corner in the young.

*Proportions as % Standard length* : Depth of body 32.5-38.7; length of head 31.2-38.5; length of pectoral fin 25.2-29.4; and length of second anal spine 12.4-16.2.

*Proportions as % length of head* : Diameter of eye 21.5-24.6; length of snout 22.2-30.0; depth of preorbital bone 13.5-15.5; interorbital width 30.0-38.9; length of upper jaw 43.3-51.0; length of lower jaw 48.3-51.0; and length of second anal spine 34.8-45.5.

Upper pores on snout 3, very small, marginal pores 5 - a large median one just above the edge of rostral flap and two pairs at edge, outer pair in feeble notches. Lower jaw with three pairs of pores at front of chin, first pair small, second and third open slits.

Gill-rakers (9-12) + (19-23) on first branchial arch, slender and finely denticulate.

Teeth differentiated in size in both jaws (only slightly differentiated in lower jaw), with the outer row in upper and inner row in lower of enlarged teeth (about twice as long as small teeth), not widely spaced, the small teeth form very narrow bands; no canine teeth.

Scales fairly large, cycloid on head and nape (and as far as bases of pectoral and pelvic fins in young), elsewhere ctenoid; a scaly present on bases of soft dorsal fin and anal fin. Lateral line scales 48 to 52, 9 to 11 between origin of dorsal fin and lateral line, and 11 or 12 between lateral line and anal fin.

Dorsal fin with deep notch; dorsal spines moderately strong, fourth or fifth longest. Anal fin inserted below the vertical from 12th-13th soft dorsal finray; second anal spine fairly strong. Pectoral fins moderately long, about three-fourths of head length. Caudal fin rhomboid.

Gasbladder (Text-fig. 4a) carrot-shaped extending whole length of body cavity to anal fin, with a pair of simple, horn-like appendages arising from broad anterior end, wholly directed forward and piercing transverse septum into head.

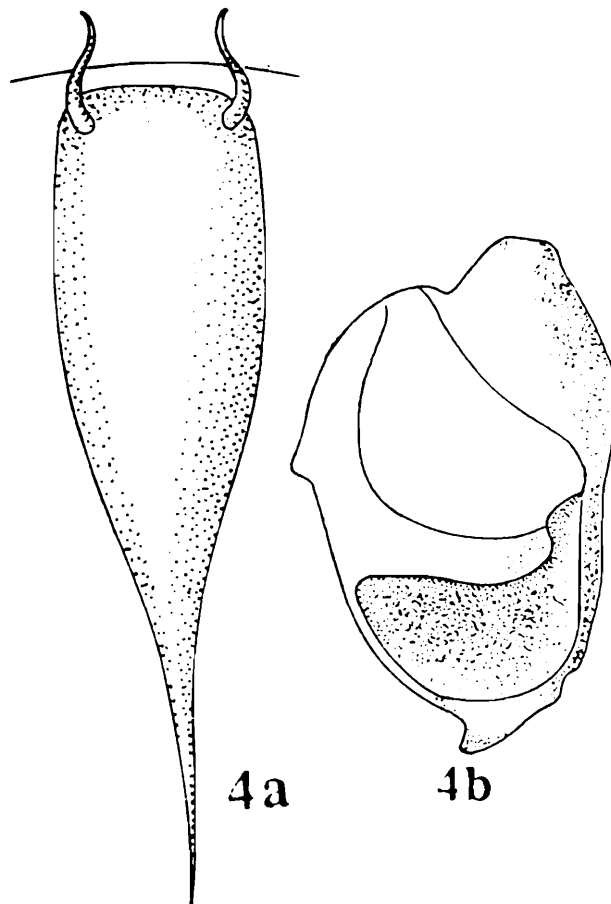
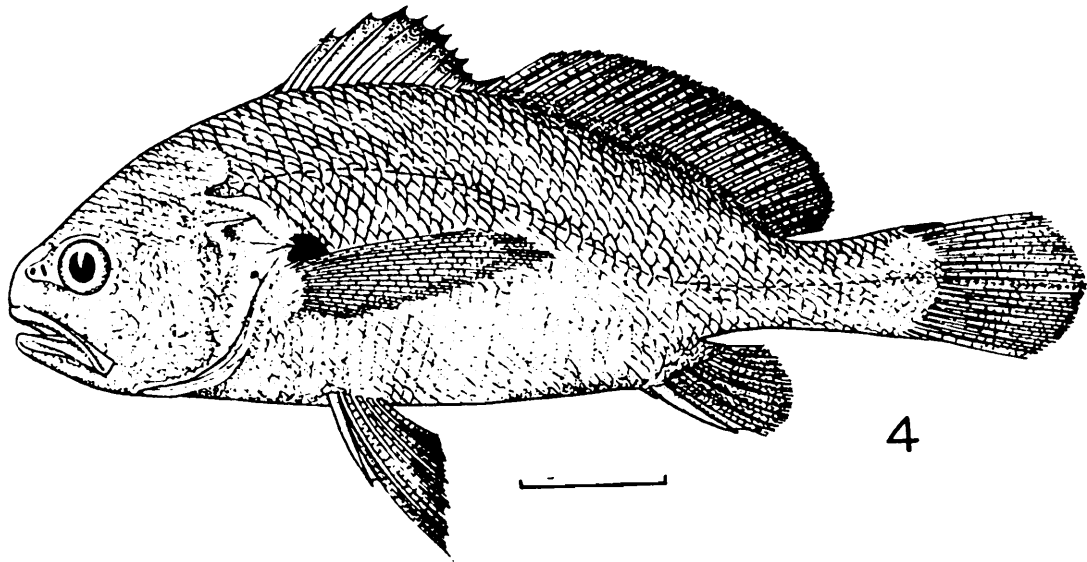


Fig. 4. *Kathala axillaris* (Cuvier); (ZSI Regd. No. F 7331/2). 4a. Systematic view of gasbladder. 4b. Sagitta (inner surface).

Otolith (sagitta) (Text-fig. 4b) with a tadpole-shaped impression on its inner surface, the 'tail' of which is broad, deeply excavated, ending close to edge and connected to 'head' by a narrow stem.

*Geographical distribution* : India, Pakistan and Sri Lanka.

Inhabits shallow coastal waters down to depths of 30 m.

*Fishery information* : This species is well represented in the commercial catches of India. It reaches a maximum length of 30 cm but the common size is 18 cm. It is caught with bottom trawls and gillnets.

#### Tribe (v) OTOLITHOIDINI

Gasbladder carrot-shaped, with on each side one long diverticulum; this may arise from the posterior end, extend forwards beside the bladder and enter the head as a branched cephalic section (*Otolithoides* and *Pama*), or it may arise at the anterior end and divide immediately into a long, simple abdominal tubule and a simple or branched cephalic tubule (*Panna*). Mouth terminal or subterminal; teeth differentiated in size in both jaws. First pair of mental pores on front of chin. Scales of upper anterior part of body very small. Caudal fin rhomboid, acute in young. Vertebrae 25.

Four genera, three in Indian region.

#### Key to Genera

- 1(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.....2
- 2(a) Soft dorsal finrays 27 to 29.....*Otolithoides*
- (b) Soft dorsal finrays 40 to 45.....*Pama*

#### Genus 5. *Otolithoides* Fowler, 1933

- 1861. *Sciaenoides* (nec Richardson), *J. Asiat. Soc. Beng.*, 29 : 139 (type-species : *Otolithus biauritus* Cantor).
- 1933. *Otolithoides* Fowler, *Bull. US. natn. Mus.*, (100) 12 : 353, 364 (type-species : *Otolithus biauritus* Cantor; substitute name for *Sciaenoides* Blyth, preoccupied by Richardson, 1843); Mohan (*partim*), 1972, *Indian J. Fish.*, 16 : 89; Trewavas (*partim*), 1977, *Trans. zool. Soc. Lond.*, 33 : 295.

*Definition* : Sciaenids with a carrot-shaped gasbladder (Text-fig. 5a) with a pair of long tubular appendages originating near its posterior end and traversing forward besides the main bladder and lying almost parallel to it and extending into head where they ramify into several caeca under the skull. Mouth large and terminal. Teeth well differentiated in size in both jaws, upper outer row and lower inner row caniniform and spaced. Interorbital width 26 to 28% length of head. Pectoral fin 20.8 to 21.5% of

standard length, 71 to 74% of head. Second dorsal finrays 27 to 29. Second anal spine weak. Lateral line scales cycloid, usually covered with small subsidiary scales; scales of upper anterior part of body very small. Sagitta with a characteristic tadpole-shaped impression (on its inner side) with a big, pouched 'head' and a 'tail' only slightly curved and ending in a disc. Vertebrae 12 + 13, the third with a pair of ventral apophyses not meeting below.

Monotypic.

5. *Otolithoides biauritus* (Cantor, 1850)  
(Text-fig. 5)

1850. *Otolithus biauritus* Cantor, *J. Asiat. Soc. Beng.*, 18(2) L 1039 (type-locality : Penang, Malay Peninsula); Bleeker, 1858, *Verh. natuurk. Ver. Ned-Indie*, 3(13) : 3.
1860. *Collichthys biauritus* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 315; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 15; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 155.
1861. *Sciaenoides biauritus* : Blyth, *J. Asiat. Soc. Beng.*, 29 : 139; Bleeker, 1877, *Atlas Ichthyol. Indes-Orient. Neerland.*, 9 : pl. 386. fig. 3; Day, 1876, *Fishes of India* : 194, pl. 47, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 2 : 125; Chabanaud, 1927, *Archs Mus. Hist. nat. Paris*, 2(7) : 37, pl. 1, figs. 4,5; Hardenberg, 1931, *Treubia*, 13(?) : 133.
1873. *Otolithus brunneus* Day, *J. Linn. Soc. Lond.*, 11 : 524 (type-locality : Bombay).
1876. *Sciaenoides brunneus* : Day, *Fishes of India* : 195, pl. 45, fig. 6; Day, 1889, *Fauna Br. India*, Fishes, 2 : 126, fig. 50; Karandikar and Thakur, 1951, *Zool. Mem. Univ. Bombay*, (3) : 1-92, figs.
1928. *Collichthys brunneus* : Fowler, *J. Bombay nat. Hist. Soc.*, 33 (1) : 115.
1933. *Otolithoides biauritus* : Fowler, *Bull. U.S. natn. Mus.*, (100) 12 : 365; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 500; Misra, 1962, *Rec. Indian Mus.*, 57 : 272; Mohan, 1972m *India*, *J. Fish.* 16 : 90; Mohan, 1973, *J. mar. biol. Ass. India*, 14 : 415; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Otold 1; Trewavas, 1977, *Trans. Zool. Soc. Lond.*, 33 : 297, fig. 52; Mohan, 1981, *Indian J. Fish.*, 28 : 3, fig. 3; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 661, fig. 265; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Otold 1.
1933. *Otolithoides brunneus* : Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 366; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 502; Talwar, 1976, *J. Inland Fish. Soc. India*, 7 : 38.

*Types* : Lectotype : BMNH 1860.3.19.171; *loc.* Penang, a half skin of 399 mm standard length; designated by Trewavas (1977).

Lectotype of *Otolithus brunneus* Day : ZSI F 906; *loc.* Bombay, original of Day's (1876) figured examples corresponding to pl. 45, fig. 6 in *Fishes of India*; designated by Talwar (1976); Paralectotypes : ZSI F 1024, 1025 and 1026 (3 exs), Bombay; AM B 8193-4.

*Common name* : Bronze croaker ... English.

*Description* : D VIII - IX + I 27-29; A II 7-8; P i 17; V I 5.

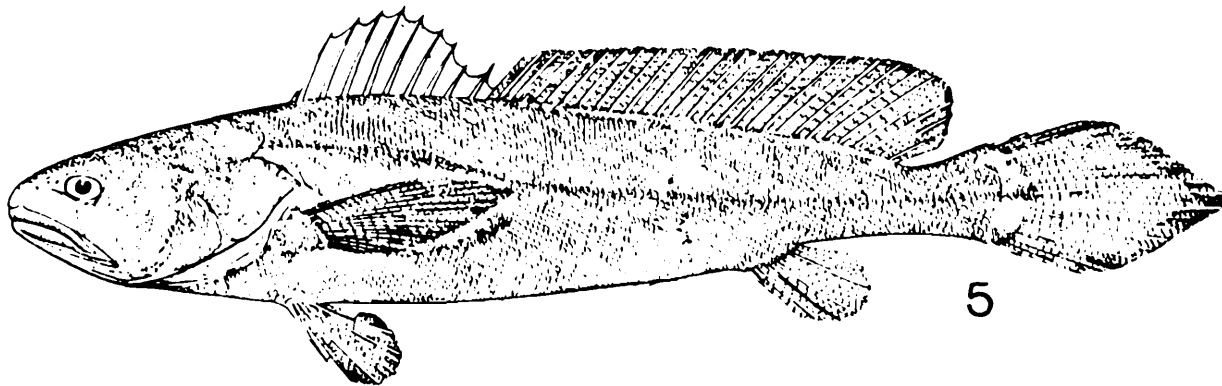


Fig. 5. *Otolithoides biauritus* (Cantor); (ZSI Regd. No. F 7334/2). 5a. Systematic view of gasbladder. 5b. Sagitta (inner surface).

A large species with a rather slender body and fairly acute snout. Mouth terminal; upper jaw reaching back well beyond eye. Interorbital region broad and convex. Operculum with two flat weak spines; preopercle margin with a few widely spaced serrations. Fifth branchiostegal ray enlarged in adults, but narrower and scarcely broader than the fourth and fifth rays in smaller fishes.

*Proportion as % Standard length* : Depth of body 18.8-20.8; length of head 27.0-29.5; length of pectoral fin 20.5-21.5; and length of second anal spine 6.0-6.5.

*Proportions as % length of head* : Diameter of eye 14.5-17.0 length of snout 24.0-25.8; depth of preorbital bone 12.2-12.8; interorbital width 26.8-28.0; length of upper jaw 46.4-49.5; length of lower jaw 50.0-53.2; and length of second anal spine 21.4-24.5.

Upper pores (rostral) on snout 3, minute; marginal pores 5 - the median and inner pair just above edge of rostral flap, outer pair in feeble notches. Mental pores two pairs, first pair small and at front of chin.

Gill-rakers on first arch (5-6) + 1 + (10-11).

Teeth well differentiated in size in both jaws, upper outer row and lower inner row strong, caniniform and spaced, with one upper often enlarged as canines, lower jaw with a cluster of teeth anteriorly, one of which on each side may be enlarged; small teeth of upper jaw forming a narrow band, those of lower jaw an irregular row outside the enlarged teeth.

Scales small, cycloid on head and on upper part of front of body including anterior part of breast, elsewhere finely ctenoid (young with cycloid scales). Lateral-line scales 50-60.

Dorsal fin weakly notched; dorsal spines rather weak, first minute and fourth longest. Second anal spine weak. Pectoral fins moderately long, about three-fourths of head length. Caudal fin acutely pointed.

Gasbladder (Text-fig. 5) carrot-shaped, with a single pair of long tubular appendages arising from posterior end of bladder and running forward besides main body of bladder and in front of it into head where they branch under skull, surrounded by various ligaments, blood vessels and muscles; lateral arborescent diverticula absent.

Otolith (sagitta) (Text-fig. 5b) with a tadpole-shaped impression on its inner surface, of which the 'head' is long, with a narrow pouched posterior part extending behind junction with 'tail' (or 'cauda') which is only slightly curved and ending in a disc; narrow groove surrounding 'head' produced forwards to rostrum as a short canal; groove of 'tail' moderately deep, becoming shallower towards its slightly curved posterior end.

Colour : in life, head and back greyish, flanks silvery with golden tinge, paler on belly; lateral line golden yellow. Dorsal, anal and caudal fins yellowish to pale orange; pelvic fins pale orange; pectoral fins brownish with a back spot at axil.

*Geographical distribution* : India, Pakistan, Burma, Sri Lanka and the Indo-Australian archipelago.

Inhabits coastal waters.

*Fishery information* : This species attains a length of 160 cm but the common size in the catches is 90 cm. It forms an important element in the trawl fisheries of the north-west coast of India and Pakistan, and is caught with bottom trawls. Marketed fresh; also dried-salted.

#### Genus 6. *Pama* Fowler, 1933

1933. *Pama* Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 353, 360 (type-species : *Bola pama* Hamilton-Buchanan).

1972. *Otolithoides* (nec Fowler) Mohan, *Indian J. Fish.*, 16 : 89.

*Definition* : Sciaenids with a carrot-shaped gasbladder having a single pair of simple tubular appendages originating near its posterior end and running forward besides the main body of bladder to enter head where they ramify under skull. Mouth large and terminal. Teeth well differentiated in size in both jaws, outer upper row and lower inner row caniniform and spaced. Interorbital width 29 to 33% of length of head. Pectoral fin 26 to 27% of standard lengths, 90 to 94% of head. Second dorsal finrays 40 to 45. Second anal spine weak. Lateral line scales cycloid, usually covered with subsidiary scales; scales of upper anterior part of body very small. Otolith (sagitta) with a characteristic tadpole-shaped impression on its inner side of which the 'head' is heavily pouched and the 'tail' (or cauda) is nearly straight but slightly curved at its posterior end. Vertebrae 12 + 13.

Two species, one in Indian region.

#### 6. *Pama pama* (Hamilton-Buchanan, 1822) (Text-fig. 6)

1822. *Bola pama* Hamilton-Buchanan, *Fishes of Ganges* : 79, 368, pl. 32, fig. 26 (type-locality : Ganges estuaries); Day, 1869, *Proc. zool. Soc. Lond.* : 516

1830. *Scioena pama* : Cuvier, *Hist. nat. Poiss.*, 5 : 55, pls 101, 138 and 140.

1860. *Collichthys pama* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 316; Volz, 1903, *Zool. Jb.* (syst.), 19 : 358; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 155; Fowler, 1932, *Proc. Acad., nat. Sci. Philad.*, 83 : 446.

1860. *Otolithus pama* : Mason, *Burmah Natural Resources* : 695.

1861. *Sciaenoides hardwickii* Blyth, *J. Asiat. Soc. Beng.*, 29 : 139 (type-locality : mouth of Ganges R.).

1861. *Sciaenoides pama*: Blyth, *J. Asiat. Soc. Beng.*, 29 : 139; Day, 1876, *Fishes of India* : 193; Day, 1889, *Fauna Br. India*, 2 : 124; Vinciguerra, 1885, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (2)2 : 88; Vinciguerra, 1889, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (2) 9 : 169; Steindachner, 1896, *Annln naturh. Mus. Wien.*, 11 : 227; Lloyd, 1907, *Rec. Indian Mus.*, 1 : 226; Hardenberg, 1931, *Treubia*, 13 : 133.

1933. *Pama pama* : Fowler, *Bull. U.S. natn. Mus.*, (100) 12 : 360; Hardenberg, 1934, *Treubia*, 14 : 309; Weber and de Beaufort, 1936, *Fishes of Indo-Australian archipelago*, 7 : 496; Misra, 1962, *Rec. India. Mus.*, 57 : 272; Munro, 1967, *Fishes of New Guinea* : 344; Ahmad, 1971, *Rec. zool. Surv. Pakistan*, 2 : 134, fig. 6; Talwar, 1976, *J. Inland Fish. Soc. India*, 7 : 37; Jayaram, 1981, *Handbook Zool. Surv. India*, (2) : 329.

1972. *Otolithoides pama* : Mohan, *Indian J. Fish.*, 16 : 90; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN

Otold 2; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 302, fig. 52; Mohan, 1981, *Indian J. Fish.*, 28 : 3, fig.4.

*Types* : ? Syntypes of *Sciaenoides hardwickii* : ZSI Cat. 884, three exs, Calcutta (registered as *Bola pama*). Lost.

*Description* : D IX-X + I 40-45; A II 7-8; P i 16; V I 5.

A large species with a fairly slender body and a conical snout. Mouth large and terminal, upper jaw reaching back well beyond eye. Eyes very small. Interorbital region broad and conical. Operculum with two flat weak spines; preopercle margin serrated, the serrations at its angle most distinct in young.

*Proportions as % Standard length* : Depth of body 21.4-24.5 (27-33 in young); length of head 27.8-34.0; length of pectoral fin 26.0-27.2; and length of second anal spine 3.0-4.5.

*Proportions as % length of head* : Diameter of eye 10.2-11.7; length of snout 24.0-26.8; depth of preorbital bone 13.4-14.7; interorbital width 29.0-32.4; length of upper jaw 47.8-50.0; length of lower jaw 51.4-54.2; and length of second anal spine 12.0-14.4.

No rostral pores; marginal pores 5, very small, at or under edge without notching it. Mental pores two pairs, minute, anterior pair on front of chin.

Gillrakers on first arch (4-6) + 1 + (11-15), long at the joint, short at extremes.

Teeth well differentiated in both jaws, with 1 or 2 pairs of caniniform teeth in upper jaw and sometimes a pair of strong teeth at symphysis of lower jaw.

Scales cycloid on head, finely ctenoid on most of body; lateral line scales 44 to 48. Scales above anterior part of lateral line much smaller, 10 or 11 between origin of dorsal fin and lateral line. Post-temporal covered with minute scales.

Dorsal fin weakly notched; dorsal spines rather weak, 3rd and 4th longest. Second anal spine short and weak. Pectoral fins pointed, as long as head. Caudal fin rhomboid, very long and tapering in juveniles.

Gasbladder (Text-fig. 6a) carrot-shaped with a pair tubules originating near its posterior end and extending forwards into head, where they give off several branches.

Otolith (sagitta) (Text-fig. 6b) with a tadpole-shaped impression on its inner side, of which the 'head' is heavily pouched and the 'tail' is attached on its dorsal side and nearer the anterior end than the posterior, the 'tail' is moderately deep and nearly straight.

*Colour* : in life, light brownish along the back and silvery-white on belly, with on distinctive markings, head shot with golden and purple. Fins yellowish, the upper half of dorsal fin gray.

*Geographical distribution* : India : Ganga R. and Brahmaputra R. and its estuaries; Burma : Sittang R.; Malay Peninsula; Sumatra; and Guinea.

Inhabits coastal waters and enters estuaries and rivers to the upper tidal limit and beyond.

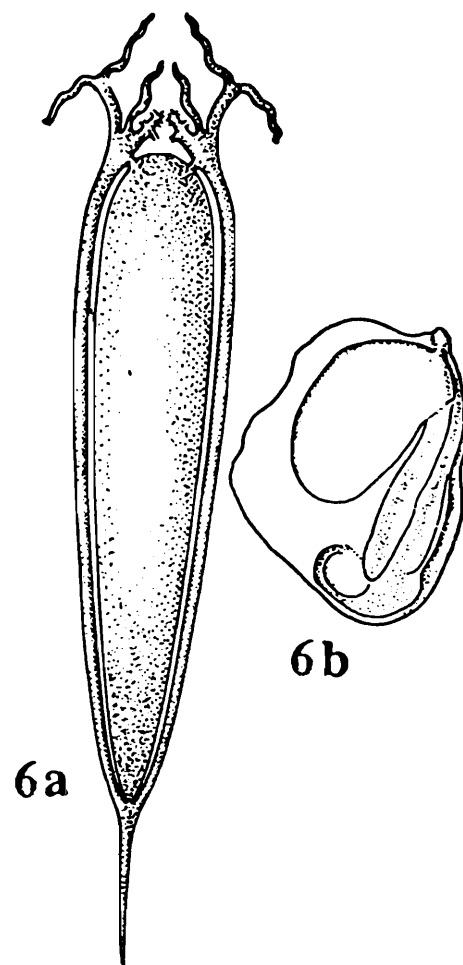
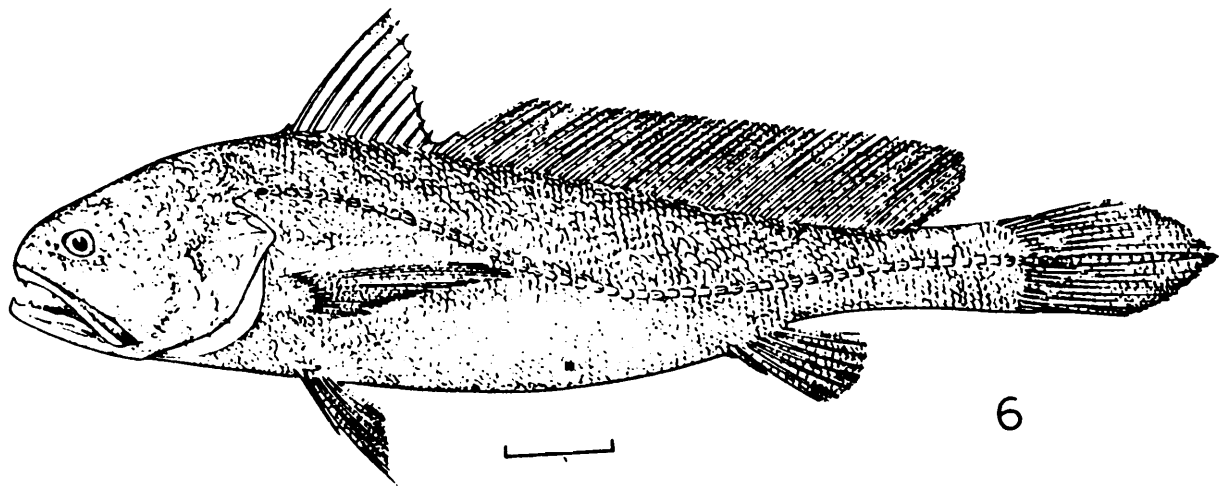


Fig. 6. *Pama pama* (Hamilton-Buchanan); 6a. Systematic view of gasbladder). 6b. Sagitta (inner surface).

**Remarks** : Ahmad (1971) reported it from Karachi (Pakistan) but its occurrence in the Western Indian Ocean is doubtful.

**Fishery information** : The sciaenid contributes an important fishery in the Hooghly estuary.

#### Genus 7. *Panna* Mohan, 1969

1969. *Panna* Mohan, *Curr. Sci.*, 38 : (12) : 296 (type-species : *Otolithus microdon* Bleeker).

**Definition** : Sciaenid fishes with a carrot-shaped gasbladder with an anterior tubule on each side which bifurcates into a long simple abdominal appendage and a simple or branched cephalic appendage. Mouth large, terminal. Eyes small, 13 to 18% length of head even in young; interorbital width 24-27% length of head in adult, about 35% in a juvenile. Teeth well differentiated in size in both jaws. Mental pores three pairs, anterior pair very small and at front of chin separated by symphysis. Second anal spine short and weak. Lateral line scales cycloid, bigger than scales above them, the anterior covered with small subsidiary scales in adult. Otolith (sagitta) (where known) with a tadpole-shaped impression in its inner side, of which the 'head' is big and pouched-shaped and the 'tail' or 'cauda' sharply curved, its distal end cutting into the ventral margin. Two or three thread-like predorsal bones. Vertebrae 25 (12 + 13 or 11 + 14).

Two species, both in Indian region.

#### Key to species

- 1(a) Gillrakers 11 to 13 on lower arm of first arch; cephalic branch of gasbladder branches 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 .....*P. heterolepis*

#### 7. *Panna microdon* (Bleeker, 1849) (Text-fig. 7)

1849. *Otolithus microdon* Bleeker, *Verh. batav. Genoot. Kunst. Wet.*, 22(4) : 10 (type-locality : Madura, East Indies); Bleeker, 1850, *Verh. batav. Genoot. Kunst. Wet.*, 23 : 16; Bleeker, 1850, *Natuurk. Tijdschr. Ned.-Indie*, 1 : 99
1860. *Sciaena microdon* : Gunther, *Cat Fishes Br. Mus.*, 1 : 294; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154; Lloyd, 1907, *Rec. Indian Mus.*, 1 : 226.
1873. *Collichthys microdon* : Bleeker, *Ned. Tijdschr. Dierk.*, 4 : 117; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 16; Chevey, 1932, *Notes Inst. Oceanogr. Indochine*, 19 : 24.
1876. *Sciaenoides microdon* : Day, *Fishes of India* : 194, pl. 45, fig. 2; Bleeker, 1877, *Atlas Ichthyol. Indes-Orient. Neerland.*, 9 : pl. 338, fig. 5; Day, 1889, *Fauna BrIndia, Fishes*, 2 : 125; Lloyd, 1907, *Rec. Indian Mus.* 1 : 226; Viniciguerra, 1926, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (3) 10 : 581; Hardenberg, 931, *Treubia*, 13(1) : 133.
1933. *Otolithoides microdon* : Fowler, *Bull. U.S. natn. Mus.*, (100) 12 : 365; Hardenberg, 1934, *Treubia*, 14 : 309; Weber and de Beaufort, 1936, *Fishes*

*Indo-Australian archipelago*, 7 : 503, fig. 4E2; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 37, fig. 20; Sinha and Rao, 1965, *Ichthyologica*, 4 : 95, figs 1, 2; Orsi, 1974, *Publ. Seto Mar. biol. Lab.*, 21(3/4) : 169.

1969. *Panna microdon* : Mohan, *Curr. Sci.*, 38(12) : 296, fig. 1c; Mohan, 1972, *Indian J. Fish.*, 16 : 90, figs 1F, 2J; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Pan 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 306, fig. 52; Mohan, 1981, *Indian J. Fish.*, 28 : 4, fig. 5; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 666, fig 268; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Pan 1.

**Types** : Syntypes : BMNH 1880.4.21.134-135, two exs; RMNH 5978, six specimens. One of those in RMNH bears evidence of having been the basis of the figure in Bleeker's *Atlas* (vide Trewavas, 1977 : 306).

**Common name** : Panna croaker ... English.

**Description** : D VIII-X + I 31-37; A II 6-7; P i 17-18; V I 5.

A medium-sized and rather slender species. Head cavernous with an acute snout. Mouth large and terminal; jaws meeting equally in front upper jaw extending backward to beyond hind margin of eye. Operculum with a flat weak spine; preopercle margin finely serrated.

**Proportions as % Standard length** : Depth of body 19.8-26.0 of head 25.8-36.0; length of pectoral fin 19.4-23.6; and length of second anal spine 5.0-8.0.

**Proportions as % length of head** : Diameter of eye 14.2-22.6; length of snout 26.1-29.5; depth of preorbital bone 12.8-15.0; interorbital width 24.8-34.4; length of upper jaw 40.3-54.8; length of lower jaw 49.0-51.3; and length of second anal spine 28.8-31.3.

Snout with 3 upper (rostral) pores and 5 along free edge of rostral flap, the median marginal just above edge, the paired not notching edge. Lower jaw with three pairs of pores, the anterior small, on front of chin separated by symphysis, second and third pair of pores slit-like.

Gillrakers on first arch (7-8) + (10-12), lanceolate, the anterior two or three short denticulate stumps.

Teeth differentiated in size in both jaws; outer upper series enlarged and spaced with one or two canine teeth at tip, a narrow band of small inner teeth. Lower jaw with a group of moderately enlarged teeth at symphysis, an inner row of enlarged teeth behind these and one or two irregular rows of small teeth outside them.

Scales small, cycloid on head and breast, elsewhere finely ctenoid; series of very small scales forming a narrow sheath at base of soft dorsal and anal fins; lateral line scales 92 to 95, with a coating of small secondary scales in adults.

Dorsal fin with a low notch; dorsal spine rather weak, third longest. Second anal spine weak, half length of first soft ray. Pectoral fins moderately long, about three-fourths of head length. Pelvic fin with a short white filament. Caudal fin rhomboid, with a pointed tip.

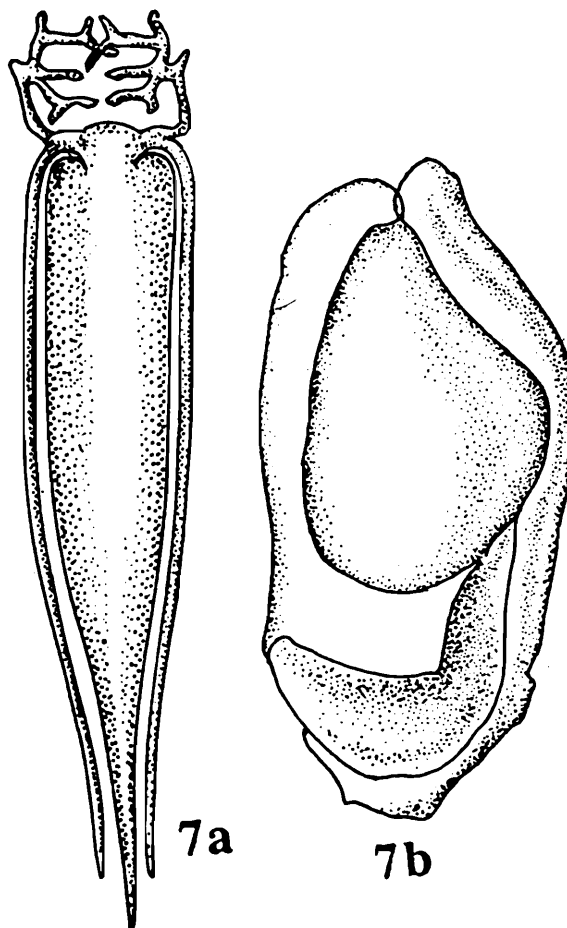
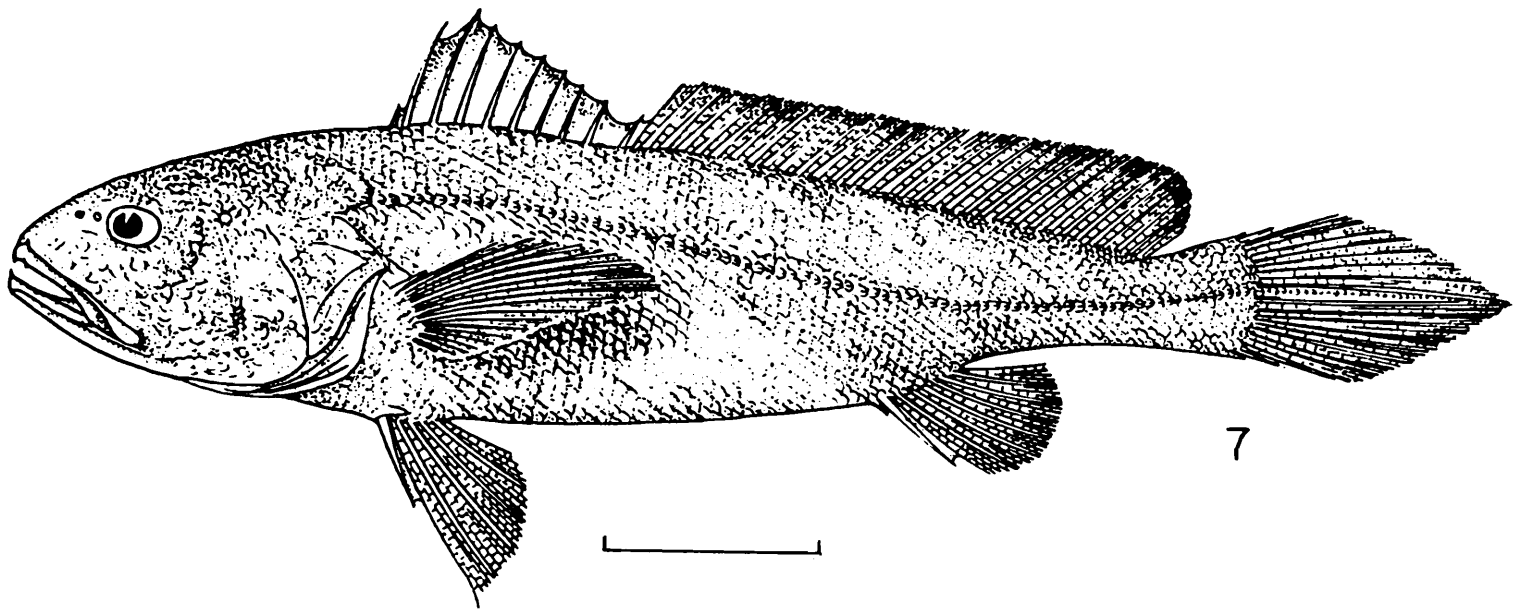


Fig. 7. *Panna microdon* (Bleeker); (ZSI Regd. No. F 6064/2). 7a. Systematic view of gasbladder. 7b. Sagitta (inner surface).

Gasbladder (Text-fig. 7a) carrot-shaped, with one pair of tubular appendages arising at its anterior end and immediately dividing into an anterior (cephalic) branch entering head and ramifying under skull, and a long posterior (abdominal) tubular branch lying beside the main bladder and extending behind vent to anal pterygiophores.

Otolith (sagitta) (Text-fig 7b) with a tadpole-shaped pattern on its inner side, the head of which is big and pear-shaped, the 'tail' (or 'cauda') is broad and deep with a sharp bend between a shorter proximal part and a longer distal part which ends by cutting into the ventral margin.

Colour : in life, brownish, becoming lighter on flanks and belly. Fins yellow; dorsal and anal fins with darker margin, two-thirds spinous dorsal fin dusky.

*Geographical distribution* : India, Sri Lanka, Burma, Malay Peninsula, Sumatra, Borneo to South China Sea.

Inhabits shallow coastal waters.

*Fishery information* : This sciaenid is fairly common in the commercial catches along the West Bengal-Orissa coast. The maximum size attained by this species is 30 cm; common to 20 cm. Caught with bottom trawls and gillnets. Marketed fresh; also dried salted.

#### 8. *Panna heterolepis* Trewavas, 1977 (Text-fig. 8)

1977. *Panna heterolepis* Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 308. fig. 6 (type-locality : Calcutta); Talwar, 1984, *Handbook zool. Surv. India*, (4) : 666 (in Key).

*Types* : Holotype : BMNH 1889.2.1.3137, a postlarval specimen in Day's collection.

*Common name* : Hooghly croaker ... English.

*Description* : D IX 34; A II 7..

Mouth terminal, at an angle of about 40° to the horizontal. Many bones of head with spine-bearing bosses or ridges, conspicuously a pungent comb-like occipital crest and an ethmoid prominence. Supraorbital ridge of frontal with a row of 5 to 8 spines, of which the hindmost is trifold. Orbital edge of lacrimal serrate and one of struts of infraorbital canal with a sharp edged flange. Spines also on sphenoticpterotic ridge, on a ridge parallel to and above it and on two ridges on surface of post-temporal, which is fimbriate. Both edges of preopercular canal jagged with two spines at its angle sharp and pointed.

*Proportions as % Standard length* : Depth of body 27.4; length of head 32.0; length of pectoral fin 24.0; and length of second anal spine 11.5.

*Proportions as % length of head* : Eye diameter 14.0; interorbital width 35.3; length of upper jaw 56.0 and length of lower jaw 58.8.

No pores apparent on snout; marginal pores 5, median just above edge, outer lateral in a slight notch. Mental pores three pairs, anterior very small, on front of chin, second and third pair of pores open ovals.

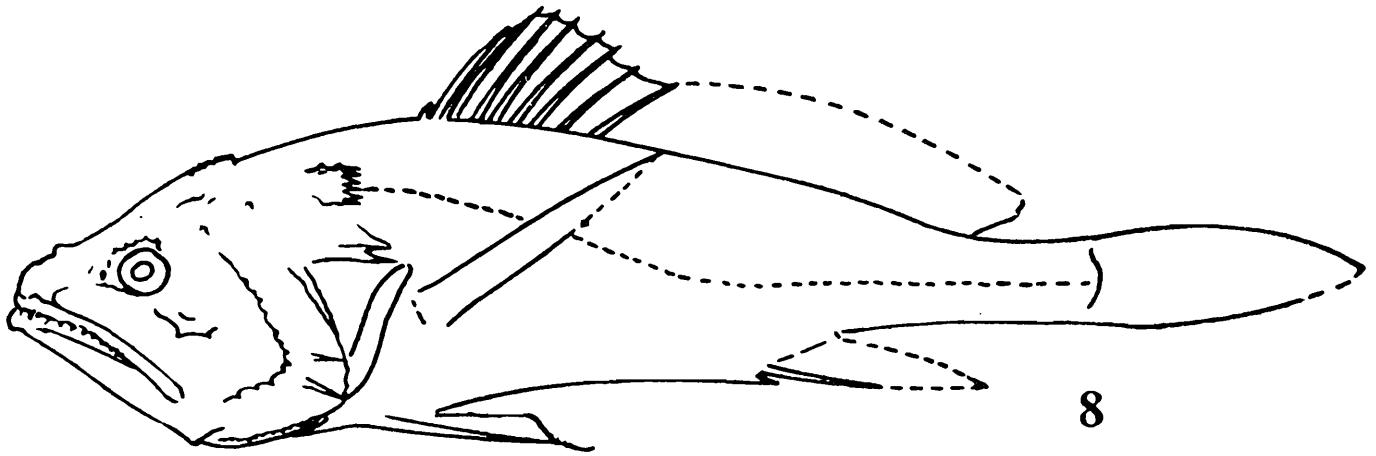


Fig. 8. *Panna heterolepis* Trewavas (after Trewavas). 8a. Systematic view of gasbladder (after Trewavas).

Gillrakers slender, 7 + 1 + 15, two uppermost and three lowest low losses.

Teeth well differentiated in both jaws; outer upper row enlarged and moderately spaced, and a narrow band of small inner teeth. Lower jaw with an enlarged, spaced series posteriorly with a narrow band of small teeth outside and between them, continued to symphysis, where there are no enlarged teeth.

Scales small, cycloid. Lateral line scales about 48, about twice as big as those above them.

Dorsal fin not notched (probably notched in adults). Anal fin inserted below fourteenth soft dorsal finray. Caudal fin acute.

Gasbladder (Text-fig. 8a) carrot-shaped, with a diverticulum on each side arising from the anterior end and immediately dividing into a short abdominal and a narrower, unbranched cephalic tube, the latter lying lateral to the otic capsule.

*Geographical distribution* : India : West Bengal (? Hooghly estuary).

*Remarks* : This species is so far known on a single juvenile specimen from Calcutta.

#### Tribe (vi) OTOLITHINI

Gasbladder carrot-shaped with several pairs of arborescent appendages arising along the length of the bladder but with not cephalic appendage. Anterior pair of mental pores on front of chin; separated by the symphysis. Vertebrae 25.

Seven genera, 6 in our area. Mainly Indo-Pacific, with species extending along the southern half of the west coast of Africa and another confined to the Mediterranean and east Atlantic waters.

#### Key to Genera

- 1(a) One or two pairs of canine teeth near symphysis of one or both jaws.. 2
- (b) No outstanding canine teeth ..... 4
- 2(a) Canine teeth in upper jaw only; mouth inferior; mental pores three pairs..... *Chrysochir*
- (b) Canine teeth in both jaws; mouth terminal or lower jaw projecting; mental pores absent or reduced to anterior pair and clusters of minute pores ..... 3
- 3(a) Gasbladder appendages set in an oblique plane in the wedge of tissue flanking the bladder, the branches *not* extending on to dorsal surface of bladder; anal fin inserted behind middle of soft dorsal fin; soft dorsal rays 7 or 8..... *Otolithes*
- (b) Some or all of the gasbladder appendages ramifying on dorsal surface of bladder; soft dorsal fin and then 7 or 8 soft rays, or behind middle of soft dorsal and then 10 to 12 soft rays..... *Pterotolithus*

- 4(a) Gasbladder appendages wing-like, in one plane, without a well-developed dorsal limb, the posterior appendages parallel to wall of bladder ..... *Pennahia*
- (b) Gasbladder appendages each with distinct dorsal and ventral limbs, the posterior appendages very short and at rt. angles to wall of bladder..... 5
- 5(a) Pectoral fin 15.0 to 22.5% of standard length; 'tail' of tadpole-shaped impression of otolith strongly curved, J-shaped..... *Argyrosomus*
- (b) Pectoral fin 25.5 to 29% of standard length; 'tail' of tadpole-shaped impression of otolith only slightly curved ..... *Atrobucca*

#### Genus 8. *Pennahia* Fowler, 1926

1926. *Johnius (Pennahia)* Fowler, *J. Bombay nat. Hist. Soc.*, 30(4) : 776 (type-species *Johnius aneus* Auctt (nec Bloch) = *Otolithus macrophthalmus* (Bleeker).
1977. *Pennahia* : Trewavas and Talwar, 1977, *Bull. zool. Nom.*, 34(3) : 185 (generic status recognised).

**Defination** : Sciaenids with a carrot-shaped gasbladder (Text-fig. 9a) with 17 to 27 pairs of arborescent appendages along sides of bladder; first (anterior) pair of diverticula branching fanwise on posterior surface of transverse septum and not entering head, other appendages wing-like, in one plane, the main trunk of each directed laterally with branches on its posterior side, without dorsal limb. Mouth large and terminal; lower jaw half as long as head or more. Teeth well differentiated in size in both jaws, but no outstanding canines. Pores on snout reduced in size, rostral pores absent or minute, marginal pores 5, not notching the edge; mental pores two pairs, first pair on front of chin and separated by the symphysis of the lower jaw. Interorbital width 8.8 to 10.3% of Standard length. Second anal spine weak. Otolith (sagitta) with a tadpole-shaped impression on its inner side of which the 'head' is broad and truncated anteriorly, and the 'tail' (or 'cauda') is only slightly curved distally and ends abruptly at edge.

Four species, one in Indian region.

#### 9. *Pennahia macrophthalmus* (Bleeker, 1850) (Text-fig. 9)

1850. *Otolithus macrophthalmus* Bleeker, *Verh. batav. Genoot. Kunst Wet.*, 23 : 16 (type-locality : Java); Bleeker, 1850, *Ntuurk. Tijdschr. Ned.-Indie*, 1 : 99.
1853. ? *Johnius resplendens* Guichenot, *Voyage au Pole Sud. Zool.*, 3 : 45, pl. 5, fig. 1 (type-locality : not known; from a drawing).
1860. *Sciaena macrophthalmus* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 291.
1861. *Johnius anei* (nec Bloch) Blyth, *J. Asiat. Soc. Beng.*, 29 : 141.
1867. *Otolithus aneus* (nec Bloch) *Proc. zool. Soc. Lond.* : 939; Day, 1870, *Proc. zool. Soc. Lond.* : 684.
1868. *Corvina macrophthalmus* : Bleeker, *Versl. Medced. K. Akad. Wet. Amst.*, (2)2 : 292.
1872. *Otolithus leuciscus* Gunther, *Ann. Mag. nat. Hist.*, (4)10 : 398 (type-locality : Manila Bay, Philippines).
1874. *Pseudosciaena macrophthalmus* Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 21.

1876. *Sciaena aneus* : Day, *Fishes of India* : 189, pl. 45, fig. 5; Day, 1889, *Fauna Br. India, Fishes*, 2 : 119.
1877. *Pseudosciaena aneus* : Bleeker, *Atlas Ichthyol. Indes-Orient. Neerland.*, 9 : pl. 385, fig. 2; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 508; Tang, 1937, *Amoy mar. biol. Bull.*, 2 : 59, fig. 4.
1907. *Pseudosciaena anea* : Jordan and Seale, *Bull. U.S. Bur. Fish.*, 26 : 25; Jordan and Richardson, 1908, *Bull. U.S. Bur. Fish.*, 27 : 261; Seale, 1910, *Phillippine J. Sci.*, 5D : 280.
1912. *Pseudosciaena anaeus* (*nec aneus* Bloch) Bean and Weed, *Proc. U.S. natn. Mus.*, 42 : 606.
1918. *Argyrosomus aneus* (*nec* Bloch) Fowler, *Copeia*, (58) : 64; Lin, 1938, *Lingnan Sci. J.*, 17 : 172; Lin, 1940, *J. Hong Kong Fish. Res. Stn.*, 1 : 246; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 58, figs. 33, 59, 85.
1926. *Johnius* (*Pennahia*) *aneus* (*nec* Bloch) Fowler, *J. Bombay nat. Hist. Soc.*, 30(4) : 776.
1927. *Otolithus ruber* (*nec* Schneider) Fowler, *Proc. Acad. nat. Sci., Philad.*, 79 : 285.
1930. *Otolithus aureus* (*nec* Richardson) Fowler, *Proc. Acad. nat. Sci. Philad.*, 81 : 610, fig. 2.
1933. *Johnius aneus* (*nec* Bloch) Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 376; Hardenberg, 1934, *Treubia*, 18 : 300; Fowler, 1937, *Proc. Acad. nat. Sci. Philad.*, 89 : 240; Munro, 1955, *Marine and Fresh water Fishes Ceylon* : 154, pl. 30, fig. 448; Dutt and Thankam, 1969, *J. Bombay nat. Hist. Soc.*, 69(2) : 337; Kuronuma and Abe, 1972, *Fishes of Kuwait* : 86, pl. 12.
1970. *Otolithes versicolor* (*nec* Cuvier) Talwar and Joglekar, *Rec. zool. Surv. India*, 64 : 163.
1970. *Pennahia macrocephalus* (*nec* Tang) Joglekar and Talwar, *J. Bombay nat. Hist. Soc.*, 67 : 575.
1972. *Pennahia aneus* (*nec* Bloch) Mohan, *Indian J. Fish.*, 16 : 91.
1974. *Pennahia macrophthalmus* : Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Penn 3; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 314, fig. 53; Mohan, 1981, *Indian J. Fish.*, 28 : 5, fig. 6; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 669, fig. 270; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Penn 3.

*Types* : Lectotype : RMNH 5972; 152.5 mm Standard length, *loc.* Java; designated by Trewavas (1977); Paralectotypes (11 exs), *loc.* Java from Bleeker's collection.

Syntypes of *Otolithus leuciscus* : BMNH 1872.10.18.128-129, two specimens, *loc.* Manila (Philippines).

*Common name* : Bigeye croaker ... English.

*Description* : D IX-X + I 21-26; A II 7-8; P i 17; V I 5.

A fairly small and rather deep-bodied species. Mouth large, terminal and oblique; upper jaw reaching to below hind part of eye; lower jaw projecting when the mouth is open. Operculum with two flat weak spines; preopercle margin finely serrate, the serrae in lower arm of young strong.

*Proportions as % Standard length* : Depth of body 28.0-32.0; length of head 33.4-36.0; interorbital width 8.8-10.3; length of pectoral fin 23.0-26.5; and length of second anal spine 7.2-8.9.

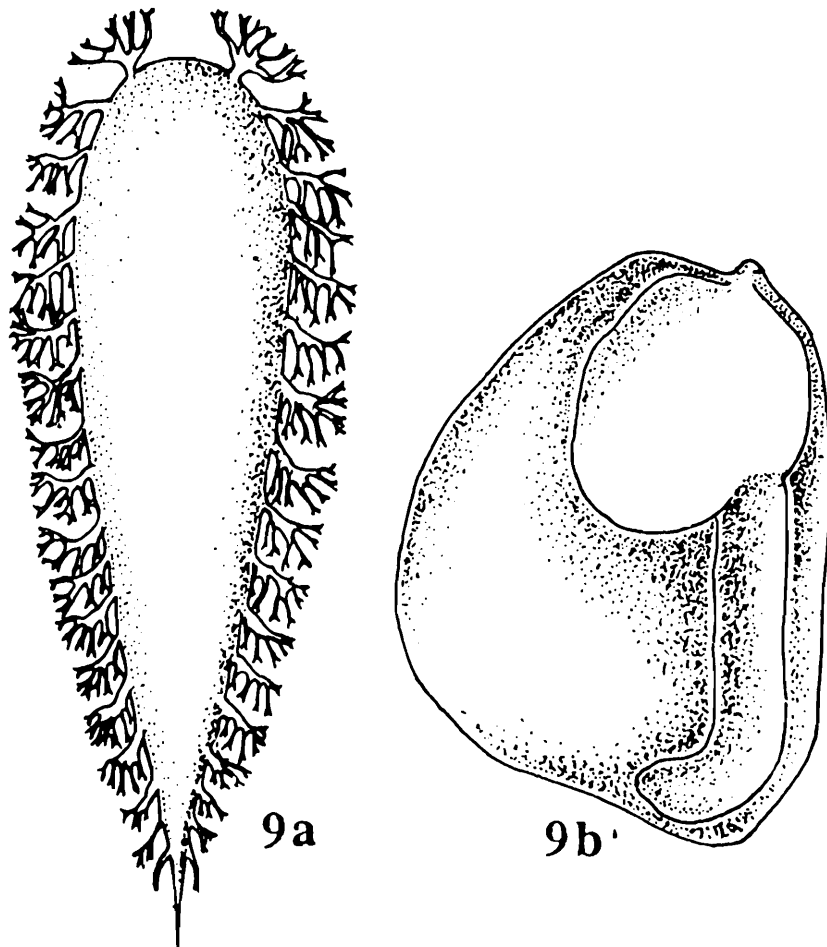
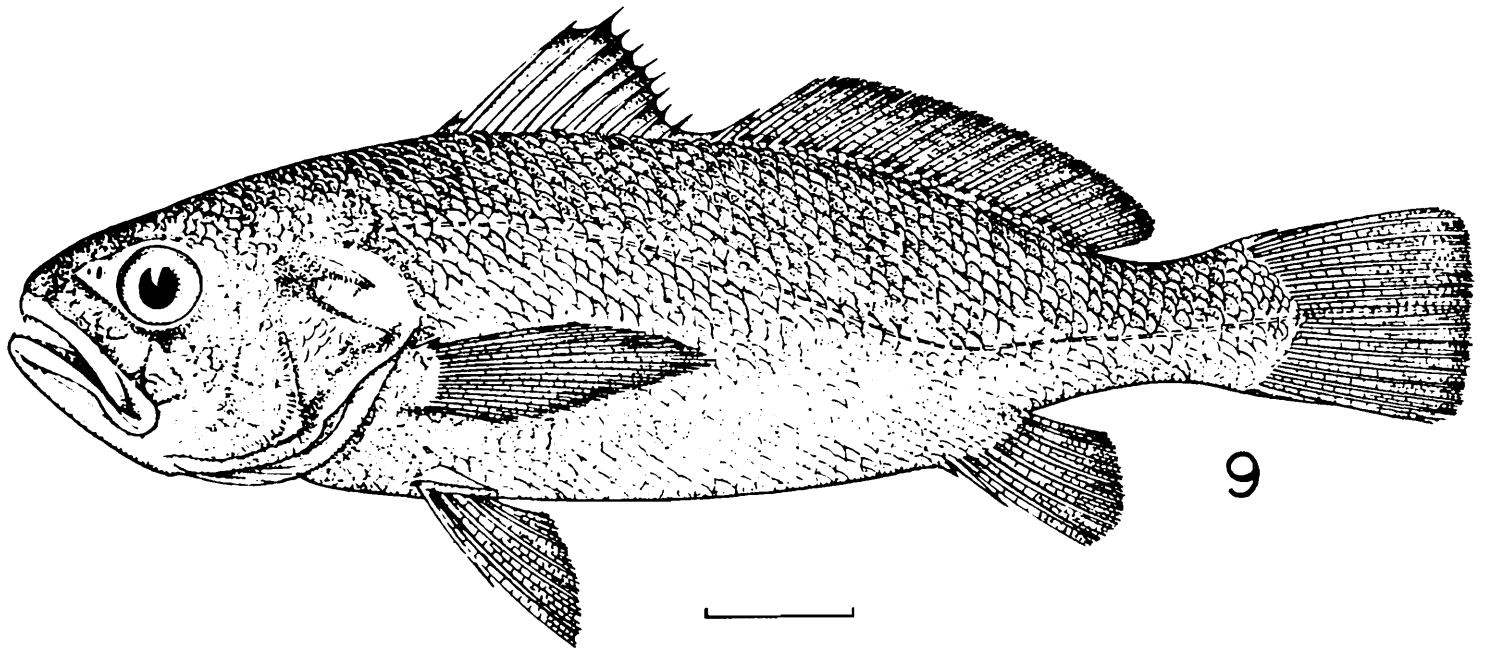


Fig. 9. *Pennahia macrophthalmus* (Bleeker); (ZSI Regd.No. F 7285/2). 9a. Systematic view of gasbladder. 9b. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 22.8–25.4; length of snout 26.0–26.8; depth of preorbital bone 11.6–14.5; interorbital width 28.2–32.0; length of upper jaw 48.0–52.5; length of lower jaw 54.8–58.0; and length of second anal spine 22.5–27.2.

Upper pores (rostral) on snout absent or minute; marginal pores 5, not notching the edge. Mental pores two pairs, both small, anterior pair on front of prominent chin.

Gillrakers on first arch (4–7) + 1 + (8–11), lanceolate.

Teeth well differentiated in size in both jaws, outer upper and lower inner series enlarged and spaced but not outstanding canine teeth; inner band of small teeth in upper jaw narrow; one irregular row of small teeth outside the enlarged lower teeth.

Dorsal fin notched; dorsal spines fairly weak, third and fourth dorsal spines longest. Second anal spine weak. Pectoral fins rather long, about one-fourth of standard length. Caudal fin truncate.

Scales cycloid on snout, elsewhere ctenoid; lateral line scales 52–54.

Gasbladder (Text-fig. 9a) carrot-shaped with 18 to 21 pairs of arborescent appendages; anterior pair of appendages branching on posterior surface of transverse septum and not entering head; last appendage a simple tube parallel to posterior end of bladder.

Otolith (sagitta) (Text-fig. 9b) with a tadpole-shaped impression on its inner side of which the 'head' is oval and truncated anteriorly, and the 'tail' (or 'cauda') is t-shaped and ends abruptly at edge.

*Geographical distribution* : The 'Gulf', Pakistan, India, Sri Lanka, through the East Indies, to China and the Philippines.

Inhabits coastal waters, down to 60m.

*Fishery information* : This sciaenid contributes a good fishery on the south-east of India and also the Andaman Sea of our area. It attains a length of 22 cm. Caught with bottom trawls and seine nets.

#### Genus 9. *Argyrosomus* Pylaie, 1835

1835. *Argyrosomus* Pylaie, *C.R. Congress Sci. Fr. Poitiers* : 532 (type-species : *Argyrosomus procerus* Pylaie, substitute name for "*Sciaena aquila* Cuvier" = *Cheilodipterus aquila* Lacepede, 1802, = *Perca regia* Asso, 1801 = *Argyrosomus regius*); Trewavas, 1963, *Bull. zool. Nom.*, 20(5) : 354; Trewavas, 1966, *Bull. zool. Nom.*, 23(1) : 5.

1863. *Pseudosciaena* Bleeker, *Ned. Tijdschr. Dierk.*, 1 : 142 (type-species : *Sciaena aquila* Lacepede); Trewavas, 1966. *Bull. zool. Nom.*, 23(1) : 5 (status clarified).

1938. *Miichthys* Lin, *Lingnam Sci. J.*, 17 : 165 (type-species : *Sciaena mtiuy* Basilewky).

*Definition* : Sciaenid fishes having a carrot-shaped gasbladder extending the whole length of body cavity and sometimes behind it to anal fin, bearing 22 to 29 pairs of arborescent appendages along sides of main bladder and are set obliquely from postero-

dorsal to antero-ventral; first (anterior) pair of appendages branching on posterior surface transverse septum, not entering head; other appendages are either usually fan-like with posterior ones overlapping dorsally the appendage next behind, or more definitely into two limbs; posterior (last) appendage short and simple. Mouth large and terminal; teeth well differentiated in size in both jaws, large ones forming outer series in upper jaw and inner series in lower jaw, but no outstanding canine teeth; enlarged teeth of lower jaw strong and widely-spaced. Interorbital width 5.0–6.8% of Standard length. Second anal spine weak. Pectoral fins short, 16.8–21% of Standard length. Otoliths (sagitta) with a characteristic tadpole-shaped impression on its inner side, 'head' of tadpole oval upright in position, 'tail' (or 'cauda') strongly curved, "J-shaped," not meeting the ventral edge.

Five species, two in Indian region.

#### Key to species

- 1(a) Caudal fin bluntly rhomboid; pectoral fin about 17% of standard length.....*A. amoyensis*  
 (b) Caudal fin S-shaped (pointed in young); pectoral fin 19 to 21% of standard length.....*A. hololepidotus*

#### 10. *Argyrosomus amoyensis* (Bleeker, 1863) (Text-fig. 10)

1863. *Pseudosciaena amoyensis* Bleeker, *Ned. Tijdschr. Dierk.*, 1 : 144 (type-locality : Amoy); Bleeker, 1865, *Ned. Tijdschr. Dierk.*, 2 : 56.  
 1876. *Sciaena bleekeri* Day, *Fishes of India* : 185, pl.45, fig. 4 (type-locality : Bombay and Gwadur); Day, 1889. *Fauna Br. India, Fishes*, 2 : 112; Lloyd, 1907, *Rec., Indian Mus.*, 1 : 225.  
 1892. *Sciaena amoyensis* : Steindachner, *Denkschr. Akad. Wiss. Wien*, 59(1) : 362.  
 1911. *Sciaena (Nibea) argentata* (nec Houttuyn) Jordan and Thompson, *Proc. U.S. natn. Mus.*, 39 : 352.  
 1933. *Johnius amoyensis* : Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 371.  
 1937. *Pseudosciaena indica* Tang, *Amoy mar. biol. Bull.*, 2(2) : 64 (nom. nov. for *Sciaena bleekeri* Day).  
 1940. *Argyrosomus indicus* : Lin, *J. Hong Kong Fish. Res. Stn.*, 1(20) : 252, fig. 5.  
 1955. *Johnius argenteus* (nec Houttuyn) Munro, *Marine and Freshwater Fishes of Ceylon* : 156, fig 456.  
 1963. *Nibea miichthyoides* Chu, Lo and Wu, *Fishes of China Monogr.*, : 54, figs 30, 56, 82 (type-locality : China).  
 1956. *Pennahia amoyensis* : Trewavas, *Copeia* : 254.  
 1971. ? *Pseudosciaena coiber* (sic) (nec Hamilton-Buchanan, nec Day), Ahmad, *Rec. zool. Surv. Pakistan*, 2 : 134, fig. 8.  
 1972. *Argyrosomus bleekeri* : Talwar and Joglekar, *Rec. zool. Surv. India*, 66(1/4):1.  
 1972. ? *Johnius bleekeri* : Mohan, *Indian J. Fish.*, 16 : 85.  
 1974. *Argyrosomus amoyensis* : Fisher and Whitehead, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Argyr 2; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 334, fig. 10; Mohan, 1981, *Indian J. Fish.*, 28 : 5; Talwar, 1984. *Handbook zool. Surv. India*, (4) : 635; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Argyr 2.

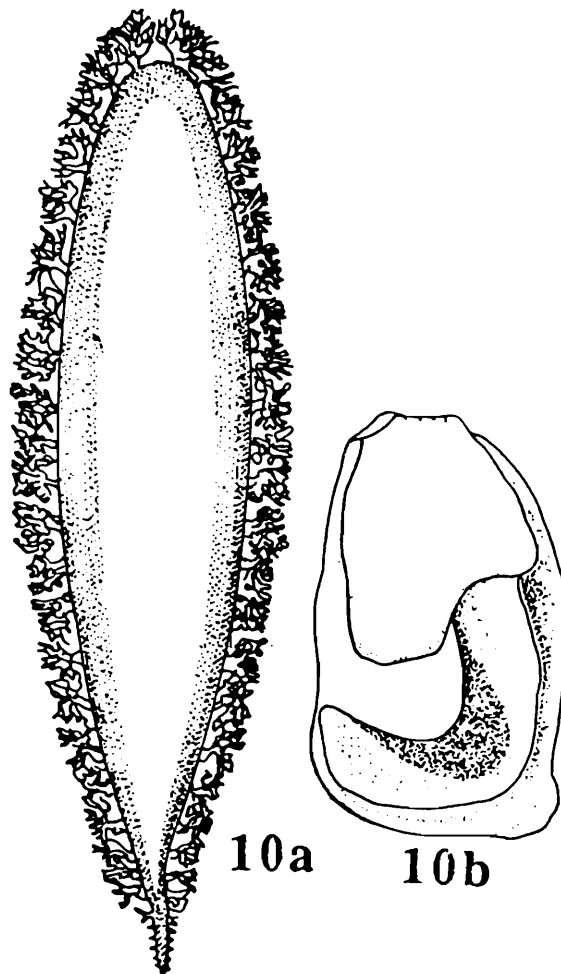
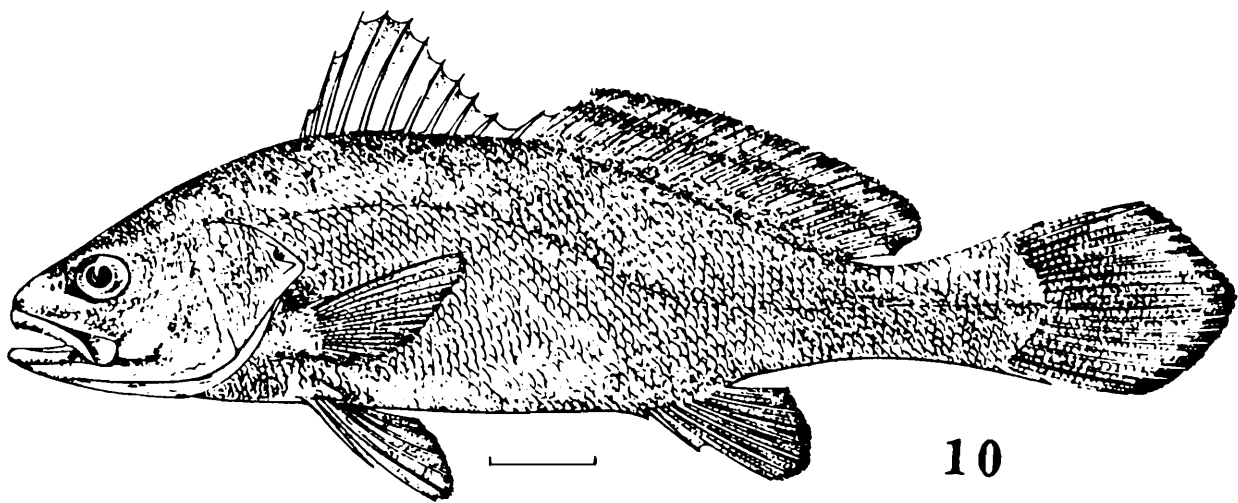


Fig. 10. *Argyrosomus amoyensis* (Bleeker) (after Day). 10a. Systematic view of gasbladder. 10b. Sagitta (inner surface) (after Mohan & Talwar).

*Types* : Holotype : RMNH 740. Lectotype of *Sciaena bleekeri* : ZSI 988 from Bombay; designated by Talwar and Joglekar (1972a). This is also the type of *Pseudosciaena indica* Tang. Holotype and paratype of *Nibea miichthyoides* : collection of Shanghai Fisheries College (now in Amoy) Nos. 57–0337 and 60–9098.

*Common name* : Amoy croaker ... English.

*Description* : (based on lectotype only). D X + I 27; A II 7; P i 16; V I 5.

A large, fairly elongate species. Snout slightly decurved, not projecting. Mouth large and terminal jaws meeting equally in front, gape only slightly oblique; chin weak, maxillary ending behind pupil. Operculum with two flat weak spines; edge of preoperculum serrated.

*Proportion as % Standard length* : Depth of body 26.5; length of head 31.1; interorbital width 5.5; length of pectoral fin 16.8; and length of second anal spine 8.6.

*Proportions as % length of head* : Diameter of eye 24.0 length of snout 25.5; depth of preorbital bone 9.0; interorbital width 19.1 length of upper jaw 40.4; length of lower jaw 51.8; and length of second anal spine 27.6.

Rostral pores 3; marginal pores 5, median just above edge, two pairs under it, the lateral barely notching edge. Mental pores three pairs; first small and round, on front of chin, others small slits.

Scales cycloid on snout and below eye, elsewhere ctenoid; pectoral fin axil scaleless; lateral line scales 60.

Dorsal fin deeply notched. Second anal spine weak, about half length of longest soft finray. Pectoral fins short. Caudal fin rhomboid in adults.

Gasbladder (Text–fig. 10a) carrot-shaped, with 29 pairs of arborescent appendages, first not entering head, last very short and simple, at right angles to bladder.

Otolith (sagitta) (Text–fig. 10b) with a tadpole-shaped impression on its inner side of which the 'head' is pouched and the 'tail' is J-shaped (after Trewavas, 1977).

*Colour* : in life, greyish and white silvery below; faint oblique stripes on upper part of body, formed from a spot on each scale; a pale yellow longitudinal stripe above lateral line; a black spot at pectoral-fin base. Spinous dorsal fin dark distally, soft dorsal fin dusky distally and with a dark spot at base on each ray (after Mohan & Talwar, 1984).

*Geographical distribution* : "Gulf" and the Arabian Sea, to the South China Sea.

Inhabits coastal waters over muddy bottoms to about 60 m. depth.

#### 11. *Argyrosomus hololepidotus* (Lacepede, 1802) (Text–fig. 11)

1802. *Labrus hololepidotus* Lacepede, *Hist. nat. Poiss.*, 3 : 448, 518, pl. 21, fig. 2 (type-locality : "grand Ocean equatorial").

1830. *Sciaena hololepidota* Cuvier, *Hist. nat. Poiss.*, 5 : 53; Barnard, 1927, *Annl. S. Afr. Mus.*, 21(2) : 569, pl. 23, fig. 3.

1872. *Sciaena antarctica* Castelnau, *Proc. zool. acclim. Soc. Vict.*, 1 : 100, pl. 1 (type-locality : Melbourne, Australia); Macleay, 1881, *Proc. Linn. Soc. N.S.W.*, 5 : 520; Roughley, 1951, *Fish and Fisheries of Australia*: 70, pl. 28.
1875. *Sciaena margaritifera* Haly, *Ann. Mag. nat. Hist.*, (4)15 : 269 (type-locality : off Port Natal, South Africa); Regan, 1908, *Ann. Natal Mus.*, 1 : 245.
1878. *Sciaena aquila* (*nec* Lacepede) Castelnau, *Proc. Linn. soc. N.S.W.*, 3 : 381; Pellegrin, 1914, *Bull. Soc. Zool. France*, 39 : 224.
1884. *Corvina axillaris* (*nec* Cuvier) DeVis, *Proc. Linn. Soc. N.S.W.*, 9 : 538.
1886. *Sciaena neglecta* Ramsay and Ogilby, *Proc. Linn. Soc. N.S.W.*, (2)1 : 941 (type-locality : Broken Bay, New South Wales, Australia).
1918. *Sciaena hololepidota antarctica* : Ogilby, *Mem. Od. Mus.*, 6 : 70, pl. 2.
1933. *Johnius hololepidotus* : Fowler, *Bull. U.S. nat. Mus.*, (100)12 : 400; Smith, 1949, *Sea Fishes of Southern Africa* : 226, fig. 552; Seshappa, 1956, *Curr. Sci.*, 25 : 121, fig.
1974. *Argyrosomus hololepidotus* : Fischer and Whitehead, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Argyr 3; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 327, fig. 54; Mohan, 1981, *Indian J. Fish.*, 28 : 5; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Argyr 3.

*Types* : Iconotype, Lacepede, 1802, pl. 2, fig. 2, from a drawing by Commerson of a fish stated (by Cuvier) to have been caught in Madagascar. Syntypes of *Sciaena margaritifera* : BMNH 1862. 11.9.13–14, two specimens. Holotype of *Sciaena neglecta* : AM. 1.822.

*Common name* : Southern meagre ... English.

*Description* (after Trewavas, 1977) : D X + I 26–29; A II 7; P i 16; V I 5.

A large, fairly elongate species. Mouth large and terminal, the jaws meeting evenly in front, or the lower jaw slightly longer. Operculum with two flat weak spines; edge of suboperculum entire.

*Proportions as % Standard length* : Depth of body 26–30; length of head 28.5–34.0; interorbital width 5.0–6.8; length of pectoral fin 19–21 and length of second anal spine 6.5–8.9.

*Proportions as % length of head* : Diameter of eye 14.5–22.0; length of snout 24.5–28.0; depth of preorbital bone 7.5–10.5 interorbital width 16.5–22.5; length of upper jaw 38–45; and length of lower jaw 43–56 (usually 45–49).

Pores on snout small; upper (rostral) 5, but outer pair minute or obsolete in larger specimens; marginal 5, median just above edge, paired just under its, outer in a slight notch. Mental pores three pairs, first pair small, round, at front of chin, others small slits.

Gillrakers on first arch (3–6) + 1 + (8–10); slender; denticulate plates on arch.

Teeth well differentiated in size, inner band of small teeth of upper jaw narrow, lower outer a sparse series of tiny teeth; larger ones not canine-like, forming outer series in upper jaw, and inner series in lower. In very large specimens major teeth few blunted and small ones not detected, perhaps buried in thick, papillose gums.

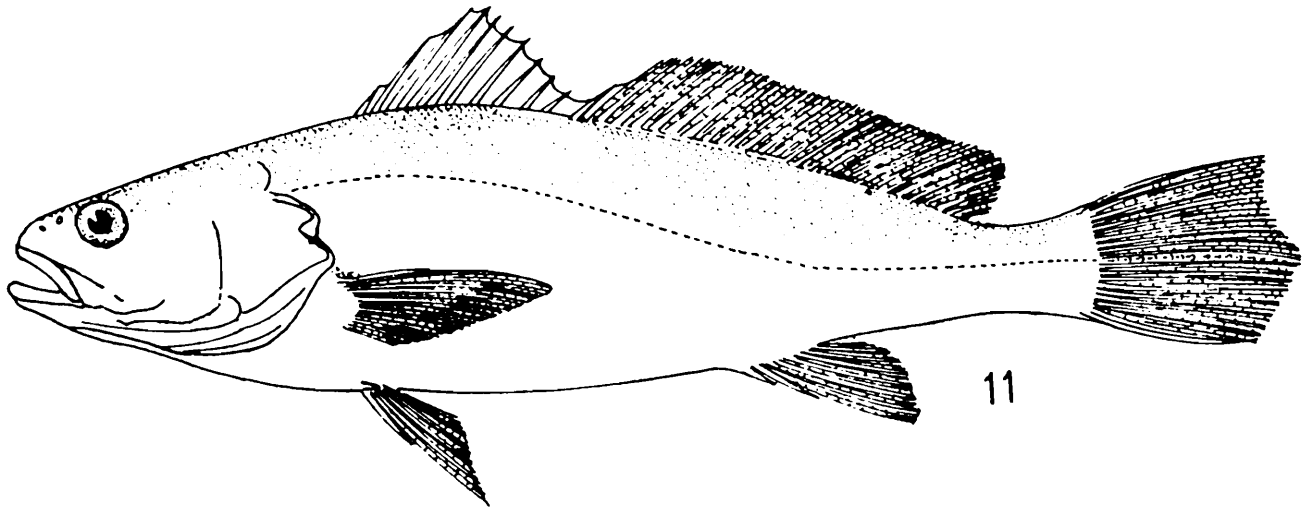


Fig. 11. *Argyrosomus hololepidotus* (Lacepede) (after Mohan & Talwar).

Scales cycloid on snout and below eye, otherwise finely ctenoid; lateral-line scales 46 to 52.

Dorsal fin notched. Second anal spine weak. Pectoral fins short. Caudal fin pointed in young, blunter and becoming S-shaped or slightly emarginate in adult.

Gasbladder carrot-shaped with 25 to 35 pairs of arborescent appendages of approximately equal size, branching in a rather ragged-looking fan-shaped; none entering head.

Otolith (sagitta) with a large tadpole-shaped impression on its inner side of which the 'head' is pouched and the 'tail' is J-shaped.

Colour : In life, grey/brown on back shading to silvery grey on flanks and belly; a black spot at pectoral-fin base. Fins reddish.

*Geographical distribution* : West coast of Africa south of the Equator, Cape of Good Hope to Natal; Madagascar; Pakistan; north-west coast of India; and west and southeast coast of Australia.

Inhabits coastal waters.

#### Genus 10. *Atrobucca* Chu, Lo & Wu, 1963

1963. *Atrobucca* Chu, Lo and Wu, *Monograph Fishes of China (Sciaenoid Fishes)* : 64 (type-species : *Sciaena nibe* Jordan and Thompson); Sasaki and Kailola, 1988, *Jap. J. Ichthyol.*, 35(3) : 261-277 (Review).

*Definition* : Sciaenid fishes with a carrot-shaped gasbladder with 20 to 30 pairs of lateral arborescent appendages; appendages with well-developed dorsal and ventral limbs, regularly arranged so that the twiglets of dorsal limb point backwards while those of ventral limb point forwards (at least near tip) and some of them enveloping the bladder;

anterior pair of arborescent appendages branching on posterior surface of transverse septum; not entering head; posterior appendages simple, very short and tube-like, and at right angles to wall of bladder. Mouth terminal; teeth sharp, needle-like, well differentiated in size in both jaws, outer series in upper jaw and inner series in lower jaw enlarged and spaced but no canines. Pores on lower jaw three pairs; anterior pair minute and on front of chin, separated by symphysis. Interorbital width 7.7–9.1% of standard length. Pectoral fins long, 25.5–29.2% of standard length. Second anal spine weak. Sagitta thick, sulcus tail only slightly curved. Peritoneum pigmented.

*Remarks* : Eight species, 3 in our area. The postocular part of the head (that is the part including the branchial chamber) is enlarged in *A. trewavasae* and *A. alcocki*. Trewavas (1977) surmised that the enlargement of the branchial chamber in these species is the functional explanation of this striking difference and concluded that the greatly increased respiratory surface of deep-water species is probably an adaptation to lower oxygen concentration.

#### Key to species

- 1(a) Head 32.0–34.5% SL.....*A. nibe*
- (b) Head 36.6–40.3% SL.....2
- 2(a) Pectoral fin length 27.0–28.0 SL; eye diameter 7.2–8.0% SL, 17.3–20.0% head length.....*A. trewavasae*
- (b) Pectoral fin length 29.7–31.3% SL; eye diameter 8.9–10.0% SL, 22.9–27.0% head length.....*A. alcocki*
- (c) Dorsal fin with 28 to 31 soft rays .....2
- 2(a) Eyes conspicuously large, 9.4% of Standard length; head length 38% of Standard length .....*A. alcocki*
- (b) Eyes moderate, 6.5–8.3% of Standard length; head 32.0–34.5% of Standard length.....*A. nibe*

#### 12. *Atrobucca nibe* (Jordan & Thompson, 1911) (Text-fig.12)

- 1907. *Sciaena aneus* (nec Bloch) Lloyd, *Rec. Indian Mus.*, 1 : 226 (Akyab, Burma).
- 1909. *Pseudolithus brunneolus* Jordan and Richardson, *Mem. Carneg. Mus.*, 4(4) : 191, pl. 71 (type-locality : Takao, Taiwan).
- 1911. *Sciaena nibe* Jordan and Thompson, *Proc. U.S. natn. Mus.* 39(1787) : 258, fig.4 (type-locality : Wakanoura, Japan).
- 1925. *Nibe nibe* : Jordan and Hubbs, *Mem. Carneg. Mus.*, 10(2) : 243.
- 1933. *Johnius argenteus* (nec Houttuyn) Fowler (*partim*), *Bull. U.S. natn. Mus.*, (100)12: 394 (type of *Sciaena nibe*).
- 1935. *Nibe pingi* Wang, *Contr. biol. Lab. Sci. Soc. China*, (Zool. Sr.), 10(9) : 448, fig.32 (type-locality : Chefoo, China).
- 1937. *Pseudosciaena nibe* : Tang, *Amoy mar. biol. Bull.*, 2(2) : 67.
- 1938. *Argyrosomus nibe* : Lin, *Lingnan Sci. J.*, 17(3) : 367.

1936. *Atrobucca nibe* : Cho, Lo and Wu, *Fishes of China Monogr.* : 65, figs 37, 63, 89; Murthy, 1969, *Bull. cent. mar. Fish. Res. Inst.*, (10) : 20 Mohan, 1972, *Indian J. Fish.*, 16(1/4) : 92; Rao, 1975, *J. mar. biol. Ass. India*, 16(1) : 310; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 340, fig. 54; Mohan, 1981, *Indian J. Fish.*, 28 : 6, fig. 7a,b; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 636, fig. 249.
1968. *Otolithes ruber* (*nec* Schneider) Dutt and Thankam, *J. Bombay nat. Hist. Soc.*, 65(2) : 344, figs 12,12a,12b.
1972. *Argyrosomus argentatus* (*nec* Houttuyn) Talwar and Joglekar, *Rec. zool. Surv. India*, 66 : 2.

*Types* : Holotype of *Sciaena nibe* : USNM 67331; two paratypes also in USNM; two paratypes (SU25010) in the California Academy of Sciences. Syntypes of *Pseudotolithus brunneolus* : "Holotype" (FMNH 52174) and two paratypes (FMNH 59521) in the Field Museum, Chicago (formerly in the Carnegie Museum, Pittsburg); one syntype (SU 21185) in the California Academy of Sciences. Holotype of *Nibe pingi* : Museum of the Biological Laboratory of the Science Society of China No. 10320.

*Common name* : Blackmouth croaker ... English.

*Description* : D X + I 28-29; A II 7; P i 17-18; V I 5.

A small, rather deep-bodied species. Body fairly compressed. Snout blunt, not projecting beyond upper jaw. Mouth terminal and oblique, jaws about equal in front; maxillary extends to below middle of head. Interdistance between pelvic-fin origin and vent considerably longer than head length. Operculum with two flat indistinct spines; edge of preoperculum crenulate.

*Proportions as % Standard length* : Depth of body 27.0—29.8; length of head 32.0-34.5; interorbital width 8.3—9.0; length of pectoral fin 23.5—26.7; and length of second anal spine 6.0-8.0.

*Proportions as % length of head* : Diameter of eye 20.3—23.9; length of snout 26.3—27.0; depth of preorbital bone 9.1—10.0; interorbital width 25.6—27.7; length of upper jaw 44.4—46.6; length of lower jaw 51.4—53.4; and length of second anal spine 20.9—23.3.

Upper pores on snout 3, minute and indistinct; those of marginal series 5, median one just above edge of rostral flap, lower paired pores just under edge which is with a small indentation. Pores on lower jaw '*Argyrosomus* - form' or 'six-pored form' (Chu, Lo & Wu, 1963), anterior pair minute on front of chin and separated by symphysis, followed by a pair of small slits, the usual third pair is placed further back and further apart.

Gill-rakers on first arch 6 + (13-14), slender; length of gill filaments 36—42% of eye-diameter.

Teeth needle-like and enlarged, well differentiated in size in both jaws (but not into canines and non-canines as in the genus *Otolithes*); outer row of upper jaw enlarged,

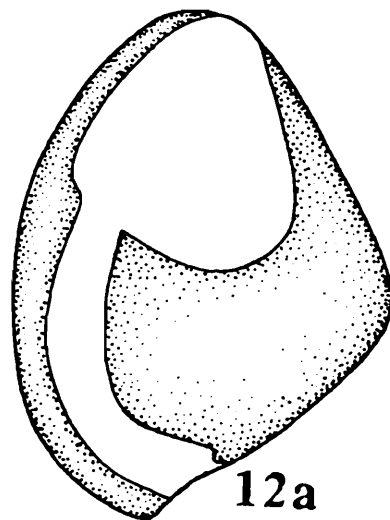
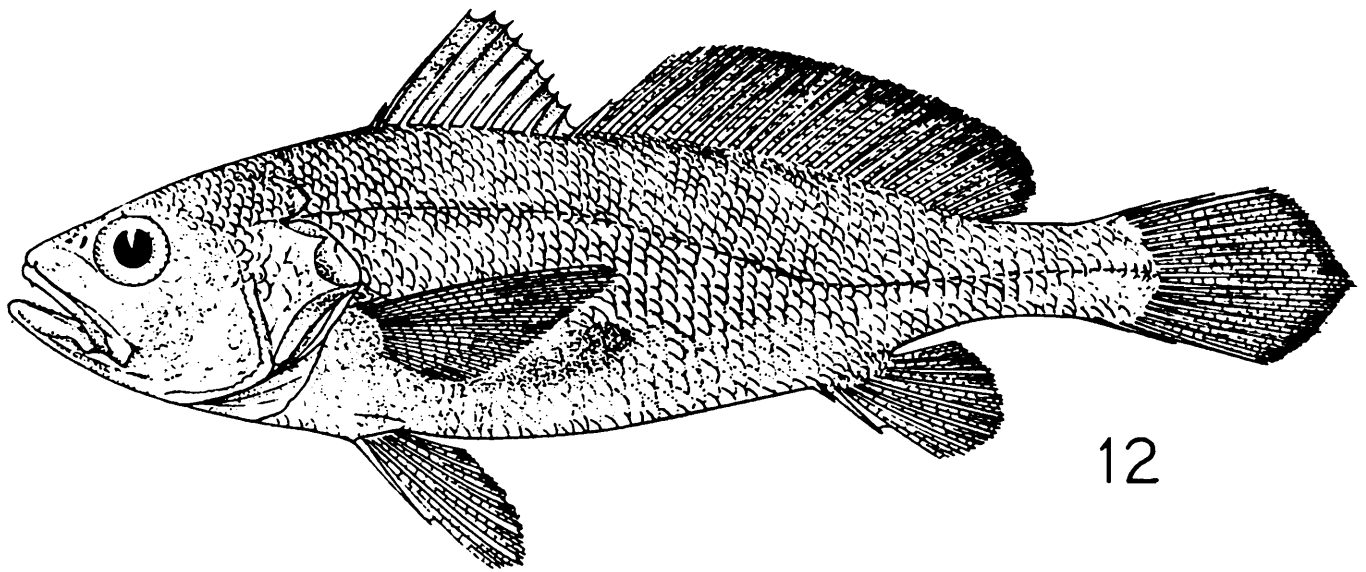


Fig. 12. *Atrobucca nibe* (Jordan & Thompson). 12a. Sagitta (inner surface).

well spaced, caniniform anteriorly, gradually decreasing in size posteriorly, sometimes fairly prominent enlarged hooked teeth below indentations of rostral flap; tiny teeth of upper jaw form a narrow inner band; lower jaw with a group of subequal teeth in front and behind these a row of enlarged, well-spaced teeth but not as large as in upper jaw, and with an irregular row of small teeth outside them.

Scales weakly ctenoid, cycloid on head; lateral line scales 48 to 52. A sheath-like row of small cycloid scales along base of soft dorsal fin.

Dorsal fin moderately notched; dorsal spines weak, fourth longest. Second anal spine slender, about three-fourth length of longest soft ray. Pectoral fins long, nearly equal to body depth. Caudal fin cuneate.

Gasbladder carrot-shaped with 25 to 30 pairs of well-developed arborescent appendages, each with a dorsal and ventral limb, regularly arranged so that twiglets of dorsal limb point backwards, those near tip of ventral limb forward; anterior pair of appendages branching on posterior surface of transverse septum and not entering head; posterior appendage rather simple, short and at right angles to wall of bladder. The bladder ends at level of vent.

Otolith (sagitta) (Text-fig. 12a) with a tadpole-shaped impression on its inner surface of which the 'head' is indistinct and pear-shaped, not in contact with anterior margin, the 'till' (or cauda) hockey-stick-shaped, slightly curved distally and ending abruptly close to the edge.

Colour : In life, grey above, silvery below; snout and symphysis of lower jaw dusky; a dusky blotch on axil of pectoral fin. Spinous dorsal fin with scattered melanophores, the soft dorsal fin with melanophores between the membrane; anal fin pale with scattered melanophores; pectoral fin with melanophores on its inner side of its upper half; pelvic fins pale; caudal fin dusky distally. Lining of mouth dusky (except its anterior part); branchial cavity dusky; peritoneum jet black.

*Geographical distribution* : North-east coast of India; Burma; Taiwan; southern Korea; and East China Sea.

Inhabits the benthic region at depth of 45 to 100m., and probably occurs in shallow parts of its range only during the spawning season.

*Remarks* : Trewavas (1977) showed that *Pseudotolithus brunneolus* Jordan and Richardson, 1909, is a senior synonym of this species based on an examination of three syntypes of the former species. The specific name *nibe* has been conserved by the International Commission on Zoological Nomenclature (1984) acting on the recommendation of Trewavas (1979). Sasaki and Kailola (1988) were uncertain of the identity of the Indian material of *nibe* from the Bay of Bengal because of a higher gill-raker count.

*Fishery information* : This sciaenid is rare in the catches of our area. It attains a size of 16 cm. Caught with bottom trawls and seine nets.

13. *Atrobuca trewavasae* Talwar & Sathiarajan, 1975  
(Text-fig.13)

1975. *Atrobuca trewavasae* Talwar and Sathiarajan, *J. nat. Hist. Lond.*, **9** : 575, figs 1,2,3 (type-locality : Madras, 250 m); Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : fig. 54; Mohan, 1981, *Indian J. Fish.*, **28** : 6; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 638, fig. 250; Sasaki and Kailola, 1988, *Jap. J. Ichthyol.*, **35** (3) : 264.

*Types* : Holotype : ZSI F 7131/2. Paratypes : ZSI F 7137/2, F 7139/2 and F 7140/2; two paratypes (ZSI F 7132/2, F 7138/2) donated to British Museum (Nat. Hist.) (BMNH 1974.7.5.4-5).

*Common name* : Trewavas' croaker ... English.

*Description* : D X + I 24-26; A II 7; P i 16-18; V I 5.

A medium-sized species with an elongated and moderately compressed body. Snout blunt, not projecting beyond upper jaw. Mouth large and terminal, jaws meeting equally in front, or lower jaw slightly longer; maxillary extending to below vertical from posterior third of eye. Interdistance between pelvic-fin origin and vent considerably less than head length. Operculum with two indistinct spines; edge of preoperculum crenulate.

*Proportions as % Standard length* : Depth of body 26.4—28.8; length of head 37.7—40.3; interorbital width 7.8—9.1; length of pectoral fin 26.7—27.9; and length of second anal spine 4.5—7.7.

*Proportions as % length of head* : Diameter of eye 18.6—20.0; length of snout 22.2—25.4; depth of preorbital bone 8.2—9.7; interorbital width 19.8—24.0; length of upper jaw 36.6—47.3; length of lower jaw 43.6—46.6; and length of second anal spine 16.1—17.9.

Upper (rostral) pores on snout 4 or 5, minute; marginal pores 5 - median one above edge and two pairs at edge of rostral flap which is almost without indentations. Mental pores three pairs, anterior pair on front of chin and separated by symphysis, followed by a pair of small slits, the usual third pair placed farther back and farther apart.

Gillrakers on first arch 6 + 1 +10, lanceolate; length of gill filaments 71—90% of eye diameter.

Teeth sharp, needle-like, sharply differentiated in size in both jaws; teeth of upper jaw with an outer enlarged series, gradually decreasing in size posteriorly, well-spaced, and an inner row of minute closely-set teeth; in lower jaw a group of subequal teeth in front and behind these a row of slightly large teeth (but not as long as the upper) with an irregular row of small teeth outside them; no canine teeth; all teeth embedded in a mass of papillae.

Scales weakly ctenoid on body, cycloid on head, rather deciduous; lateral line scales 49 to 51. A sheath-like row of small scales along bases of soft dorsal and anal fins.

Dorsal fin deeply notched; dorsal spines weak, fourth longest. Second anal spine weak, less than half as long as first soft ray. Pectoral fins long, nearly equal to body depth. Caudal fin rhomboid.

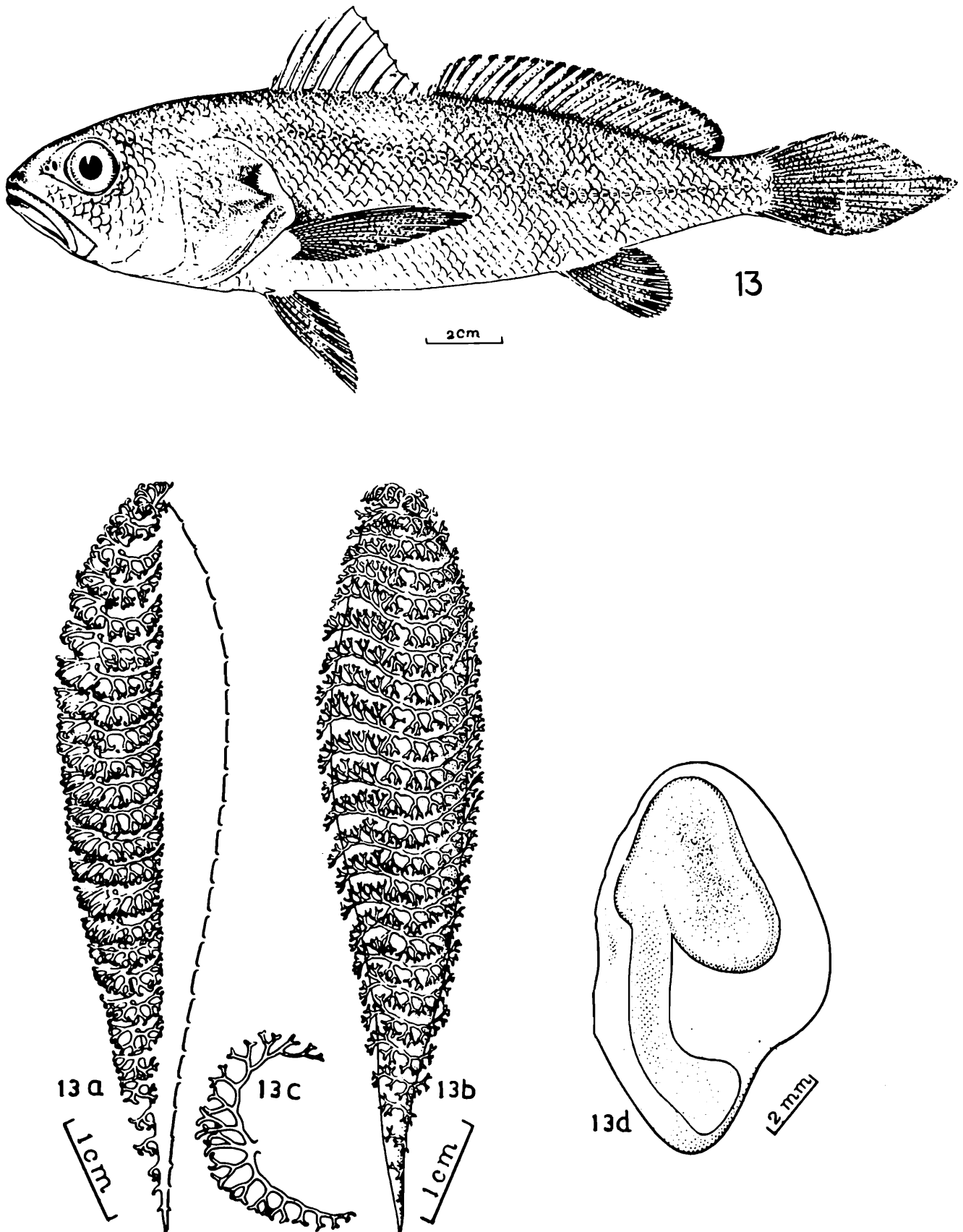


Fig. 13. *Atrobucca trewasae* Talwar & Sathiarajan; (Holotype : ZSI Regd No. F 7131/2). 13a. Gasbladder, dorsal view. 13b. Gasbladder, ventral view. 13c. Gasbladder tubule, diagrammatic representation. 13d. Sagitta (inner surface).

Gasbladder (Text-fig. 13a, b, c) carrot-shaped with 26 pairs of arborescent lateral appendages, all but last pair with a dorsal and ventral limb, anterior pair without cephalic extension, last appendage simple at right angles to wall of bladder; each dorsal branch again divided into many twiglets, all pointing backwards; each ventral branch similarly divided into many twiglets, all pointing forwards; as a result of branching a system of network is formed on both the dorsal and ventral surfaces of bladder which is embedded in a thick layer of fatty tissue.

Otolith (sagitta) (Text-fig. 13d) with a tadpole-shaped impression on its inner side of which the 'head' is pear-shaped, not in contact with anterior margin, and the 'tail' (or 'cauda') hockey-stick-shaped, very slightly curved distally and ending abruptly close to edge.

Colour : In life, drab grey above, paler below. Spinous dorsal fin covered with melanophores; soft dorsal fin light basally with a slight covering of melanophores distally; anal fin with few melanophores; pectoral fins dusky; axillary region dusky; ventral fins pale; caudal fin dusky. Symphysis of lower jaw dusky; lining of mouth and branchial cavity dusky, peritoneum jet black.

*Geographical distribution* : South-east coast of India; bathypelagic at depths of 250 m.

*Fishery information* : This bathypelagic species is presently not exploited but is fairly common in the experimental catches off the south-east coast of India at a depth of 250 m.

#### 14. *Atrobucca alcocki* Talwar, 1980 (Text-fig.14)

1980. *Atrobucca alcocki* Talwar, *Bull. zool. Surv. India*, 3 : 23, fig. 1 (type-locality : Bombay, 60 m); Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 636; Sasaki and Kailola, 1988, *Jap. J. Ichthyol.*, 35 (3) : 274.

*Types* : Holotype : ZSI F 7591/2.

*Common name* : Bombay blackmouth croaker ... English.

*Description* : D IX + I 24—28; A II 7; P i 17; V I 5.

Body elongate and moderately compressed. Snout, blunt, not projecting. Mouth terminal, gape at an angle of about 30° with horizontal; maxillary ending below iris. Interdistance between pelvic-fin origin and vent considerably less than head length. Operculum with two flat weak spines; edge of preoperculum crenulate.

*Proportions as % Standard length* : Depth of body 25.3; length of head 36.6—38.9; interorbital width 7.8; length of pectoral fin 29.7—31.3; and second anal spine 8.3—9.6.

*Proportions as % length of head* : Diameter of eye 22.9—27.0; length of snout 22.2; depth of preorbital bone 8.5; interorbital width 20.5; length of upper jaw 41.9; length of lower jaw 47.9; and length of second anal spine 43.3.

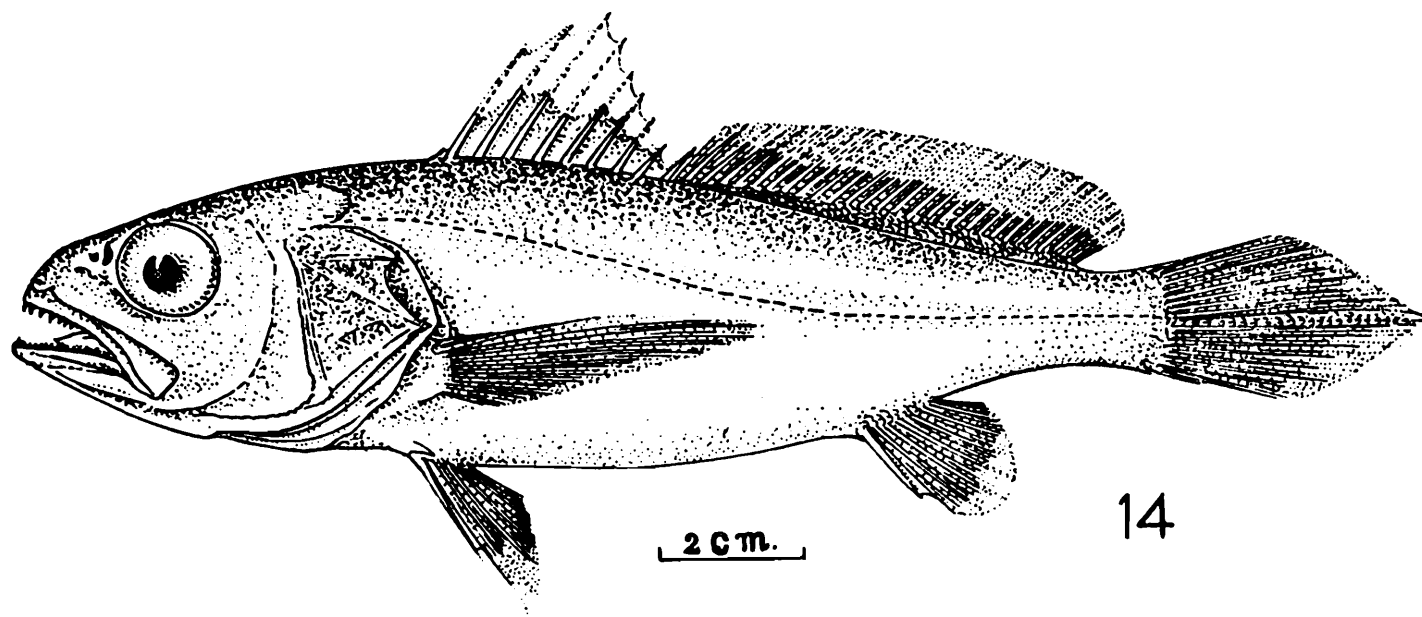


Fig. 14. *Atrobucca alcocki* Talwar; (Holotype : ZSI Regd No. F 7591/2).

No pores on snout, those on marginal series 5, median one above edge of rostral flap, inner pair under edge, and lateral pair at edge in a very slight embayment. Three pairs of mental pores, first minute and on front of chin separated by symphysis of lower jaw, others small but conspicuous (has been referred to as the "*Argyrosomus* - form" or "Six-pored form") (Chu, Lo & Wu, 1963).

Gillrakers on first arch 6 + 1 + 10, lanceolate; gill-filaments 5.5% of standard length.

Teeth sharply differentiated in size in both jaws; teeth of upper jaw with an outer series of sharp, needle-like, well spaced enlarged teeth and a narrow inner band of minute teeth; lower jaw with a group of strong teeth in front and an inner row of strong spaced teeth posteriorly, with an irregular row of tiny teeth between and outside them.

Scales weakly ctenoid on body, cycloid on head lateral line scales about 50.

Dorsal fin moderately notched; dorsal spines weak. Second anal spine moderate. Pectoral fins long. Caudal fin ? rhomboid.

Gasbladder carrot-shaped with about 30 pairs appendages, all but last pair arborescent, ramifying in a wedge of tissue flanking bladder on each side; two anterior appendages branch profusely between bladder and transverse septum; behind these each appendage is first divided into well developed dorsal and ventral limbs, ventral limb with its axis so turned that its branches are directed anteriorly; dorsal limbs have their branches directed posteriorly, together forming an elaborate filigree pattern on dorso-lateral wall of bladder, and near posterior end nearly meet their fellows of other side; bladder ends just before the vent.

Colour : In alcohol, drab gray above and paler; below symphysis of lower jaw dusky. Pectoral fins fairly dusky; pelvic fins pale. Lining of mouth speckled; branchial cavity dusky; peritoneum jet black.

*Geographical distribution* : India : off Bombay; and Pakistan : off Sind.

Probably inhabits the deep waters off the continental shelf beyond the 100 fm (= 160 m) line.

Genus 11. *Chrysochir* Trewavas and Yazdani, 1966

1966. *Chrysochir* Trewavas and Yazdani, *Ann. Mag. nat. Hist.*, (13) 8 : 250 (type-species : *Otolithus aureus* Richardson).

*Definition* : Sciaenid fishes with a carrot-shaped gasbladder (Text-fig. 15a) bearing 24 to 28 pairs of arborescent appendages along the sides, not extending on to dorsal surface of bladder, anterior (first) pair of appendages with swollen bases and ramifying over posterior surface of transverse septum and *not* entering head. Snout acute, slightly projecting before upper jaw; mouth nearly horizontal and subterminal, upper jaw slightly projecting before lower. Teeth of both jaws well-differentiated in size, but two pairs of canines in upper jaw only near symphysis; behind anterior teeth in lower jaw a series of enlarged, spaced teeth with a row of much smaller teeth outside them. Rostral and mental pores well-developed, first of three mental pairs flanking symphysis are parallel slits. Second anal spine rather weak. Sagitta with a tadpolelike impression on its inner side with an asymmetrically pouched 'head' and a t-shaped 'tail' (or 'cauda'), the 'tail' only slightly curved and ending in a disc at posterior end of otolith. Vertebrae 25.

Monotypic.

15. *Chrysochir aureus* (Richardson, 1846)  
(Text-fig. 15)

1846. *Otolithus aureus* Richardson, *Rep. Br. Ass. Advmt. Sci.*, 15 : 224 (type-locality : Canton, China).
1850. *Otolithus argenteus* (*nec* Cuvier) Cantor, *J. Asiat. Soc. Beng.*, 18 : 1043.
1889. *Sciaena ophiceps* Alcock, *J. Asiat. Soc. Beng.*, 58(2) : 300 (type-locality : Off deltas of Mahanadi and Godavari R., eastern India); Alcock, 1896, *J. Asiat. Soc. Beng.*, 65(2) : 315.
1926. *Sciaena incerta* Vinciguerra, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (3)10 : 578 (type-locality : Sarawak, N. Borneo).
1932. *Johnius birtwistlei* Fowler, *Proc. Acad. nat. Sci. Philad.*, 83 : 446, fig. (type-locality : Singapore); Fowler, 1933, *Bull. U.S. natn. Mus.* (100)12 : 403.
1933. *Johnius ophiceps* : Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 402 (after Alcock).
1937. *Pseudosciaena acuta* Tang, *Amoy mar. biol. Bull.*, 2(2) : 62, fig. 5 (type-locality : Hainan Is., China).
1938. *Nibea acuta* : Lin, *Lingnan Sci. J.*, 17(4) : 540; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 56, figs 32, 58 and 64.
1966. *Pseudosciaena ophiceps* : Yazdani, *J. zool. soc. India*, 15(1) : 64.
1966. *Chrysochir aureus* : Trewavas and Yazdani, *Ann. Mag. nat. Hist.*, (13) 8 : 249, pl. 6, text-fig. 1; Mohan, 1972, *Indian J. Fish.*, 16(1/4) : 94, fig. 1K; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Chrys 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 345, fig. 53; Mohan, 1981, *Indian J. Fish.*, 28 : 6, fig. 8; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 639, fig. 251; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Chrys 1.

1968. *Otolithoides brunneus* (nec Day) : Dutt and Thankam, *J. Bombay nat. Hist. Soc.*, 65(2) : 524.

*Types* : Lectotype : BMNH (unreg.), a half skin of 291 mm SL from "China", coll J.R. Reeves; designated by Trewavas (1977). Syntypes of *Sciaena ophiceps* Alcock : ZSI 12099-12101, 12103, 12170-1, 12336 and 12381; ? BMNH 1890.12.4.6-7 (formerly ZSI 12979-80). Holotype of *Sciaena incerta* Vinciguerra : MCHN, Gonoa, C.E. 23308. Holotype and paratypes of *Johnius birtwistlei* Fowler : ANSP 53467 and 53468-9. Type of *Pseudosciaena acuta* Tang : Marine Biological Station, Amoy.

*Common name* : Reeve's croaker ... English.

*Description* : D X + I 25-28; A II 6-7; P i 16-18; V I 5.

A rather slender species, with an acute prominent snout. Mouth large, nearly horizontal and subterminal, upper jaw extending backward to below hind margin of eye, overshooting lower jaw in front; lower jaw more than half of head length. Operculum with two flat weak spines; edge of preoperculum weakly serrated.

*Proportions as % Standard length* : Depth of body 23.0—27.5; length of head 27.5—36.1; length of pectoral fin 21.8—29.; and length of second anal spine 5.0—9.8.

*Proportions as % length of head* : Diameter of eye 15.4—21.0; length of snout 23.0—29.5; depth of preorbital bone 11.2—12.5; interorbital width 17.0—19.5; length of upper jaw 41.5—45.8; length of lower jaw 51.0—55.0; and length of second anal spine 23.8—25.0.

Snout with 3 upper (rostral) and 5 marginal pores, lower median just above edge of rostral flap, outer marginal pair in a marked notch. Mental pores three pairs, first slit-like on either side of symphysis.

Gillrakers on first arch (4-6) + (7-10), in adult very short denticulate stumps at extremes; flat tooth-plates below the series.

Teeth well-differentiated in size in both jaws, outer series in upper jaw of enlarged teeth of which two pairs only are outstanding canines, these closing outside lower lip; in lower posteriorly an inner series of enlarged teeth, but no canine teeth.

Scales cycloid in front and below eye, elsewhere ctenoid; a small scaly sheath of one or two rows of smaller scales at bases of soft dorsal and anal fins; both pectoral and pelvic fins with a scaly axillary process; lateral line scales 48 to 51.

Dorsal fin deeply notched; dorsal spines weak, third and fourth longest. Second anal spine rather weak, about half length of soft rays. Pectoral fins long, acutely pointed, as long as head without snout. Caudal fin rhomboid with pointed tip.

Gasbladder (Text-fig. 15a) carrot-shaped bearing 24 to 28 pairs of arborescent appendages along sides, anterior pair with swollen bases and branching over posterior surface of transverse septum, not entering head; other diverticula *not* divided into dorsal and ventral limbs and are so set that the posterior branches of each appendage overlap dorsally the anterior branches of appendages behind, posterior diverticula simpler.

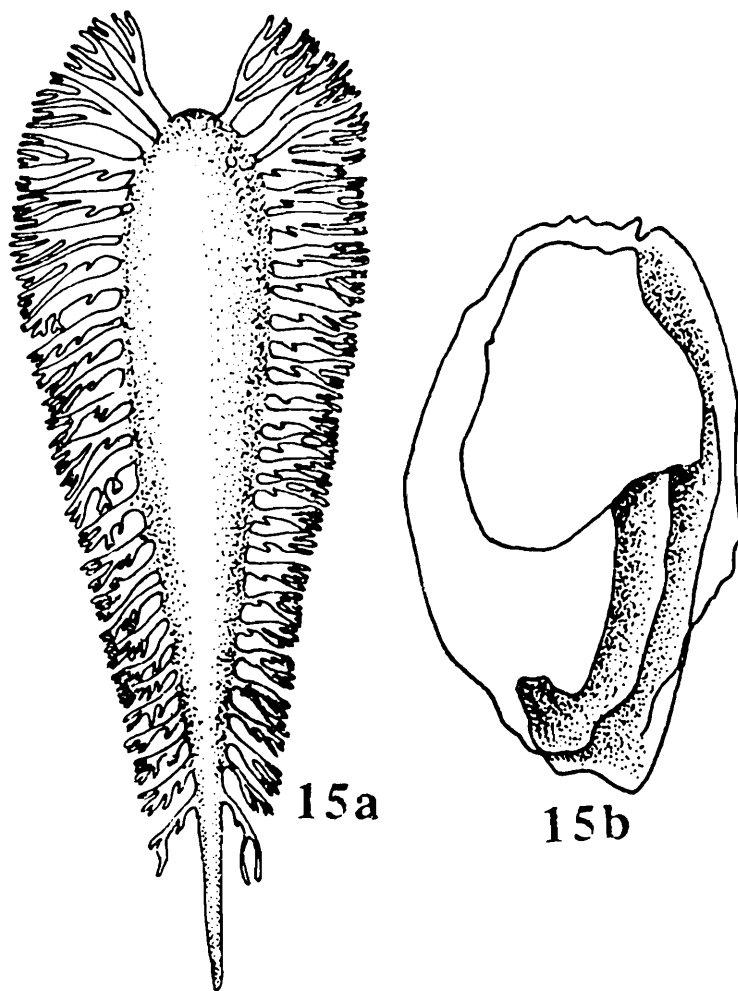
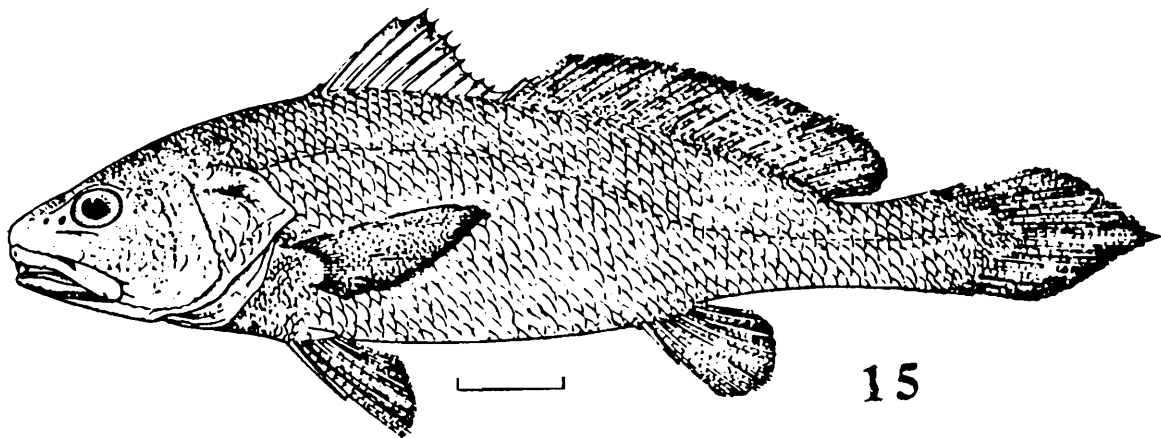


Fig. 15. *Chrysochir aureus* (Richardson); (ZSI Regd. No. F 7309/2). 15a. Systematic view of gasbladder. 15b. Sagitta (inner surface).

Otolith (sagitta) (Text-fig. 15b) with a tadpole-shaped pattern on its inner side having an asymmetrically pouched 'head' and a t-shaped 'tail' (or 'cauda') which is only slightly curved and ends in a disc at posterior end of otolith.

Colour : In life, metallic blue above, shading to silvery below. Pectoral fins yellow; other fins suffused with orange.

*Geographical distribution* : East coast of India, Sri Lanka, the Malay Peninsula, Borneo, Hainan and Chinese waters.

Inhabits shallow coastal waters.

*Fishery information* : This sciaenid is fairly common in the commercial catches on the Orissa coast. It attains a size of 30 cm; common to 25 cm. Caught with bottom trawls and gillnets.

#### Genus 12. *Otolithes* Oken, 1817

1817. *Otolithes* Oken, *Isis oder Encyclopadische Zeitung*, 8 : 1782 (from *Les Otolithes* Cuvier, 1816) (type-species : *Johnius ruber* Schneider); Schintz, 1822, in Cuvier's *Das Thierreich*, 2 : 482.

1829. *Otolithus* Cuvier, *Regne animale* (ed. 2) 2 : 172 (type-species : *Johnius ruber* Schneider).

*Definition* : Sciaenids having a carrot-shaped gasbladder with a series (28 to 36) of arborescent appendages along the sides, diverticula branch in a fan-like manner on posterior surface of transverse septum and *not* entering head, posterior appendages are simple while other appendages are set in an oblique plane in wedge of the tissue flanking bladder; posterodorsal branches bud-like, not extending on to dorsal surface of bladder. Mouth large lower jaw projecting. No upper pores on snout; marginal pores 3 or 5; mental pores (on lower jaw) variable, absent or reduced to anterior pair and clusters of minute pores. Both jaws with canine teeth near symphysis. Anal-fin inserted behind middle of soft dorsal-fin, with 7 or 8 soft rays; second anal spine short and weak. Scales cycloid on head and anterior part of body; more posteriorly a small striated zone is found on each scale and above anal fin there are fine ctenii; on tail all scales are finely ctenoid. Otolith (sagitta) with a tadpole-shaped impression on its inner side, of which 'head' is oval and 'tail' (or 'cauda') slightly curved, t-shaped, the end of 'tail' is expanded and forms a disc near posterior edge.

Two species, both in Indian region.

#### Key to species

- 1(a) Gill-rakers 8-11 on lower arm of first arch; distance between sphenotic ridge and angle of lower jaw less than length of lower jaw; canines very strong; gasbladder with 30 to 38 pairs of arborescent appendages ..  
.....*O. ruber*
- (b) Gill-rakers 12-17 on lower arm of first arch; distance between sphenotic ridge and angle of lower jaw as long as or longer than lower jaw; canines moderate; gasbladder with 25 to 28 arborescent appendages.....*O. cuvieri*

16. *Otolithes ruber* (Schneider, 1801)  
(Text-fig. 16)

1801. *Johnius ruber* Schneider, *Syst. Ichth.* : 75, pl. 17 (type-locality : Tranquebar).
1817. *Otolithes ruber* : Oken, *Isis oder Encyclopädische Zeitung*, 8 : 1182 (on *Les Otolithes* Cuvier); Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 490; Smith, 1949, *Sea Fishes of Southern Africa* : 227; Mohan (*partim*) 1972, *Indian J. Fish.*, 16 : 91, fig. 1E; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Otol 2; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 349, pl. 1 & 2; Mohan, 1981, *Indian J. Fish.*, 28 : 7, fig. 9; Talwar, 1984, *Handbook zool. Surv. Indian*, (4) : 664, fig. 267; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Otol 2.
1830. *Otolithus ruber* : Cuvier (*partim*), *Hist. nat. Poiss.*, 5 : 60, pl. 102; Cantor, 1850, *J. Asiat. Soc. Beng.*, 18 : 1041; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 309; Day, 1865, *Fishes of Malabar* : 19; Day, 1865, *Proc. zool. soc. Lond.* : 19; Day, 1889, *Fauna Br. India*, Fishes, 2 : 128; Gilchrist and Thompson, 1908, *Ann. Durban Mus.*, 1 : 184; Barnard, 1927, *Ann. S. Afr. Mus.*, 21 : 573; Blegvad and Loppenthin, 1944, *Dan. Scient. Invest. Iran*, (3) : 27, pl. xi, fig. 1; Khalaf, 1961, *Marine and freshwater Fishes of Iraq* : 98.
1830. *Otolithus argenteus* Kuhl and van Hasselt in : Cuvier, *Hist. nat. Poiss.*, 5 : 62; Bleeker, 1845, *Natuur. Geneesk. Arch. Neerl.-Ind.*, 2 : 522; Richardson, 1946, *Rep. Br. Ass. Advmt. Sci.*, 15 : 225; Bleeker, 1849, *Jour. Ind. arch.*, 3 : 66; Bleeker, 1850, *Verh. batav. Genoot. Kunst. Wet.*, 23 : 15; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 310 Kner, 1865, *Novara-Exp. Fische* : 135; Day (*partim*), 1865, *Fishes of Malabar* : 58 (*nec* figure); Playfair, 1866, *Fishes of Zanzibar* : 53; Bleeker, 1874, *Verh. K. Akad. Amst.*, 14(4) : 9; Bleeker, 1877, *Atlas Ichthyol. des Indes-Orientales Neerl.* : pl. 385, fig. 5; Day, 1876, *Fishes of India* : 197, pl. 45, fig. 3; Day, 1889, *Fauna Br. India*, Fishes 2 : 129; Sauvage, 1891, *Histoire phy. nat. et. politique Madagascar*, 16 : 520; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154; Fowler 1904, *J. Acad. nat. Sci. Philad.*, (2)12 : 530; Pellagrini, 1905, *Bull. Soc. Zool. France*, 13 : 84; Bean and Weed, 1912, *Proc. U.S. natn. Mus.*, 42 : 606; Jordan and Starks, 1917, *Ann. Carneg. Mus.*, 11 : 452; Ogilby, 1918, *Mem. Qd. Mus.*, 6 : 63; Pillay, 1929, *J. Bombay nat. Hist. Soc.*, 33 : 366.
1830. ? *Otolithus versicolor* Cuvier, *Hist. nat. Poiss.*, 5 : 64 (on Russell, 1803, pl. 109).
1846. *Otolithus tridentifer* Richardson, *Rep. Br. Ass. Advmt. Sci.*, 15 : 225 (type-locality : Canton, China).
1911. *Otolithus orientalis* Seale, *Philippine J. Sci.*, 5 : 281, pl. 4 (type-locality : Borneo).
1932. *Otolithes argenteus* : Fowler, *Proc. Acad. nat. Sci. Philad.*, 83 : 446; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100)12 : 355; Lin, 1935, *Bull. Chekiang prov. Fish. Exp. Stn.*, 1(1) : 5; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 492, fig. 96; Tang, 1937, *Amoy mar. biol. Bull.*, 2 : 49; Munro, 1955, *Marine Freshwater Fishes Ceylon*; 156, fig. 458; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 45, figs 7, 25, 51, 77; Munro, 1967, *Fishes of New Guinea* : 345, fig. 646; Dutt and Thankam (*partim*), 1968, *J. Bombay nat. Hist. Soc.*, 65(2) : 345, figs 13, 13A-C; Ahmad, 1971, *Rec. zool. surv. Pakistan*, 2 : 131, fig. 5 (gasbladder); Mohan, 1972, *Indian J. Fish.*, 16 : 91; Kuronuma and Abe, 1972, *Fishes of Kuwait* : 87, fig. 12.

*Types* : Syntype of *Otolithus tridentifer* : ? BMNH (unregistered skin); ? Gunther, 2 : 310b), China, *coll.* Reeves.

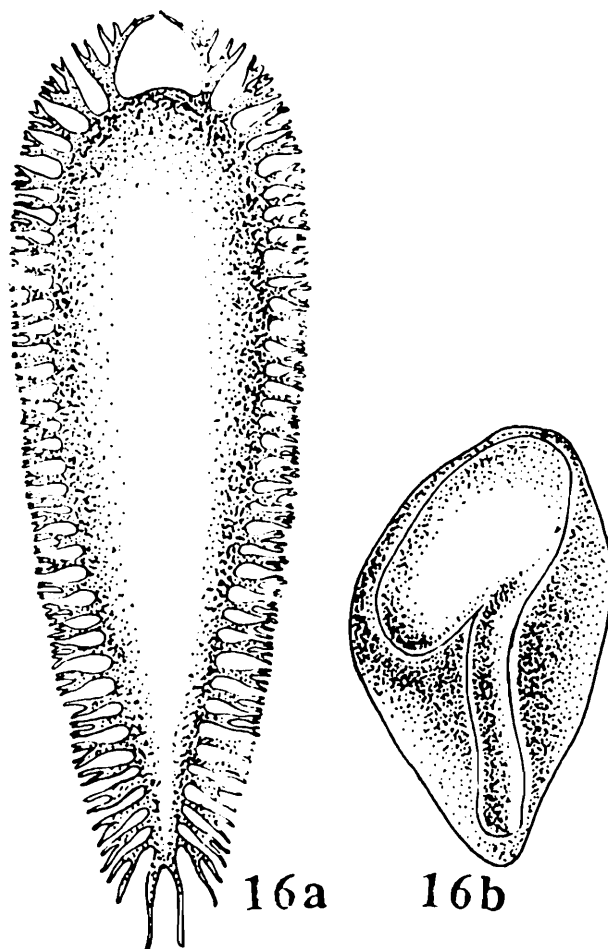
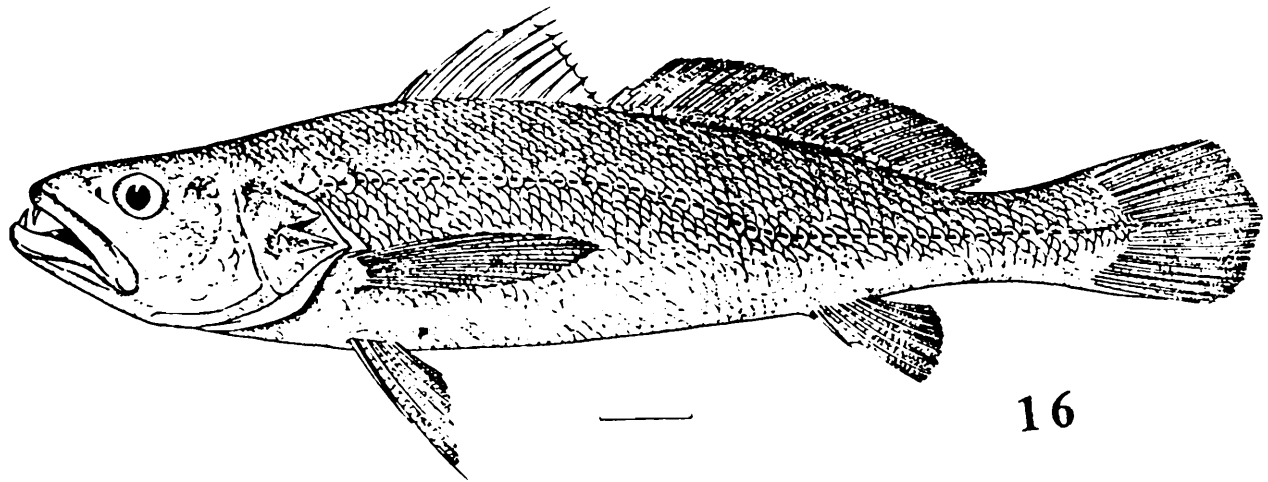


Fig. 16. *Otolithes ruber* (Schneider); (ZSI Regd. No. F 7283/2). 16a. Systematic view of gasbladder. 16b. Sagitta (inner surface).

*Common name* : Tigertooth croaker ... English.

*Description* : D IX - X + I 27-30; A II 7; P i 15; V I 5.

A slender species, the body depth 4 to 5 times in standard length. Snout longer than eye diameter, its upper profile rising evenly to dorsal fin or slightly concave before eye. Mouth large, terminal, slightly upturned. Operculum with two flat weak spines; edge of preoperculum weakly serrate.

*Proportions as % Standard length* : Depth of body 21.0—25.6; length of head 29.0—34.0; length of pectoral fin 21.0—22.2; and length of second anal spine 3.6—5.0.

*Proportions as % length of head* : Diameter of eye 15.4—23.5; length of snout 23.0—27.6; depth of preorbital bone 8.2—8.5; interorbital width 20.5—24.3; length of upper jaw 44.8-46.3; length of lower jaw 53.4—54.5; and length of second anal spine 17.0—17.6.

No upper (rostral) pores on snout; rostral lobe nearly entire with 3 marginal pores. Mental pores rather indistinct.

Gill-rakers on first arch 4 + (8-11), long and slender.

Teeth in upper jaw in two rows, inner row villiform, outer series enlarged with 1 or 2 pairs of strong canines on either side of symphysis of jaw; lower jaw with a lateral row of small teeth and a single or a pair of strong canines at tip of jaw.

Scales cycloid but a few ctenoid on lower part of hind end of body; lateral line scales 52 to 54.

Dorsal fin with a deep notch; dorsal spines slender, third and fourth longest. Anal fin inserted behind middle of soft dorsal fin; second anal spine short and weak. Caudal fin rhomboid, pointed in juveniles.

Gasbladder (Text-fig. 16a) carrot-shaped with 32 to 36 pairs of arborescent appendages along sides, branching in a very regular pattern, anterior pair of diverticula branching on posterior surface of transverse septum and not entering head.

Otolith (sagitta) (Text-fig. 16b) with a tadpole-shaped impression on its inner side, on which the 'head' is oval and 'tail' (or 'cauda') is only slightly curved, ending in a disc near posterior edge.

Colour : in life, brownish above, silvery with a golden sheen on flanks and belly, often with oblique dark streaks dorsally.

*Geographical distribution* : East coast of Africa, Iraq, throughout the Indian Ocean and Indo-Australia Archipelago, Queensland (Australia), the Philippines and Chinese seas.

Inhabits coastal waters, down to 40 m.

*Fishery information* : This species is caught all along the coast of India with bottom trawls and gillnets. It is the most abundant sciaenid along the Kerala and Maharashtra coast. It attains a length of 75 cms; common to 40 cm.

17. *Otolithes cuvieri* Trewavas, 1974  
(Text-fig. 17)

1830. *Otolithus ruber* (nec Schneider) Cuvier (*partim*), *Hist. nat. Poiss.*, 5 : 60; *Dat* (*partim*), *Fishes of India* : 196; Day (*partim*), 1889, *Fauna Br. India*, *Fishes*, 2 : 128.
1917. *Otolithes ruber* (nec Schneider) Jordan and Starks, *Ann. Carneg. Mus.*, 11(3/4): 452; Fowler, 1926, *J. Bombay nat. Hist. Soc.*, 31 : 776; Fowler, 1929, *J. Bombay nat. Hist. Soc.*, 33(1) : 285; Fowler (*partim*), 1933, *Bull. U.S. natn. Mus.*, (100) 12 : 356; Munro, 1955, *Marine Freshwater fishes Ceylon* : 156 (*nec figure*); Dutt and Thankam (*partim*), 1968, *J. Bombay nat. Hist. Soc.*, 65 : 338.
1966. *Otolithes argenteus* (nec Cuvier) Menon, *Rec. Indian Mus.*, 59 : 393.
1974. *Otolithes cuvieri* Trewavas in : Fischer and Whitehead, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Otol 1, fig. (type-locality : Malabar and Karachi); Kothaus, 1975, "Meteor" *Forsch-Ergebnisse*, (D)(21) : 36, figs 363 & 374; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 351, pl. 2; Mohan 1981, *Indian J. Fish.*, 28 : 8, fig.10; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 663, fig. 226; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Otol 1.

*Types* : Holotype : MNHN 7617; a male 164.5 standard length, Malabar (India).  
*Paratypes* : MNHN 7617; one ex., 118 mm. SL, Malabar; BMNH 1898.11.18.29, one ex., Karachi.

*Common name* : Lesser tigertoothed croaker ... English.

*Description* : D X + I 29-32; A II 7-8; P i 15; V I 5.

A fairly slender species; body depth 3.25 to 4.5 in standard length. Snout slightly longer than eye-diameter, its upper profile rising evenly to dorsal fin but slightly concave over eye. Mouth large and terminal, lower jaw projecting and more than half of head length. Operculum with two flat weak spines; edge of preoperculum weakly serrate.

*Proportions as % Standard length* : Depth of body 26.2—30.0; length of head 30.0—33.5; length of pectoral fin 21.0—22.2; and length of second anal spine 5.0—7.2.

*Proportions as % length of head* : Diameter of eye 23.0—26.0; length of snout 23.0—26.5; depth of preorbital bone 9.0—9.5; interorbital width 24.5—28.4; length of upper jaw 44.6—51.0; length of lower jaw 42.8—43.4; and length of second anal spine 13.2—13.9.

No rostral (upper) pores on snout; rostral lobe nearly entire with 5 small marginal pores; mental pores indistinct.

Gillrakers on first arch 6 + 1 + (11-16), lanceolate, with some toothed plates anteriorly.

Teeth in upper jaw in two rows, inner row villiform, outer series enlarged with one or two pairs of strong canines on either side symphysis of jaw; lower jaw with single series (sometimes part of second series present) of small conical teeth with a pair of strong canines at tip of jaw.

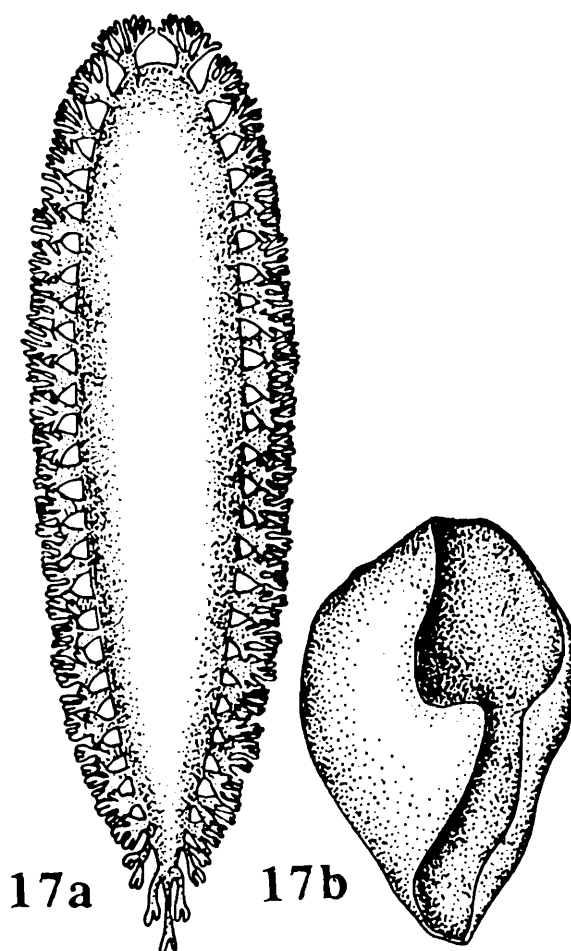
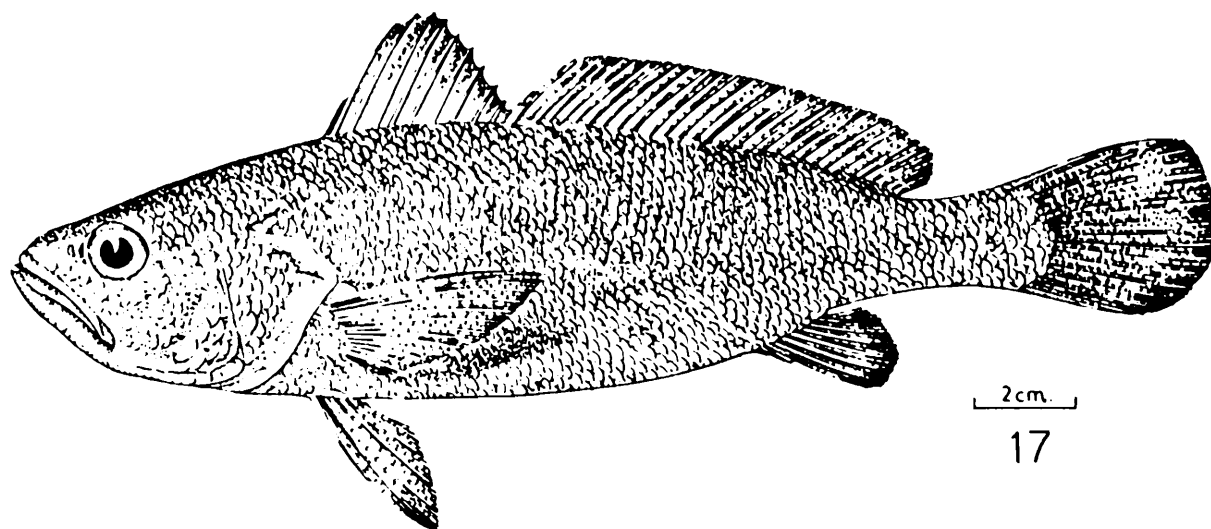


Fig. 17. *Otolithes cuvieri* Trewavas (after Mohan & Talwar). 17a. Systematic view of gasbladder. 17b. Sagitta (inner surface).

Scales cycloid on head and anterior part of body, elsewhere ctenoid; lateral line scales 50 to 54.

Dorsal fin deeply notched; dorsal spines slender, third and fourth longest. Anal fin inserted behind middle of soft dorsal fin; second anal spine short and weak. Caudal fin rhomboid, but with tip pointed.

Gasbladder (Text-fig. 17a) carrot-shaped with 25 to 28 pairs of arborescent appendages along sides, somewhat swollen at their bases, branching in a very regular pattern; anterior pair of appendages branching on posterior surface of transverse septum and not entering head, posterior appendages are simple.

Otolith (sagitta) (Text-fig. 17b) with a tadpole shaped impression on its inner side, of which the 'head' is oval and the 'tail' (or 'cauda') is t-shaped but is only slightly curved and ends in a disc near posterior edge.

Colour : In life, brown/pink above, silvery with a golden tinge on flanks; axilla with a bluish spot. Soft part of dorsal fin and anal fin edged in grey; pectoral and pelvic fins yellow.

*Geographical distribution* : India, Pakistan and Sri Lanka.

Inhabits inshore and coastal waters.

*Fishery information* : This species forms a fishery on the Gujarat coast of India. It attains a size of 30 cm; common to 20 cm. Caught with bottom trawls and gillnets.

### Genus 13. *Pterotolithus* Fowler, 1933

1933. *Otolithes* (*Pterotolithus*) Fowler, *Bull. U.S. natn. Mus.*, (100) 12 : 359 (type-species : *Otolithus maculatus* Cuvier).

1977. *Pterotolithus* : Trewavas, *Trans. zool. Soc. Lond.*, 33 : 354 (status recognised).

*Definition* : Sciaenids with carrot-shaped gasbladder bearing 41 to 53 pairs of arborescent appendages, branching in a shallow wedge of tissue flanking the bladder, some or all of their dorsal twiglets ramifying on dorsal surface of bladder with a filigree of tubules; anterior appendages branching on posterior surface of transverse septum; no cephalic appendage. Body elongate and compressed. Mouth large and strongly oblique, with long jaws set an angle of 50-70° to the horizontal; lower jaw strongly projecting. A pair of canine teeth in each jaw, lower pair between the two upper, in adults fitting into sockets in upper lip. No upper pores on snout; five conspicuous marginal; no conspicuous pores on lower jaw. Anal fin with 7 to 12 soft rays; second anal spine weak, about half length of longest soft ray. Scales cycloid or part cycloid, part finely ctenoid. Otolith (sagitta) about twice as long as wide, with a tadpole-shaped impression on its inner side of which the 'head' is oval and the 'tail' (or 'cauda') is long, J - shaped, not reaching the ventral edge. Vertebrae 25 (11 + 14).

Two species, both in Indian region.

## Key to species

- 1(a) Anal fin with 10 to 12 soft rays; anal fin inserted behind middle of soft dorsal fin; black blotches on dorsal fin and upper part of body.....  
..... *P. maculatus*
- (b) Anal fin with 7 or 8 soft rays; anal fin inserted before middle of soft dorsal fin; no black blotches on body..... *P. lateoides*

18. *Pterotolithus maculatus* (Kuhl & van Hasselt, 1830)  
(Text-fig. 18)

1830. *Otolithus maculatus* Kuhl and van Hasselt, in : Cuvier, *Hist. nat. Poiss.*, 5 : 64 (from a painting of a specimen from Java waters); Valenciennes, 1840, *Regne animale* : 80, pl. 27, fig. Cantor, 1850, *J. Asiat. Soc. Beng.*, 18 : 1044; Blyth, 1861, *J. Asiat. Soc. Beng.*, 29 : 139; Day, 1869, *Proc. zool. Soc. Lond.* : 300; Day, 1876, *Fishes of India* : 196, pl. 46, fig. 1; Bleeker, 1877, *Atlas Ichthyol. Indes-Orientales Neerl.* 9 : pl. 384, fig. 3; Day, 1889, *Fauna Br. India, Fishes*, 2 : 127, fig. 5; Lloyd, 1907, *Rec. Indian Mus.*, 1 : 226; Vinciguerra, 1926, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (3)10 : 581.
1830. *Otolithus bispinosus* Cuvier, *Hist. nat. Poiss.*, 5 : 65 (type-locality : Rangoon, Burma).
1861. *Otolithus submaculatus* Blyth, *J. Asiat. Soc. Beng.*, 29 : 139 (type-locality : ? Calcutta).
1931. *Otolithes maculatus* : Hardenberg, *Treubia*, 13 : 134; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 493; Munro, 1955, *Marine and Freshwater fishes of Ceylon* : 156, fig. 457; Mohan, 1972, *Indian J. Fish.*, 16 : 91.
1933. *Otolithes (Pterotolithus) maculatus* Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 359.
1974. *Pterotolithus maculatus* : Fischer and Whitehead, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Ptero 2; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 355; Mohan, 1981, *Indian J. Fish.*, 28 : 8, fig. 11, Talwar, 1984, *Handbook zool. Surv. India*, (4) : 673, fig. 272.

*Types* : Holotypes of *Otolithus bispinosus* : MNHN 7619, Rangoon (Burma).  
*Syntypes* of *Otolithus submaculatus* : ZSI Regd No. ?, 2 exs. coll. E. Blyth. Lost.

*Common name* : Blotched tiger-toothed croaker ... English.

*Description* : D IX + I 30-34; A II 10-12; P i 17; V I 5.

A fairly large and slender species, with the head profile low and horizontal or gently curved. Mouth large, oblique and terminal, its cleft at an angle of 60-70° with the horizontal; maxillary extending to below middle of eye; lower jaw strongly projecting, with a mental process. Operculum with two flat weak spines; edge of preoperculum entire, weakly serrate in young specimens.

*Proportions as % Standard length* : Depth of body 27.8—28.2; length of head 30.0—33.5; length of pectoral fin 19.0—22.7; and length of second anal spine 4.0—6.7.

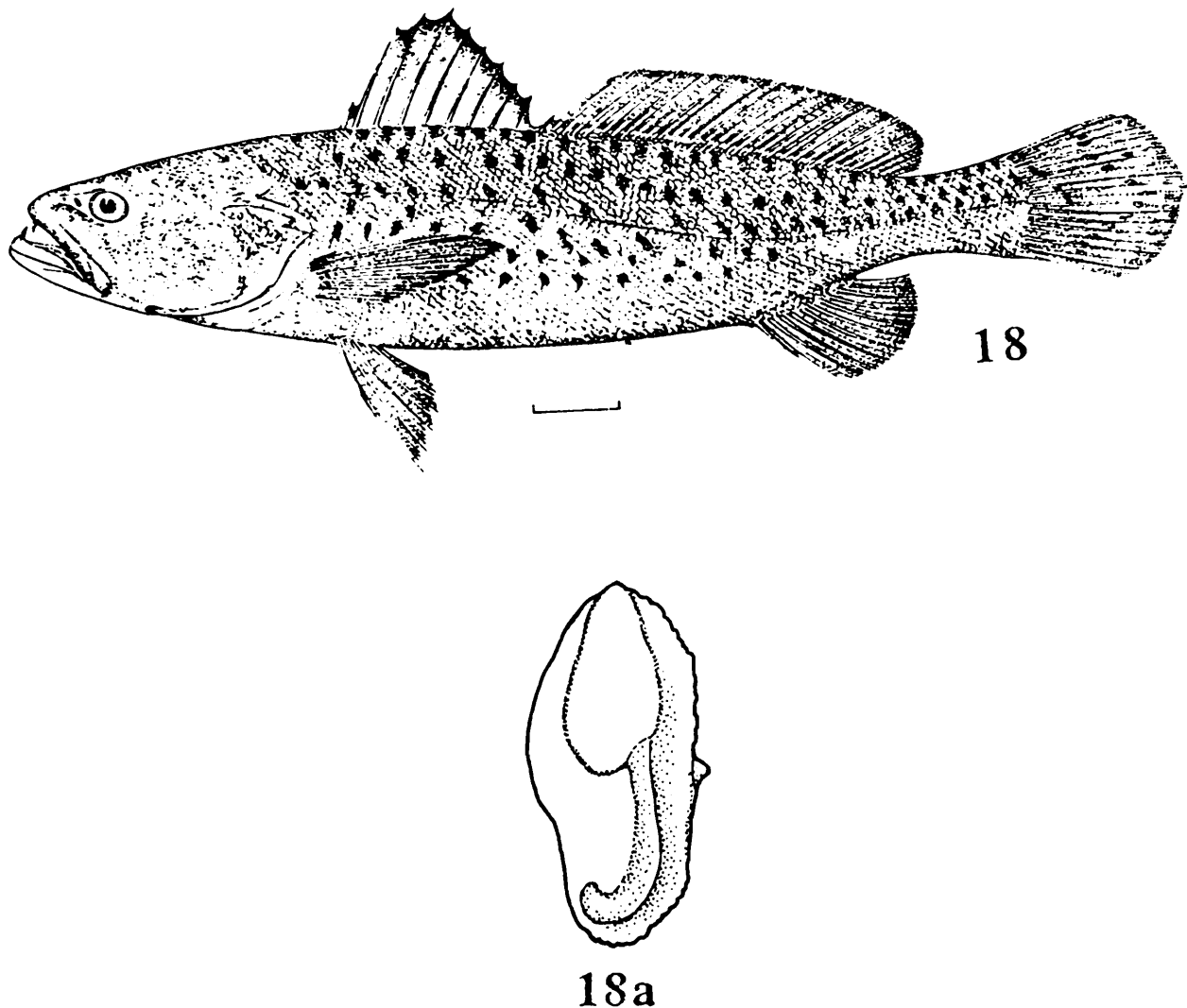


Fig. 18. *Pterotolithus maculatus* (Kuhl & van Hasselt); (ZSI Regd. No. F 7332/2).  
18a. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 18.0—21.5; length of snout 21.5—23.7; depth of preorbital bone 9.0—10.0; interorbital width 20.7—23.6; length of upper jaw 46.7—47.8; length of lower jaw 58.5—59.2; and length of second anal spine 16.2—16.9.

No rostral (upper) pores on snout; 5 inconspicuous marginal, outer pair weakly indenting edge. No conspicuous pores on lower jaw.

Gillrakers (3-4) + (9-12) on first arch, the one or two lowest mere denticulate stumps.

Teeth well differentiated in size in both jaws; in two or three rows in upper jaw, outer row enlarged with a pair of strong canines at tip of jaw, inner row/s of villiform teeth. In lower jaw a pair of strong canines at its symphysis; behind canines a row of few teeth  $\frac{1}{3}$  to  $\frac{1}{2}$  length of canines and more widely spaced than upper; between or outside them a sparse irregular row of much smaller teeth.

Scales cycloid; lateral line scales 47 to 51.

Dorsal fin with a deep notch; dorsal spines weak, third and fourth spines longest. Anal fin inserted behind middle or soft dorsal fin; second anal spine short and weak. Pectoral fins acutely rounded. Pelvic fins slightly shorter than pectoral fins, without a filament. Caudal fin rhomboid, pointed in young.

Gasbladder broad, oval, with a narrow point posteriorly, having 37 to 53 pairs of arborescent appendages which branch in a shallow wedge of tissue flanking the bladder; for the greater part of its length the appendages are very uniform and regular; each appendage arises by a stout trunk which curves upwards over the bladder lying on its dorsal surface in a curve concave in front and giving off branches of decreasing length and calibre, some or all with the dorsal twiglets extending on to dorsal surface of the bladder with a filigree of silvery tubules; twiglets of lower limbs forming a parallel series of tubules; no diverticula entering the head.

Otolith (sagitta) (Text-fig. 18a) with a tadpole-shaped impression on its inner side, the 'head' of which is in contact with the dorsal edge and the 'tail' (or 'cauda') is long J-shaped, not reaching the ventral edge.

Colour : in life, greyish above, silvery golden below, with a distinctive pattern of three or four rows of black blotches on the upper part of the body. Dorsal fin also with blotches; outer fins greyish. In young the characteristic blotch pattern is absent, but the body is pigmented, and the spinous dorsal, pectoral, pelvic and anal fins are very dark.

*Geographical distribution* : North-east coast of India, Burma, Malay Peninsula and Borneo.

Inhabits inshore and coastal waters.

*Remarks* : This distinctive sciaenid is common in the catches of the Orissa and West Bengal coast. It attains a length of 45 cm; common 30 to 40 cms. Caught with bottom trawls; gillnets and boat seines.

#### 19. *Pterotolithus lateoides* (Bleeker)

1850. *Otolithus lateoides* Bleeker, *Verh. batav. Genoot. Kunst. Wet.*, **23** : 16 (type-locality : Batavia); Bleeker, 1850, *Natuurk. Tijdschr. Ned.-Indie*, **1** : 98; Gunther, 1860, *cat. Fishes. Br. Mus.* **2** : 311; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, **14**(4) : 7; Bleeker, 1877, *Atlas Ichthyol. Indes-Orientales Neerl.*, **9** : pl. 384, fig. 1; Vinciguerra, 1926, *Annali Mus. Civ. Stor. nat. Giacomo Doria*, (3)**10** : 582.
1850. *Otolithus versicolor* (*nec* Cuvier) Cantor, *J. Asiat. Soc. Beng.*, **18** : 1045; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, **21** : 154.
1910. *Otolithus dolorosus* Seale, *Philippine Jour. Sci.*, **5**(D) : 280, pl. 3 (type-locality : Sandakan, North Borneo).
1933. *Otolithes versicolor* : Fowler, *Bull. U.S. nat. Mus.*, (100)**12** : 354.
1936. *Otolithes lateoides* : Weber and de Beaufort, *Fishes Indo-Australian archipelago*, **7** : 488; Druzhinin and Hlaing, 1972, *Proc. Indo-Pacific Fish. Coun.* : 155 (Burma).
1974. *Pterotolithus lateoides* : Fisher and Whitehead, *FAO species identification sheets for fishery purposes*, **3** : SCIAEN Ptero 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, **33** : 357, fig. 53.

*Types* : Holotype of *Otolithus dolorosus* : PBS 2485.

*Common name* : Bigmouth croaker ... English.

*Description* : D X + I 24-27; A II 7-8; P i 16; V I 5.

A slender species, its depth 4 to 5 times in standard length. Snout longer than eye diameter, its upper profile rising evenly and almost horizontal to dorsal-fin origin. Mouth large and oblique, the lower jaw projecting, slightly less than half of head length; maxillary ending below pupil.

No upper pores on snout; marginal pores five, the outer pair feebly notching the edge. No visible mental pores, but these possible represented by minute multiple pores.

Teeth in a single series in both jaws, with 1 or 2 pairs of strong canine in upper jaw and 1 pair at tip of lower jaw, the lower closing between the upper; behind these a row of moderately enlarged teeth in each jaw, and a second row of very small subsidiary teeth in upper jaw on oral side of the larger; tiny teeth in lower jaw very few, between or outside the larger.

Gillrakers 3 + 1 + 12 on first arch, the four lowest mere stumps.

Scales cycloid on head and breast and below pectoral fins, elsewhere finely ctenoid; lateral line scales 52 to 56.

Dorsal fin notched; dorsal spines fairly weak, third or fourth longest. Anal fin inserted before middle of soft dorsal, fin; second anal spine rather weak. Pectoral fins rather short. Caudal fin wedge-shaped, the middle rays prolonged.

Gasbladder carrot-shaped, with about 40 pairs of arborescent appendages, some of the dorsal branches of which are long and lie on the dorso-lateral surface of the bladder, none entering the head.

Otolith (sagitta) long and narrow, with a long J-shaped 'cauda' ('tail') not reaching the ventral edge.

*Colour* : In life, more or less greyish above, below and on sides silvery. Fins yellowish hyaline; a series of black or brown spots along soft dorsal fin.

*Geographical distribution* : Bangladesh, Burma, Malayasia, Indonesia and Borneo.

Inhabits coastal waters and mouths of rivers.

*Remarks* : This species is listed based on Druzhinin and Hlaing's (1972) listing from Burma, and Rainboth's (personal communication) report from Bangladesh. The above description is compiled from Fischer and Whitehead (1974) and Trewavas (1977) since I have not examined any specimens of this species.

#### Tribe (vii) NIBEINI

Gasbladder carrot-shaped with 14 to 26 pairs of diverticula, the first wholly or partly cephalic (except in *Protonibea*) and the last one to three parallel to the tubular end of bladder, which extends behind the vent (except in *Paranibea*); gasbladder appendages

without dorsal limb. Mental pores five, of which the median is the opening of a pair lying close together behind the symphysis, often joined by a crescentic groove. Second anal spine strong, 9 to 17% of Standard length. One or two rows of small scales along base of soft dorsal fin (up to four in *Paranibea*), which is otherwise naked Otolith (sagitta) with a tadpole pattern on its inner side of which the 'tail' (or 'cauda') bent sharply at about a right angle, its distal limb at least as long as its proximal and ending abruptly close to or cutting into the ventral edge. Vertebrae 25.

Seven genera, 5 in Indian region.

#### Key to genera

- 1(a) First (anterior) pair of arborescent appendages of gasbladder branching on posterior surface of transverse septum and not entering head; upper parts of body, dorsal and caudal fins usually with black spots .....  
.....*Protonibea*
- (b) Anterior pair of bladder appendage extending into head and branching between skull and upper gill arches..... 2
- 2(a) Teeth of lower jaw uniform, small or rather strong ..... 3
- (b) Teeth of lower jaw differentiated in size ..... 4
- 3(a) A median mental barbel present; teeth of lower jaw small .....  
.....*Dendrophysa*
- (b) No barbels; teeth of lower jaw rather strong .....*Paranibea*
- 4(a) A pair of mental barbels present .....*Daysciaena*
- (b) No barbels .....*Nibea*

#### Genus 14. *Protonibea* Trewavas, 1971

1971. *Protonibea* Trewavas, *J. Fish. Biol. Lond.*, 3 : 458 (type-species : *Lutjanus diacanthus* Lacepede).

**Definition** : Sciaenid fishes with a carrot-shaped gasbladder (Text-fig. 19a) bearing 16 to 22 pairs of arborescent appendages along sides, first (anterior) appendage behind transverse septum, last two diverticula small and simple, others branching but without dorsal limbs. Mouth large and forming a low angle to the horizontal. Teeth well-differentiated in size in both jaws, the inner row of lower and outer row of upper of enlarged teeth but no outstanding caninoids. Mental pores five, of which median is the opening of a pair lying close together behind the symphysis, joined by a semicircular groove; no barbels. Second anal spine moderate, 10 to 12% of Standard length. Otolith (sagitta), with a tadpole-shaped impression on its inner side, of which the 'head' is truncated the 'tail' (or 'cauda') is strongly curved, J-shaped, and very narrowly separated from ventral edge. Vertebrae 25 (10 + 15). Distinctive colour pattern of scattered dark spots on dorsal and caudal fins, and usually on the upper part of body too; black pectoral, pelvic and anal fins.

Monotypic.

20. *Protonibea diacanthus* (Lacepede, 1802)  
(Text-fig. 19)

1802. *Lutjanus diacanthus* Lacepede, *Hist. nat. Poiss.*, 4 : 240 (type-locality : ?).
1829. *Johnius cataleus* Cuvier, *Le Renge animale* (ed. 2), 2 : 173 (on Russell, 1803, pl. 116 ex Vizagapatnam); Bleeker, 1845, *Natuurk. Geneesk. Arch. Neerl.-Indie*, 2 : 523; Blyth, 1861, *J. Asiat. Soc. Beng.*, 29 : 141.
1830. "*Corvina catalea* nob.; *Lutjan diacantha* Lac." Cuvier, *Hist. nat. Poiss.*, 5 : 128, pl. 139.
1830. ? *Corvina platycephala* Kuhl & van Hasselt in : Cuvier, *Hist. nat. Poiss.*, 5 : 152 (type-locality : Java).
1830. *Corvina maculata* (nec Schneider) Cuvier (*partim*), *Hist. nat. Poiss.*, 5 : 126 (Malabar specimen only).
1834. *Corvina catalea* : Valenciennes, *Voyage aux Indes Orientales, Poissons* : 360; Richardson, 1846, *Rep. Br. Ass. Advmt. Sci.*, 15 : 207; Bleeker, 1849, *Verh. batav. Genoot. Kunst. Wet.*, 22(4) : 4; Bleeker, 1850, *Verh. batav. Genoot. Kunst. Wet.*, 23 : 18.
1848. *Johnius valenciennii* Eydoux and Souleyet, *Voyage La Bonite, zool.*, 1 : 159, pl 1, fig. 2 (type-locality : nr. Macao, China Sea).
1850. *Johnius diacanthus* : Cantor, *J. Asiat. Soc. Beng.*, 18(2) : 1049; Bleeker, 1857, *Natuurk. Tijdschr. Ned.-Indie*, 13 : 326; Kner, 1866, *Novara Exp., Fische*, (2) : 153; Fowler, 1926, *J. Bombay nat. Hist. Soc.*, 30(4) : 777; Fowler, 1929, *J. Bombay nat. Hist. Soc.*, 33(1) : 115; Fowler, 1930, *Proc. Acad. nat.Sci. Philad.*, 81 : 596; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100)12 : 374; Munro, 1955, *Marine Freshwater Fishes of Ceylon* : 153, fig. 447.
1860. *Sciaena diacanthus* : Gunther, *Cat. Fish. Br. Mus.*, 2 : 290; Day, 1865, *Proc. zool. Soc. Lond.* : 18; Day, 1876, *Fishes of India* : 189; Day, 1889, *Fauna Br. India, Fishes*, 2 : 118; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154; Seale, 1914, *Philippine J. Sci.*, 9(1) : 68; Vinciguerra, 1926, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (3)10 : 578; Pillay, 1929, *J. Bombay nat. Hist. Soc.* 33 : 366; Herre and Myers, 1931, *Lingnan Sci. J.*, 10 : 251; Taylor, 1963, *Rec. Am.-Austr. scient. Exped. Arnhem Land* : 218, Pl. 46.
1861. *Johnius maculatus* (nec Schneider) Blyth, *J. Asiat. Soc. Beng.*, 29 : 141; Blegvad and Loppenthin, 1944, *Dan. scient. Invest. Iran*, (3) : 131, fig. 71; Ahmad, 1971, *Rec. zool. Surv. Pakistan*, 2 : 137, fig.
1865. *Sciaena maculata* (nec Schneider) Day, *Fishes of Malabar* : 50.
1873. *Corvina diacanthus* : Bleeker, *Ned. Tijdschr. Dierk.*, 4 : 142.
1874. *Pseudosciaena diacanthus* : Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 27; Bleeker, 1877, *Atlas Ichthol. Indes-Orient. Neerland.*, 9 : pl.398, fig.2; Seale, 1910, *Philippine J. Sci.*, 5D : 279; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 515.
1915. *Sciaena goma* Tanaka, *Zool Mag. Tokyo*, 27 : 616 (type-locality : Nagasaki, Japan); Tanaka, 1916, *Figures and descriptions of the Fishes of Japan* : 392, pl.107, fig.327.
1930. *Corvina nigromaculata* Borodin, *Bull. Vanderbilt mar. Mus.*, 1 : 53, pl.2, fig.2 (type-locality : ? Saigon).
1933. *Johnius goma* : Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 374.
1935. *Nibea goma* Lin, *Bull. Chekiang prov. Fish. Exp. Stn.*, 1(1) : 15, fig.8; Matsubara, 1937, *J. Imp. Fish. Inst.*, 32(2) : 37; Lin, 1938, *Lingnan Sci. J.* 17(3) : 453.

1937. *Pseudosciaena goma* : Tang, *Amoy mar. Biol. Bull.*, 2(2) : 57, fig.3.  
 1937 *Pseudosciaena maculata* (nec Schneider), Tang, *Lingnan Sci. J.*, 17(4) : 544.  
 1938. *Nibea diacanthus* : Lin, *Lingnan Sci. J.*, 17 : 544; Chu, Lo and Wu, 1963, *fishes of China Monogr.* : 52, figs.29, 55, 81; Mohan, 1972, *Indian J. Fish.*, 16 : 93, fig.1B, 2D.  
 1945. *Sciaena antarctica rex* Whitley, *Austr. Zool.*, 11 : 26 (type-locality : Onslow, Western Australia).  
 1971. *Protonibea diacanthus* : Trewavas, *J. Fish. Biol. Lond.*, 3 : 458; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Proto 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 364; Mohan, 1981, *Indian J. Fish.*, 28 : 9, fig.12; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 670, fig.271; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Proto 1.

*Types* : Probable Holotype : MNHN 5539 (dry half skin), 180 mm standard length, "Ancienne Collection" (vide Trewavas, 1977).

*Common name* : spotted croaker ... English.

*Description* : D IX-X + I 22-25; A II 7; P i 17-18; V I 5.

A large and rather slender species. Snout acute. Mouth large and terminal; lower jaw closes within the upper in front but is barely overshoot by it; mouth makes a low angle with the horizontal; maxillary extends below the posterior half of eye. Operculum with two flat weak spines; edge of preoperculum weakly serrate, the angle only denticulate in the young.

*Proportions as % Standard length* : Depth of body 24.0—31.2; length of head 30.0—34.4; length of pectoral fin 18.2—25.0; and length of second anal spine 10.0—11.8.

*Proportions as % length of head* : Diameter of eye 18.0—21.8; length of snout 22.5—27.0; depth of preorbital bone 9.5—12.0; interorbital width 20.0—22.6; length of upper jaw 42.0—47.5; length of lower jaw 48.0-53.0; and length of second anal spine 31.0—32.5.

Snout with 3 rostral (upper) pores; marginal pores 5, one median slightly below central rostral and a pair along each side of rostral flap, only the outer marginal pair notching the edge. Mental pores three pairs; anterior pair close to symphysis and joined by a semicircular groove.

Gillrakers on first arch (4-6) + 1 + (5-8), lanceolate.

Teeth well differentiated in size in both jaws; outer series in upper jaw enlarged and spaced, anterior one or two pairs caniniform but no outstanding canines; in lower jaw the inner series of slightly enlarged teeth.

Scales cycloid on snout and below eyes, elsewhere ctenoid; lateral line scales 51 to 52.

Dorsal fin deeply notched; dorsal spines slender, third and fourth longest. Anal fin inserted below vertical from 7th dorsal soft-ray; second anal spine moderately strong, about half length of first soft ray. Pectoral fins acutely rounded, fairly small, a little more than half of head length. Caudal fin rhomboid.

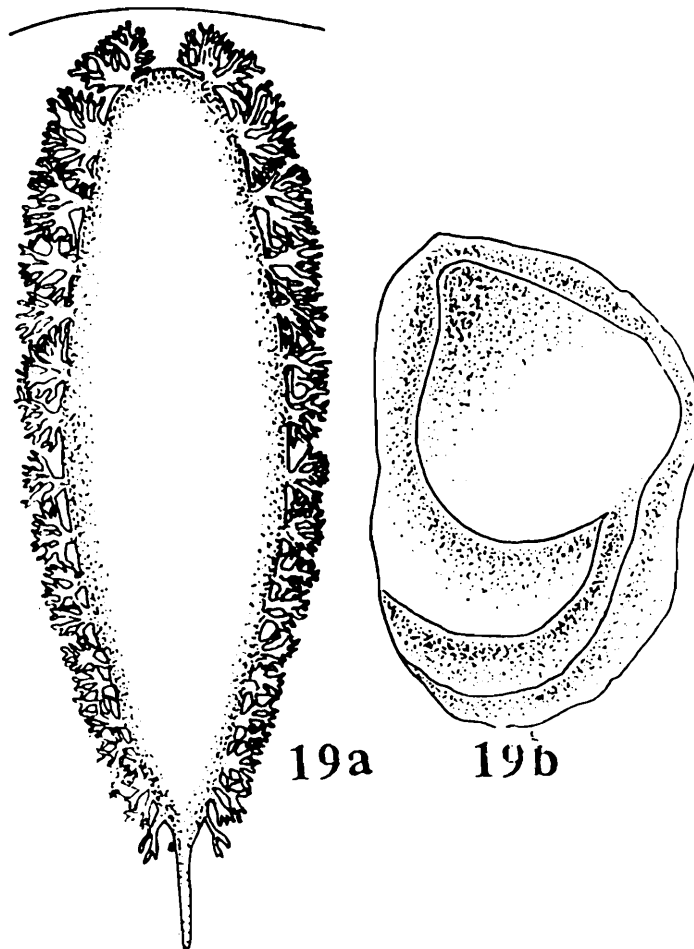
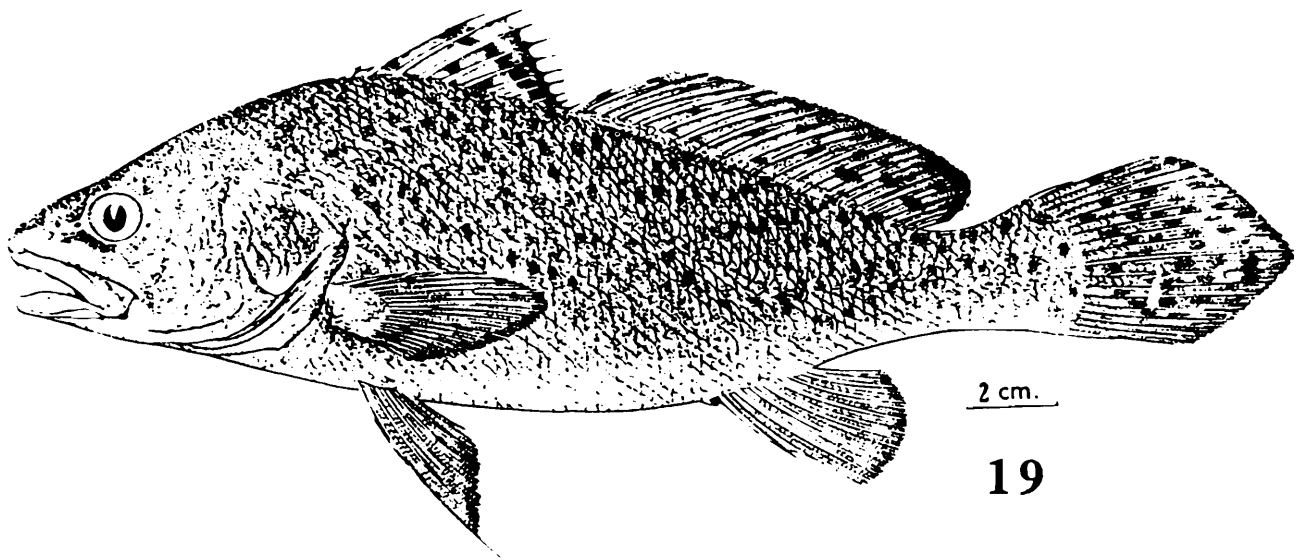


Fig. 19. *Protonibea diacanthus* (Lacepede); (ZSI Regd. No. F 7245/2). 19a. Systematic view of gasbladder. 19b. Sagitta (inner surface).

Gasbladder (Text-fig 19a) carrot-shaped bearing 16 to 20 pairs of appendages along sides of bladder, anterior pair branching in a fan-like manner on posterior surface of transverse septum but no entering head, last two pairs small and simple, rest arborescent but without dorsal limbs.

Otolith (sagitta) (Text-fig. 19b) having a tadpole-like pattern on its inner surface of which the 'head' is asymmetrically pouched and the 'tail' (or 'cauda') strongly curved, J-shaped, very narrowly separated from ventral edge, but not cutting into the edge.

Colour : In life, soiled drab-gray generally; five dark blotches along back, many smaller black spots (about size of pupil) on top of head, upper half of body and dorsal and caudal fins; pectoral, pelvic, anal and lower parts of caudal fins black; in larger fishes, either the five blotches or the smaller spots may be absent.

*Geographical distribution* : Gulf of Oman, Pakistan, India, Sri Lanka, Burma, through the East Indies, extending eastward to Western Australia, the Philippines, China and Japan.

Inhabits coastal waters, down to about 60 m depth, mainly over muddy bottoms.

*Fishery information* : This is primarily a species of muddy grounds, living off the sea-bed; forms a good fishery along the northwest coast of India and Pakistan. Main fishing seasons are from March to May and October to November. Caught with bottom set and drift gillnets, and bottom trawls. It attains a length of 120 cm; common to 70 cm.

#### Genus 15. *Dendrophysa* Trewavas, 1964

1964. *Dendrophysa* Trewavas, *Copeia*, (1) : 110 (type-species : *Umbrina russelli* Cuvier).

*Definition* : Sciaenid fishes having a carrot-shaped gasbladder with 14 to 17 pairs of arborescent diverticula, first (anterior) branching fanwise, wholly or partly cephalic, the last appendage simple of with a short branch; appendages without dorsal limbs. Mouth inferior, lower jaw shorter than upper; snout prominent. Mental pores five, of which the median is the opening of a pair lying close together behind the symphysis; a median mental barbel present. Teeth in upper jaw villose band, outer row slightly enlarged; teeth of lower jaw uniform, small. Second anal spine strong, 11.5 to 17% of Standard length. Scales ctenoid on body; one or two rows of small scales along base of soft dorsal fin, which is otherwise naked. Otolith (sagitta) with a tadpole-shaped impression on its inner side, of which the 'head' is truncated and the 'tail' (or 'cauda') is bent sharply at about right angle, its distal limb as long as its proximal and cutting into the ventral edge. Vertebrae 25 (10 + 15).

Monotypic.

#### 21. *Dendrophysa russelli* (Cuvier, 1830) (Text-fig. 20)

1803. *Labrus* sp. Russell, *Fishes of Vizagapatam*, 2 : pl. 118.

1830. *Umbrina russelii* Cuvier, *Hist. nat. Poiss.*, 5 : 178 (type-locality : Vizagapatnam) (inadvertent error in spelling of specific name).

1830. *Umbrina kuhlii* Cuvier, *Hist. nat. Poiss.*, 5 : 179 (type-locality : Java); Bleeker, 1845, *Natuurk. Geneesk. Arch. Neerl.-Indie*, 2 : 523; Bleeker, 1850, *Verh. batav. Genoot. Kunst. Wet.*, 23 : 19.
1839. *Umbrina russelli* : Cantor, *J. Asiat. Soc. Beng.*, 18(2) : 1053; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 278; Jordan and Seale, 1907, *Bull. U.S. Bur. Fish.*, 26 : 25; Evermann and Seale, 1907, *Bull. U.S. Bur. Fish.*, 26 : 87; Seale, 1910, *Philippine J. Sci.*, 5(4) : 279.
1846. *Umbrina russellii* : Richardson, *Rep. Br. Ass. Advmt. Sci.*, 15 : 226; Kner, 1866, *Novara Esp., Fische*, (2) : 131; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154.
1865. *Johnius kuhlii* : Bleeker, *Ned. Tijdschr. Dierk.*, 2 : 56.
1868. *Sciaena kuhlii* : Bleeker, *Versl. Meded. K. Akad. Wet. Amst.*, (2)2 : 292.
1874. *Sciaena russelli* : Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 58; Day, 1876, *Fishes of India* : 183, pl. 43, fig. 4; Bleeker, 1877, *Atlas Ichthyol. Indes-Orientales Neerl.*, 9 : pl. 386; Day, 1889, *Fauna Br. India*, Fishes, 2 : 110; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 54; Lin, 1938, *Lingnan Sci. J.*, 17(3) : 373; Munro, 1955, *Marine and Freshwater Fishes of Ceylon*: 153, fig. 444; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 42, figs 3a, 3b, 9, 24, 50, 76.
1964. *Dendrophysa russelli* : Trewavas, *Copeia*, (1) : 110; Mohan, 1972, *Indian J. Fish.*, 16 : 93; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Dend 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 367, fig. 55; Mohan, 1981, *Indian J. Fish.*, 28 : 9, fig. 13; Talwar 1984, *Handbook zool. Surv. India*, (4) : 642, fig. 253; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Dend 1.

*Types* : Iconotype : Russell, 1803, pl. 118 (Vizagapatnam). Neotype, designated by Trewavas (1964 : 111) : BMNH 1889.2.1.3087, Andamans, coll. F. Day.

*Common name* : Goatee croaker ... English.

*Description* : D X + I 25-28; A II 7; P i 16; V I 5.

A fairly small species with an oblong body. Snout rounded and projecting slightly before upper jaw. Mouth ventral; lower jaw shorter than upper, upper jaw less than half length of head; maxillary extending to vertical from posterior edge of pupil. Operculum with two flat weak spines; edge of preoperculum weakly serrated.

*Proportions as % Standard length* : Depth of body 29.2—33.0; length of head 28.3—33.0; length of pectoral fin 20.6—24.0; and length of second anal spine 11.5—17.0.

*Proportions as % length of head* : Diameter of eye 24.4—29.5; length of snout 28.0—30.5; depth of preorbital bone 18.5—21.8; interorbital width 21.8—23.2; length of upper jaw 36.2—37.7; length of lower jaw 37.6—42.0; length of second anal spine 38.5—39.8; and length of mental barbel 16.5—19.5.

Snout with 3 upper (rostral) pores; marginal pores 5, dividing the snout edge into lobes. Mental pores 5, one median and two lateral pairs; a solid; pointed and tapering barbel behind the median mental pore, the barbel 2/3rds to equal the diameter of eye.

Teeth of upper jaw a villose band with an outer series of slightly bigger teeth, not widely spaced; teeth of lower jaw uniformly small.

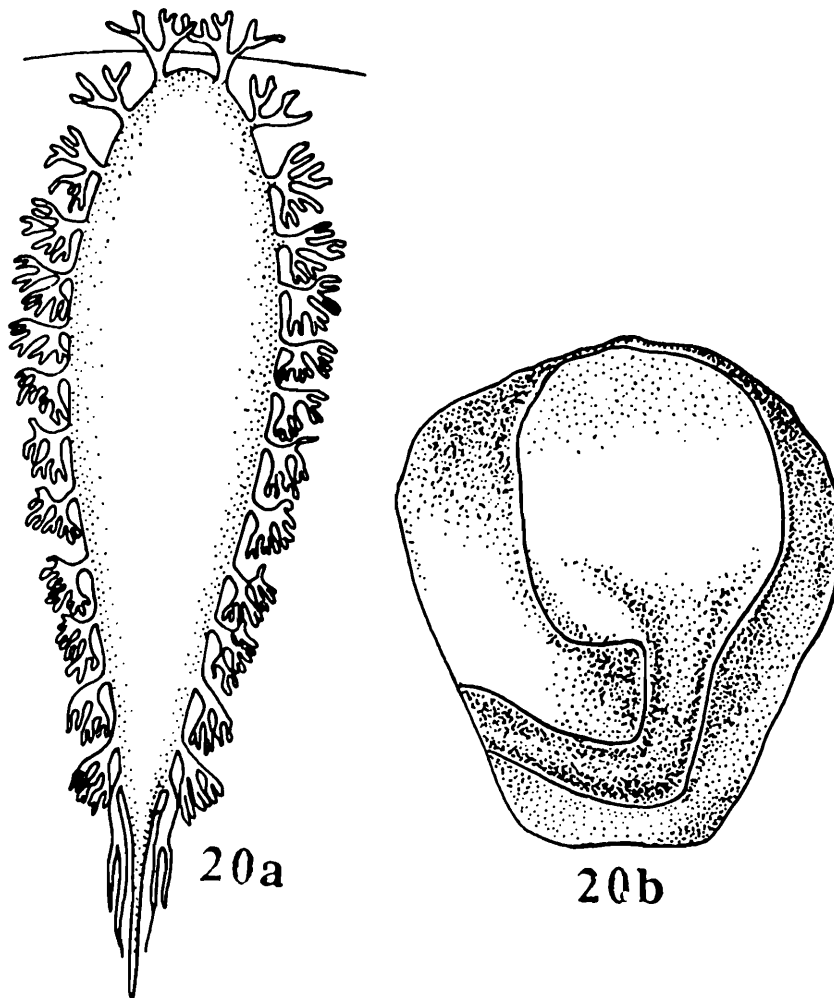
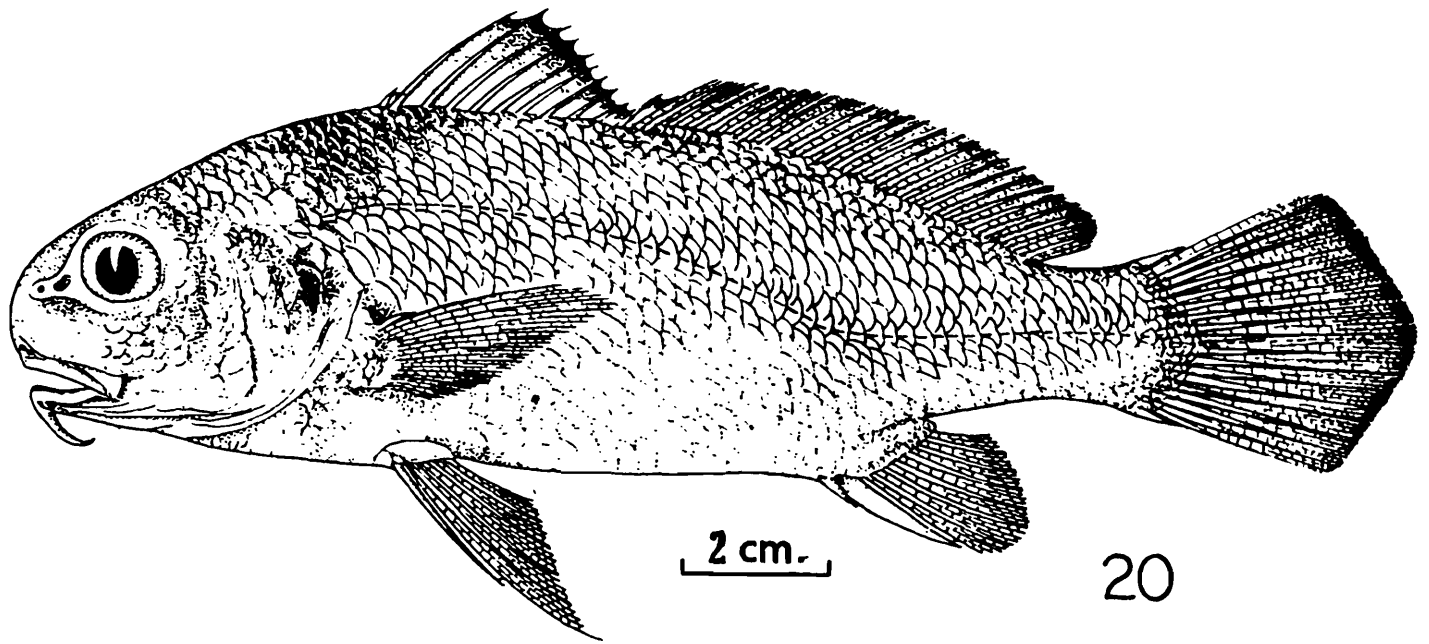


Fig. 20. *Dendrophysa russelli* (Cuvier); (ZSI Regd. No. F 7286/2). 20a. Systematic view of gasbladder. 20b. Sagitta (inner surface).

Gillrakers on first arch (4-5) + (8-10), short, those at extreme upper and lower ends mere denticulate stumps.

Scales cycloid on snout and below eye, elsewhere ctenoid; small cycloid scales between finrays on anal, and forming a sheath on lower quarter of soft dorsal fin; lateral line scales 46 to 49.

Dorsal fin deeply notched; dorsal spines fairly strong; third spine longest. Second anal spine strong, four-fifths of first soft rays. Pectoral fins moderately long, about 3/4ths of head length. Pelvic fin prolonged into a short filament. Caudal fin rhomboid.

Gasbladder (Text-fig 20a) carrot-shaped with 14 to 17 pairs of arborescent appendages, first branching fanwise, wholly or partly entering head and branching under skull among pharyngeal muscles; last diverticula simple or bifid; tubular end of bladder extending to base of second anal spine.

Otolith (sagitta) (Text-fig. 20b) with a tadpole-shaped impression on its inner surface of which 'head' is truncated, upright in position and in contact with the anterior margin, 'tail' (or 'cauda') strongly curved, J-shaped, its posterior end slightly curved and terminally cutting into the ventral edge.

Colour : in life, back grey, shading to silvery white on belly; a dark brown band on nape; opercle with a deep blue blotch. Upper two-thirds of spinous dorsal fin dusky; other fins pale; pelvic fin with white outer edge.

*Geographical distribution* : South-west coast and east coast of India, the Andamans, Sri Lanka, through the East Indies, to the Philippines, China and Australia.

Inhabits coastal waters, down to 40 m depth, often enters estuaries when sexually mature.

*Remarks* : Weber and de Beaufort (1936 : 544) explained that the specific name *indica* used for this species by Chaudhuri (1923) and Fowler (1933, 1934) is invalid, based on a false citation which should not be used again even in synonymy. This contention was accepted by Trewavas (1977).

*Fishery information* : This species is fairly common in the commercial catches in the Chilka Lake (Orissa), the east coast of India and the Andaman Sea. Caught with bottom trawls, gillnets and traps. It attains a length of 25 cm; common to 15 cm.

#### Genus 16. *Paranibea* Trewavas, 1977

1977. *Paranibea* Trewavas, *Trans. zool. Soc. Lond.* 33 (type-species : *Corvina semiluctuosa* Cuvier).

*Definition* : Sciaenid fishes with a carrot-shaped gasbladder, with 15 to 21 pairs of arborescent appendages, first diverticula fan-like and having an inner branch ramifying on posterior surface of transverse septum and four other branches in the head region; bladder does not extend posteriorly behind the vent. Mouth slightly inferior, with very thick papillose lips. Mental pores five. Teeth of lower jaw uniform in size, rather strong; teeth of upper jaw differentiated in size, outer row moderately enlarged but no canines. Dorsal fin with a shallow embayment between spinous and soft parts; second

anal spine strong, 11.0 to 14.5% of Standard length. Scales unusually rough, cycloid on snout and below eyes. Otolith (sagitta) with a tadpole-shaped impression on its inner side of which the 'head' is pear-shaped and joined by a narrow stem to the broad, deep 'tail' (or 'cauda') which ends close to the ventral edge.

Monotypic.

22. *Paranibea semiluctuosa* (Cuvier, 1830)  
(Text-fig. 21)

1830. *Corvina semiluctuosa* Cuvier, *Hist. nat. Poiss.*, 5 : 106 (type-locality : Malabar, Goa and Pondicherry); Bleeker, 1845, *Natuurk. Geneesk. Arch. Neerl.-Indie*, 2 : 522; Day, 1865, *Fishes of Malabar* : 53; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154.
1866. *Johnius semiluctuosus* : Kner, *Novara Exp., Fische*, (2) : 124; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 54; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 535; Misra, 1963, *Fishes of China Monogr.* : 22; ? Rajan Patnaik and Basu, 1969, *J. zool. Soc. India*, 20(1/2) : 88.
1876. *Sciaena semiluctuosa* : Day, *Fishes of India* : 191; Day, 1889, *Fauna Br. India*, *Fishes*, 2 : 121; Zugmayer, 1913, *Abh. bayer Akad. Wiss.*, 26(6) : 12.
1971. *Nibea semiluctuosa* : Trewavas, *J. Fish. Biol. Lond.*, 3 : 457; Mohan, 1972, *Indian J. Fish.*, 16 : 93; Talwar, 1973, *J. Bombay nat. Hist. Soc.*, 70(1) : 212; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Nib 5; Mohan, 1981, *Indian J. Fish.*, 28 : 10, fig. 14.
1977. *Paranibea semiluctuosa* : Trewavas, *Trans. zool. soc. Lond.*, 33 : 370, fig. 56; Talwar, 1984, *Handbook zool. surv. India*, (4) : 667, fig. 269; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Paranib 1.

*Types* : Lectotype : MNHN 7573, one ex., 226.5 mm Standard length, off Goa, coll. Dussumier; designated by Trewavas (1977 : 370). Paralectotypes : MNHN 7573 and MNHN 7592.

*Common name* : Half-mourning croaker ... English.

*Description* : D IX - X + I 27-31; A II 7; P i 18; V I 5.

A fairly small species, with the dorsal profile much more arched than ventral; profile straight from tip of snout to occiput. Mouth slightly inferior and at a low angle to the horizontal. Snout moderately acute, slightly projecting before upper jaw when mouth is closed and upper jaw well before lower; lips thick and papillose. Operculum with two flat weak spines; edge of preoperculum serrated.

*Proportions as % Standard length* : Depth of body 30.2—35.5; length of head 31.0—33.7; length of pectoral fin 20.0—23.2; and length of second anal spine 11.0—14.5.

*Proportions as % length of head* : Diameter of eye 18.2—20.6; length of snout 26.0—30.5; depth of preorbital bone 15.2—16.5; interorbital width 20.2—22.7; length of upper jaw 38.5—41.0; length of lower jaw 38.7—42.6; and length of second anal spine 47.6—48.7.

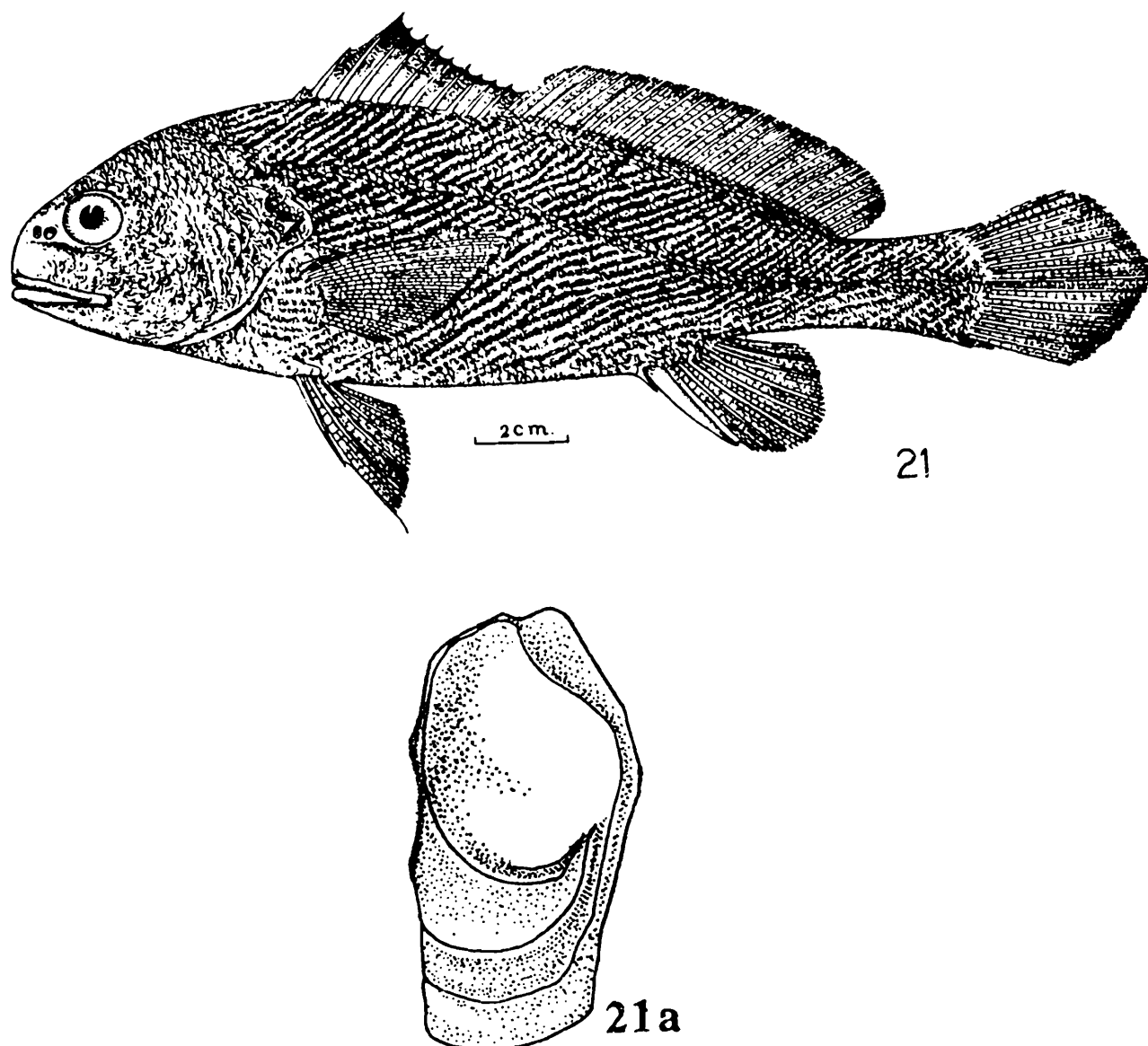


Fig. 21. *Paranibea semiluctuosa* (Cuvier); (ZSI Regd. No. F 7357/2). 21a. Sagitta (inner surface).

Snout with 3 minute rostral (upper) pores and 5 marginal (lower) pores, marginal pores big and sometimes dividing the edge into lobes. Mental pores 5, the median single and followed by conspicuous pairs on either side posterior to it.

Gillrakers (4-5) + (7-9) on first arch, short near the joint, grading above and below through dentate bosses to dentate plates.

Teeth differentiated in size in upper jaw only, with an outer row of moderately enlarged and spaced teeth, and a narrow band of small teeth inside them; lower jaw with teeth in a band divided at symphysis and tapering posteriorly, some of outer anterior slightly larger than rest, but no sharp differentiation in size, all about size of enlarged teeth of upper jaw; no canine teeth. All teeth embedded in a mass of papillae.

Scales cycloid on snout, below eyes and at extreme anterior end of breast, elsewhere rather coarsely ctenoid, this and the fact that most scales are thickened with granular

bone centrally making the fish rough to touch. Base of soft dorsal fin thickly scaled, forming a basal sheath; base of anal fin also thickly scaled. Lateral line not prominent, with 49 to 53 scales.

Dorsal fin superficially notched; dorsal spines weak, third longest. Second anal spine stout, its length 1.1—1.3 times in longest soft ray, up to half of head length. Pectoral fins moderate. Pelvic fin with a short filament. Caudal fin rounded or bluntly rhomboid.

Gasbladder carrot-shaped, ending posteriorly at or before level of vent, with 15 to 21 pairs of arborescent appendages; first appendage has an inner branch ramifying on posterior surface of transverse septum and four other branches in head region, each forked once or twice; posterior appendage parallel to main bladder which tapers gradually.

Otolith (sagitta) (Text-fig. 21a) with a tadpole-shaped impression on its inner side of which the 'head' is big and pear-shaped, joined by a narrow stem to the broad, deep 'tail' (or 'cauda'), which ends close to, but not cutting into the ventral edge.

Colour : in life, dark brown with series of narrow dark stripes along the scale-rows covering the whole body except a narrow strip on the belly. Fins dark; pelvic and anal fins very dark.

*Geographical distribution* : India and eastwards to Sumatra and Java.

Inhabits coastal waters.

*Fishery information* : This distinctive sciaenid fish forms a fishery along the north-west coast of India. It attains a length of 40 cm; common to 30 cm. Caught with bottom trawls, gillnets and handlines.

#### Genus 17. *Daysciaena* Talwar, 1970

1970. *Daysciaena* Talwar, *Proc. zool. Soc., Calcutta*, 23 : 192 (type-species : *Corvina albida* Cuvier).

*Definition* : Sciaenid fishes with a carrot-shaped gasbladder extending behind the vent to the anal spines, having 17 to 19 pairs of arborescent appendages (except the last tubule which is simple), first (anterior) pair fan-like, partly cephalic sending some of its twiglets into head. Mouth terminal, or slightly inferior. Snout with 3 upper and 5 marginal pores; mental pores 5, of which the median is the opening of a pair lying close together behind the symphysis; a pair of minute barbels present between the median and anterior lateral pores. Teeth differentiated in size in both jaws, inner posterior teeth of lower jaw enlarged and spaced, but shorter than outer row of upper jaw. Second anal spine strong, 11.7 to 15.5% of Standard length. No specialised scales. Otolith (sagitta) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and the 'tail' (or 'cauda') is strongly curved and ends very close to the ventral edge without cutting into it.

Monotypic.

23. *Daysciaena albida* (Cuvier, 1830)  
(Text-fig. 22)

1830. *Corvina albida* Cuvier, *Hist. nat. Poiss.*, 5 : 93 (type-locality : Pondicherry and Malabar); Valenciennes, 1834, *Voyage aux Indes Orientales* : 355; Day, 1865, *Fishes of Malabar* : 54.
1865. *Corvina neilli* Day, *Fishes of Malabar* : 55 (type-locality : Cochin).
1876. *Sciaena albida* : Day, *Fishes of India* : 188, pl. 44, figs. 4 & 6; Day, 1889, *Fauna Br. India, Fishes*, 2 : 117; Pillay, 1929, *J. Bombay nat. Hist. soc.*, 33 : 366; ? Hardenberg, 1931, *Treubia*, 13(1) : 131.
1923. *Sciaena coibor* (nec Hamilton-Buchanan) Chaudhuri, *mem. Indian Mus.*, 5 : 724.
1933. *Johnius coibor* (nec Hamilton-Buchanan) : Fowler (partim), *Bull. U.S. natn. Mus.*, (100)12 : 378; Munro, 1955, *Marine Fresh Water Fishes Ceylon* : 154, fig. 149.
1934. *Johnius coiber* (sci) (nec Hamilton-Buchanan) Hardenberg, 1934, *Treubia*, 14 : 309.
1936. *Pseudosciaena coibor* (nec Hamilton-Buchanan) Weber and de Beaufort, *Fishes, Indo-Australian archipelago.*, 7 : 517, fig. 103 (after Day); Hardenberg, 1936, *Treubia*, 15 : 252; Misra, 1962, *Rec. Indian Mus.*, 57 : 267.
1969. *Dendrophysa hoogliensis* Sinha and Rao, *Copeia*, (1) : 77 (type-locality : Hooghly estuary at Calcutta); Rao and Sinha, 1969, *J. mar. biol. Ass. India*, 10(1) : 74, figs 1a,b.
1969. *Nibea albida* : Mohan, *Curr. Sci.*, 38 : 295; Mohan, 1981, *Indian J. Fish.*, 28 : 11, fig. 15; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Nib 7.
1970. *Dendrophysa albida* : Talwar, *Proc. Indian Acad. Sci.*, 72 : 201, pl. 1; Talwar, 1972, *Rec. zool. Surv. India*, 67 : 215.
1970. *Daysciaena albida* : Talwar, *Proc. zool. Soc., Calcutta*, 23 : 192; Trewavas, 1971, *J. Fish. Biol. Lond.*, 3 : 454; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Daysc 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 372, fig. 55; Talwar, 1984; *Handbook zool. Surv. India*; (4) : 640, fig. 252.

*Types* : Syntypes : MNHN 7523 and 8825 from Malabar; MNHN 9805 from Pondicherry. Holotype of *Dendrophysa hoogliensis* : ZSI F 5843/2. Paratypes of *Dendrophysa hoogliensis* : ZSI F 5844/2 (two exs); BMNH 1967.7.31. 12-15 (four exs); USNM 203 and 256.

*Common name* : Two-bearded croaker ... English.

*Description* : D IX-X + I 23-36; A II 7; P i 17; V I 5.

A fairly large species, with an oblong body. Snout rounded, projecting only slightly beyond tip of upper jaw. Mouth terminal, or only slightly inferior; maxilla extending to below vertical from last third of eye-diameter. Interorbital spaces flat. Operculum with two weak spines; edge of preoperculum weakly serrated.

*Proportions as % Standard length* : Depth of body 2.0—31.4; length of head 28.3—32.0; length of pectoral fin 19.6—23.5; and length of second anal spine 11.7—15.5.

*Proportions as % length of head* : Diameter of eye 18.5-21.6; length of snout 23.0—27.0; depth of preorbital bone 10.0—12.0; interorbital width 20.0—22.2; length of upper jaw 43.2—47.0; length of lower jaw 48.5—52.6; and length of second anal spine 47.2—48.6.

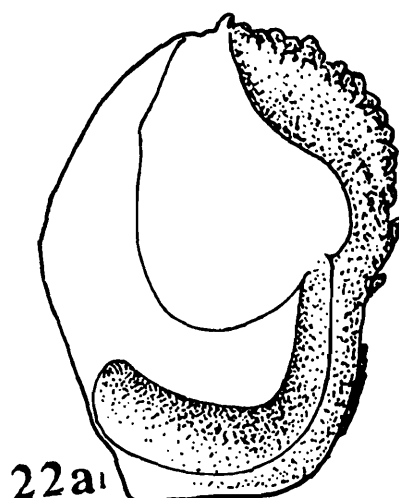
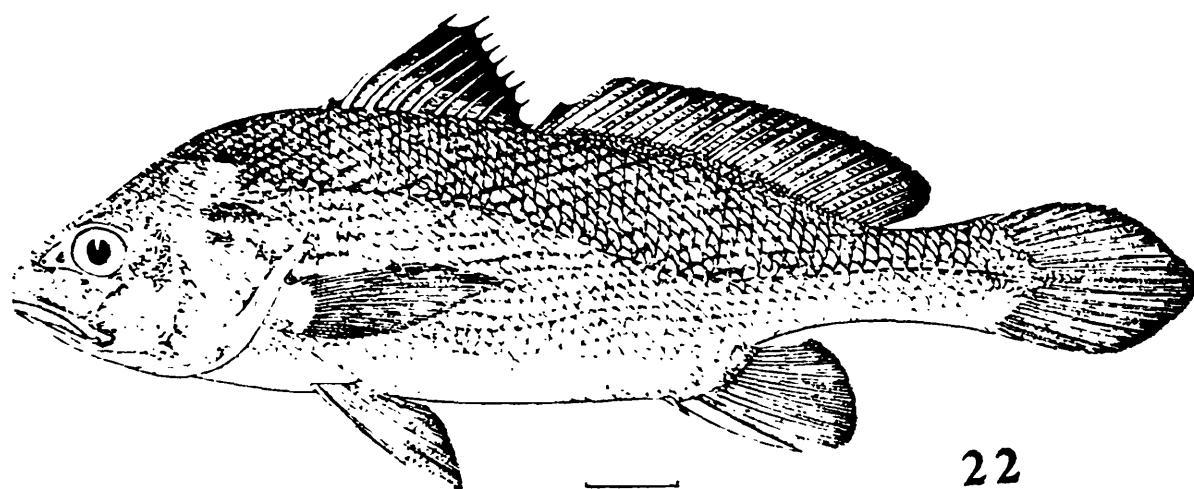


Fig. 22. *Daysciaena albida* (Cuvier); (ZSI Regd. No. F 7282/2). 22a. Sagitta (inner surface).

Snout with 3 upper pores and 5 at edge of rostral flap, median just above edge and two lateral pairs under it. Pores on lower jaw 5 ("false-five" pattern), of which median is the opening of pair lying close together behind symphysis; a pair of minute tapering barbels situated between median pore and anterior lateral pores.

Gill-rakers (5-7) + (7-10) on first arch, with several toothed plates below.

Teeth differentiated in size in both jaws (particularly the upper jaw), outer row of upper and inner posterior teeth of lower jaw enlarged and spaced; no canines or outstanding caninoids.

Scales cycloid on front part of head and lower part of dorsal and anal fins, elsewhere ctenoid; lateral line scales 48—51. Two rows of scales along bases of soft dorsal fin and anal fin.

Dorsal fin deeply notched; dorsal spines moderately strong, third longest. Second anal spine long and strong, about four-fifths of first soft ray. Pectoral fins moderately long, about 3/4ths of head length. Caudal fin bluntly rhomboid in adults (wedge-shaped in juveniles).

Gasbladder carrot-shaped extending behind the vent to the anal spines, with 17 to 19 pairs of arborescent appendages (except posterior pair which is small), some of twiglets of first (anterior) diverticula pierce transverse septum and branch in head region between skull and upper gull-arches surrounded by the various ligaments, blood vessels and muscles.

Otolith (sagitta) (Text-fig. 22a) with a tadpole-shaped impression on its inner side of which the 'head' is truncated, upright in position and in contact with the anterior margin, 'tail' (or 'cauda') is strongly curved, J-shaped, and abruptly close to the ventral edge without cutting into it.

Colour : In life, 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 dusky in adults; pectoral, pelvic and caudal fins yellowish; a black blotch at axil of pectoral fins.

*Geographical distribution* : India and Sri Lanka, and extending possibly eastwards to Borneo.

Inhabits shallow coastal waters and estuaries, ascending backwaters.

*Fishery information* : This sciaenid contributes an important fishery in the Hooghly estuary (West Bengal) and in the backwaters of Kerala. It attains a length of 90 cm. Caught with bottom trawls; gillnets and handlines. Marketed fresh; also dried salted; gasbladder dried.

#### Genus 18. *Nibeia* Jordan & Thompson, 1911

1911. *Sciaena (Nibeia)* Jordan and Thompson, *Proc. U.S. natn. Mus.*, 39 : 246 (type-species : *Pseudotolithus mitsukurii* Jordan & Snyder).

1977. *Nibeia* Trewavas, *Trans. zool. Soc. Lond.*, 33 : 375 (genus recognised).

*Definition* : Sciaenid fishes with a carrot-shaped gasbladder bearing a series of arborescent diverticula along its length, anterior (first) appendage partly or (usually) wholly cephalic, its cephalic part consisting of trunk curved towards the mid-line and branching from its tip and convex side; posteriorly one or more diverticula are simple and parallel to the tubular end of the bladder, which extends beyond the vent to the base of anal spines, to which it is bound by connective tissue. Mouth terminal; teeth differentiated in size in both jaws, inner row in lower jaw and outer row in upper jaw of enlarged teeth, but no outstanding caninoids. Mental pores five; no barbels. Second anal spine strong, 8.5 to 17.0% of Standard length. Otolith (sagitta) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and the 'tail' (or 'cauda') is a deep groove, strongly curved and ending by cutting into the ventral edge. Vertebrae 10 + 15.

Six species, 3 in Indian region.

## Key to species

- 1(a) A distinctive colour pattern of 4 or 5 broad, dark, broken bands/bars extending obliquely from back to lower part of flanks, and a blotch on top of caudal peduncle.....*N. maculata*  
 (b) No distinctive colour pattern on body.....2  
 2(a) Soft dorsal finrays 28 to 31.....*N. soldado*  
 (b) Soft dorsal finrays 24.....*N. chui*

24. *Nibea chui* Trewavas, 1971  
 (Text-fig. 23)

? 1860. *Sciaena albida* (nec Cuvier) Gunther (*partim*), *Cat. Fishes Br. Mus.*, 2 : 304 (China).

1863. *Pseudosciaena albida* (nec Cuvier) Bleeker, *Ned. Tijdschr. Dierk.*, 1 : 145.

1963. *Nibea coibor* (nec Hamilton-Buchanan) Chu, Lo and Wu (*partim*), *Fishes of China Monogr.* : 48, figs 26 (?), 52, 78.

1971. *Nibea chui* Trewavas, *J. Fish. Biol. Lond.*, 3 : 456 (type-locality : Hong Kong and Japan); Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Nib 2; Jayaprakash, 1975, *Indian J. Fish.*, 22 : 261, fig. 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 377, pl. 5, fig. 55; Mohan, 1981, *Indian J. Fish.*, 28 : 12; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 657, fig. 262.

*Types* : Syntypes : BMNH 1939.1.17.7-8 (two exs.), Hong Kong, coll. Herlots.

*Common name* : Chu's croaker ... English.

*Description* : D IX + I 24; A II 7; P i 17; V I 5.

A large-sized species, with an evenly rounded head profile but slightly concave before eyes. Mouth terminal; jaws meeting equally in front; maxilla extending to below vertical from hind edge of eye. Operculum with two flat weak spines; edge of preoperculum with some rather widely spaced serrations, particularly at its angle.

*Proportions as % Standard length* : Depth of body 30.6; length of head 31.6; length of pectoral fin 20.5; and length of second anal spine 13.7.

*Proportions as % length of head* : Diameter of eye 16.6; length of snout 24.2; depth of preorbital bone 13.6; interorbital width 22.0; length of upper jaw 41.4; length of lower jaw 49.7; and length of second anal spine 40.0.

Snout with 3 inconspicuous rostral (upper) pores and 5 marginal pores, outer marginal pair in a weak notch. Mental pores 5, median composed of two united by a crescentic groove just behind symphysis.

Gill-rakers on first arch 6 + 1 + 11; above and below them some flat tooth-plates.

Teeth well-differentiated in both jaws; teeth of upper jaw with an outer series moderately enlarged and a narrow band of small ones inside them; lower jaw with a group of subequal teeth in front, and behind these a row of large teeth (but not as long as the upper) with an irregular row of small teeth outside them. All teeth embedded in a mass of papillae.

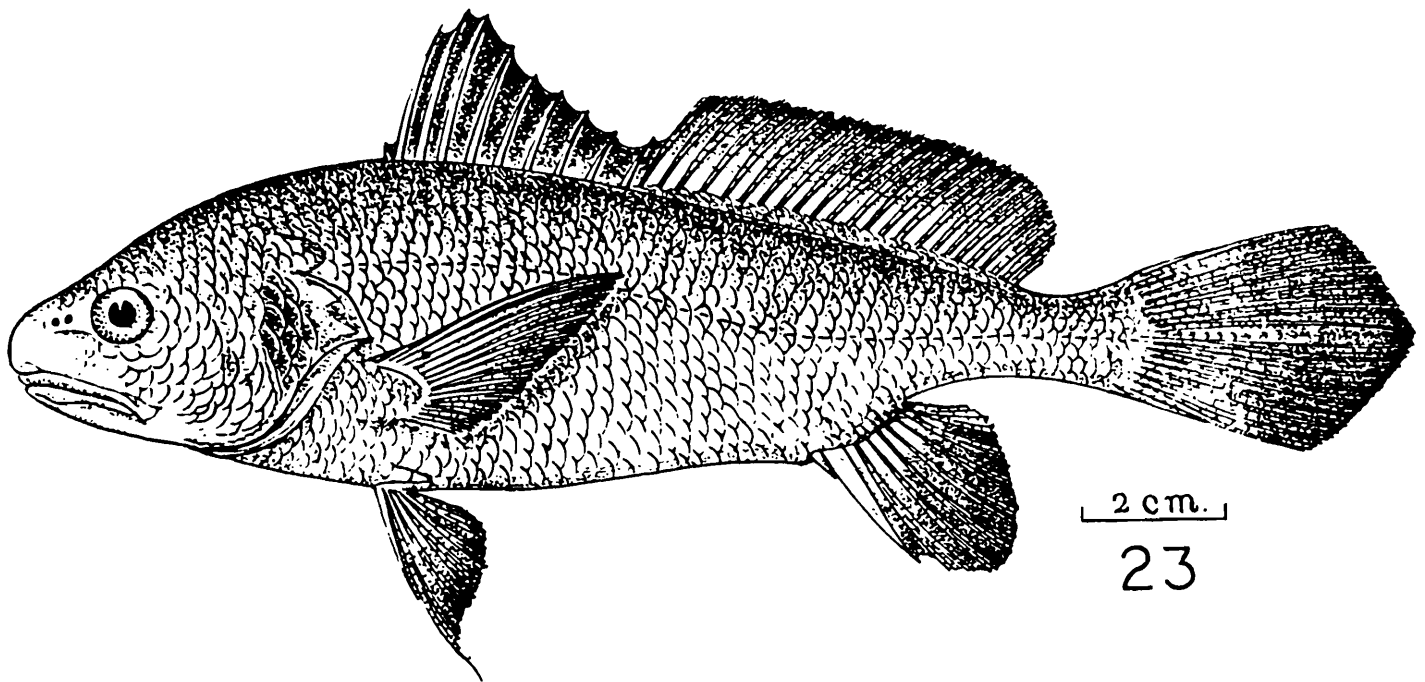


Fig. 23. *Nibea chui* Trewavas.

Scales cycloid on snout and on lower part of head, ctenoid on top of head and body; a double row of scales along base of dorsal fin; lateral line scales 50.

Dorsal fin deeply notched; dorsal spines moderately strong. Second anal spine long and strong, about half of head length. Pectoral fins moderate. Caudal fin rhomboid.

Gasbladder carrot-shaped, with 19 pairs of appendages, the first long and extending into head and branching under occipital region of skull, the last appendage simple and parallel to tubular end of bladder, the others arborescent but with no dorsal limb.

Colour : In life, silvery grey. Spinous dorsal fin dusky at margin.

*Geographical distribution* : India : Bombay; and Chinese, Korean and Japanese waters.

Inhabits coastal waters, down to 40m.

*Remarks* : The above description is based on the female specimen, 313 mm standard length, from Bombay collected by Jayaprakash (1975) and presently in the collections of the Central Marine Fisheries Research Institute, Mandapam Camp. No further specimens have been collected or observed.

25. *Nibea soldado* (Lacepede, 1802)  
(Text-fig. 24)

1802. *Holocentrus soldado* Lacepede, *Hist. nat. Poiss.*, 4 : 344, 389 (type-locality : ? East Indies).

1829. *Corvina miles* Cuvier, *Le Regne Animale* (ed. 2) 2, : 173 (on 'Tella katcheke' of Russell, 1803, pl. 117-ex. Vizagapatnam); Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 300; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154; Borodin, 1930, *Bull. Vander-bilt mar. Mus.*, 1 : 54.

1830. *Sciaena miles* : Cuvier, *Hist. nat. Poiss.*, 5 : 94; Day, 1869, *Proc. zool. Soc. Lond.* : 300; Day, 1876, *Fishes of India* : 185, pl. 43, fig. 5; Day, 1889, *Fauna Br. India, Fishes*, 2 : 113; Lloyd, 1907, *Rec. Indian Mus.*, 1 : 226.
1850. *Corvina soldado* : Cantor, *J. Asiat. Soc. Beng.*, 18(2) : 1052.
1851. *Corvina wolffii* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 2 : 66 (type-locality : Bandjermassing, Borneo).
1852. *Corvina sampitensis* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 3 : 421 (type-locality: Sampit, Borneo).
1854. *Corvina celebica* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 7 : 244 (type-locality: Celebes); Bleeker, 1860, *Verh. natuurk. Ver. Ned.-Indie*, 8(4) : 12.
1859. *Johnius soldado* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 17 : 145; Fowler (partim), 1933, *Bull. U.S. natn. Mus.*, (100)12 : 392; Fowler, 1937, *Proc. Acad. nat. Sci. Philad.*, 89 : 240.
1859. *Johnius miles* : Bleeker, *Natuurk. tijdschr. Ned.-Indie*, 18 : 364; Bleeker, 1860, *Verh. natuurk. Ver. Ned.-Indie*, 8(4) : 12; Fowler, 1925, *J. Bombay nat. Hist. Soc.*, 30(2) : 320; Fowler, 1927, *J. Bombay nat. Hist. Soc.*, 32(2) : 260.
1860. *Johnius wolffii* : Bleeker, *Verh. natuurk. Verh. Ned.-Indie*, 8(4) : 12.
1860. *Johnius sampitensis* : Bleeker, *Verh. naturrk. Verh. Ned.-Indie*, 8(4) : 12.
1874. *Pseudosciaena miles* : Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 25; Bleeker, 1877, *Atlas Ichthyol. Indes Orientales Neerland.*, 9 : pl. 385, fig. 3.
1879. *Sciaena mulleri* Steindachner, *Denkschr. Akad. Wiss. Wien*, 41(1) : 1 (type-locality : Queensland, Australia).
1880. *Sciaena (Corvina) mulleri* : Klunzinger, *Sber, Akad. Wien*, 80(1) : 372.
1884. *Corvina argentea* Macleay, *Proc. Linn. Soc. N.S. Wales*, 8(1) : 372 (type-locality: Queensland, Australia).
1884. *Umbrina mulleri* : Macleay, *Proc. Linn. Soc. N.S. Wales*, 9 : 23.
1918. *Sciaena leptolepis* Ogilby, *Mem. Qd. Mus.*, 6 : 87, pl. 25 (type-locality : Croker Is., N. Territory, Australia).
1918. *Sciaena soldado* : Ogilby, *Mem. Qd. Mus.*, 6 : 81, pl. 24 (type of *Corvina argentea* Macleay).
1936. *Pseudosciaena soldado* : Weber and De Beaufort, *Fishes Indo-Australian archipelago*, 7 : 521, Tang, 1937, *Amoy mar. biol. Bull.*, 2(2) : 71; Hardenberg, 1941, *Treubia*, 18 : 229; Misra, 1962, *Rec. Indian Mus.*, 57 : 369; Taki, 1974, *Fishes of Mekong basin* : 194, fig. 182; Orsi, 1974, *Bull. Seto Mar. biol. Lab.*, 21(3/4) : 169.
1963. *Wak soldado* : Chu, Lo and Wu, *Fishes of China Monogr.* : 29, fig. 15.
1968. *Nibea soldado* : Dutt and Thankam, *J. Bombay nat. Hist. Soc.*, 65(2) : 341, pl. 7; Mohan, 1972, *Indian J. Fish.*, 16 : 93; Trewavas, 1971, *J. Fish. Biol. Lond.*, 3 : 458; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Nib 6; Trewavas, 1977, *Trans. zool. soc. Lond.*, 33 : 378, fig. 55; Mohan, 1981, *Indian J. Fish.*, 28 : 12, fig. 17; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 659, fig. 264; Mohan, and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Nib 6.

*Types* : Holotype : MNHN 7606 (skin). Holotype of *Corvina miles* Cuvier : MNHN 5550 (Skin). Holotype of *Corvina wolffii* Bleeker : RMNH 5982. Syntypes of *Corvina sampitensis* Bleeker : RMNH 5982 (2 ex). Holotype of *Corvina celebica* Bleeker : RMNH 5982. Holotype of *Sciaena leptolepis* Ogilby : Queensland museum I 1534. Syntypes of *Corvina argentea* Macleay : AMI 14578-81, A 1824, A 18243-5.

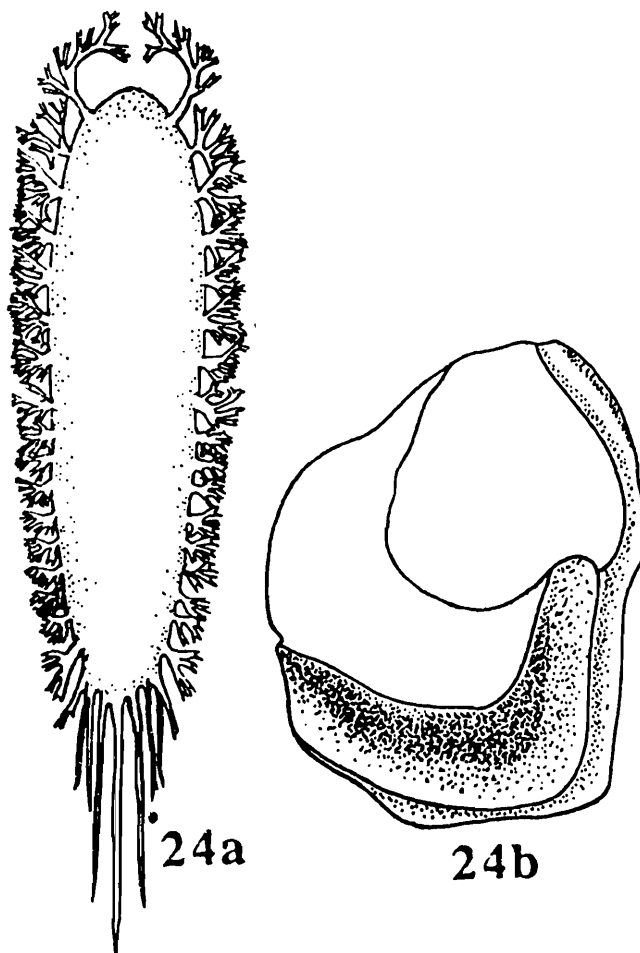
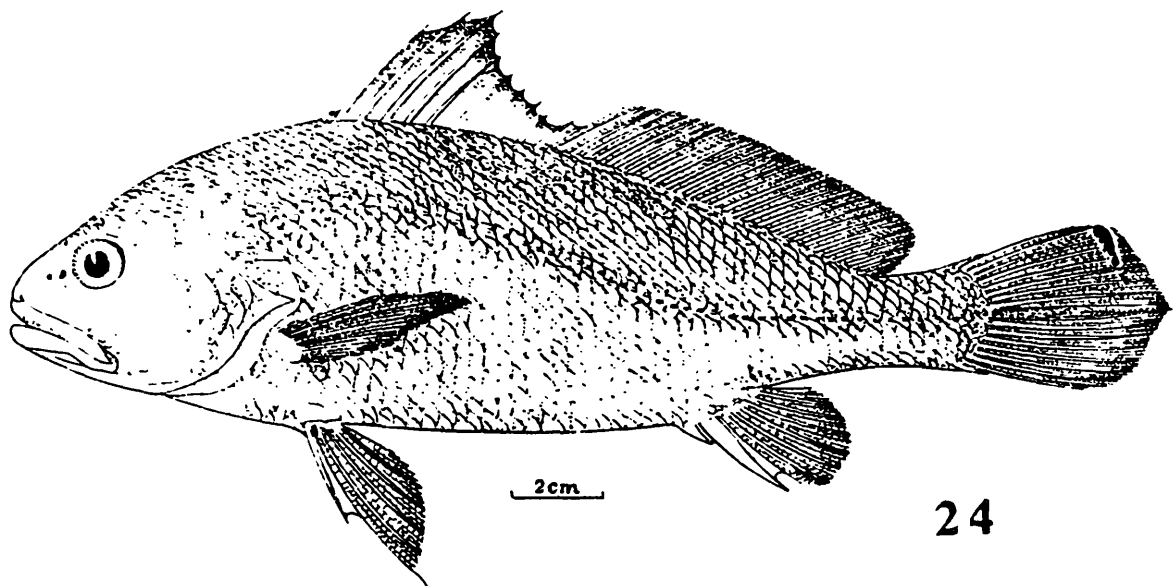


Fig. 24. *Nibea soldado* (Lecepede); (ZSI Regd. No. F 7353/2). 24a. Systematic view of gasbladder. 24b. Sagitta (inner surface).

*Common name* : Soldier croaker ... English.

*Description* : D X + I 28-30; A II 7; P i 16; V I 5

A fairly large species with a well arched back and deep body. Mouth terminal, at a low angle to the horizontal. Snout decurved, not projecting beyond upper jaw, jaws meeting equally in front; maxillary ending below pupil or posterior part of iris. Operculum with two flat weak spines; edge of preoperculum with some rather widely spaced denticulations especially at its angle.

*Proportions as % Standard length* : Depth of body 26.5—32.0; length of head 30.2—32.0; length of pectoral fin 20.6—22.8; and length of second anal spine 14.0—18.0.

*Proportion as % length of head* : diameter of eye 21.0—24.0; length of snout 24.2—28.7; depth of preorbital bone 13.0—14.8; interorbital width 19.2—21.7; length of upper jaw 40.8—44.0; length of lower jaw 49.5—53.0; and length of second anal spine 52.8—54.0.

Snout with 3 very small rostral (upper) pores; and 5 marginal well-developed pores, median just above edge and paired under it, outer marginal pair in a weak notch. Mental pores 5 ('false-five'), median composed of two united by a crescentic groove just behind symphysis, followed by a conspicuous inner mental pore and an outer pore on either side posterior to it.

Gill-rakers on first arch (3-6) + 1 + (6+9), rapidly becoming shorter above and below joint; above and below them some flat tooth-plates.

Teeth well differentiated in size in both jaws, outer row in upper jaw moderately enlarged, in jaw a group of subequal teeth in front, and behind these a row of large teeth (but not as long as upper) with an irregular row of small teeth inside them; all teeth embedded in a mass of papillae.

Scales cycloid on snout, below and behind eyes and on breast, elsewhere ctenoid; lateral line scales 48 to 50. Soft dorsal and anal fins with scales in basal sheaths, few others on membranes basally.

Dorsal fin deeply notched; dorsal spines weak, third and fourth longest. Second anal spine very strong, nearly half head length. Pectoral fins short, about two-thirds of head length. Pelvic fin with a short filament. Caudal fin rhomboid, acutely pointed in fishes of 120—130 mm SL.

Gasbladder (Text-fig. 24a) carrot-shaped with 20 to 22 pairs of lateral appendages, all but pair arborescent, those of main part of bladder are branched in a fanlike manner, with anterior branches overlapping those of appendages in front ventrally; first diverticula long, entering the head, curving towards the midline and giving off branches from its convex side below the skull; posteriorly slightly before vent, the bladder abruptly contracts to a tube no wider than the posterior appendages that lie parallel to it.

Otoliths (sagitta) (Text-fig. 24b) with a tadpole-shaped impression on its inner side of which 'head' is truncated, upright in position and in contact with the anterior margin,

and 'tail' (or 'cauda') strongly curved, J-shaped, its posterior end slightly curved and cuts into the ventral edge.

Colour : In life, silvery with faint series of oblique stripes along scale-rows. Margin of soft part of dorsal fin dark; pectoral and pelvic fins with a yellowish tinge.

*Geographical distribution* : Pakistan, India, Sri Lanka, Malay Peninsula, Gulf of Siam, Indonesia and Australia.

Inhabits coastal waters down to 40m depth.

*Fishery information* : This is a common species in the commercial catches on the east coast of India. Caught with bottom trawls, gill-nets and handlines. It attains a maximum size of 30 cm; common to 20 cm.

26. *Nibea maculata* (Schneider, 1801)  
(Text-fig. 25)

1801. *Johnius maculatus* Schneider, *Syst. Ichthol.* 75 (type-locality : Tranquebar); Blyth, 1861, *J. Asiat. Soc. Beng.*, 29 : 141; Jordan and Starks, 1917, *Ann. Carneg. Mus.*, 11 : 453; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100)12 : 380; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 538; Munro 1955, *Marine and Fresh water Fishes of Ceylon* : 451; Menon, 1966, *Rec. Indian Mus.*, 59(4) : 392.
1830. *Corvina maculata* : Cuvier (*partim*), *Hist. nat. Poiss.*, 5 : 126; Jerdon, 1851, *Madras J. Lit. Sci.*, 17 : 132.
1860. *Sciaena maculata* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 291; Day, 1865, *proc. zool. Soc. Lond.* : 19; Day, 1865, *Fishes of Malabar* : 50; Day, 1876, *Fishes of India* : 190; Day, 1889, *Fauna Br. India, Fishes*, 2 : 119.
1868. *Nibea maculata* : Dutt and Thankam, *J. Bombay nat. Hist. Soc.*, 65(2) : 340, pl. 6, fig.; Trewavas, 1971, *J. Fish. Biol. Lond.*, 3 : 459; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Nib 3; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 376, pl. 5; Mohan, 1981, *Indian J. Fish.*, 28 : 11, fig. 16; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 658, fig. 263; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Nib 3.
1972. *Nibea maculatus* : Mohan, *Indian J. Fish.*, 16 : 93.

*Types* : Syntypes : ? ZMB 8732 and 8805, two stuffed specimens. Lost (*vide* Trewavas, 1977 : 376).

*Common name* : Blotched croaker ... English.

*Description* : D X + I 24-26; A II 7; P i 17; V I 5.

A medium-sized species, with an acute and prominent snout which slightly projects beyond upper jaw. Mouth inferior; lips rather thick; upper jaw overshooting lower and extending to below middle of eye. Operculum with two flat weak spines; edge of preoperculum denticulate.

*Proportions as % Standard length* : Depth of body 30.6—33.5; length of head 28.0—35.0; length of pectoral fin 21.4—25.5; and length of second anal spine 8.5—12.0.

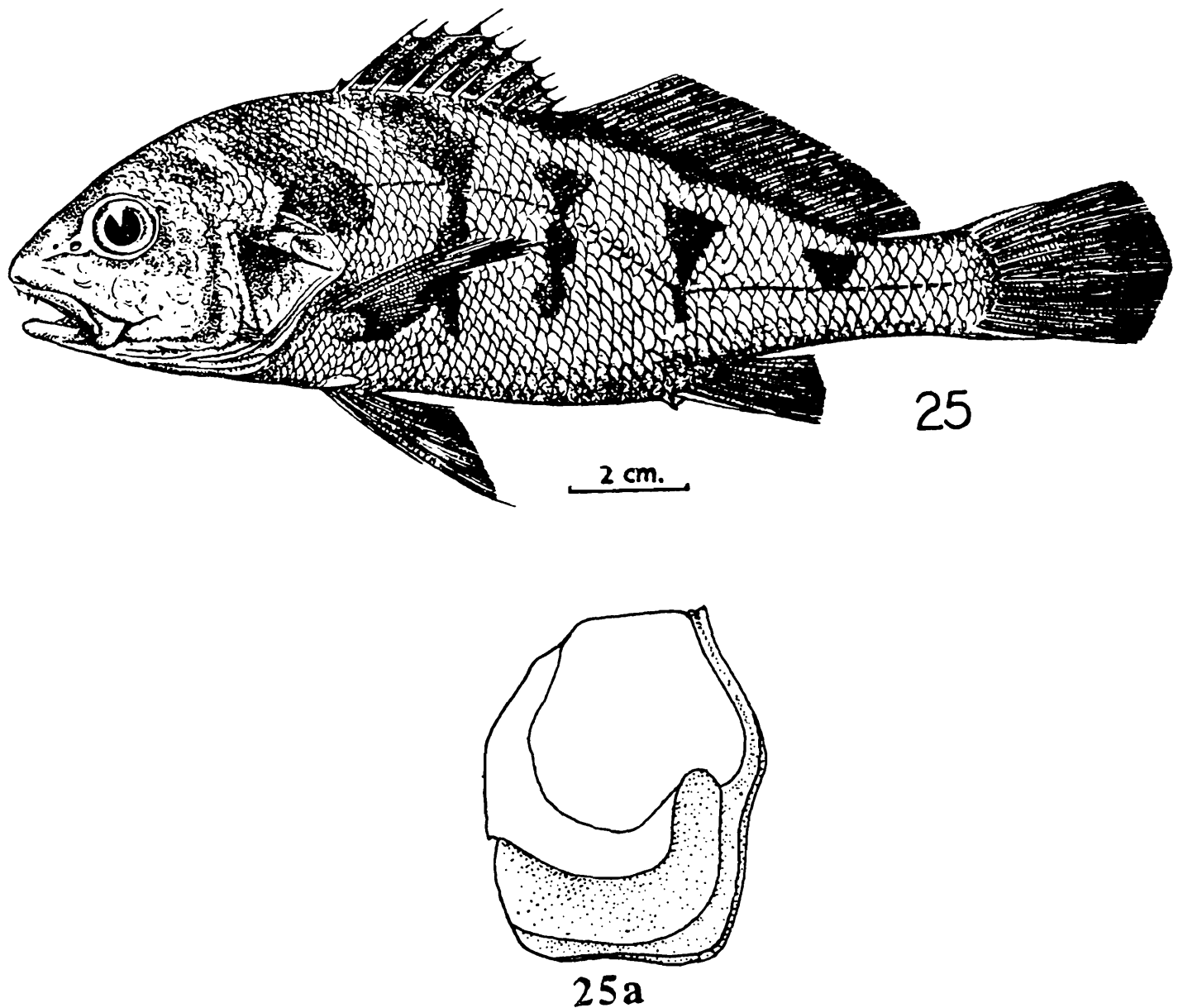


Fig. 25. *Nibea maculata* (Schneider); (ZSI Regd. No. F 7247/2). 25a. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 21.5—27.6; length of snout 26.5—30.0; depth of preorbital bone 16.2—18.7; interorbital width 20.8—23.0; length of upper jaw 38.0—40.8; length of lower jaw 41.6—45.2; and length of second anal spine 26.6—27.8.

Snout with 3 upper (rostral) and 5 marginal pores, the median marginal pore just above edge, paired under it notching the edge to produce three lobes. Mental pores 5, surrounded by thick skin; median pore sometimes open and exposing the two tributary pores.

Gill-rakers on first arch (3-5) + (5-10), with some flat tooth-plates between them.

Teeth differentiated in size in both jaws; upper jaw with a band of small villiform teeth with an outer row of moderately enlarged and spaced teeth; lower jaw with a band of moderately enlarged teeth anteriorly, behind this is a narrowing band with inner row enlarged; teeth surrounded by long papillae.

Scales cycloid on snout and below and behind eyes, elsewhere ctenoid; one or two rows of small scales forming basal sheath along soft dorsal fin; base of anal fin also covered fairly thickly with scales; lateral line scales 45 to 48.

Dorsal fin notched; dorsal spines weak, third longest. Second anal spine strong, about one-third of head length. Pectoral fins moderate, about two-thirds of head length. Caudal fin with a slightly convex hind margin, often angular above and rounded below.

Gasbladder carrot-shaped, with 18 to 21 pairs of arborescent appendages (except the posterior 2 or 3), first diverticula long and branching mainly in the head but one of its three primary divisions ramifying on posterior surface of transverse septum; posterior 2 or 3 appendages simple and parallel to tubular end of bladder.

Otolith (sagitta) (Text-fig. 25a) with a tadpole-shaped impression on its inner side of which the 'tail' is sharply curved, grooved, and cutting into the ventral edge.

Colour : In life, a distinctive colour pattern of five dark bars extending obliquely from back to lower part of flanks, and a sixth dark blotch on top of caudal peduncle; first bar broadest, from nape obliquely backward, lower parts of bars narrower and often broken and discontinuous. Spinous dorsal fin dusky except along its base, soft dorsal fin with a rather broad black margin; pectoral, pelvic and anal fins pale.

*Geographical distribution* : Pakistan, India, Sri Lanka and probably extending eastwards to the Malay Peninsula.

Inhabits coastal waters.

*Fishery information* : This sciaenid forms an important constituent of the trawl catches in the Gulf of Mannar. In our area it is caught with bottom trawls, gill-nets and boat seines. The common size in the catches is 22 cm.

#### Tribe (viii) JOHNIINI

Gasbladder hammer-shaped with the head of hammer immediately behind the transverse septum; first (anterior) appendage of each side arising from front of the hammer and branching in the head, a lateral branch extending to the antero-lateral face of pectoral arch at the junction of cleithrum and supracleithrum, where its palmate twiglets lie between the bone and the skin; gasbladder appendages without dorsal limbs. Mental pores three pairs of which the anterior open close behind the symphysis 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. Barbels present or absent, if present median with the median mental-pore at front of its base. Sagitta with a tadpole-shaped pattern on its inner side of which the 'head' has its long axis lying obliquely or nearly at right angles to the long axis of the otolith (instead of parallel to it as in most sciaenids) and the 'tail' is expanded and deepened as a hollow cone, connected with the 'head' by a narrow groove and continued distally (ventrally) as a narrow, shallow groove. Otolith very thick in its anterior half. Soft dorsal and anal fins scaly. Vertebrae 24 (10 + 14).

Two genera, both in Indian region.

## Key to Genera

- (1) Teeth of lower jaw subequal; upper outer teeth not widely spaced; mouth inferior; gill-rakers 5 to 13 on first arch.....*Johnius*
- (b) Inner lower teeth more or less enlarged, spaced; upper outer teeth enlarged and widely spaced; mouth usually subterminal; gill-rakers 9 to 20 on first arch.....*Johnieops*

Genus 19. *Johnius* Bloch, 1793

1793. *Johnius* Bloch, *Naturges. ausland. Fische*, (7) : 132 (type-species : *Johnius carutta* Bloch).
1822. *Bola* Hamilton-Buchanan, *Fishes of Ganges* : 73 (type-species : *Bola coitor* Hamilton-Buchanan); Talwar, 1970, *Proc. Indian Acad. Sci.*, 72B : 266 (status discussed).
1848. *Apeches* Gistel, *Naturges. Thierr.* : ix (type-species : *Johnius carutta* Bloch; substitute name for *Johnius* Bloch).
1908. *Pseudomycterus* Ogilby, *Proc. roy. Soc. Qd.*, 21 : 94 (type-species : *Pseudomycterus maccullochii* Ogilby).
1938. *Wak* Lin (*partim*), *Lingnan Sci. J.*, 17(2) : 35, 378 (type-species : *Bola coitor* Hamilton-Buchanan; substitute name for *Bola* Hamilton-Buchanan, 1822, allegedly preoccupied by *Bola* Gunther).
1971. *Blythia* Talwar (*nec Blythia* Theobald, 1868), *J. Inland Fish. Soc. India*, 3 : 23 (type-species : *Umbrina dussumieri* Valenciennes).
1975. *Blythsciaena* Talwar, *Newsl. Zool. surv. India* 1 (2) : 17 (type-species : *Umbrina dussumieri* Valenciennes) (Substitute name for *Blythia* Talwar, the name being preoccupied by Theobald, 1868).

*Definition* : Sciaenids with a hammer-shaped gasbladder with the head of the hammer immediately behind the transverse septum, bearing a series (12 to 20 pairs) of arborescent appendages along the sides; first (anterior) appendage of each side pierces the transverse septum and branches between the skull and upper gill-arches, sending a palmate branch to the front of pectoral arch; gasbladder appendages without dorsal limbs.

Mouth ventral or subterminal. Upper outer teeth not widely spaced; lower teeth in a band, uniform in size or with a few inner slightly enlarged. Pores on lower jaw three pairs of which the anterior (first) open close behind the symphysis 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. Mental barbel present or absent, if present with the median mental pore at front of its base. Lower gill-rakers 5 to 13, usually 5 to 10. Otolith (sagitta) with a tadpole-shaped impression on its inner side, of which the 'head' having its long axis lying obliquely or nearly at right angles to the long axis of the otolith (instead of parallel to it as in most sciaenids), and the 'tail' expanded and deepened as a hollow cone, connected with the 'head' by a narrow groove and continued distally (ventrally) as a narrow, shallow groove, Otolith very thick in its anterior half. Vertebrae 25.

•About 10 species, 8 in Indian region, all Indo-West Pacific.

## Key to Species

- 1(a) A barbel present on chin.....2  
 (b) No mental barbel .....3
- 2(a) Scales on body ctenoid; soft dorsal finrays 30 to 33 ..... *J. macropterus*  
 (b) Scales on body cycloid; soft dorsal finrays 22 to 26 ..... *J. dussumieri*
- 3(a) scales on head and breast cycloid, and most of body scales are either cycloid or have a feebly ctenoid zone; lateral line with a conspicuous silvery or yellow streak; interorbital width 8.9 to 9.3% of Standard length ..... *J. carutta*  
 (b) Scales on occiput and whole body (except breast) ctenoid; lateral line without a distinct silvery streak; interorbital width narrower, less than 8.5% of Standard length .....4
- 4(a) Snout conspicuously prominent and projecting, and 1.5 times in eye-diameter; second anal spine strong; 43 to 56% head length; lower gill-rakers 10 to 13 ..... *J. coitor*  
 (b) Snout often projecting but less timidly, about equal to, or less than eye-diameter .....5
- 5(a) Lower gillrakers 6 or 7; mental pores surrounded by thickened skin, produced into two short, irregular tags (barbel-like)..... *J. elongatus*  
 (b) Lower gillrakers 8 to 13; no thickened skin produced into tags around mental pores .....6
- 6(a) Snout steeply curved, not or very slightly projecting in front of upper jaw .....7  
 (b) Snout swollen, projecting .....8
- 7(a) Dorsal fin with 9 spines; second anal spine about 1/2 of head length.....  
 ..... *J. belangerii*  
 (b) Dorsal fin with 10 spines; second anal spine about 1/3 of head length...  
 ..... *J. carouna*
- 8(a) Body deep, its deep 29.0 to 30.5% Standard length; second anal spine about 1/3rd of head length..... *J. glaucus*  
 (b) Body slender, its depth 20.0 to 24.5% Standard length; second anal spine about 1/2 of head length..... *J. gangeticus*

27. *Johnius macropterus* (Bleeker, 1853)  
 (Text-fig. 26)

1853. *Umbrina macropterus* Bleeker, *natuurk. Tijdschr. Ned.-Indie*, 4 : 254 (type-locality : Priaman, Sumatra).

1860. *Umbrina macroptera* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 279; Day, 1876, *Fishes of India* : 182; Day, 1889, *Fauna Br. India*, Fishes, 2 : 108; Perugia, 1889, *Anali Mus. civ. Stor. nat. Giacomo Doria*, 27 : 273; Bean and Weed, 1912, *proc. U.S. natn. Mus.*, 42 : 606; Jordan and Starks 1917, *Ann. Carneg. Mus.*, 11 : 454; Barnard, 1927, *Ann. S. Afr. Mus.*, 21 : 581; Machan, 1930, *Ann. natuurh. Mus. Wien*, 44 : 436; Talwar and Sen, 1971, *Rec. zool. Surv. India*, 65 : 247.
1874. *Sciaena macropterus* : Bleeker, *Verh. K. Akad. wet. Amst.*, 14(4) : 60; Bleeker, 1877, *Atlas Ichthyol. des Indes-Orientales Neerl.*, 9 : pl. 384, fig. 5; Munro, 1955, *Marine Fresh water Fishes Ceylon* : 153, fig. 444.
1904. *Sciaena macroptera* : Fowler, *J. Acad. nat. Sci. Philad.*, (2)12 : 530; Fowler and Bean, 1923, *Proc. U.S. natn. Mus.*, 63 : 18; Fowler, 1925, *J. Bombay nat. Hist. Soc.*, 30 : 320; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100)12: 412; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 546; 1953, *Sea Fishes of Southern Africa* : 228; Menon, 1966, *Rec. Indian Mus.*, 59(4) : 394.
1964. *Dendrophysa macroptera* : Trewavas, *Copeia*, (1) : 111; Dutt and Thankam, 1968, *J. Bombay nat. Hist. Soc.*, 65(2) : 343.
1969. *Johnius mannarensis* Mohan, *J. mar. biol. Ass. India*, 11 : 320, figs 1 & 2 (type-locality : Pamban, Gulf of Mannar); Mohan, 1981, *Indian J. Fish.*, 28 : 15, fig.22.
1971. *Blythia macroptera* : Talwar, *J. Inland Fish. Soc. India*, 3 : 23.
1972. *Johnius macropterus* : Mohan, *Indian J. Fish.*, 16 : 85; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 423, fig.59; Mohan, 1981, *Indian J. fish.*, 28 : 17, fig.35; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 423; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 9.
1975. *Blythsciaena macroptera* : Talwar, *Newsl. zool. Surv. India* 1(2) : 17.

*Types* : Syntypes : RMNH 5993, *loc. Priaman* (Sumatra). Holotype of *Johnius mannarensis* : ZSI F 7691/2; Paratypes : CMFRI 150A and 150B.

*Common name* : Large fin croaker ... English.

*Description* : D X + I (27) 30 - 34; A II 7; P i 14 - 16; V I 5.

A small-sized species with a rounded, slightly projecting snout. Mouth narrow and inferior, its cleft horizontal; maxillary ending below middle of eye. Operculum with two flat weak spines; edge of preoperculum weakly serrated.

*Proportions as % Standard length* : Depth of body 26.2—31.0; length of head 24.6—29.6; length of pectoral fin 19.0—20.2; and length of second anal spine 8.5—11.4.

*Proportions as % length of head* : Diameter of eye 19.5—24.0; length of snout 26.0—31.7; depth of preorbital bone 15.8—18.0; interorbital width 25.3—31.5; length of upper jaw 34.2—37.0; length of lower jaw 34.2—35.8; and length of second anal spine 29.2—34.0.

Snout with 3 to 5 rostral (upper) pores and 5 marginal (lower) pores, dividing the edge into lobes; lower jaw with 5 large pores, one median at base of mental barbel; and 2 outer and 2 inner; a short, stiff, blunt mental behind the median pore, about 1/4 of eye-diameter.

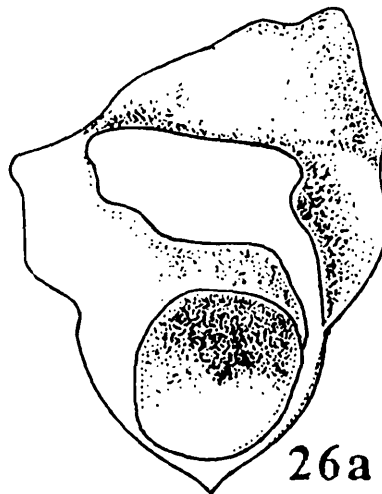
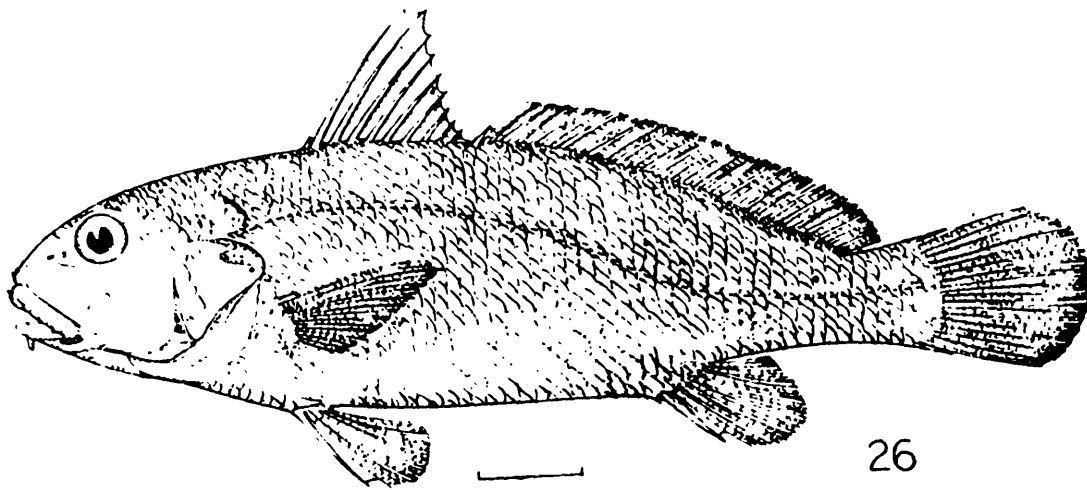


Fig. 26. *Johnius macropterus* (Bleeker). 26a. Sagitta (inner surface).

Gillrakers on first arch (4-5) + 1 + (8 - 11), those near the joint short and narrow, the lowers very short.

Teeth in villiform bands; outer row in upper jaw slightly enlarged, not widely spaced; teeth in lower jaw uniform.

Scales cycloid on snout, below eye and on breast, ctenoid on hind part of interorbital or occiput and on whole body; lateral line scales 44 to 50. A small scaly sheath along bases of soft dorsal and anal fins.

Dorsal fin notched; dorsal spines slender, the third longest. Second anal spine moderate-sized, about 1/2 to 2/3rds as long as first soft finray. Pectoral fins about 2/3rds of head length. Caudal in rhomboid.

Gasbladder hammer-shaped with 13 to 16 pairs of lateral appendages, all except posterior one or two arborescent; first pair of appendages extend forwards into head piercing the transverse septum below the cranium and branching among upper pharyngeal muscles and sending a forked branch to anterior face of cleithrum:

Otolith (sagitta) (Text-fig. 26a) with a tadpole-shaped impression on its inner side, of which the 'head' is truncated and obliquely bent and the 'tail' (or 'cauda') is expanded and deepened as a hollow cone, connected with the 'head' by a narrow groove.

Colour : In life, back dark grey, flanks and belly whitish with silvery reflections; barbel and chin whitish. Spinous dorsal fin darkish; pectoral fins hyaline.

*Geographical distribution* : Natal, India, Sri Lanka, to the Malay Peninsula and Indo-Australian archipelago as far as New Guinea.

Inhabits coastal waters down to 30 m depth.

*Fishery information* : This sciaenid is fairly common in the commercial catches on the Tamil Nadu coast. Caught with bottom trawls, boat seines and shore seines. It attains a length of 25 cm; common to 18 cm.

28. *Johnius dussumieri* (Valenciennes, 1883)  
(Text-fig. 27)

1833. *Umbrina dussumieri* Valenciennes, *Hist. nat. Poiss.*, 9 : 481 (type-locality : Coromandel coast of India); Bleeker, 1845, *Natuurk. Geneesk. Arch. Ned.-Indes* (3) 2 : 523; Bleeker, 1850, *Verh. bataav. Genoot. Kunst. Wet.*, 23 : 19; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 218; Day, 1865, *Fishes of Malabar* : 48; Day, 1865, *Proc. Zool. Soc. Lond.* : 18; Day, 1876, *Fishes of India* : 183, pl. 43, figs 2 & 3; Day, 1889, *Fauna Br. India*, Fishes, 2 : 110; Pellegrin, 1905, *Bull. Soc. zool. Fr.*, 30 : 84; Jordan and Seale, 1907, *Bull. U.S. Bur. Fish.*, 26 : 25; Evermann and Seale, 1907, *Bull. U.S. Bur. Fish.*, 26 : 87; Jordan and Richardson, 1908, *Bull. U.S. Bur. Fish.*, 27 : 261; Zugmayer, 1913, *Abh. Bayer. Akad. Wiss.*, 26(6) : 12; Pellegrin, 1914, *Bull. Soc. zool. Fr.*, 39 : 225; Gilchrist and Thompson, 1917, *Ann. Durban Mus.*, 1(4) : 351; Talwar and Sen, 1971, *Rec. zool. Surv. India*, 65 : 247.
1855. *Umbrina amblycephala* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 8 : 412 (type-locality : Amboina).
1873. *Sciaena dussumieri* : Bleeker, *Ned. Tijdschr. Dierk.*, 4 : 142; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 56; Gunther, 1874, *Ann. Mag. nat. Hist.*, (4)13 : 155; Bleeker, 1877, *Atlas Ichthyol. des Indes-Orientales Neerland.*, 9 : pl. 387, fig. 4; Fowler, 1918 *Copeia*, (58) : 64; Fowler and Bean, 1923, *Proc. U.S. natn. Mus.*, 63 : 17; Fowler, 1926, *J. Bombay nat. Hist. Soc.*, 30(4) : 778; Fowler and Bean, 1927, *Proc. U.S. natn. Mus.*, 71 : 8; Fowler, 1927, *Proc. nat. Sci. Philad.*, 79 : 286; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100) 12 : 412; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 542, fig. 100; Tang, 1937, *Amoy mar. biol. Bull.*, 22(2) : 77; Lin, 1938, *Lingnan J. Sci.*, 17(3) : 372; Smith, 1953, *Sea Fishes of Southern Africa* : 227; Munro, 1955, *Marine Fresh Water Fishes Ceylon* : 153, fig. 443; Chu, 1956, *Re. Inst. Fish. Biol. Taipeh*, 1(1) : 15, pl. 1, fig. 1; Menon, 1966, *Rec. Indian Mus.*, 59(4) : 393; Munro, 1967, *Fishes of New Guinea* : 342, fig. 635; Ahmad, 1971, *Rec. zool. Surv. Pakistan*, 2(1) : 132, fig. 1.
1880. *Umbrina mulleri* Klunzinger, *Sber. Akad. Wiss. Wien*, 80 : 373 (type-locality : Queensland, Australia).
1923. *Umbrina fuscolineata* Von Bonde, *Rep. Fish. mar. biol. Survey S. Afr.*, No. 3. *Special Rep.*, (1) : 15, pl. 4 (type-locality : Natal); Barnard, 1927, *Annl. S. Afr. Mus.*, 21(2) : 577.
1963. *Johnius amblycephalus* : Chu, Lo and Wu, *Fishes of China Monogr.* : 21, figs. 10, 43 & 69; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 426, fig. 59; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 645, fig. 254.

1964. *Dendrophysa dussumieri* : Trewavas, *Copeia*, (1) : 111, figs. 1a & 1b; Dutt and Thankam, 1968, *J. Bombay nat. Hist. Soc.*, 65(2) : 342.
- 1971 *Blythia dussumieri* : Talwar, *J. Inland Fish. soc. India*, 3 : 23.
1972. *Johnius dussumieri* : Mohan, *Indian J. Fish.*, 16 : 85; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN, John 4; Mohan, 1981, *Indian J. Fish.*, 28 : 15, fig. 21; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN, John 4.
1975. *Blythsciaena dussumieri* : Talwar, *Newsl. zool. Surv. India*, 1(2) : 17.

*Types* : Holotype : MNHN 9623. Syntypes of *Umbrina amblycephala* : RMNH 8289, two exs.

*Common name* : Bearded croaker ... English.

*Description* : D X + I 22-26; A II 7; P i 16; V I 5.

A medium-sized species with a rounded projecting snout. Mouth ventral; lower jaw considerably shorter than upper; upper jaw extending to ventral from hind edge of pupil. Operculum with two flat weak spines; edge of preoperculum weakly serrated.

*Proportions as % Standard length* : Depth of body 28.8—32.6; length of head 29.6—32.5; length of pectoral fin 22.5—25.6; and length of second anal spine 8.0—11.0.

*Proportions as % length of head* : Diameter of eye 18.4—20.6; length of snout 29.2—30.8; depth of preorbital bone 16.3—17.8; interorbital width 23.3—28.6; length of upper jaw 33.0—34.4; length of lower jaw 29.0—31.6; and length of second anal spine 27.5—30.5.

Snout with 3 upper (rostral) pores and 5 marginal (lower) pores, one median on central lobe, inner and outer pores deep and along the lobular rostral flap lower jaw with 5 large pores, one median and two pairs; behind the median pore a short, solid, imperforate mental barbel present, about 1/5th to 1/4th of eye diameter.

Gillrakers on first arch (3 - 4) + 1 + (5 - 9) short, the two lowest mere stumps.

Teeth differentiated in size in upper jaw only, outer row of teeth larger than those of inner band, close-set, no caniniform; teeth of lower jaw villiform and uniform.

Scales cycloid; lateral line scales 48 to 50. A small scaly sheath along bases of soft dorsal and anal fins.

Dorsal fin deeply notched; dorsal spines weak, rather high, second and third longest and slightly filiform. Second anal spine weak, about half as long as first finray. Pectoral fins moderately long, about 3/4ths of head length. Caudal fin rhomboid in young, its posterior edge truncate or S - shaped in adults.

Gasbladder (Text-fig. 27a) hammer-shaped with 14 or 15 pairs of arborescent tubules (except posterior one or two which are simple), the first pair extends forwards into head and branches between the skull and upper gill-arches.

Otolith (sagitta) (Text-fig. 27b) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and obliquely bent, and the 'tail' (or 'cauda') is expanded to form a hollow cone, the distal end of 'tail' is a faint, narrow groove between the cone and the ventral edge.

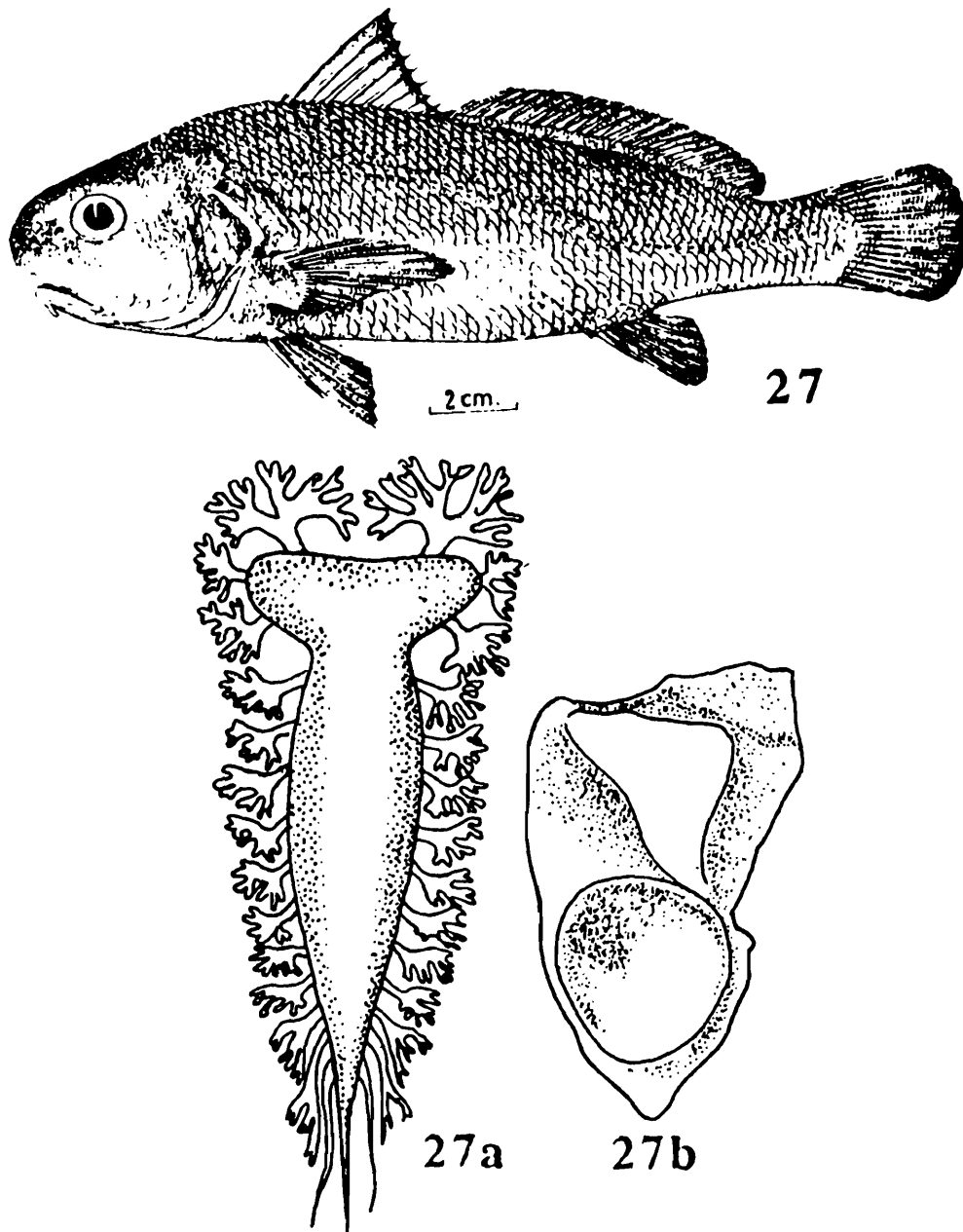


Fig. 27. *Johnius dussumieri* (Valenciennes); (ZSI Regd. No. F7250/2). 27a. Systematic view of gasbladder. 27b. Sagitta (inner surface).

**Colour :** In life, head, dorsum and flanks black, white or silvery on belly. Upper part of spinous dorsal fin dusky black; soft dorsal, caudal and pectoral fins grey; pelvic and anal fins hyaline.

**Geographical distribution :** East coast of Africa, Madagascar, Pakistan, India, through the East Indies, to the Philippines, Japan, New Guinea, China and Australia.

Inhabits coastal waters, down to 40 m depth.

**Fishery information :** This sciaenid is fairly common in the commercial catches along the Tamil Nadu and Maharashtra coasts. It attains a maximum size of 25 cm; common to 15 cm. Caught with bottom trawls and boat seines.

29. *Johnius carutta* Bloch 1793  
(Text-fig. 28)

1793. *Johnius carutta* Bloch. *Naturges. ausland. Fische*, (7) : 133, pl. 356 (type-locality: Tranquebar); Schneider, 1801, *Syst. ichth.* : 74; Cantor, 1850, *J*

- Asiat. Soc. Beng.*, 18(2) : 1048; Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 48; Jordan and Seale, 1905, *Proc. Devenport Acad. Sci.*, 10 : 11; Jordan and Starks, 1917, *Ann. Carneg. Mus.*, 11(3/4) : 453; Fowler, 1926, *J. Bombay nat. Hist. Soc.*, 30(4) : 10; Fowler, 1930, *Proc. Acad. nat. Sci., Philad.*, 81 : 596; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100) 12 : 384; Hardenberg, 1934, *Treubia*, 14 : 309; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 529; Munro, 1955, *Marine Freshwater Fishes Ceylon* : 155, pl. 30, fig. 453; Misra, 1962, *Rec. Indian Mus.*, 57 : 270; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 26, fig. 13; Dutt and Thankam, 1968, *J. Bombay nat. Hist. Soc.*, 65 : 37, fig. 1; Talwar and Sinha, 1972, *J. Inland Fish. Soc. India*, 4 : 99, fig. (Neotype designated); Mohan, 1972, *Indian J. Fish.*, 16 : 85, figs. 1A & 2A; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN John 2; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 407, pl. 8; Mohan, 1981, *Indian J. Fish.*, 28 : 13, fig. 18; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 649, fig. 256; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 2.
1816. *Sciaena carutta* : Cuvier, *Le Regne animale* (ed. 1), 2 : 298; Day, 1876, *Fishes of India* : 192, pl. 44, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 2 : 122; ? Hardenberg, 1931, *Treubia*, 13(1) : 133.
1829. *Johnius karutta* : Cuvier, *Le Regne animale* (ed. 2), 2 : 73.
1830. *Corvina carutta* : Cuvier, *Hist. nat. Poiss.*, 5 : 124; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 302; Day, 1865, *Fishes of Malabar* : 51; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154.

*Types* : Neotype : ZSI F 6273/2, loc. Hooghly estuary; designated by Talwar and Sinha (1972).

*Common name* : Karut croaker ... English.

*Description* : D IX + X + I 25 - 30; A II 7; P i 17; V I 5.

A small species with a rounded snout. Mouth small, low-set, nearly horizontal and inferior; maxillary extending to below middle of eye-diameter; no barbel on chin. Operculum with two flat weak spines; edge of preoperculum crenulated, more on its lower angle.

*Proportions as % Standard length* : Depth of body 27.8—33.0; length of head 30.0—33.0; interorbital width 8.9—9.3; length of pectoral fin 23.0—26.3; and length of second anal spine 7.4—12.6.

*Proportions as % length of head* : Diameter of eye 22.2—24.6; length of snout 28.0—33.3; depth of preorbital bone 17.8—18.6; interorbital width 29.0—29.8; length of upper jaw 33.5—36.4; length of lower jaw 32.2—36.4; and length of second anal spine 28.0—29.4.

Snout with 5 rostral (upper)-and 5 marginal (lower) pores, of lower the median is just above edge of rostral flap, inner and outer lateral pairs in deep notches, giving a quadrilobate snout. Lower jaw with 5 pores, median behind symphysis on a prominence flanked by inner lateral pair and behind these a pair of buttresses.

Gillrakers on first arch (3 - 4)<sup>1</sup> + 1 + (7 - 9), short, the extreme upper and lower mere denticulate stumps.

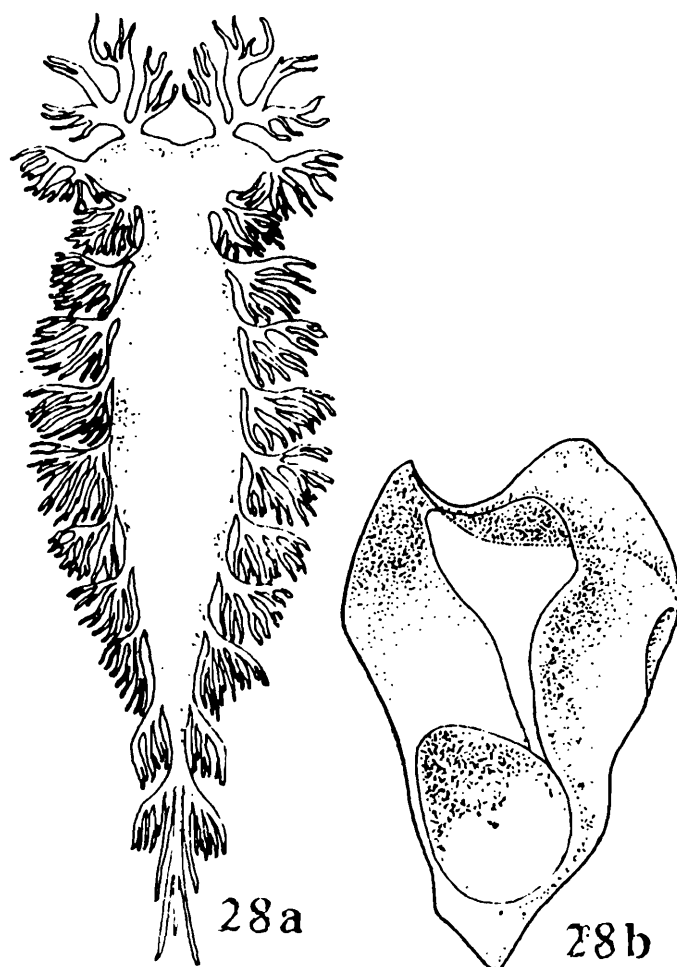
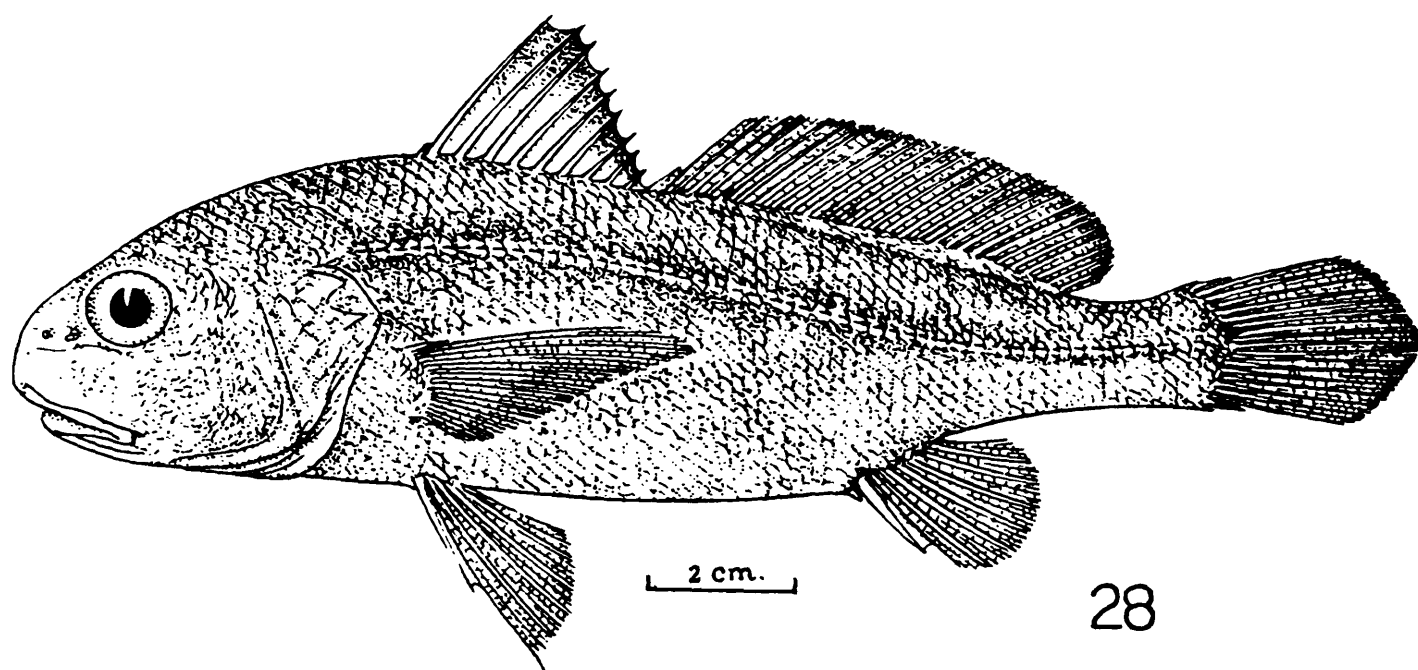


Fig. 28. *Johnius carutta* Bloch; (Neotype : ZSI Regl. No. F 6273/2). 28a. Systematic view of gasbladder. 28b. Sagitta (inner surface).

Teeth villiform in both jaws, differentiated in size in upper jaw only, outer upper row slightly enlarged but close set; lower jaw teeth uniformly small, forming a broader band than those of the upper.

Scales of head, breast and upper part of body cycloid, and most of body scales are either cycloid or have a short striate or feebly ctenoid zone, nowhere feeling rough to touch as in related species; lateral line scales 48 to 50. One or two rows of small scales sheathing bases of soft dorsal and anal fins.

Dorsal fin with a deep notch; dorsal spines moderately weak, second and third longest. Second anal spine rather weak, about 1/4th of head length. Pectoral fins moderately long 3/4ths of head length. Caudal fin nearly truncate or rhomboid.

Gasbladder (Text fig. 28a) hammer-shaped, with 15 to 16 pairs of appendages, all but the last arborescent, first largest and entering the head and sending a palmate branch to front of pectoral arch.

Otolith (sagitta) (Text-fig. 28b) with a tadpole-shaped impression on its inner side of which the 'head' has its long axis lying obliquely to that of the otolith, and the 'tail' (or 'cauda') is expanded and deepened as hollow cone, connected with the 'head' by a narrow groove.

Colour : In life, upper two-thirds of body drab-grey with a deep soiled appearance, cheeks and opercles silvery, belly golden-silvery; scales minutely dotted with black and their margins of a darker brown than the ground colour; lateral line silvery with a characteristic pale yellow median streak along its entire length in strong contrast to the purple-brown of the contiguous parts. Upper two-thirds of first dorsal fin black; other fins pale whitish yellow, minutely dotted with black.

*Geographical distribution* : Pakistan, India, Sri Lanka and eastward to the Malay Peninsula and Thailand.

Inhabits inshore waters down to 40 m depth.

*Fishery information* : This sciaenid is common along the entire coast of India, constituting a minor fishery along the Tamil Nadu coast. It attains a maximum size of 30 cm; common to 20 cm. Caught with bottom trawls, seines and gillnets.

### 30. *Johnius coitor* (Hamilton-Buchanan, 1822) (Text-fig. 29)

1822. *Bola coitor* Hamilton-Buchanan, *Fishes of Ganges* : 75, 368, pl. 27, fig. 24 (type-locality : Ganges R.).
1830. *Corvina coitor* : Cuvier, *Hist. nat. Poiss.* 5 : 116; Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 301; Dunker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154.
1861. *Johnius coitor* : Blyth, *J. Asiat. Soc. Beng.* 29 : 141; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100) 12 : 405; Talwar and Shetty, 1971, *Proc. Indian Acad. Sci. B* 74 : 75, figs 1|2; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN John. 3; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 418, pl. 11; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 64A (in Key).

1866. ? *Sciaena (Corvina) novae-hollandiae* Steindachner, *Sber. Acad. Wiss. Wien*, **53** : 445, pl. 5, fig. 2 (type-locality : Port Jackson, New South Wales, Australia).
1874. *Johnius novae-hollandiae* : Bleeker, *Verh. K. Akad. Wet. Amst.*, **14**(4) : 44; Bleeker, 1877, *Atlas Ichthyol. des Indes-Orientales Neerland.*, **9** : pl. 387, fig. 2; Vinciguerra 1926, *Annali Mus. Civ. Stor. nat. Giacomo Doria*, (3) **10** : 576; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, **7** : 527.
1876. *Sciaena coitor* : Day, by *Fishes of India* : 187, pl. 46, fig. 3; Vinciguerra, 1885, *Annali Mus. Civ. Stor. nat. Giacomo Doria*, **22** : 88; Day, 1889, *Fauna Br. India*, *Fishes*, **2** : 115; Shaw and Shebbeare, 1937, *J. roy. Asiat. Soc. Beng.*, **3** : 115, fig. 121; Srivastava, 1968, *Fishes Eastern Uttar Pradesh* : 75, pl. 9, fig. 1 and pl. 10, figs. 1-3.
1938. *Wak coitor* : Lin, *Lingnan Sci. J.*, **17**(3) : Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 28, fig. 14 (compiled).
1972. *Johnius coiter* : Mohan, *Indian J. Fish.*, **16** : 85.

*Types* : Iconotype : Hamilton-Buchanan's (1822) pl. 27, fig. 24 from the Ganga R. Holotype of *Sciaena (Corvina) novae-hollandiae* : HNMW ?

*Common Name* : Coitor croaker ... English.

*Description* : D X + I 26-29; A II 7; P i 15-16; V I 5.

A small species with a swollen and projecting snout, projecting well beyond lower jaw. Mouth inferior; maxillary extending to below middle eye. Interorbital space flat, and the profile over eyes rather concave. Operculum with two flat weak spines; edge of preoperculum denticulate, most distinctly at angle.

*Proportions as % Standard length* : Depth of body 26.6—31.0; length of head 28.5—31.0; interorbital width 7.0—8.5; length of pectoral fin 21.3—24.0; and length of second anal spine 11.0—15.3.

*Proportions as % length of head* : Diameter of eye 17.8—22.3; length of snout 28.0—32.0; depth of preorbital bone 17.6-19.8; interorbital width 23.0—26.8; length of upper jaw 35.3—37.6; length of lower jaw 38.0—42.0; and length of second anal spine 43.0—52.6.

Snout with 3 or 5 small rostral (upper) and 5 marginal (lower) pores; of the marginal the median is above edge of rostral flap, the outer marginal dividing rostral edge into lobes. Mental pores three pairs, first close together behind the symphysis, in a pit or opening by a single pore, followed on each side by a pair; no mental barbel.

Gillrakers on first arch (5 – 6) + 1 + (9 – 12), with one or two minute stumps often in front, the uppermost and one or two lowest usually minute.

Teeth villiform, differentiated in size in upper jaw only; outer upper row slightly enlarged and rather close-set. In the lower jaw a band of small villiform teeth which may be uniform or the inner row may be slightly enlarged.

Scales cycloid on snout, below and immediately behind eye and on anterior part of breast, ctenoid on top of head and on body; lateral line scales 48 to 51. A sheath of small cycloid scales at base of soft dorsal fin and smaller scales extending to near margin; anal fin also scaly.

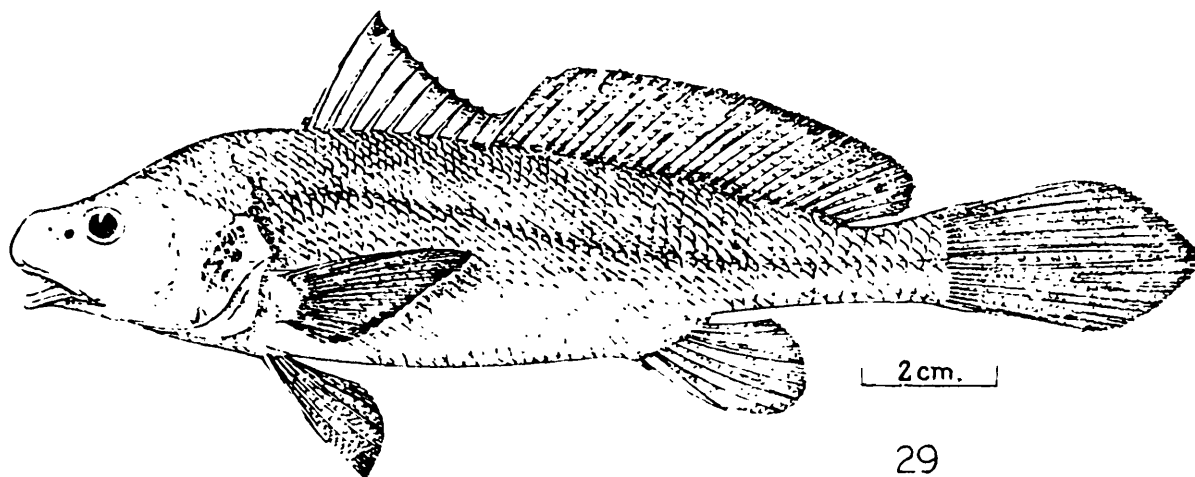


Fig. 29. *Johnius coitor* (Hamilton-Buchanan); (ZSI Regd No. F).

Dorsal fin deeply notched; dorsal spines moderately weak, second longest. Second anal spine strong, about two-thirds of first soft anal ray. Pectoral fins moderately long, about half of head length. Pelvic ending in a short filament. Caudal fin acutely rhomboid.

Gasbladder hammer-shaped with 11 to 13 pairs of lateral appendages, all but the last arborescent, the first pair piercing transverse septum and entering head.

Otolith (sagitta) *Johnius*-type, its inner side with a tadpole-shaped impression of which 'head' is truncated and obliquely bent and the 'tail' (or 'cauda') expanded to form a hollow cone, connected by a short narrow groove with the bounding groove of the 'head'

Colour : In life, light golden yellow with a light purple/blue sheen. Spinous dorsal fin with dusky to black border; soft dorsal fin, anal and caudal fins with a dull green/grey border.

*Geographical distribution* : East coast of India, Bangladesh, Burma, and extends to the Indo-Australian Archipelago, as well as to the eastern coast of Australia.

Inhabits coastal waters, down to 40 m; also estuaries.

*Fishery information* : This species contributes a small fishery in the Sunderbans (West Bengal). It attains a length of 16 cm; common size 13 cm.

31. *Johnius elongatus* Mohan, 1976  
(Text-fig. 30)

1955. ? *Johnius dussumieri* (hec Cuvier) : Munro, *Marine Freshwater fishes Ceylon* : 153, fig. 446; Devadots, 1972, *Indian J. Fish.*, 17 : 117.

1976. *Johnius elongatus* Mohan, *Matsya*, (1) : 19, fig. 1A (type-locality : Veraval, Bombay, Mangalore); Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 409, fig. 38(c); Mohan, 1981, *Indian J. Fish.*, 28 : 13, fig. 19; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 651, fig. 258; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Joh 7.

*Types* : Holotype : ZSI F7685/2, loc. Veraval (originally accessioned as CMFRI 187). Paratypes : CMFRI 188, eight specimens, from Veraval, Mangalore and Bombay.

*Common name* : Spindle croaker ... English.

*Description* : D X-XI + I 25-29; A II 7; P i 15-16; V I 5.

A small, rather slender species with a swollen snout projecting beyond the mouth. Mouth narrow, ventral; upper jaw extending to vertical from middle of eye-diameter. Operculum with two flat weak spines; edge of preoperculum serrated.

*Proportions as % Standard length* : Depth of body 26.5—29.0; length of head 28.0—31.6; interorbital width 7.0—8.0; length of pectoral fin 19.8—21.4; and length of second anal fin 8.6—9.8.

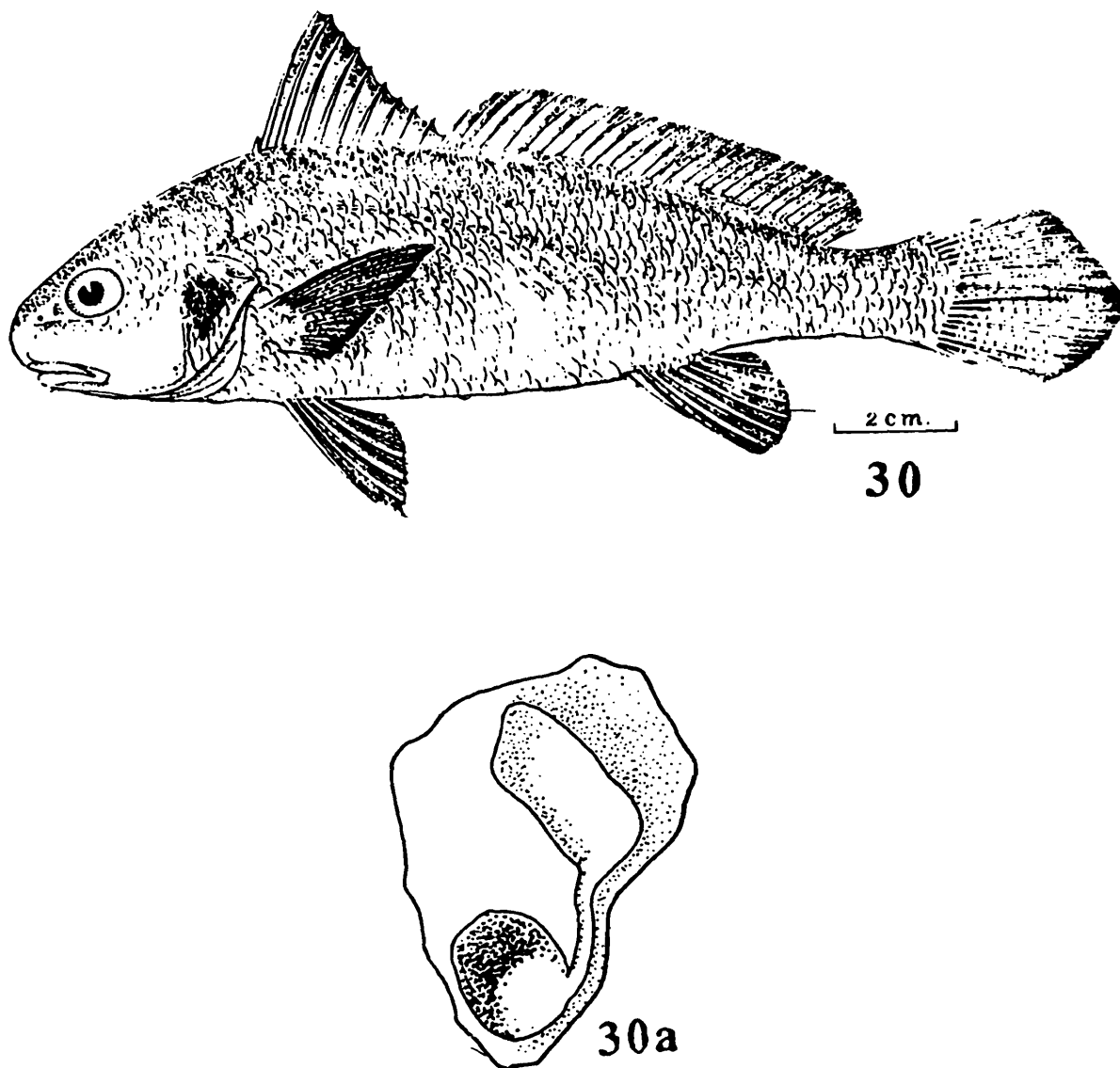


Fig. 30. *Johnius elongatus* Mohan; (ZSI Regd. No. F 7592/2). 30a. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 22.8—26.0; length of snout 31.0—32.6; depth of preorbital bone 16.4—17.8; interorbital width 25.4—28.0; length of upper jaw 35.4—37.0; length of lower jaw 34.0—38.0; and length of second anal spine 24.6—32.0.

Snout with 5 upper (rostral) and 5 lower (marginal) pores, of the lower the median is just above edge of rostral flap, inner and outer lateral pairs in deep notches giving a quadrilobate snout; lower jaw with 5 well-developed pores, surrounded by thickened skin produced into two short, irregular tags (referred to as barbels by Mohan, 1976) between the median and first lateral pores.

Gillrakers on first arch (3 – 5) + 1 + (5 – 6), short and narrow, the outermost upper and lower minute.

Teeth differentiated in size in upper jaw only, outer upper row of teeth enlarged and close-set teeth of lower jaw villiform and uniform, hidden in papillae.

Scales cycloid on snout and below eye, and ctenoid on top of head and on body; lateral line scales 48 to 49. Soft dorsal and anal fins scaly.

Dorsal fin deeply notched; dorsal spines moderately weak, second and third longest. Second anal spine weak, about 1/3 of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 13 to 15 pairs of arborescent appendages, first pair pierces the septum transversum and branches in the head region.

Otolith (sagitta) (Text-fig. 30a) with a tadpole-shaped impression on its inner side, of which the 'head' is truncated and obliquely bent, and the 'tail' (or 'cauda') is expanded and deepened as a hollow cone, connected with the 'head' by a narrow groove.

Colour : In life, back grey, silvery on flanks and belly, prepared with black on the lower flanks. Tips of dorsal, anal and caudal fins peppered with black.

*Geographical distribution* : West coast of India and Sri Lanka.

Inhabits coastal waters, down to 30 m. depth.

*Fishery information* : This sciaenid forms an important constituent of trawls catches along the West coast of India. It attains a length of 30 cm; common to 20 cm. Caught with bottom trawls and boat seines.

### 32. *Johnius belangerii* (Cuvier, 1830) (Text-fig. 31)

1830. *Corvina belangerii* Cuvier, *hist. nat. Poiss.*, 5 : 120 (type-locality : Pondicherry); Day, 1865, *Fishes of Malabar* : 54; Day, 1870, *Proc. Zool. Soc. Lond.*: 684.

1830. *Corvina kuhlii* Cuvier, *Hist. nat. Poiss.*, 5 : 121, pl. 107 (type-locality : Malabar); Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 304; Day, 1865, *Fishes of Malabar* : 55.

1834. *Corvina belangerii* : Valenciennes, *Voyage aux Indes Orientales (Zool.)*, 2 : 358 (corrected spelling); Gunther, 1860, *Cat. Fishes Br. Mus.*, 2 : 303; Day, 1865, *Fishes of Malabar* : 54; Duncker, 1904, *Mitt. naturh. Mus. Hamb.*, 21 : 154; Borodin, 1930, *Bull. Vanderbilt Mar. Mus.*, 1 : 53.
1845. *Johnius belengeri* : Bleeker, *Natuurk. Geneesk. Arch. Neerl.-Ind.* 2 : 523; Cantor, 1850, *J. Asiat. Soc. Beng.*, 18(2) : 1047; Bleeker, 1873, *Ned. Tijdschr. Dierk.*, 4 : 118; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 46; Bleeker, 1877, *Atlas Ichthyol des Indes-Orientales Neerland.*, 9 : pl. 387, fig. 1; Fowler, 1933, *Bull. U.S. natn. Mus.*, (100) 12 : 382; Lin, 1934, *Lingnan Sci. J.*, 13 : 681; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 533, figs 98, 99, 104; Tang, 1937, *Amoy mar. biol. Bull.*, 2 : 76; Lin, 1938, *Lingnan Sci. J.*, 17 : 375; Misra, 1962, *Rec. Indian Mus.*, 57 : 269; Chu, Lo and Wu, 1963, *Fishes of China Monogr.* : 24; figs 12, 45, 71; Munro, 1967, *Fishes of New Guinea* : 342, pl. 46, fig. 637; Dutt and Thankam, 1968, *J. Bombay nat. Hist. Soc.*, 65(2) : 338; Mohan, 1972, *Indian J. Fish.*, 16 : 85.
1846. ? *Corvina grypota* Richardson, *Re. Br. Ass. Advmt. Sci.*, 15 : 225 (type-locality : China).
1850. *Johnius carutta* (nec Bloch) Cantor, *J. Asiat. Soc. Beng.*, 18(2) : 1048.
1860. *Corvina carutta* (nec Bloch) Gunther, *Cat. Fishes Br. Mus.*, 2 : 302.
1861. *Johnius belangeri* : Bleeker, *Verh. K. Akad. Wet. Amst.*, 12 : 49, 72; Kner, 1866, *Reise der osterreichischen Fregatta Novara (Zool.)* : 133; Fowler, 1927, *J. Bombay nat. Hist. Soc.*, 32(3) : 260.
1865. ? *Sciaena dussumieri* (nec Cuvier) Day, *Fishes of Malabar* : 51.
1866. *Sciaena (Corvina) nasus* Steindachner, *Verh. zool. bot. Ges. Wien*, 16 : 771, pl. 15, fig. 1 (type-locality : Calcutta).
1866. *Sciaena (Corvina) belangeri* : Steindachner, *Verh. zool. bot. Ges. Wien*, 16 : 771.
1876. *Sciaena belengeri* : Day, 1876, *Fishes of India* : 191, pl. 44, fig. 5.
1880. *Corvina australis* Gunther, 1880, *Rep. Voyage of H.M.S. Challenger (Zool.)*, 1(6) : 33 (type-locality : Mary R., Queensland, Australia).
1884. *Corvina comes* de Vis, *Proc. Linn. Soc. N.S.W.*, 9 : 538 (Type-locality : Brisbane R., Queensland, Australia).
1889. *Sciaena belangeri* : Day, *Fauna Br. India, Fishes*, 2 : 120; Regan, 1914, *Trans. zool. Soc. Lond.*, 20(6) : 276; Hardenberg, 1931, *Treubia*, 13(1) : 131.
1908. *Pseudomycterus maccullochi* Ogilby, *Proc. R. Soc. Qd.*, 21 : 96 (type-locality : Queensland, Australia)
1918. *Sciaena novaehollandiae* (nec Steindachner) Ogilby, *Mem. Qd. Mus.*, 6 : 79, pl. 23.
1963. *Johnius fasciatus* Chu, Lo and Wu, *Fishes of China Monogr.* : 23, figs 11, 44, 70 (type-locality : Kwanghai, China).
1974. *Johnius belangerii* : Fischer and Whitehead, *FAO species identification sheets of fishery purposes*, 3 SCIAEN John 1; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 413, pl. 9, 9, 10a; Mohan, 1981, *Indian J. Fish.*, 28 : 14, fig. 20; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 647, fig. 255; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 1.

*Types* : Syntypes : MNHM 7613 and I 1450. Syntypes of *Corvina lobata* : MNHN 7587, two specimens. Holotype of *Sciaena (Corvina) nasus* : NHMW 2. Holotype of *Corvina australis* : BMNH 1879. 5.14.190. Holotype of *Corvina comes* : Queensland Museum, Australia. Syntypes of *Johnius fasciatus* : Shanghai Fisheries College, now transferred to Amoy (China).

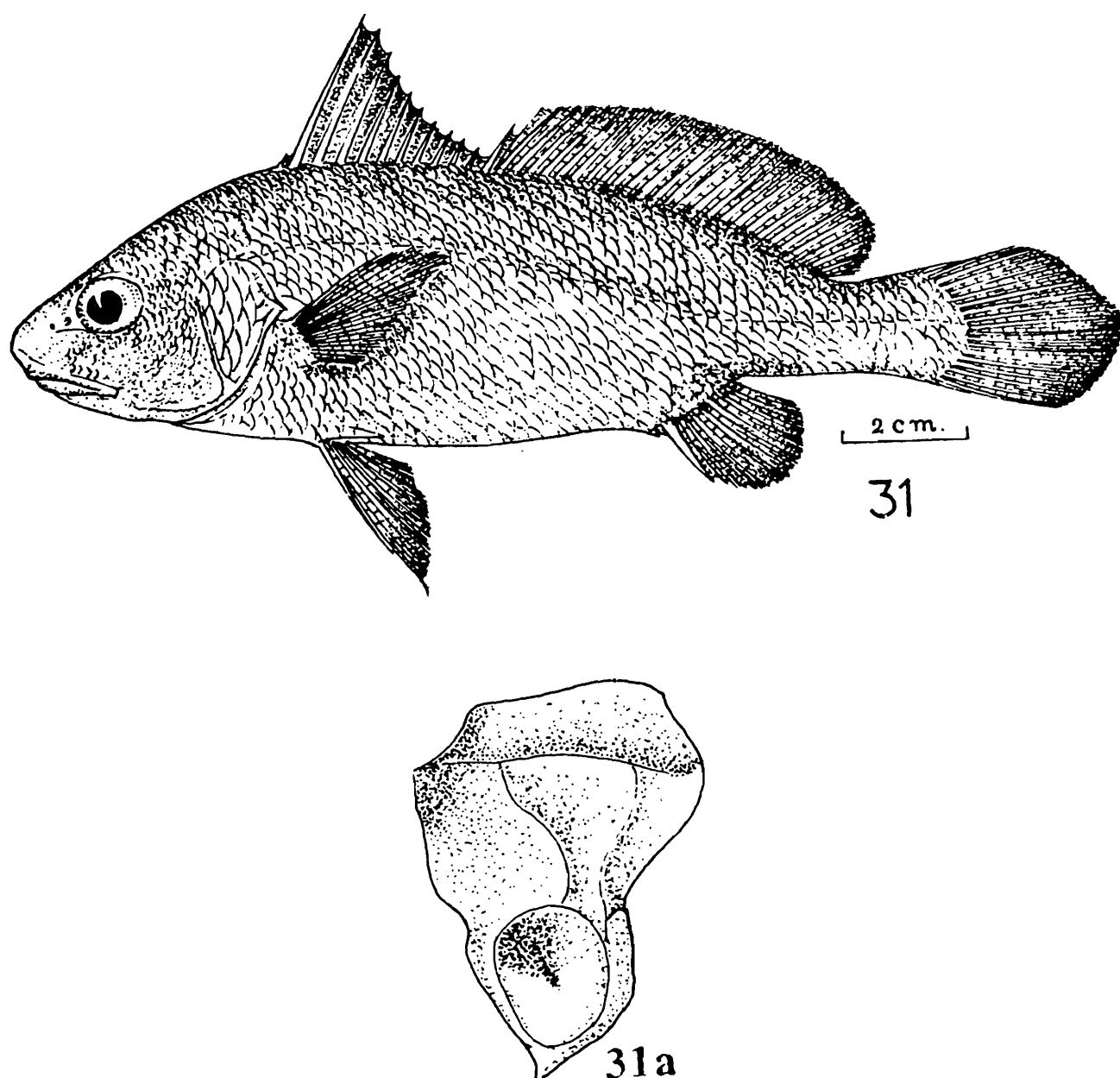


Fig. 31. *Johnius belangerii* (Cuvier); (ZSI Regd. No. F 6814/2). 31a. Sagitta (inner surface).

*Common name* : Belanger's croaker ... English.

*Description* : D IX (X) + I 27-31; A II 7-8; P i 15-16; V I 5.

A medium-sized species with a steeply rounded snout, not or but slightly projecting. Mouth small, inferior; upper jaw well in front of lower and ending below some part of pupil. Eyes circular. Interorbital region broadly convex. Operculum with two flat weak spines; edge of preoperculum serrated, more coarsely so at its angle and horizontal arm.

*Proportions as % Standard length* : Depth of body 25.6—31.4; length of head 27.0—31.7; interorbital width 6.0—8.2; length of pectoral fin 19.5—21.8; and length of second anal spine 8.0—12.2.

*Proportions as % length of head* : Diameter of eye 21.5—26.4; length of snout 25.0—29.8; depth of preorbital bone 15.0—16.2; interorbital width 23.4—27.8; length of upper jaw 34.2—37.5; length of lower jaw 33.6—38.7; and length of second anal spine 38.8—49.0.

Snout with 5 upper (rostral) and 5 lower (marginal) pores, of the lower the median is just above the edge of rostral flap, inner and outer lateral pairs in deep notches giving a quadrilobate snout. Lower jaw with 5 pores, the median behind the symphysis and two pairs behind these, surrounded by thick skin; no mental barbel.

Gillrakers on first arch (4 – 5) + 1 + (7 – 9), very short, often club-shaped, spinulose.

Teeth villiform, differentiated in size in upper jaw only, outer row of larger, curved, conical teeth, not widely spaced, and an inner band of four or five series of very small, villiform teeth; teeth of lower jaw uniformly small.

Scales cycloid on snout and lower parts of head, elsewhere coarsely ctenoid so that the fish is rough to the touch; lateral line scales 48 to 52. Dorsal, anal and caudal fins covered with small scales.

Dorsal fin deeply notched; dorsal spines fairly weak, second or third spine longest. Second anal spine rather strong, about half of head length. Pectoral fin moderately long, about three-fourth of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 11 to 14 pairs of arborescent appendages, first pair entering head and sending a palmate branch to front of pectoral arch.

Otolith (sagitta) (Text-fig. 31a) with a tadpole-shaped impression on its inner side, of which the 'head' has its long axis lying obliquely to that of the otolith and the 'tail' is expanded and deepened as a hollow cone, connected with 'head' by a narrow groove.

Colour : In life, bronzy (darkly pigmented), but pigment sometimes irregular, sometimes concentrated into short dark bars along back or on dorsal fin. Spinous dorsal fin black; anal and caudal fins also black in many cases; a dark blotch shows through gill-cover.

*Geographical distribution* : Pakistan, India, Sri Lanka, through the East Indies, to China and Japan and along the eastern coast of Australia.

Inhabits coastal waters down to 40 m depth.

*Fishery information* : This sciaenid is common in the catches of our region and is caught with bottom trawls and boat seines. It attains a maximum size of 30 cm; common to 20 cm.

### 33. *Johnius carouna* (Cuvier, 1830) (Text-fig. 32)

1830. *Corvina carouna* Cuvier, *Hist. nat. Poiss.*, 5 : 125 (type-locality : Malabar).

1876. *Johnius carutta* (nec Bloch) Day (*partim*), *Fishes of India* : 192.

1977. *Johnius belangerii* (nec Cuvier) Trewavas, (*partim*), 1977, *Trans. zool. Soc. Lond.*, 33 : 413.

1984. *Johnius carouna* : Talwar, *Handbook Zool. Surv. India*, (4) : 645 (status recognised); Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 6.

*Types* : Holotype : MNHN 7529.

*Common name* : Caroun croaker ... English.

*Description* : D X + I 26-29; A II 7; P i 15-16; V I 5.

A small-sized species with an abruptly rounded snout projecting slightly beyond upper jaw. Mouth horizontal and inferior; upper jaw well in front of lower and extends to beyond middle of eye. Interorbital region broadly convex. Operculum with two flat weak spines; edge of preoperculum serrated, more coarsely so at its angle.

*Proportions as % Standard length* : Depth of body 26.6—29.4; length of head 27.4—30.5; interorbital width 6.2—7.0; length of pectoral fin 15.4—17.2; and length of second anal spine 11.7—14.5.

*Proportions as % length of head* : Diameter of eye 20.0—25.7; length of snout 20.0—28.5; depth of preorbital bone 15.6—16.8; interorbital width 22.8—25.8; length of upper jaw 31.4—34.8; length of lower jaw 20.0—25.6; and length of second anal spine 45.7—47.4.

Snout with 5 upper (rostral) and 5 lower (marginal) pores, of lower the median is just above edge of rostral flap, inner and outer marginal pairs in deep notches giving a quadrilobate snout. Mental pores 3 pairs of which the first pair open close behind symphysis of lower jaw in a common pit; no mental barbel.

Gillrakers (4 – 5) + 1 + (10 – 12) on lower arm of first arch, short.

Teeth villiform, differentiated in size in upper jaw only, outer upper row slightly enlarged and rather closely-set; lower jaw with a uniform band of villiform teeth.

Scales on snout cycloid, other parts of head and body with rather coarsely ctenoid scales; lateral line scales 46 to 49. Small scales, present on bases of soft parts of dorsal and anal fins.

Dorsal fin deeply notched; dorsal spines fairly weak, third spine longest. Second anal spine fairly strong, one-third of head length. Pectoral fins moderately long, about three-fourth of head length. First ray of pelvic fin filiform. Caudal fin rhomboid.

Gasbladder hammer-shaped with 14 or 15 pairs of arborescent appendages, first (anterior) pair entering head through the transverse septum and dividing into two tubules - inner tubule branching under the skull and outer tubule extending laterally to end in a palmate tip under skin of branchial wall covering the supracleithrum.

Otolith (sagitta) with a tadpole-shaped impression on its inner side, of which the 'head' has its long axis lying obliquely to that of the otolith and the 'tail' (or 'cauda') is expanded and deepened as a hollow cone connected with the 'head' by a narrow groove.

*Colour* : In life, greyish on back, fading to yellowish on flanks and belly; operculum with a bluish blotch. Dorsal fin light grey; pectoral, pelvic and anal fins, and also lower part of caudal fin with a yellowish tinge.

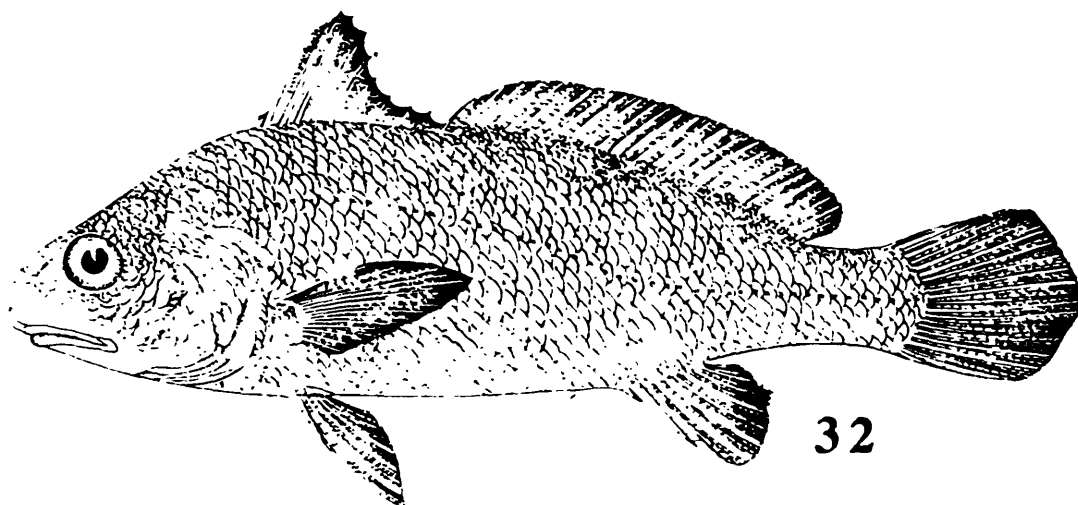


Fig. 32. *Johnius carouna* (Cuvier) (after Mohan & Talwar).

*Geographical distribution* : South-west and South-east coast of India.

Inhabits coastal waters, entering estuaries and backwaters.

*Fishery information* : This species constitutes a minor fishery in the Cochin backwaters. It attains a length of 145 mm; common about 100 mm.

34. *Johnius glaucus* (Day, 1876)  
(Text-fig. 33)

1865. *Sciaena dussumieri* (nec Valenciennes) Day, *Fishes of Malabar* : 51.

1876. *Sciaena glaucus* Day, *Fishes of India* : 192, pl. 46, fig. 2 (type-locality : Bombay).

1889. *Sciaena glauca* : Day, *Fauna Br. India*, *Fishes*, 2 : 122; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 450.

1926. *Johnius glaucus* : Fowler, *J. Bombay nat. Hist. Soc.*, 30(4) : 10; Fowler, 1927, *Indian J. Fish.*, 16 : 85; Mohan, 1981, *Indian, J. Fish.*, 28 : 17, fig. 24; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh. 8.

*Types* : ? Syntypes : ZSI 984 and 985, both fragile. ? Syntypes : AM B 8236-7.

*Common name* : Pale spotfin croaker ... English.

*Distinguishing characters* : D X + I 28-30; A II 7; P<sub>i</sub> 17; V I 5.

A medium-sized species with a fairly deep body. Snout swollen and prominent, projecting beyond the mouth. Mouth narrow, ventral; upper jaw extending to beyond middle of eye diameter. Eyes large. Operculum with two flat weak spines; edge of preoperculum serrated, more coarsely at angle.

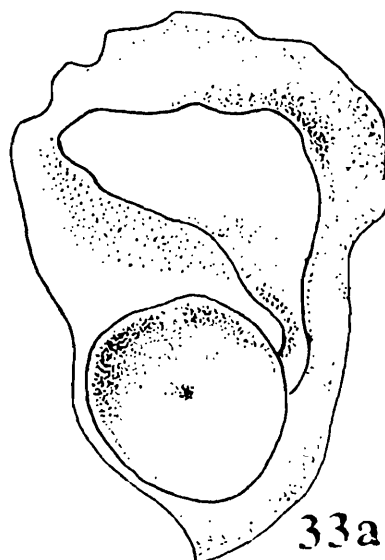
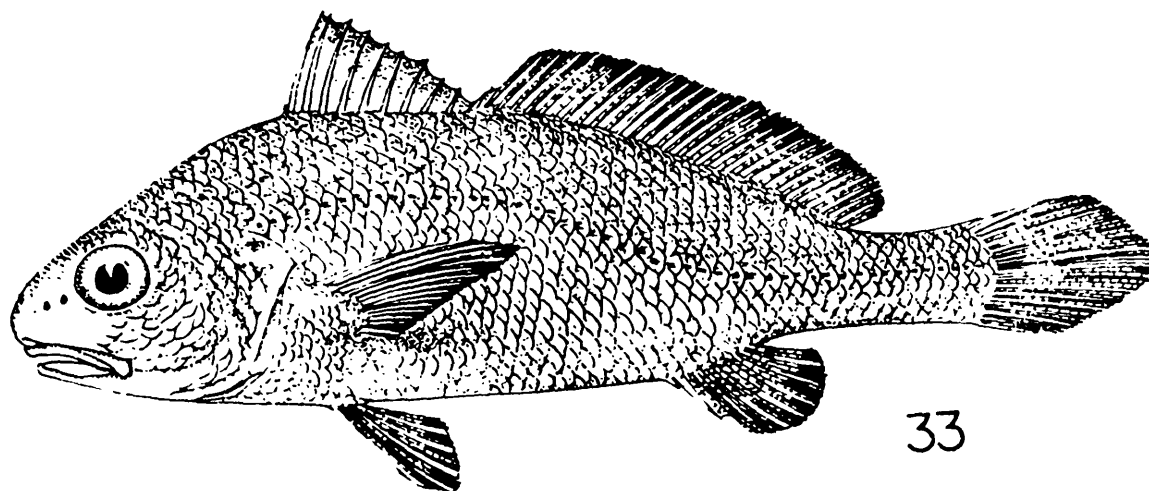


Fig. 33. *Johnius glaucus* (Day) (after Mohan). 33a. Sagitta (inner surface).

*Proportions as % Standard length* : Depth of body 29.0—30.5; length of head 25.8—32.4; length of pectoral fin 21.8—23.0; and length of second anal spine 8.2—10.0.

*Proportions as % length of head* : Diameter of eye 24.4—29.0; length of snout 25.3—27.3; depth of preorbital bone 12.9—13.8; interorbital width 24.3—25.5; length of upper jaw 38.6—40.4; and length of second anal spine 26.5—35.8.

Snout with 5 rostral (upper) and 5 marginal (lower) pores, marginal pores dividing snout into deep lobes. Mental pores 5; no mental barbel.

Gillrakers on first arch (5 – 6) + 1 + (10 – 12), short, with simple curved spines on both sides.

Teeth villiform, differentiated in size in upper jaw only, the large teeth close-set and forming the outer row.

Scales cycloid on snout, below the eye and on extreme anterior part of breast; ctenoid on interorbital region, occiput and whole body; lateral line scales 48 to 50. Soft dorsal and anal fins scaly.

Dorsal fin deeply notched; dorsal spines moderately weak, second spine longest. Second anal spine weak, about one-third of head length. Pectoral fins about three-fourths of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 14 or 15 pairs of arborescent appendages, the first pair branching in the head.

Otolith (sagitta) (Text-fig. 33a) with a tadpole-shaped impression on its inner side of which the 'head' lies obliquely to that of the otolith and the 'tail' (or 'cauda') is expanded and deepened as a hollow cone.

Colour : In life, dorsally grey becoming silvery yellow below; a diffused bluish blotch on opercles. Upper two-thirds of spinous dorsal fin dusky.

*Geographical distribution* : Northwest coast of India, and Pakistan.

Inhabits shallow muddy coastal waters down to 30 m depth.

*Fishery information* : This sciaenid forms a constituent of the trawl catches at Bombay. Caught with bottom trawls and boat seines. It attains a length of 30 cm; common to 20 cm.

35. *Johnius gangeticus* sp. nov.  
(Text-fig. 34)

1986. *Johnius novae-hollandiae* (nec Steindachner) Rao and Sinha, *J. mar. biol. Ass. India*, 8 : 370, figs 1 & 2 (Hooghly estuary).

1981. *Johnius coitor* (nec Hamilton-Buchanan) Mohan *Indian, J. Fish.*, 28 : 16, fig. 23.

*Types* : Holotype (Text-fig. 34) ZSI FF 2605; 115 mm Standard length, *loc.* Ganga R. at Allahabad (Uttar Pradesh), *coll.* H.P.C. Shetty, 5 December 1969. Paratypes : ZSI FF 2606; 26 exs, 98-116 mm Standard length; collected along with holotype.

*Distinguishing characters* : D X + I 26-27; A II 7; P i 16; V I 5

A small-sized species with a fairly slender body. Snout well rounded, projecting slightly before upper jaw and this before lower. Mouth narrow, inferior; maxillary extending to below middle of eye. Eyes small. Operculum with two flat weak spines; edge of preoperculum serrate, more coarsely so at angle.

*Proportions as % Standard length* : Depth of body 20.0—24.5; length of head 27.0—28.6; interorbital width 7.2—7.8; length of pectoral fin 20.7—21.9; and length of second anal spine 12.9—13.7.

*Proportions as % length of head* : Diameter of eye 24.0—27.4; length of snout 28.6—30.0; depth of preorbital bone 16.9—17.5; interorbital width 25.5—26.7; length of upper jaw 30.0—31.4; and length of lower jaw 39.6-40.8; and length of second anal spine 45.4—48.4.

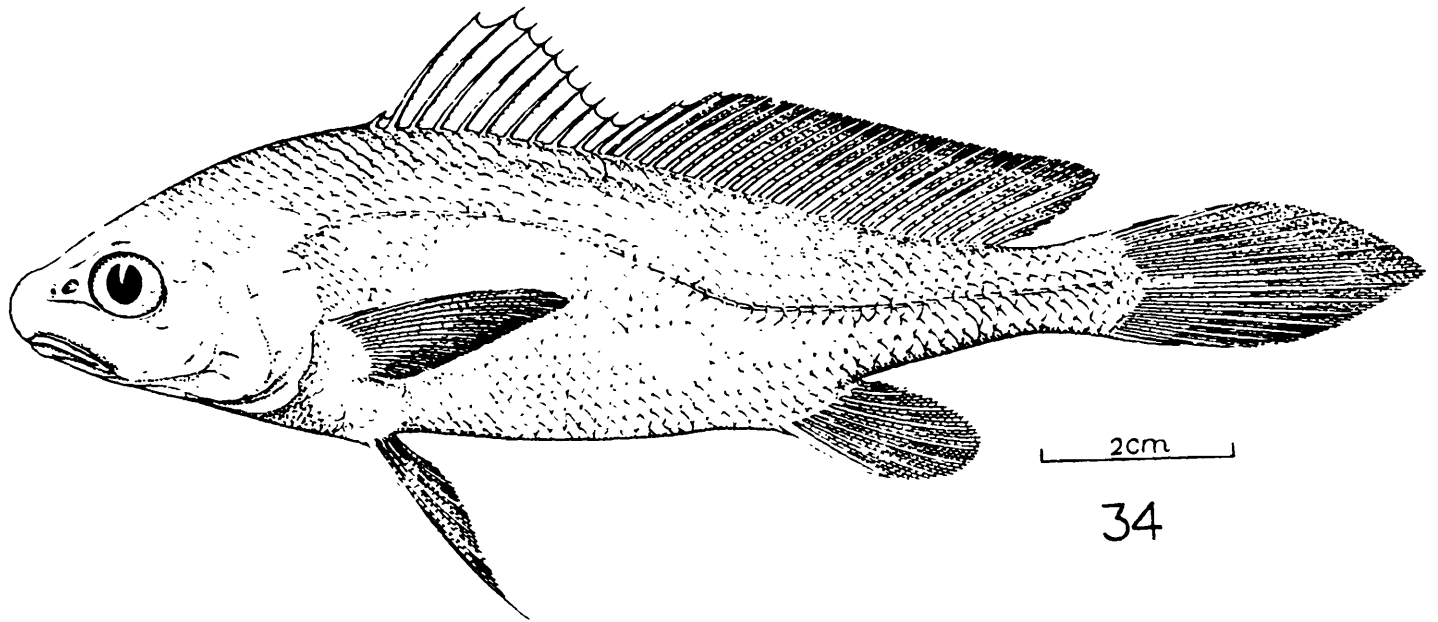


Fig. 34. *Johnius gangeticus* Talwar; Holotype : ZSI Regd. No. FF 2605.

Snout with 5 rostral (upper) and 5 marginal (lower) pores, marginal ones dividing snout into deep lobes. Mental pores 5; no mental barbel.

Gillrakers on first arch (5 – 6) + 1 + (10 – 11); short and slender, the uppermost and two lowest minute.

Teeth villiform, differentiated in size in upper jaw only; outer upper row of enlarged conical teeth, not widely spaced; followed by an inner band of four or five series of very small, villiform teeth; the lower jaw teeth uniformly small.

Scales cycloid on snout, below eye and on anterior part of breast; ctenoid on occiput and whole body; lateral line scales 48 to 50, five scale rows between lateral line and origin of dorsal fin. Soft dorsal and anal fins scaly.

Dorsal fin moderately notched; dorsal spines moderately weak, third longest. Second anal spine strong, about half of head length. Pectoral fins moderately long, about three-fourths of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 12 or 13 pairs of lateral arborescent appendages; first (anterior) pair cephalic and well developed.

Otolith (sagitta) of the johniine type, with a tadpole-shaped impression on its inner side of which the 'head' is truncated and obliquely bent and the 'tail' (or 'cauda') is a deep hollow cone, connected by a short narrow groove with the bounding groove of the 'head'

Colour : In life, pale brown dorsally and silvery along flanks and belly. Spinous dorsal fin tip dusky; other fins hyaline.

*Geographical distribution* : Ganga River, including its estuary.

*Fishery information* : This sciaenid forms a fishery in the Ganga river at Allahabad (Uttar Pradesh) and also in the Sundarbans. It attains a length of 12 cm.

Genus 20. *Johnieops* Mohan, 1972

1938. *Wak Lin (partim)*, *Lingnan Sci. J.* 17(2) : 378.

1972. *Johnieops* Mohan, *Indian J. Fish.*, 16 : 85 (type-species : *Sciaena ossea* Day).

*Definition* : Sciaenids with a hammer-shaped gasbladder with the head of the hammer immediately behind the transverse septum, bearing 12 to 20 pairs of arborescent appendages along the sides; first (anterior) pair pierces the transverse septum and enters the head, branching between skull and upper gill arches and sending a palmate branch to front of pectoral arch; gasbladder appendages without dorsal limbs.

Mouth large, terminal or subterminal, with the lower jaw nearly always more than 40% length of head and longer in the young. Teeth in narrow bands, moderately to well differentiated in size in both jaws; inner row of teeth in lower jaw more or less enlarged and spaced, and the enlarged teeth of the upper jaw more widely spaced.

Mental pores three pairs of which the anterior open close behind the symphysis and sunken in a pit and opens by a median pore; no mental barbel. Gill-rakers 9 to 20 (usually 12 to 15) on lower arm of first arch. Otolith (sagitta) with a tadpole-shaped impression on its inner side, 'head' of tadpole truncated and obliquely bent and the 'tail' (or 'cauda') is expanded to form a hollow cone. Vertebrae 25.

Key to species

- 1(a) Inner row of teeth in lower jaw well developed and spaced; mouth terminal; gillrakers 9 to 12 on lower arm of first arch .....*J. vogleri*
- (b) Inner row of teeth moderately or slightly enlarged; mouth subterminal to inferior .....2
- 2(a) Lower gillrakers 5 to 8; outer upper row of teeth slightly enlarged and not widely spaced .....*J. macrorhynchus*
- (b) Lower gillrakers 10 to 15; outer upper row of teeth clearly enlarged and widely spaced .....3
- 3(a) Snout and preorbital inflated; teeth not well differentiated in size in jaws .....*J. dussumieri*
- (b) Snout decurved but *not* inflated .....4
- 4(a) Teeth well differentiated in size in both jaws .....*J. sina*
- (b) Teeth slightly differentiated in size in both jaws .....*J. aneus*

36. *Johnieops vogleri* (Bleeker, 1853)

(Text-fig. 35)

1850. ? *Otolithus borneensis* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 1 : 268 (type-locality : Bandjermassing, Borneo); Bleeker, 1877, *Atlas Ichthyol. Indes-*

- Orientalis Neerland.*, 9 : pl. 385, fig. 4; Weber de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 523; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 432 (type redescribed).
1853. *Otolithus vogleri* Bleeker, *Natuurk. Tijdschr. Ned.-Indie*, 4 : 253 (type-locality : Benculen, Sumatra); Trewavas, 1977, *Trans. zool. Soc. Lond.* 33 : 433 (type redescribed).
1860. *Sciaena vogleri* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 294; Day, 1876, *Fishes of India* : 186, pl. 45, fig. 1; Day, 1889, *Fauna Br. India*, Fishes, 2 : 113; Zugmayer, 1913, *Abh. bayer. Akad. Wiss.*, 26(6) : 12; Vinciguerra, 1926, *Annali Mus. Civ. Stor. nat. Giacoma Doria*, (3)10 : 577; Hardenberg, 1931, *Treubia*, 13(1) : 130.
1874. *Pseudosciaena vogleri* : Bleeker, *Verh. K. Akad. Wet. Amst.*, 14(4) : 35; Bleeker, 1877, *Atlas Ichthyol. Indes-Orientalis Neerland.*, 9 : pl. 386, fig. 4.
1876. *Sciaena sina* (nec Cuvier) Day (partim), *Fishes of India* : 186; Day (partim), 1889, *Fauna Br. India*, Fishes, 2 : 113.
1884. *Corvina canina* De Vis, *Proc. Linn. Soc. N.S.W.*, 9 : 538 (type-locality : Brisbane R., Australia).
1970. *Johnius vogleri* : Seale, *Philippine J. Sci.*, 5(4) : 280; Fowler, 1931, *Proc. Acad. nat. Sci. Philad.*, 82 : 44.
1914. *Corvina papuensis* Hase, *Jena. J. Naturw.*, 51 : 531, figs 4-6 (type-locality : New Guinea).
1914. ? *Sciaena belangari* (nec Cuvier) Regan, *Trans. zool. Soc. Lond.*, 20 : 276.
1918. *Sciaena australis* (nec Gunther) Ogilby, *Mem. Qd. Mus.*, 6 : 75, pl. 22; Marshall, 1954, *Commercial fishes and fisheries of Queensland* : 71.
1924. *Sciaena siamensis* Hora, *Mem. Indian Mus.*, 5 : 487, fig. 4 (type-locality : Sing-gora, Thailand).
1933. *Johnius siamensis* : Fowler, *Bull. U.S. nat. Mus.*, (100)12 : 392.
1934. *Pseudosciaena axillaris* (nec Cuvier) Herre, *Fishes of the Herre Philippines Expedition, 1931* : 57.
1935. *Johnius coibor* (nec Hamilton-Buchanan) Fowler (partim), *Proc. Acad. nat. Sci. Philad.*, 87 : 152.
1936. *Pseudosciaena sina* (nec Cuvier) Weber and de Beaufort (partim), *Fishes Indo-Australian archipelago*, 7 : 513; Munro, 1967, *Fishes of new Guinea* : 343.
1937. *Johnius sina* (nec Cuvier) Fowler, *Proc. Acad. nat. Sci. Philad.*, 89 : 240, figs 239, 240.
1968. *Nibea sina* (nec Cuvier) Dutt and Thankam (partim), *J. Bombay nat. Hist. Soc.*, 65(2) : 341.
1972. *Wak vogleri* : Talwar and Joglekar, *Rec. zool. Surv. India*, 66 : 230.
1972. *Johnieops vogleri* : Mohan, *Indian J. Fish.*, 16 : 85; Fischer and Whitehead, 1974, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Johps. 3; Mohan, 1981, *Indian J. Fish.*, 28 : 20, fig. 30; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 SCIAEN Joh 3.
1977. *Johnius* (*Johnieops*) *vogleri* : Trewavas, *Trans. zool. Soc. Lond.*, 33 : 441; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 654, fig. 260.

*Types* : Syntypes : RMNH 5979; 2 exs, 168.5 and 179 mm SL; the smaller syntype is probably the model for the figure in Bleeker's (1877) *Atlas* (vide Trewavas, 1977). Syntype : AM B 8135. Holotype of *Otolithus borneensis* : RMNH 5980. Holotype of *Sciaena siamensis* : ZSI Regd. No. ?; Lost.

*Common name* : Sharptooth hammer croaker ... English.

*Description* : D IX-X + I 27-31; A II 7-8; P i 16-17; V I 5.

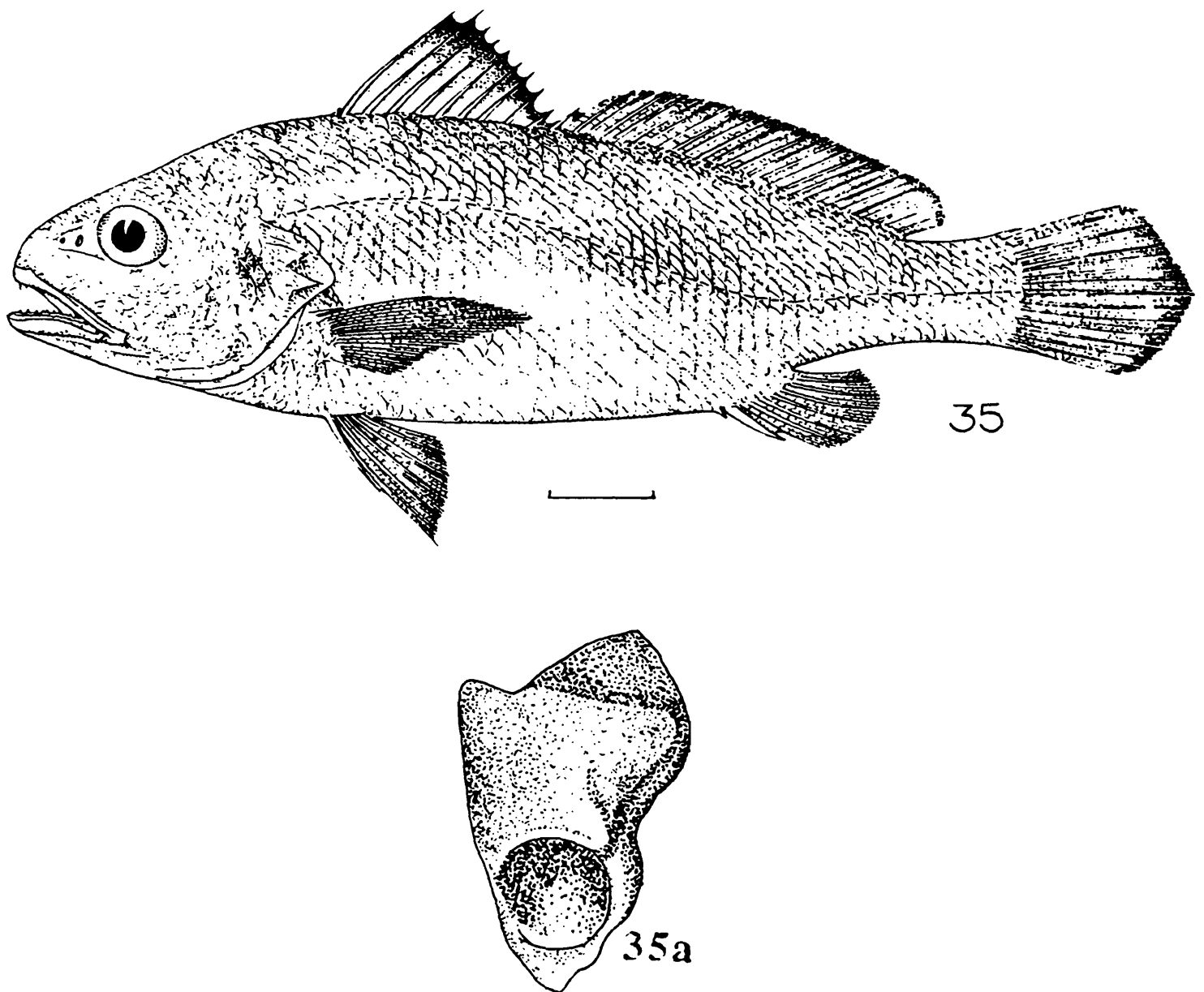


Fig. 35. *Johnieops vogleri* (Bleeker); (ZSI Regd. No. F 7353/2). 35a. Sagitta (inner surface).

A fairly small species. Snout evenly decurved, but not swollen or projecting. Eyes large. Mouth large. Mouth large and terminal; upper jaw slightly overshooting lower in front and ending posteriorly below hind margin of pupil, making an angle of about  $30^\circ$  with the horizontal. Operculum with two flat weak spines; preopercular margin finely serrated.

*Proportions as % Standard length* : Depth of body 27.5—29.0; length of head 30.5—34.0; interorbital width 7.6—8.0; length of pectoral fin 19.0—20.8; and length of second anal spine 8.0—9.7.

*Proportions as % length of head* : Diameter of eye 24.0-26.8; length of snout 27.5—30.0; depth of preorbital bone 17.0—17.8; interorbital width 24.0—25.8; length of upper jaw 43.0—47.0; length of lower jaw 49.4—52.5; and length of second anal spine 21.8—23.0.

Upper pores on snout 3, minute and indistinct; those of marginal series 5, the median above the edge, outer pair slightly notching the edge, inner pair not in notches. Lower jaw with three pairs of pores, the two anterior close together and joined by a groove; no mental barbel.

Gillrakers on first arch (4 – 6) + 1 + (9 – 12), short, curved and coarsely spinulose in adults, slender in young.

Teeth villiform in narrow bands, well differentiated in size in both jaws, outer upper row and lower inner row of enlarged and widely spaced teeth.

Scales cycloid on top of head, and below and behind eye, elsewhere ctenoid; lateral line with 48 to 50 scales. Small scales on bases of dorsal and anal fins.

Dorsal fin deeply notched; dorsal spines moderately weak, third and fourth longest. Second anal spine short and fairly weak. Pectoral fins moderately long, about three-fourths of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped, with 14 or 15 pairs of arborescent appendages; first (anterior) pair pierces the transverse septum and enters the head, sending a palmate branch to front of pectoral arch.

Otolith (sagitta) (Text-fig. 35a) with a tadpole-shaped impression on its inner side, of which the 'head' is truncated and obliquely bent and the 'tail' (or 'cauda') is deepened as a hollow conc.

Colour : In life, greyish on back and silvery, glossed with golden on flanks and belly. Spinous dorsal fin dusky in its upper third; anal, pectoral and pelvic fins yellowish.

*Geographical distribution* : Gulf of Oman, Pakistan, India, Sri Lanka, through the East Indies, the Philippines, to the northern coast of Australia.

Inhabits shallow coastal waters.

*Fishery information* : This sciaenid forms a fishery on the northwest coast of India and is also fairly common in the catches on the east coast. It attains a length of 30 cm; common to 20 cm. Caught with bottom trawls, bottom gillnets, etc.

### 37. *Johnieops macrorhynus* Mohan, 1976 (Text-fig. 36)

1932. ? *Johnius cantori* (nec Blecker) Fowler, *proc. Acad. nat. Sci. Philad.*, 81 : 447.

1933. ? *Johnius osseus* (nec Day) Fowler, *Bull. U.S. natn. Mus.*, (100)12 : 379.

1976. *Johnieops macrorhynus* Mohan, *Matsya*, (1) : 20, fig. 2 (type-locality : East and West coast of India); Mohan, 1981, *Indian J. Fish.*, 28 : 18, fig. 26; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 5.

1977. *Johnius (Johnius) macrorhynus* : Trewavas, *Trans. zool. Soc. Lond.*, 33 : 412; Talwar, 1984, *Handbook zool. Surv. India*, (4) : 645 (in Key).

*Types* : Holotype : ZSI F 7684/2; *loc.* Bombay. Paratypes : CMFRI 190/1-19; 19 exs, *loc.* Calcutta, Waltair, Mandapam, Bombay and Veraval.

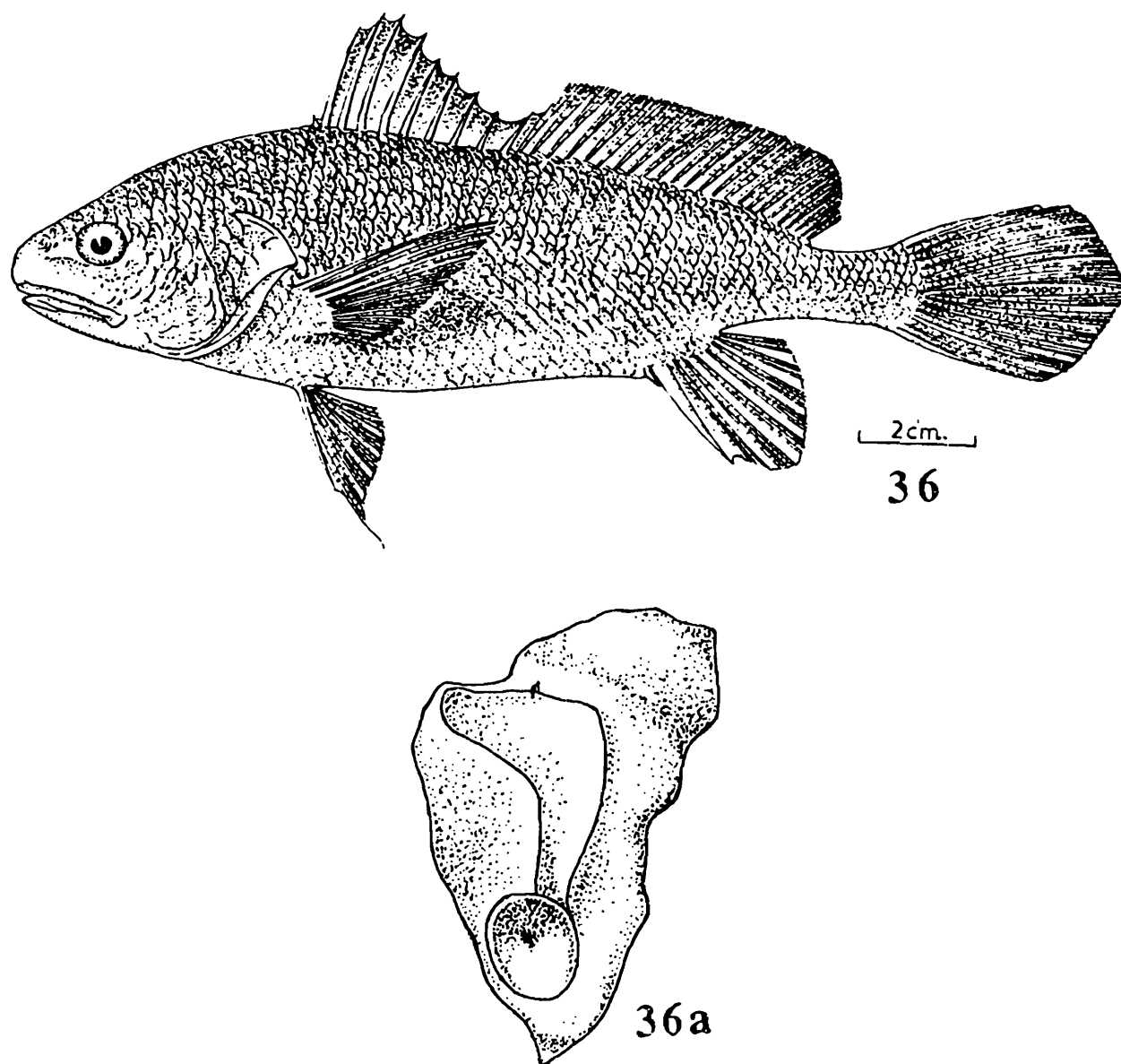


Fig. 36. *Johnieops macrorhynus* (Mohan); (Holotype : ZSI Regd. No. F 7684/2).  
36a. Sagitta (inner surface).

*Common name* : Bigsnout croaker ... English.

*Distinguishing characters* : D X + I 26-30; A II 7; P i 15-16; V I 5.

A medium-sized species. Body spindle-shaped. Snout rounded (rather obtuse), projecting. Eyes large. Mouth narrow and inferior; maxillary extending to below middle of eye. Operculum with two flat weak spines; preopercular margin finely serrated.

*Proportions as % Standard length* : Depth of body 26.0—30.2; length of head 25.2—29.0; interorbital width 7.2—8.0; length of pectoral fin 19.8—21.7; and length of second anal spine 7.0—9.7.

*Proportions as % length of head* : Diameter of eye 24.4—27.0; length of snout 24.0—27.5; depth of preorbital bone 18.6—19.8; interorbital width 24.1—26.6; length of upper jaw 33.0—37.0; length jaw 37.8—39.2; and length of second anal spine 24.0—25.2.

Upper (rostral) pores on snout 3; those on marginal series 5, the marginal dividing the snout into deep lobes. Mental pores 5, but inside the median opening the anterior pair may be seen at the bottom of their pit; the skin around them, though thick, is not produced into lobes or tags; no mental barbel.

Gillrakers on first arch (3 – 5) + 1 + (5 – 8), short and stumpy with minute spines.

Teeth in villiform bands, weakly differentiated in size in both jaws; outer upper row slightly enlarged and not widely spaced; lower inner row slightly enlarged posteriorly (in large specimens the enlarged posterior teeth are blunt).

Scales cycloid on snout, below eye and on extreme anterior part of breast, cycloid or ctenoid on interorbital region and behind eye; ctenoid on occiput and whole body. Soft dorsal and anal fins scaly.

Dorsal fin deeply notched; dorsal spines weak, second and third longest. Second anal spine short and weak, about one-fourth of head length. Pectoral fin moderate, about three-fifths of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 13 or 14 pairs of arborescent appendages; first (anterior) pair pierces the transverse septum and branches in the head, sending an outer palmate branch to the front of pectoral arch.

Otolith (sagitta) (Text-fig. 36a) with a tadpole-shaped impression on its inner side, of which the 'head' is obliquely truncated, and the 'tail' (or 'cauda') is expanded and deepened as a hollow cone, connected with the head by a narrow groove.

Colour : In life, pale brown dorsally, yellow on flanks and belly; a faint steel blue blotch on opercle. Pectoral, pelvic and anal fins yellowish.

*Geographical distribution* : India, Sri Lanka, Andaman Sea and Singapore.

Inhabits shallow coastal waters.

*Fishery information* : This sciaenid is fairly common in the catches along the West coast of India. It attains a length of 30 cm; common to 22 cm. Caught by bottom trawls, shore seines and bottom seines.

### 38. *Johnieops dussumieri* (Cuvier, 1830) (Text-fig. 37)

1830. *Corvina dussumieri* Cuvier, *Hist. nat. Poiss.*, 5 : 119 (type-locality : Malabar); Bleeker, 1852, *Natuurk. Tijdschr. Ned.-Indie*, 3 : 56; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 430, pl. 12 (type-redescribed).
1840. *Johnius dussumieri* : Valenciennes, *Regne Animale* : pl. 28, fig. 2; Cantor, 1849, *J. Asiat. Soc. Beng.*, 18(2) : 1046; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 49; Fowler, 1933, *Bull. U.S. nat. Mus.*, (100)12 : 398; Weber and de Beaufort, 1936, *Fishes Indo-Australian archipelago*, 7 : 530.
1855. *Corvina dorsalis* Peters, *Arch. Naturgesch.*, 21(1) : 242 (type-locality : Mozambique); Sauvage, 1891, *Hist. physique, naturelle politique Madagascar* : pl. 17, fig. 3; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 434, pl. 12 (type redescribed).
1904. *Sciaena dussumieri* : Duncker, *Mitt. naturh. Mus. Hamb.*, 21 : 154; ? Hardenberg, 1934, *Treubia*, 14 : 309.

1970. *Wak sina* (nec Cuvier) Talwar and Joglekar, *J. Inland Fish. soc. India*, 1 : 4.
1974. *Johnieops dussumieri* : Fischer and Whitehead, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Johps 1; Mohan, 1981, *Indian J. Fish.*, 28 : 19, fig. 28; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh. 1.
1977. *Johnius (Johnieops) dussumieri* : Trewavas, *Trans. zool. Soc. Lond.*, 33 : 437; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 650, fig. 257.

*Types* : Holotype : MNHN 7614; Syntypes of *Corvina dorsalis* : ZMB 896; two cxs.

*Common Name* : Dussumier's croaker ... English.

*Distinguishing Characters* : D IX-X + I 26-29; A II 7-8; P i 15-16; V I 5.

A fairly small species. Snout well rounded and prominent, projecting a little beyond upper jaw; snout and preorbital inflated. Mouth small and subterminal, its angle about 30° to the horizontal; maxillary extending to below posterior part of iris. Operculum with two flat weak spines; preopercular margin finely serrate.

*Proportions as % Standard length* : Depth of body 29.0—31.6; length of head 30.2—32.8; interorbital width 9.1—10.6; length of pectoral fin 19.2—21.0; and length of second anal spine 7.5—10.4.

*Proportions as % length of head* : Diameter of eye 18.5—21.0; length of snout 24.0—28.0; depth of preorbital bone 12.8—13.6; interorbital width 28.8—32.0; length of upper jaw 39.0—44.8; length of lower jaw 43.8—46.5; and length of second anal spine 25.0—26.4.

Snout with 5 minute rostral (upper) and 5 marginal (lower) pores, outer two marginal pairs notching the edge of rostral flap. Pores of lower jaw three pairs, the anterior very small and close to each other and to the lower end of symphysis, and in a pit ('false five-pored' form); no mental barbel.

Gillrakers on first arch 4 + 1 + (13 - 16), short, rather stout, curved and coarsely toothed, the two lowest mere dentate stumps.

Teeth villiform, in very narrow bands, slightly differentiated in size in both jaws; outer upper row of enlarged teeth, spaced anteriorly but closer posteriorly, inner in 3 or 4 series buried in papillae; teeth of lower jaw small and equal anteriorly, posteriorly the innermost of three rows slightly enlarged.

Scales cycloid on snout, below and immediately behind eye and on breast to between pelvic fins; ctenoid from between eyes backwards over whole body; lateral line scales 47 to 49. Dorsal and anal fins with a basal scaly sheath of cycloid scales.

Dorsal fin deeply notched; dorsal spines moderately weak, third spine longest. Second anal spine rather weak but moderately long. Pectoral fins moderately long, about three-fourths of head length. Caudal fin rhomboid.

Gasbladder (Text fig. 37a) hammer-shaped with 14 or 15 pairs of arborescent appendages along sides of bladder; first pair branching in head and sending a pectoral arch.

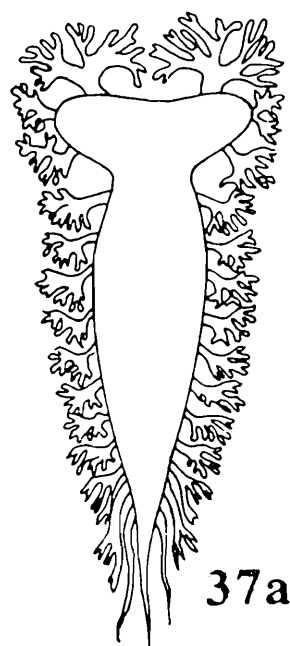
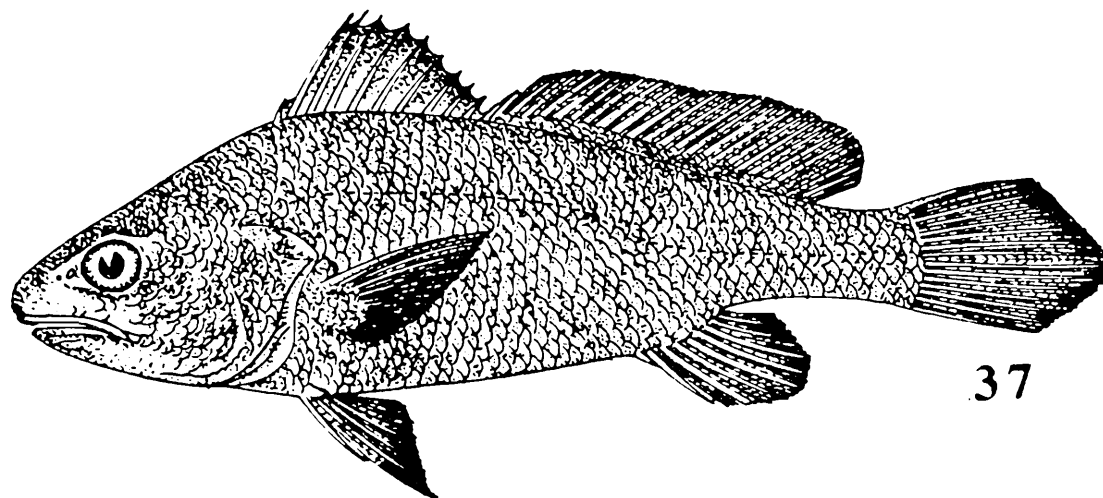


Fig. 37. *Johnieops dussumieri* (Cuvier) (after Mohan & Talwar). 37a. Systematic view of gasbladder.

Otolith (sagitta) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and obliquely bent, and the 'tail' (or 'cauda') is expanded to form a hollow cone.

Colour : In life, dusky brown on back, silvery along flanks and belly; opercle with a steel-blue blotch. Spinous dorsal fin dusky.

*Geographical distribution* : Southeast coast of Africa, Madagascar, India and the Andaman Sea.

Inshore waters, down to 40 m depth.

*Fishery information* : This sciaenid forms a fishery in peninsular India. It attains a length of 40 cm; common to 20 cm. Caught with bottom trawls, gill nets and bag nets.

39. *Johnieops sina* (Cuvier, 1830)  
(Text-fig. 38)

1830. *Corvina sina* Cuvier, 1830, *Hist. nat. Poiss.*, 5 : 122 (type-locality : Pondicherry and Malabar); Valenciennes, 1834, *Voyage aux Indes Orientales* : 359; Richardson, 1846, *Rep. Br. Ass., Advmt. Sci.*, 15 : 225; Bleeker, 1853, *Verh. batav. Genoot. Kunst. Wet.*, 25 : 12; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 430 (type-re-described).
1860. *Sciaena sina* : Gunther, *Cat. Fishes Br. Mus.*, 2 : 292; Day, 1865, *Fishes of Malabar* : 52; Day (*partim*), 1876, *Fishes of India* : 186, pl. 44, fig. 2; Gunther, 1880, *Voyage of H.M.S. Challenger (Zool.)*, 1 : 66; Day (*partim*), 1889, *Fauna Br. India, Fishes 2* : 114; Boulenger, 1892, *Proc. zool. Soc. Lond.* : 135; Zugmayer, 1913, *Abh. Bayer. Akad. Wiss.*, 26(6) : 12; Herre and Myers, 1931, *Lingnan Sci. J.* 10 : 251.
1861. *Johnius sina* : Blyth, *J. Asiat. Soc. Beng.*, 29 : 141; Bleeker, 1874, *Verh. K. Akad. Wet. Amst.*, 14(4) : 54; Fowler, 1925, *Proc. Acad. nat. Sci. Philad.*, 77 : 247; Fowler, 1928, *J. Bombay nat. Hist. Soc.*, 33(1) : 115; Fowler (*partim*), 1933, *Bull. U.S. natn. Mus.*, (100)12 : 388; Munro (*partim*), 1955 *Marine and Fresh Water Fishes Ceylon* : 155.
1908. *Sciaena parva* Gilchrist and Thompson, *Ann. S. Afr. Mus.*, 6 : 183 (type-locality : Natal); Gilchrist and Thompson, 1911, *Ann. S. Afr. Mus.*, 11(4) : 350; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 435 (type re-described).
1925. *Johnius parvus* : Fowler, *Proc. Acad. nat. Sci. Philad.*, 77 : 247.
1936. *Pseudosciaena sina* : Weber and de Beaufort, *Fishes Indo-Australian archipelago*, 7 : 513; Misra (*partim*), 1962, *Rec. Indian Mus.*, 57 : 268.
1968. *Nibea sina* : Dutt and Thankam (*partim*), *J. Bombay nat. Hist. Soc.*, 62(2) : 241.
1970. *Wak menoni* Talwar and Joglekar, *J. Inland Fish. Soc. India*, 1 : 2, figs 1 & 2 (type-locality : Hooghly estuary); Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 435.
1972. *Wak sina* : Talwar and Joglekar, *Rec. zool. Surv. India*, 66 : 23.
1972. *Johnieops sina* : Mohan, *Indian J. Fish.*, 16 : 85; Fischer and Whitehead, 174, *FAO species identification sheets for fishery purposes*, 3 : SCIAEN Johs 2; Mohan, 1981, *Indian J. Fish.*, 28 : 20, fig. 29; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 2.
1977. *Johnius (Johnieops) sina* : Trewavas, *Trans. zool. Soc. Lond.*, 33 : 439; Talwar, 1984, *Handbook Zool. Surv. India*, (4) : 653, fig. 259.

*Types* : Holotype : MNHN ?, probably a dry skin, collected at Pondicherry. Lost (*vide* Trewavas, 1977 : 430). ? Paratypes : MNHN 7521; 2 exs from Malabar. Syntypes of *Sciaena parva* : BMNH 1927.12.6.25; and SAM 9961, three exs. Holotype of *Wak menoni* : ZSI F 6136/2. Paratypes of *Wak menoni* ZSI F6137/2, seven exs.

*Common name* : Sin croaker ... English.

*Distinguishing characters* : D IX-X + I 26-31; A II 7; P i 16-17; V I 5.

A fairly small species. Snout evenly decurved, but not swollen or projecting before the mouth. Mouth fairly large, slightly inferior, its angle about 30° with the horizontal; maxillary extending nearly to below posterior edge of eye. Operculum with two flat weak spines; preopercular margin finely serrated.

*Proportions as % Standard length* : Depth of body 29.5—33.0; length of head 29.0—32.8; interorbital width 7.0—8.4; length of pectoral fin 21.8—23.0; and length of second anal spine 4.5—8.6.

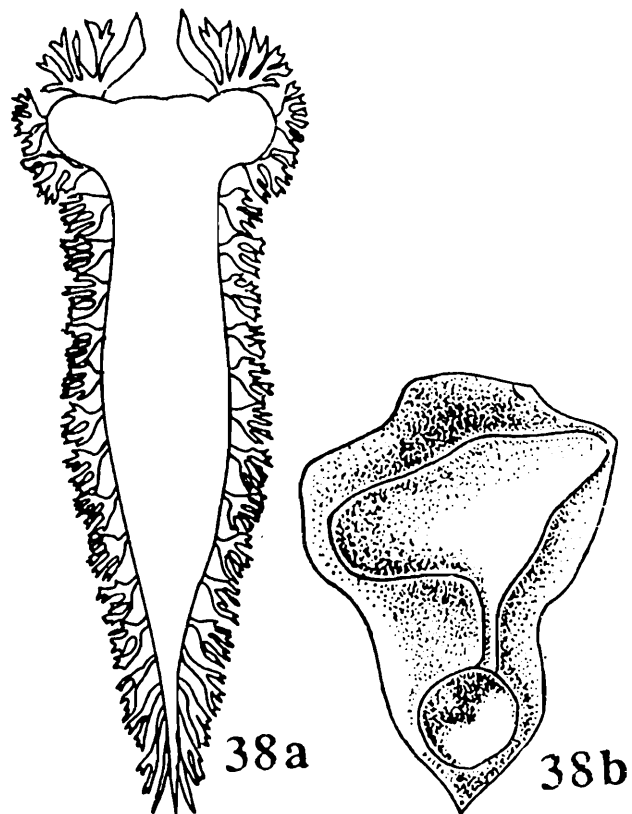
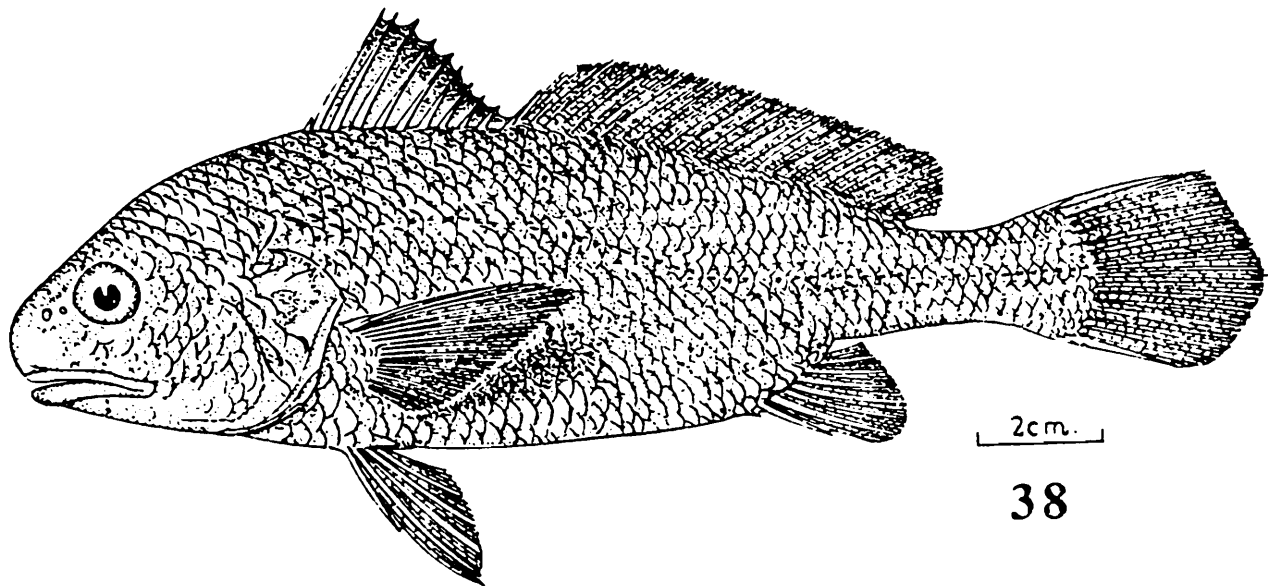


Fig. 38. *Johnieops sina* (Cuvier) (after Mohan & Talwar). 38a. Systematic view of gasbladder. 38b. Sagitta (inner surface).

*Proportions as % length of head* : Diameter of eye 21.0—23.8; length of snout 26.2—29.0; depth of preorbital bone 14.0—14.8; interorbital width 28.8—33.6; length of upper jaw 41.6—45.0; length of lower jaw 44.0—48.5; and length of second anal spine 30.5—32.4.

Snout with 3 minute rostral (upper) pores and 5 marginal (lower) pores of which the median is just above the edge, outer pair in notches, inner pair in notches or slight embayments. Lower jaw with three pairs of pores, anterior ones close together just behind the symphysis, joined by a groove or in a common pit ('false-five pored' form); no mental barbel.

Gillrakers on first arch (6 – 8) + 1 + (14 – 15), long and slender except one or two minute at lower end of the series.

Teeth villiform in very narrow bands, moderately well differentiated in size in both jaws, outer upper row enlarged and widely spaced, and lower inner row of moderately enlarged teeth posteriorly, outside them two irregular rows of small teeth.

Scales cycloid on head, elsewhere ctenoid; lateral line scales 48 to 50. Dorsal and anal fins with a basal scaly sheath of small cycloid scales.

Dorsal fin deeply notched; dorsal spines moderately weak, third longest. Second anal spine moderately strong and long, about one-third of head length. Pectoral fins moderately long, about three-fourths of head length. Caudal fin rhomboid.

Gasbladder (Text-fig. 38a) hammer-shaped, with 12 to 17 pairs of arborescent appendages; first (anterior) pair branching in head and sending a palmate branch to the front of pectoral arch.

Otolith (sagitta) (Text-fig. 38b) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and obliquely bent and the 'tail' (or 'cauda') is deepened as a hollow cone.

Colour : in life, dusky brown on back and silvery on flanks and belly; a steel blue blotch on opercle. Upper two-thirds of spinous dorsal fin dusky.

*Geographical distribution* : Indian Ocean, from Natal to the Malay Peninsula, and the Western Central Pacific to the northern coast of Australia.

Inhabits inshore waters, down to 40 m depth.

*Fishery information* : This sciaenid forms a fishery along the northwest coast of India and is also fairly common in the catches along the east coast of India. It attains a length of 30 cm; common to 13 cm. Caught with bottom trawls, bottom gillnets, etc.

#### 40. *Johnnieops aneus* (Bloch, 1793)

(Text-fig. 39)

1793. *Johnius aneus* Bloch, *Naturges. ausland. Fische*, (7) : 135, pl. 357 (type-locality : Malabar); Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 429, pls. 6 and 7 (type redescribed).
1876. *Sciaena osseus* Day, *Fishes of India* : 193, pl. 46, fig. 3; Jacob, 1948, *J Bombay nat. Hist. Soc.*, 48(1) : 122.
1889. *Sciaena ossea* : Day, *Fauna Br. India*, Fishes, 2 : 123; Trewavas, 1977, *Trans. zool. Soc. Lond.*, 33 : 434.
1917. *Bola ossëa* : Jordan and Starks, *Ann. Carneg. Mus.*, 11 : 453.
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1981. *Johnieops aneus* : Mohan, *Indian J. Fish.*, 28 : 19, fig. 27; Baragi, 1983, *Matsya* (8) : 34, fig. 1; Mohan and Talwar, 1984, *FAO species identification sheets for fishery purposes*, 4 : SCIAEN Joh 4.

*Types* : Lectotype : ZMB 8798 (a stuffed skin); designated by Trewavas (1977 : 429). Lectotype of *Sciaena osseus* : ZSI 1340; designated by Talwar (1971 : 325).

*Common name* : Greyfin croaker ... English.

*Description* : D X + I 25-29; A II 7; P i 15-16; V I 5.

A fairly small species. Snout rounded (rather obtuse), but not inflated. Head cavernous. Mouth horizontal, slightly inferior, with upper jaw scarcely overlapping lower; maxillary extending to below posterior edge of eye. Operculum with two flat weak spines; preopercular margin denticulate.

*Proportions as % Standard length* : Depth of body 25.4—30.0; length of head 29.4—31.0; interorbital width 27.0—29.4; length of pectoral fin 19.8—21.4; and length of second anal spine 7.9—10.5.

*Proportions as % length of head* : Diameter of eye 21.4—23.6; length of snout 25.0—26.8; depth of preorbital bone 18.2—19.4; interorbital width 28.0—31.2; length of upper jaw 40.0—42.8; length of lower jaw 42.1—46.8; and length of second anal spine 29.0—30.6.

Snout with 3 minute rostral (upper) pores and 5 marginal (lower) of which the median is just above the rostral edge, inner lower on edge, outer lower in a deep notch. Mental pores three pairs, the anterior close together behind the symphysis in a pit (false 'five-pored form'); no mental barbel.

Gillrakers on first arch (7 – 8) + 1 + (14 – 15), short and spinulose.

Teeth villiform, slightly differentiated in size both jaws; outer upper row moderately enlarged and a band of 3 or 4 deep of small inner teeth; lower jaw with a band about 4-deep in front, small but firm, and an inner row behind about as big as those near symphysis, outside them a single row of teeth about half as long.

Scales cycloid on snout, top of head, below and behind eye and on anterior part of breast, ctenoid on rest of breast, on nape and rest of body; lateral line scales 49 to 50. Dorsal and anal fins with a basal sheath of small cycloid scales.

Dorsal fin moderately notched; dorsal spines moderately weak, second longest. Second anal spine moderately weak. Pectoral fins moderate, three-fourths of head length. Caudal fin rhomboid.

Gasbladder hammer-shaped with 13 or 14 pairs of arborescent appendages along the side of bladder; first (anterior) pair branching in the head with a palmate branch to the front of pectoral arch.

Otolith (sagitta) (Text-fig. 39a) with a tadpole-shaped impression on its inner side of which the 'head' is truncated and obliquely bent, and the 'tail' (or 'cauda') is deepened as a hollow cone.

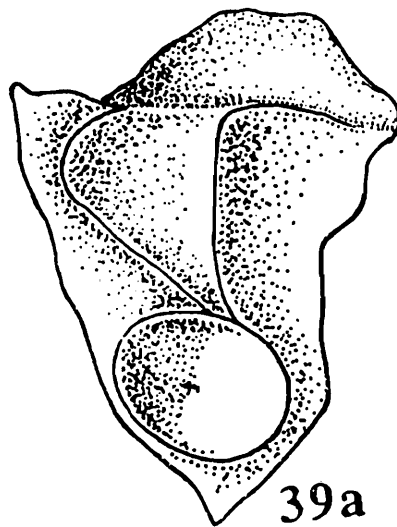
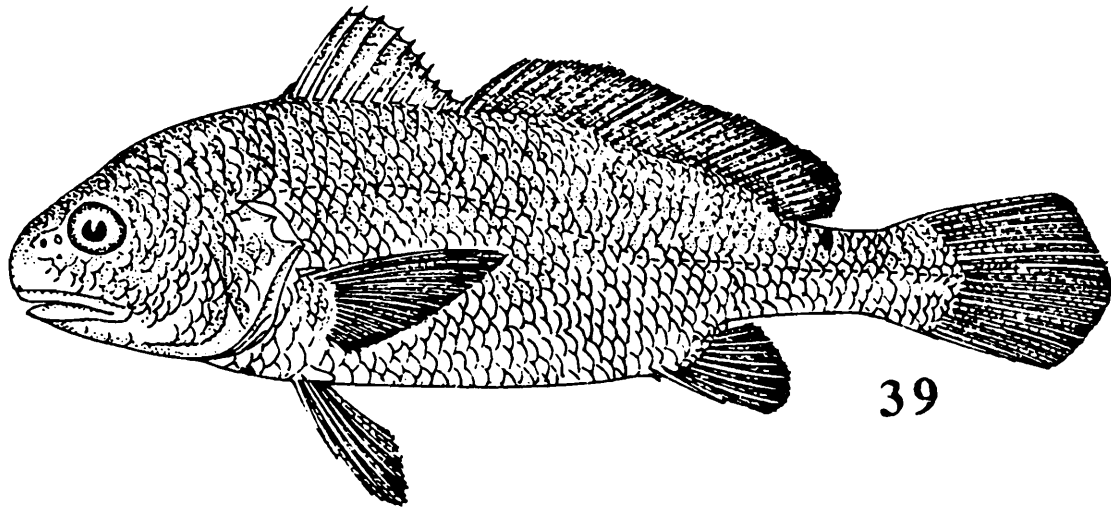


Fig. 39. *Johnnieops aneus* (Bloch) (after Mohan & Talwar. 39a. Sagitta (inner surface).

**Colour :** In life, back dark grey, silvery along flanks and belly. Spinous dorsal fin dusky in its upper half; pelvic fins tinged orange.

**Geographical distribution :** Iraq, Pakistan, southwest coast of India and Sri Lanka.

Inhabits inshore waters, down to 30 m depth.

**Fishery information :** This species is the most abundant of the sciaenids caught in trawl nets on the Karnataka coast and the Kerala coast. It attains a length of 25 cm; common to 20 cm. Caught with bottom trawls, boat seines and shore seines.

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