

OCCASIONAL PAPER No. 258

**A review on the Goat Fish
Family Mullidae
in the Indian Waters**

**R.P. BARMAN
S.S. MISHRA**



ZOOLOGICAL SURVEY OF INDIA

OCCASIONAL PAPER NO. 258

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA**

**A review on the Goat fish family Mullidae in the
Indian waters**

R.P. BARMAN

S.S. MISHRA

Zoological Survey of India, Fire Proof Spirit Building, Kolkata - 700 016

Edited by the Director, Zoological Survey of India, Kolkata



**Zoological Survey of India
Kolkata**

CITATION

Barman, R.P. and Mishra, S.S. 2007. A review on the Goat fish family Mullidae in the Indian waters. *Rec. zool. Surv. India, Occ. Paper No. 258* : 1-44. (Published by the Director, *Zool. Surv. India, Kolkata*)

Published : January, 2007

ISBN 81-8171-133-5

© *Govt. of India, 2007*

ALL RIGHTS RESERVED

- No part of this publication may be reproduced stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise without the prior permission of the publisher.
- This book is sold subject to the condition that it shall not, by way of trade, be lent, resold hired out or otherwise disposed of without the publisher's consent, in an form of binding or cover other than that in which, it is published.
- The correct price of this publication is the price printed on this page. Any revised price indicated by a rubber stamp or by a sticker or by any other means is incorrect and should be unacceptable.

PRICE

Indian Rs. 200.00

Foreign : \$ 10; £ 8

Published at the Publication Division by the Director Zoological Survey of India, 234/4, AJC Bose Road, 2nd MSO Building, 13th floor, Nizam Palace, Kolkata - 70002. and printed at Krishna Printing Works, Kolkata - 700 006.

**RECORDS OF THE
ZOOLOGICAL SURVEY OF INDIA
OCCASIONAL PAPER**

NO. 258

2007

1-44

CONTENTS

INTRODUCTION	1
Family MULLIDAE	2
(Goat fishes)	
Key to genera	2
Genus <i>Mulloidichthys</i> Whitley, 1929	2
Key to species	3
1. <i>Mulloidichthys flavolineatus</i> (Lacepede, 1802)	3
2. <i>Mulloidichthys vanicolensis</i> (Valenciennes, 1831)	4
Genus <i>Parupeneus</i> Bleeker	6
Key to species	6
3. <i>Parupeneus barberinus</i> (Lacepede, 1801)	8
4. <i>Parupeneus cyclostomus</i> (Lacepede, 1801)	9
5. <i>Parupeneus heptacanthus</i> (Lacepede, 1802)	11
6. <i>Parupeneus indicus</i> (Shaw, 1803)	12
7. <i>Parupeneus macronemus</i> (Lacepede, 1801)	14
8. <i>Parupeneus multifasciatus</i> (Quoy and Gaimard, 1824)	15
9. <i>Parupeneus pleurostigma</i> (Bennett, 1831)	17
10. <i>Parupeneus rubescens</i> (Lacepede, 1801)	18
11. <i>Parupeneus trifasciatus</i> (Lacepede, 1801)	20

Genus <i>Upeneus</i> Cuvier, 1829	21
Key to species	22
12. <i>Upeneus guttatus</i> (Day, 1868)	23
13. <i>Upeneus luzonius</i> Jordan and Seale, 1907	25
14. <i>Upeneus moluccensis</i> (Bleeker, 1855)	26
15. <i>Upeneus sulphureus</i> Cuvier, 1829	27
16. <i>Upeneus sundaicus</i> (Bleeker, 1855)	29
17. <i>Upeneus taeniopterus</i> Cuvier, 1829	30
18. <i>upeneus tragula</i> Richardson, 1846	31
19. <i>Upeneus vittatus</i> (Forsskal, 1775)	33
SUMMARY	34
ACKNOWLEDGEMENTS	34
REFERENCES	35
COLOUR FIGURS 1-19	37-44

INTRODUCTION

The goatfishes, of the family Mullidae also called as red mullets, are rather small in size. The maximum adult size of these fishes range between 20 cm and 50 cm. Although these fishes do not form a major source of commercial catches, these species frequently found in catch of small boats using hand-lines and bottom gill nets; and also taken regularly by bottom trawls over mud and sand stone substrata, in estuaries and shallow coastal waters. Moreover, they constitute one of the groups of the food fishes of India of considerable regional importance. These fishes are sold fresh or frozen; the flesh is excellent to eat, some considered a delicacy.

The goatfishes are demersal, neretic. Most species inhabit shallow water, maximum up to 60 m. depth, over soft bottoms (sandy-mud to muddy). Some species form stationary aggregations over coral reefs during daytime and move onto soft bottoms for feeding at sunset. They use their barbels as chemosensory receptors by means of which they stir the soft bottom to search out their prey such as polychaetes, worms and small crustaceans (mostly zoo benthos); some feed almost exclusively on small fishes.

Taxonomic studies of this important and interesting group of fishes in India are very meager. Day (1875) gave an account of 14 species of goatfishes in which he expressed doubts about the validity of some of the species described and suggested that a detailed study of the group was necessary to assess the correct systematic position of the species. Weber and de Beaufort (1931) reported 28 species from Indo-Australian Archipelago including 3 species as doubtful species or doubtful as to locality, but only 11 from India. Thomas (1969) did a detailed study on the taxonomy of 19 species of goatfishes occurring in the seas around India, at least 2 of which, *i.e.*, *Parupeneus fraterculus* (Valenciennes) [= *Parupeneus rubescens* (Lacepede)] and *Parupeneus porphyreus* (Jenkins), were not recorded from Indian waters; and, *Parupeneus seychellensis* (Smith and Smith), included in Thomas (1969) is relegated to synonymy of *Parupeneus heptacanthus* (Lacepede) (Ben-Tuvia, 1986). Talwar (1984) compiled information on 20 species known to occur in our area, the work that is mostly based on Thomas (1969). Kumaran and Randall (1984) also dealt with the species available in the Western Indian Ocean. Apart from these works, Balan (1959), Fowler (1927, 1933), Jones (1964), Jones and Kumaran (1959, 1966, 1967, 1980) and Thomas (1967) contribute to our knowledge on goatfish fauna of India.

There have been considerable changes in the systematic, taxonomy and nomenclature of species belonging to the goatfish family Mullidae during last two decades. In the present scenario, it became a necessity to review the species of this family occurring in the coastal waters of India.

Family MULLIDAE
(Goat fishes)

Body elongate and almost compressed, covered with ctenoid scales. Chin with 2 long barbels. Mouth small, protractile, inferior, gape slightly diagonal. Teeth in jaws villiform or conical, in one to several rows. Usually a small flat spine on opercle. Eyes situated near dorsal profile on head. Dorsal fin two, well separated, the first with 7 to 8 (generally) slender spines (first spine often very small) and the second with one spine and 8 soft rays. Anal fin with 1 spine and 6 rays. Pectoral fins short, with 13 to 18 rays. Pelvic fins with one spine and 5 soft rays, scaly axillary process present at base of pelvic fins. Caudal fin deeply forked, with 13 branched rays. Vertebrae 24.

A total of 6 genera with 67 species known worldwide (Eschmeyer, 2005), only 3 genera and 18 species known from the Indian waters.

Key to genera

- 1a. Teeth present on vomer and palatines; both dorsal fins with stripe; most species with oblique bands on caudal lobes ***Upeneus***
- 1b. No teeth on vomer and palatines; stripes sometimes present on second dorsal fin; caudal fin lobes without black bands 2
- 2a. Teeth in jaws small, in villiform band anteriorly; 5 rows of scales between dorsal fins; 11 to 12 rows of scales along upper part of caudal peduncle; lateral line scales 33 to 38 ***Mulloidichthys***
- 2b. Teeth in jaws moderately large, blunt, in a single row; 2 or 3 rows of scales between dorsal fins; 8 or 9 rows of scales along upper part of caudal peduncle; lateral line scales 26 to 31 ***Parupeneus***

Genus *Mulloidichthys* Whitley, 1929

1929. *Mulloidichthys* Whitley, *Rec. Australian Mus. Sydney*, 17 : 122. (Type-species : *Mullus flavolineatus* Lacepede) (Proposed to replace *Mulloides* Bleeker).

Distinctive characters : Body more or less elongate. Operculum with a small spine at its margin. Dentition incomplete; no teeth on vomer and palatine; villiform teeth on jaws, in 2 to 3 rows anteriorly, decreasing to 1 or 2 row on sides. Lateral line with 33 to 38 scales. Five vertical rows of scales present in between two dorsal fins and 11 to 12 vertical rows of scales present on the upper side of caudal peduncle, between 2nd dorsal fin and caudal fin. Body mostly yellow without dark marks on fins.

The genus *Mulloidichthys* Whitley, 1929, was substituted for *Mulloides* by many authors (Whitley, 1929; Myers, 1999; Randal, 2000). But Ben-Tuvia (1986) has the opinion that *Mulloides* is not preoccupied, as Richardson (1843) used it only in synonymy. In parlance with the present day nomenclature (Eschmeyer, 2005), we used the replaced genus *Mulloidichthys* in this work.

Six species recognized in the world, two recorded in India.

1. *Mulloidichthys flavolineatus* (Lacepede) – Yellow-stripe goatfish.
2. *M. vanicolensis* (Valenciennes) – Yellow-fin goatfish.

Key to species

- 1a. A black spot often present in lateral yellow stripe on body; body depth 3.6 to 4.7 in standard length; gillrakers 25 to 30 on first arch; barbels slightly less than snout plus eye diameter; fins whitish to fairly yellowish *M. flavolineatus*
- 1b. No blackish spot in lateral yellow stripe on body; body depth 3.3 to 3.6 times in standard length; gillrakers 32 to 36; barbels longer than snout plus eye diameter; fins yellow *M. vanicolensis*

1. *Mulloidichthys flavolineatus* (Lacepede, 1802)

1802. *Mullus flavolineatus* Lacepede, *Hist. nat. Poiss.*, 3 : 384, 406 (Type-locality : Hawaiian Ids.)

1875. *Mulloides flavolineatus* Day, *Fishes of India* : 122, Pl. 30, fig.6.

1889. *Mulloides flavolineatus* Day, *Fauna Br. India*, Fishes, 2 : 28, fig. 11.

1969. *Mulloidichthys samoensis* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 71, pl. 7, fig. B.

1980. *Mulloidichthys auriflamma* Jones and Kumaran, *Fishes of the Laccadive Archipelago* : 346, fig. 294.

1984. *Mulloides flavolineatus* Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Mullo 1.

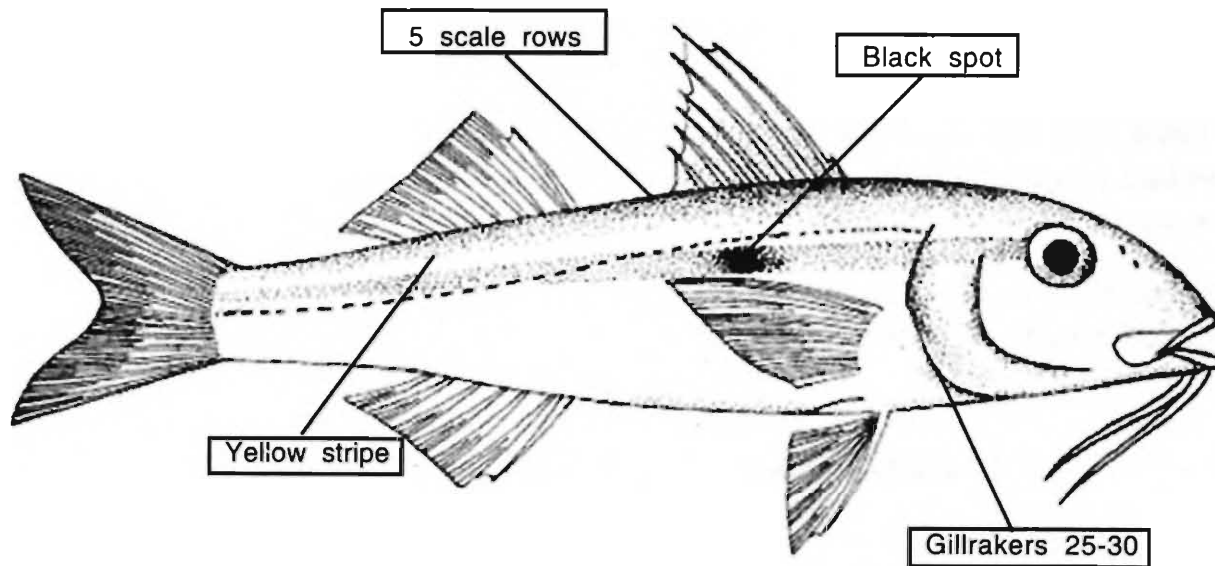
Material examined : 1 ex., 143 mm SL, ZSI F 8837/2, Mandapam, Tamil Nadu, R. P. Barman and party, 13.8.1996; 1 ex., 80 mm SL, ZSI F 9722/2, Nagapattinam, Tamil Nadu, R. P. Barman and party, 10.7.2003.

English name : Yellow-stripe goatfish

Diagnostic features : Body elongate, depth 3.6 to 4.7 times in standard length. Chin with a pair of barbels, generally not extending to rear border of preopercle; length of barbels 1.4 to 1.8 times in head length. Mouth small, maxilla not extending to anterior margin of eye. Rear edge of maxilla not closer to vertical line from front edge of eye than

to vertical at front nostril. Snout length 1.7 to 2.6 times in head length. Teeth on jaws villiform, present in bands; no teeth on roof of mouth. Eyes 3.3 to 3.9, interorbital width 3.5 to 4.0, caudal peduncle depth 3.3 to 3.5 times in head length. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 16 to 17 rays. Lateral line with 33 to 38 scales; 5 rows of scales present in interdorsal space; 11 to 12 rows of scales along upper part of caudal peduncle. Gillrakers 25 to 30.

Colour : Body silvery white with a yellow stripe at level of eye, which continued backwardly up to caudal peduncle. A blackish spot generally present on the yellow stripe below first dorsal fin. Barbels white. Fins whitish to pale yellowish.



Size : Maximum 40 cm standard length.

Geographical distribution : Widely distributed in the Indo-Pacific from east coast of Africa to the Hawaiian Islands; French Polynesia, and the Pitcairn group of islands.

Interest to Fisheries : It is marketed fresh, its flesh highly esteemed.

Remarks : *Mulloidichthys flavolineatus* was previously recorded as *Mullus aureovittatus* Shaw, as *Mulloidichthys auriflamma* (Forsskal), as *Mulloidichthys samoensis* (Gunther) and as *Mulloides flavolineatus* in India (Shaw 1803; Jones and Kumaran, 1980; Thomas, 1969).

2. *Mulloidichthys vanicolensis* (Valenciennes, 1831)

1831. *Upeneus vanicolensis* Valenciennes, In : Cuvier & Valenciennes, *Hist. nat. Poiss.*, 7 : 521 (Type-locality : Vanicolo).

1984. *Mulloides vanicolensis* Kumaran & Randall, In : Fischer & Bianchi *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Mullo 2.

1995. *Mulloidichthys vanicolensis*: de Bruin *et al.*, *FAO identification field guide for fishery purposes. Marine fishery resources of Sri Lanka* : 268, pl. 18, fig. 128.

Material examined : 1 ex., 120 mm SL, ZSI F9680/2, Kanyakumari, R. P. Barman and party, 24.9.2002; 2 ex., 100 –103 mm SL, ZSI F9697/2, Tuticorin, R. P. Barman and party, 30.9.2002; 1 ex., 102 mm SL; ZSI F 9713/2, Kakinada, Andhra Pradesh; R. P. Barman and party, 7.10.2002.

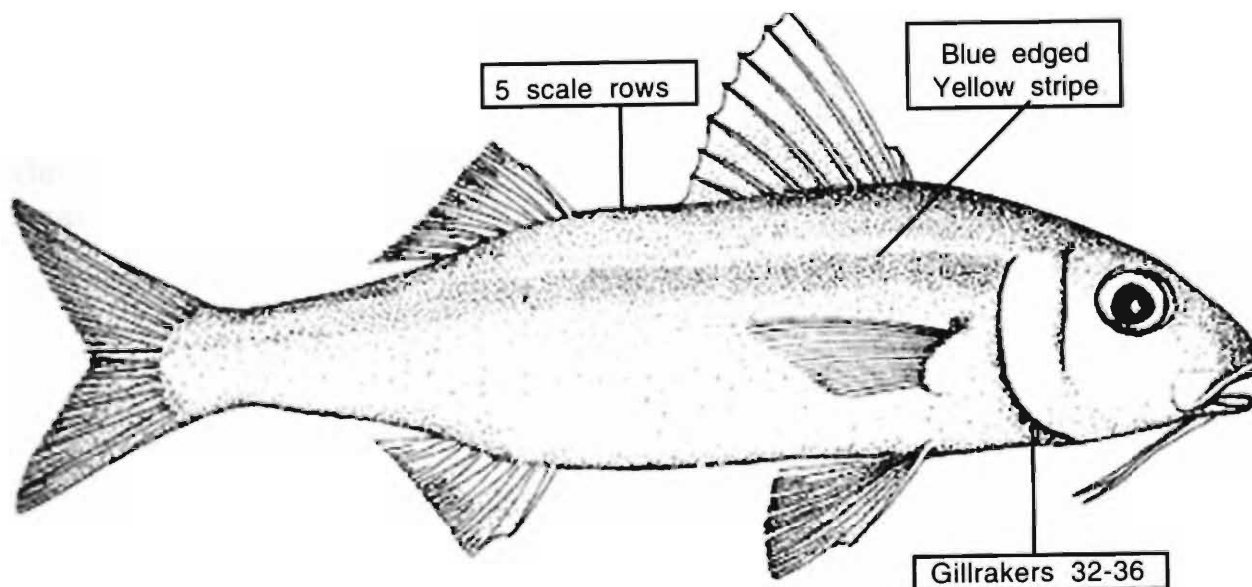
English name : Yellow-fin goatfish.

Diagnostic features : Body elongate, depth 3.3 to 3.9 times in standard length. Chin with a pair of barbels, extending beyond rear border of preopercle; length of barbels 1.2 to 1.6 times in head length. Mouth small, maxilla not extending to anterior margin of eye. Rear edge of maxilla much closer to vertical line from front margin of eye than to vertical at front nostril. Snout length 2.1 to 2.6, eyes 3.1 to 3.5, interorbital width 3.3 to 3.5, caudal peduncle depth 3.0 to 3.4 times in head length. Teeth on jaws villiform, present in bands; no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 16 to 17 rays. Lateral line with 35 to 38 scales, 5 rows of scales in interdorsal space; 11 to 12 rows of scales along upper part of caudal peduncle. Gillrakers on first arch 32 to 36.

Colour : Body whitish to pink with a yellow longitudinal band edged in pale blue at level of upper end of gill openings to the caudal peduncle. No dark blotch under middle of first dorsal fin. Barbels white to yellowish. All fins yellowish.

Size : Maximum 38 cm standard length.

Geographical distribution : Wide spread in the Indo-Pacific from the east coast of Africa, Red Sea to the Hawaiian, Marquesan, Tuamotu Islands, north to southern Japan, south to Lord Howe island and throughout Micronesia.



Interest to Fisheries : It is marketed fresh, its flesh highly esteemed.

Remarks : Apparently there was no reliable record of occurrence of this species in India earlier than Kumaran and Randall (1984).

Genus *Parupeneus* Bleeker

1863. *Parupeneus* Bleeker, *Ned. Tijdschr. Dierk.*, 1 : 342 (Type-species : *Mullus trifasciatus* Lacepede).

Distinctive characters : Body elongate. Mouth small, teeth moderately large, conical, blunt tipped, stout, in a single row in jaws and no teeth on vomer and palatines. Two long barbels on chin. Two widely separated dorsal fins, first with 8 spines, the first spine very small and second dorsal fin with one spine and 8 soft rays. Lateral line with 26 to 31 scales; 2 to 3 vertical rows of scales in space between the two dorsal fins. Caudal peduncle with 8 to 9 vertical rows of scales along its upper side. Second dorsal and anal fins sometimes with stripes but first dorsal fin never striped. These fishes are found in pairs or in groups.

In all 27 species recognized worldwide, 8 occurring in our area. *P. rubescens* (Lacepede) is included here for it is likely to occur.

1. *Parupeneus barberinus* (Lacepede) (Dash-and-dot goatfish)
2. *P. cyclostomus* (Lacepede) (Gold-saddle goatfish)
3. *P. heptacanthus* (Lacepede) (Cinnabar goatfish)
4. *P. indicus* (Shaw) (Indian goatfish)
5. *P. macronemus* (Lacepede) (Long-barbel goatfish)
6. *P. multifasciatus* (Quoy and Gaimard) (Many-bar goatfish)
7. *P. pleurostigma* (Bennett) (Black spot goatfish)
8. *P. rubescens* (Lacepede) (Rosy goatfish)
9. *P. trifasciatus* (Lacepede) (Double-bar goatfish)

Key to species

- 1a. A dark longitudinal band from snout or eye to below second dorsal fin; a dark round blotch of not more than 2½ scale diameter on caudal peduncle centered on lateral line 2
- 1b. No dark longitudinal band; dark blotch on caudal peduncle absent, or if present, more than half of the blotch above lateral line and extending over 3 or more scales 3
- 2a. Barbels much longer than snout and eye combined; last ray of second dorsal fin distinctly longer than penultimate ray; dark blotch at middle of caudal peduncle *P. macronemus*

- 2b. Barbels shorter than or equal to snout and eye combined; last ray of second dorsal fin not longer than penultimate ray; dark blotch close to upper edge of caudal peduncle *P. barberinus*
- 3a. Black vertical saddle-like dark vertical bars extending ventrally from dorsal fin base; gillrakers 27 to 33 on lower limb of first arch..... 4
- 3b. No vertical bars below dorsal fin (at most one on caudal peduncle); gillrakers 18 to 26 on lower limb of first arch 5
- 4a. Body depth 2.5 to 3.4 times in SL; barbels short, 1.6 to 1.9 times in head; last 2 rays of 2nd dorsal fin and anal fin subequal; a broad dark bar below each dorsal fin, a faint 3rd bar often present on caudal peduncle and a large dark area on head enclosing eye *P. trifasciatus*
- 4b. Body depth 3.15 to 3.65 times in SL: barbels long, 1.1 to 1.35 times in head; last ray of 2nd dorsal fin and anal fin clearly longer than penultimate ray; 4 or 5 dark bars on body, the one in interdorsal space the narrowest, last 2 bars, below 2nd dorsal fin and caudal peduncle, heavily pigmented *P. multifasciatus*
- 5a. Barbels long, reaching base of pelvic fins, their length less than 1.2 times in head length; a large oblong, golden saddle on upper part of caudal peduncle *P. cyclostomus*
- 5b. Barbels reach slightly beyond rear edge of preopercle, their length more than 1.2 times in head length; no golden saddle on caudal peduncle 6
- 6a. Gillrakers 19 to 21 on lower limb of first arch 7
- 6b. Gillrakers 22 to 26 on lower limb of first arch 8
- 7a. A large oval dark blotch about twice eye diameter on sides of caudal peduncle; yellow or whitish oblong blotch from below posterior part of 1st dorsal to anterior part of 2nd dorsal fin *P. indicus*
- 7b. Dark blotch on caudal peduncle and pale oblong blotch below dorsal fins absent; a small dark rectangular blotch below and behind first dorsal fin often present *P. heptacanthus*
- 8a. A large dark blotch on lateral line below interdorsal space; no dark saddle on caudal peduncle; body depth more than 3.4 times in standard length; lower gillrakers 22 or 23 *P. pleurostigma*
- 8b. No dark blotch on lateral line below interdorsal space; a dark saddle over rear half caudal peduncle, preceded by a light patch; body depth less than 3.4 times in standard length; lower gillrakers 23 to 26 *P. rubescens*

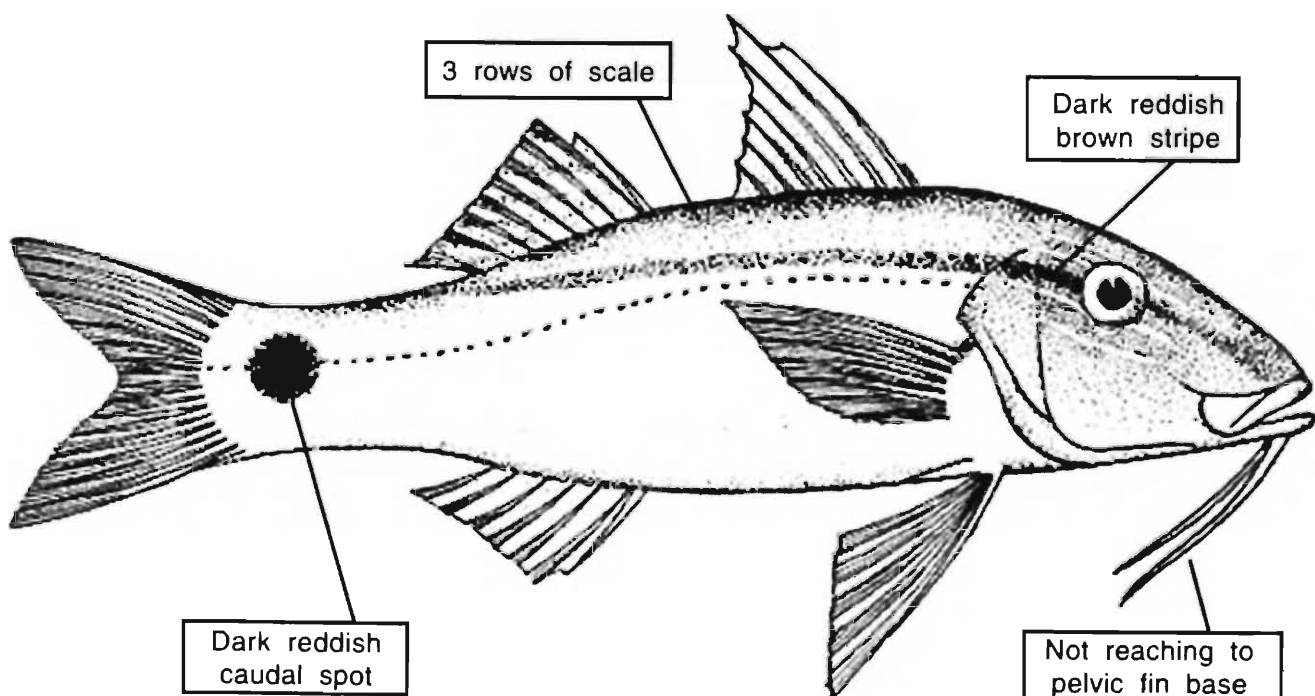
3. *Parupeneus barberinus* (Lacepede, 1801)

1801. *Mullus barberinus* Lacepede, *Hist. nat. Poiss.*, 3 : 383, 406, pl. 13, fig. 2 (Type-locality : Indo-Pacific).
1875. *Upeneus barberinus* Day, *Fishes of India*, (1) : 124.
1889. *Upeneus barberinus* Day, *Fauna Br. India, Fishes*, 2 : 30.
1959. *Parupeneus barberinus* Jones and Kumaran, *Indian J. Fish.*, 6(1) : 47.
1964. *Parupeneus barberinus* Jones, *Mar. Biol. Ass. India, Proc. Symp. on Scombroid Fishes*, (2) : 663, fig. 30.
1984. *Parupeneus barberinus*: Kumaran & Randall, In : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Paru 2.
2004. *Parupeneus barberinus*: Randall, *Indo-Pacific Fishes*, (36) : 12, fig. 2.

Material examined : 1 ex., 120 mm SL, ZSI F 9680/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 24.9.2002; 2 ex., 100 –103 mm SL, ZSI F 9697/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 30.9.2002; 1 ex., 102 mm SL; ZSI F 9713/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 7.10.2002.

English name : Dash-dot goatfish.

Diagnostic features : Body elongate, depth 3.2 to 3.5 times in standard length. Chin with a pair of barbels, usually extend posterior to rear border of preopercle; length of barbels 1.4 to 1.5 times in head length. Mouth small, maxilla extending only almost half distance to vertical at front margin of eye. A single row of well-spaced, stout conical



teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small; third spine longest, its length 1.2 to 1.3 in head in adult specimens. Last ray of second dorsal fin not elongated and far from reaching the blotch on caudal peduncle. Pectoral fins with 16 to 18 rays. Lateral line with 28 to 30 scales; 3 rows of scales in interdorsal space; 8 to 9 rows of scales along upper part of caudal peduncle. Gillrakers on first arch 25 to 30, 6 or 7 on upper limb plus 19 to 23 on lower limb.

Colour : Body brown to reddish brown dorsally, shading to whitish on sides and ventrally. A dark reddish brown stripe extending from tip of snout through eye across upper end of gill openings, and along upper side extending beneath rear base of second dorsal fin. Caudal peduncle with a round dark reddish spot larger than eye diameter, placed at about middle of peduncle. A few blue lines alternately with brownish yellow lines run above and below the eye. Fins almost without marks.

Size : Maximum 50 cm standard length.

Geographical distribution : Indo-West Pacific. From east coast of Africa, Red sea to Southern Japan in north and to the Southern Great Barrier Reef, Australia in south and eastward to the Line, Marquesan and Tuamotu Islands.

Interest to Fisheries : It is marketed fresh as food fish and also used in the Aquarium trade as an ornamental fish.

Remarks : This species was previously recorded as *Upeneus barberinus* by Day (1875, 1889). Thomas (1969) discussed in detailed on the dorsal fin and caudal peduncle blotch of *P. barberinus* distinguishing it from *P. macronemus*.

4. *Parupeneus cyclostomus* (Lacepede, 1801)

1801. *Mullus cyclostomus* Lacepede, *Hist. nat. Poiss.*, 4 : 383, 404, pl. 14, fig.3 (type-locality : Indo-Pacific).

1829. *Upeneus chryserydros* Cuvier, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 3 : 470.

1875. *Upeneus luteus* Day, *Fishes of India*, (1) : 125, pl. 31, fig. 2.

1939. *Pseudupeneus cyclostomus*: Fowler, *Bull. U. S. natn. Mus.*, 12 (100) : 304

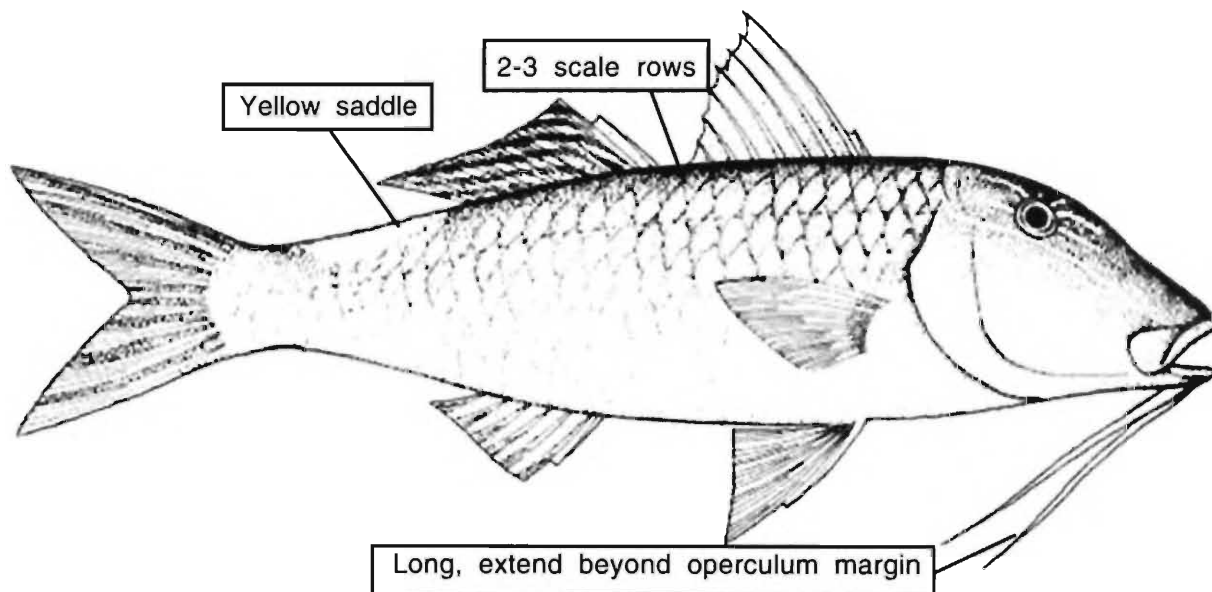
1984. *Parupeneus cyclostomus* Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Paru 7.

2004. *Parupeneus cyclostomus*: Randall, *Indo-Pacific Fishes*, (36) : 22, fig. 4.

Material examined : 2 ex., 380-385 mm SL, Reg. No. 1958, Wandoor, South Andaman, D.V. Rao and party, 19.8.1992.

English name : Gold-saddle goatfish.

Diagnostic features : Body elongate, depth 3.4 to 3.9 times in standard length. Chin with a pair of barbels, 1.1 to 1.2 times in head length, extend beyond hind border of head, reaching to base of pelvic fins. Dorsal profile of head slightly convex. Snout length 1.7 to 2.0 times in head length. Mouth small, maxilla extending almost $\frac{2}{3}$ distances to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third spine longest, its length 1.4 to 1.8 in head in adult specimens. Pectoral fins with 16 to 17 rays. Lateral line with 27 to 29 scales; 2 to 3 vertical rows of scales present in interdorsal space; 8 to 9 rows of scales present along upper part of caudal peduncle. Gillrakers on first arch 28 to 32, 6 or 7 on upper limb plus 21 to 24 on lower limb.



Colour : Body red, reddish blue or blue with a yellow saddle mark/blotch behind second dorsal fin on the top of caudal peduncle. Head with blue streaks radiating from eyes. Narrow dark edge pale blue bands in second dorsal fin and anal fins. Caudal fin with alternating bands of yellow and pale blue.

Size : Maximum 50 cm standard length

Geographical distribution : Indo-Pacific. Red Sea to the Hawaiian, Line, Marquesan, Tuamotu Islands, north to Ryukyu Island to New Caledonia and Rapa; throughout Micronesia.

Interest to Fisheries : It is marketed fresh and used in aquarium trade.

Remarks : *P. cyclostomus* was previously recorded as *Upeneus chryserydros* Lacepede, *Upeneus luteus* Valenciennes, *Parupeneus luteus* (Valenciennes) and also as *Pseudupeneus cyclostomus* (Lacepede) in Indian waters (Cuvier, 1829; Day, 1875; Fowler, 1933; Thomas, 1969; Jones and Kumaran, 1980).

5. *Parupeneus heptacanthus* (Lacepede, 1802)

1802. *Sciaena heptacantha* Lacepede, *Hist. nat. Poiss.*, 4 : 308, 311 (type-locality : No locality given).

1958. *Pseudupeneus pleurospilos*: Balan, *J. Bombay nat. Hist. Soc.*, 55 (2) : 301.

1969. *Parupeneus pleurospilos* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 61, pl. 6, fig. A.

1984. *Parupeneus cinnabarinus* Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Paru 5.

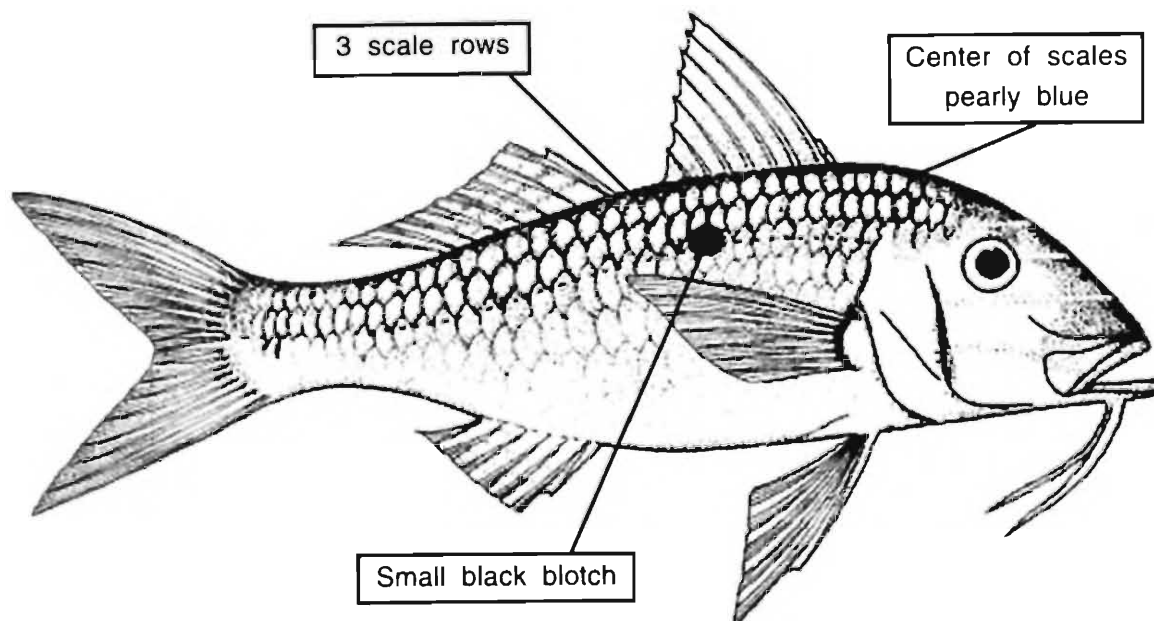
1991. *Parupeneus heptacanthus* Myers, *Micronesian Reef Fishes* (2nd ed.): 149.

2004. *Parupeneus heptacanthus* Randall, *Indo-Pacific Fishes*, (36) : 30, fig. 6.

Material examined : 1 ex., 160 mm SL, ZSI F 9705/2, Rameswaram, Tamil Nadu, R. P. Barman and party, 2.10.2002; 1 ex. 120 mm. SL, ZSI F 9681/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 24.9.2002.

English name : Cinnabar goatfish.

Diagnostic features : Body elongate, depth 3.1 to 4.0 times in standard length. Chin with a pair of barbels, extend to rear border of preopercle; length of barbels 1.2 to 1.4 times in head length. Dorsal profile of head convex. Snout length 1.8 to 2.1 times in head length. Mouth small, maxilla extending almost 2/3 distance to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third spine longest, its length 1.5 to 1.9 in head in adult specimens. Pectoral fins with 16 rays. Lateral line with 27 to 28 scales; 3 vertical rows of scales in interdorsal space; 9 rows of scales along upper part of caudal peduncle. Gillrakers on first arch 25 to 29, 6 or 7 on upper limb plus 19 to 21 on lower limb.



Colour : Body brownish yellow to red shading to silvery white ventrally. Scale margins darker with a blue to pearly spot centrally on the back. A small reddish spot on the 7th and 8th lateral line scales in adults. Cheek, snout and interorbital space with a few inconspicuous iridescent blue lines -diagonally placed. Faint narrow pale blue bands on second dorsal and anal fins.

Size : Maximum 30 cm standard length.

Geographical distribution : Indo- West Pacific, Red sea and east Africa to southern Japan and Lord Howe island; throughout Micronesia.

Interest to Fisheries : It is marketed fresh.

Remarks : This species was previously recorded as *Pseudupeneus pleurospilos* (Bleeker) and *Parupeneus pleurospilos* (Bleeker) (Balan, 1958; Thomas, 1969) from India. This species has been referred as *Parupeneus cinnabarinus* (Cuvier, 1829) in Indian Ocean by many authors (Kumaran and Randall, 1984; Ben-Tuvia, 1986; de Bruin *et al.*, 1995). In concurrence with the suggested change in nomenclature by Myers (1991) and Randall (2004), the present name is considered for this species. *Parupeneus seychellensis* (Smith and Smith), included in Thomas (1969), is relegated to synonymy of *Parupeneus heptacanthus* (Lacepede) (Ben-Tuvia, 1986).

6. *Parupeneus indicus* (Shaw, 1803)

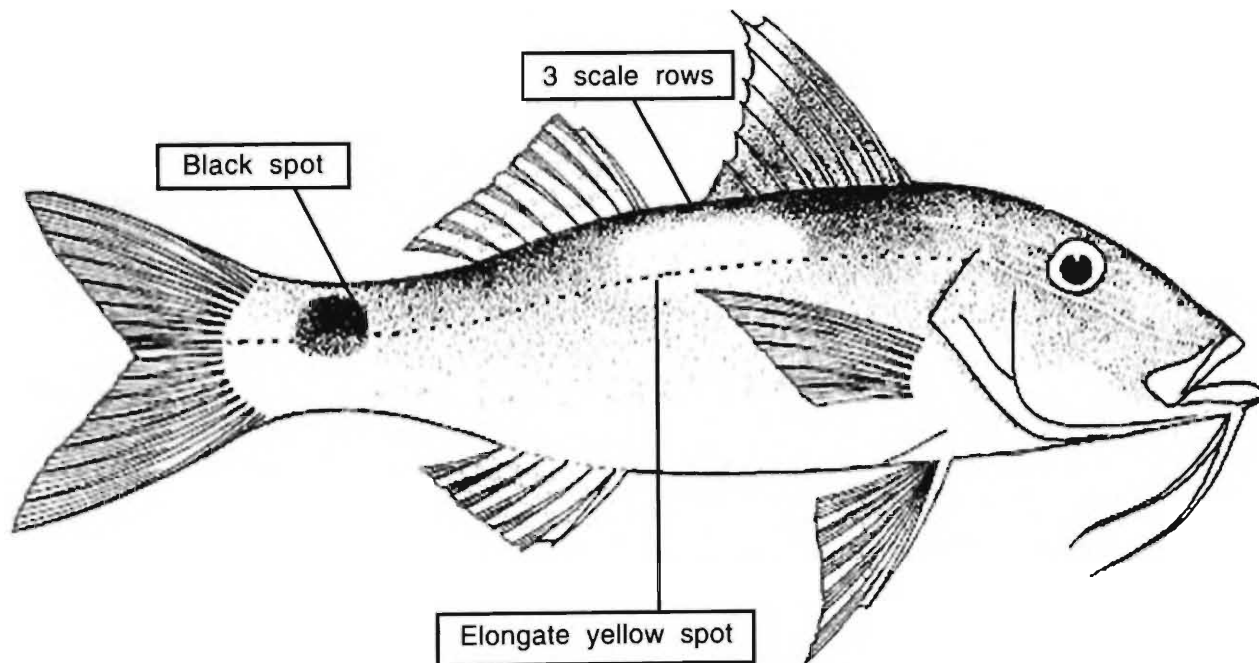
1803. *Mullus indicus* Shaw, *Gen. Zoology*, **4** : 611 (Type-locality : Vizagapatnam, Andhra Pradesh, India).
1829. *Upeneus malabaricus* : Cuvier, in Cuvier & Valenciennes, *Hist. Nat. Poiss.*, **3** : 467.
1865. *Upeneus indicus*: Day, *Fishes of Malabar* : 28
1875. *Upeneus indicus*: Day, *Fishes of India*, (1) : 126, pl. 31, fig. 4.
1889. *Upeneus indicus*: Day, *Fauna Br. India, fishes*, **2** : 32.
1933. *Pseudupeneus indicus*: Fowler, *Bull. U. S. natn. Mus.*, **12** (100) : 287, fig. 22.
1984. *Parupeneus indicus*: Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, **3** : MULL Paru 4.
2004. *Parupeneus indicus*: Randall, *Indo-Pacific Fishes*, (36) : 32, fig. 7.

Material examined : 4 ex., 110-140 mm SL, ZSI F 9679/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 24.9.2002; 2 ex., 90.5-92 mm SL, ZSI F 9689/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 28.9.2002; 1 ex., 130 mm SL, ZSI F 9698/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 30.9.2002; 1 ex., 120 mm SL, ZSI F 9703/2, Tuticorin, Tamil Nadu, R. P. barman & party; 1.10.2002; 4 ex., 110- 160 mm SL, ZSI F 9706-7/2, Kakinada, Andhra Pradesh, 5.10.2002; 1 ex., 110.5 mm SL, ZSI F 9013/

2, Chengelpet, Tamil Nadu, 22.1.1997; 1 ex., 168 mm SL; ZSI F 9120/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 27.8.1997; 1 ex., 140 mm SL, ZSI F 9303/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 21.8.1996; 1 ex., 100 mm SL, Mandapam, Tamil Nadu, R. P. Barman and party, 13.8.1996.

English name : Indian goatfish.

Diagnostic features : Body almost elongate, depth 3.3 to 3.7 times in standard length. Chin with a pair of barbels, extend to or slightly beyond hind border of preopercle; their length 1.3 to 1.5 times in standard length. Dorsal profile of head straight. Snout length 1.9 to 2.2, caudal peduncle depth 2.4 to 2.8 times in head length. Mouth small, maxilla extending almost 2/3 distance to front margin of eye. A single row of well-spaced, stout, conical teeth in jaws; no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third spine longest, its length 1.3 to 1.5 in head in adult specimens. Pectoral fins with 16 to 17 rays. Lateral line with 29 to 30 scales; 3 vertical rows of scales in interdorsal space; 9 to 10 rows of scales along upper part of caudal peduncle. Gillrakers on first arch 24 to 27, 6 on upper limb plus 19-21 on lower limb.



Colour : Body greenish brown to reddish brown dorsally shading to whitish or pale pink ventrally. A large elongate yellow spot centered on lateral line below posterior part of first dorsal fin to anterior part of second dorsal fin. Caudal peduncle with a round black spot larger than eye diameter. A slight curved pale blue line passing from above mouth to upper angle of gill openings touching the lower border of eye. Some short lines radiating from eyes. Second dorsal fin, anal fin and caudal fin with narrow pale blue bands.

Size : Maximum 40 cm standard length.

Geographical distribution : Indo-Pacific. East coast of Africa to Samoa and Tonga, north to the Philippines, the Ogasawara Island, south to New Caledonia; Palau to Kosrae, Caroline Islands in Micronesia.

Interest to Fisheries : It is marketed mainly fresh.

Remarks : Previously recorded as *Upeneus malabaricus* Cuvier, *Upeneus russelli* Cuvier, *Pseudupeneus indicus* Shaw (Cuvier, 1829; Day, 1865; Fowler, 1933).

7. *Parupeneus macronemus* (Lacepede, 1801)

1801. *Mullus macronemus* Lacepede, *Hist. nat. Poiss.*, **3** : 383, 404, Pl. 13, Fig. 2 (type-locality : Indo-Pacific).

1875. *Upeneus macronemus* Day, *Fishes of India*, (1) : 123, pl. 31, fig. 1.

1889. *Upeneus macronemus* Day, *Fauna Br. India, Fishes*, **2** : 29, fig. 12.

1959. *Pseudupeneus macronema* Balan, *J. Bombay nat. Hist. Soc.*, **55** (2) : 301.

1984. *Parupeneus macronema* Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, **3** : MULL Paru 3.

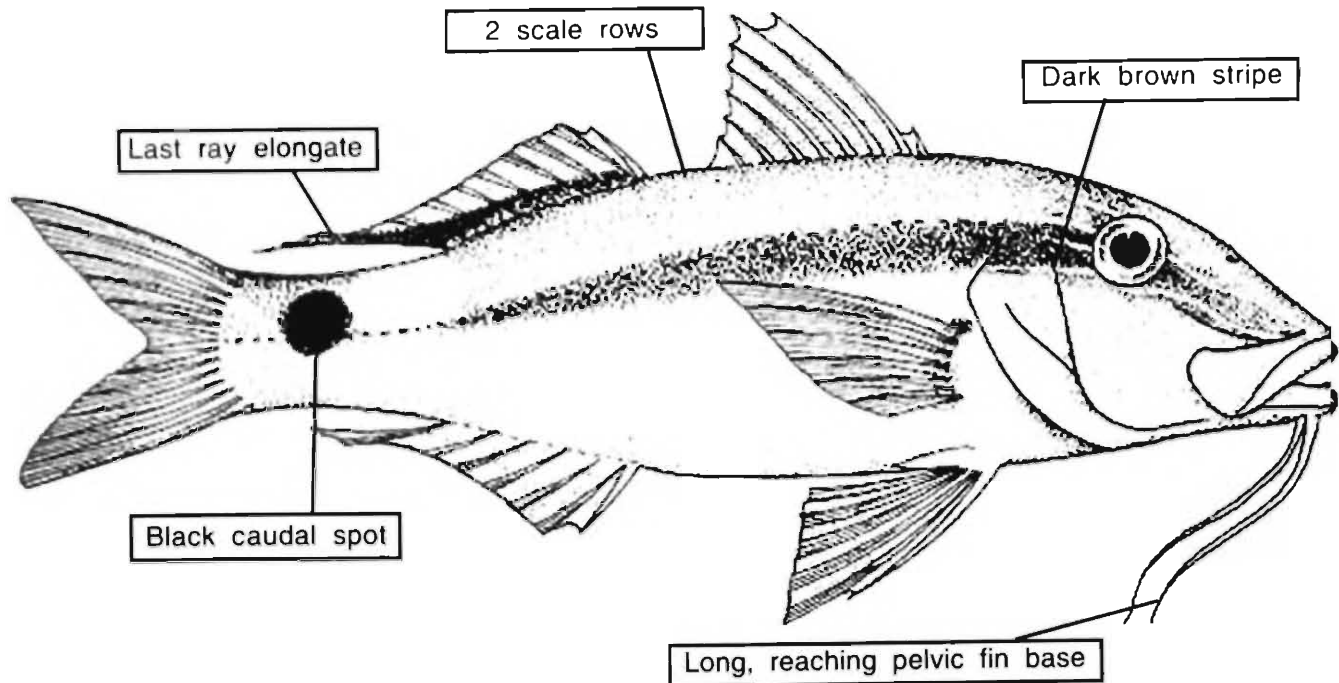
2004. *Parupeneus macronemus*: Randall, *Indo-Pacific Fishes*, (36) : 38, fig. 9.

Material examined : 2 ex., 270-277 mm. SL, Reg. No. : 1921; Mayabander, North Andaman, D. V. Rao, 9.1.1992; 1 ex., 215 mm. SL, Reg. No. : 2009, Bambooflat, South Andaman, P. T. Rajan, 14.9.1992.

English name : Long-barbel goatfish

Diagnostic features : Body almost elongate, depth 2.9 to 3.2 times in standard length. Chin with a pair of barbels, extend to or slightly beyond hind border of head; their length 1.1 to 1.4 times in head. Dorsal profile of head conical. Snout length 1.7 to 2.0, caudal peduncle depth 2.5 to 3.0 times in head length. Mouth small, maxilla extending almost $\frac{3}{5}$ distance to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third spine longest, its length 1.6 in head length. Last dorsal and anal fin rays elongate. Pectoral fins with 15 to 16 rays. Lateral line with 29 to 30 scales, 2 vertical rows of scales in interdorsal space; 8 to 9 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 33 to 39, 8 or 9 on upper limb plus 26 to 29 on lower limb.

Colour : Body reddish brownish dorsally, paler ventrally and posteriorly with a dark brown stripe passing from tip of snout, through eye, across upper part of gill openings to below the rear end of second dorsal fin base. A round black spot, usually larger than eye on the caudal peduncle, preceded by a pale area of the base of last dorsal fin ray. Basal third of second dorsal fin black, with a narrow extension to posterior tip of fin. Lateral edge of pelvic fins broadly dark.



Size : Maximum 32 cm standard length.

Geographical distribution : Indo-West Pacific: Red sea to Sodwana bay, South Africa, extends to east to Indonesia and the Philippines.

Interest to Fisheries : It is marketed mainly fresh and used in aquarium trade.

Remarks : It was previously recorded as *Upeneus macronemus*, *Pseudupeneus macronema* by Day (1875, 1889) and Balan (1959).

8. *Parupeneus multifasciatus* (Quoy and Gaimard, 1824)

1824. *Mullus multifasciatus* Quoy and Gaimard, *Voyage, Uranie Zool.*, : 330, pl. 59, fig. 1 (type-locality: Hawaii Is.).

1875. *Upeneus multifasciatus* Day, *Fishes of India*, (1) : 124.

1889. *Upeneus multifasciatus* Day, *Fauna Br. India, Fishes*, 2 : 30.

1969. *Parupeneus trifasciatus* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 54, pl. 5, fig. B.

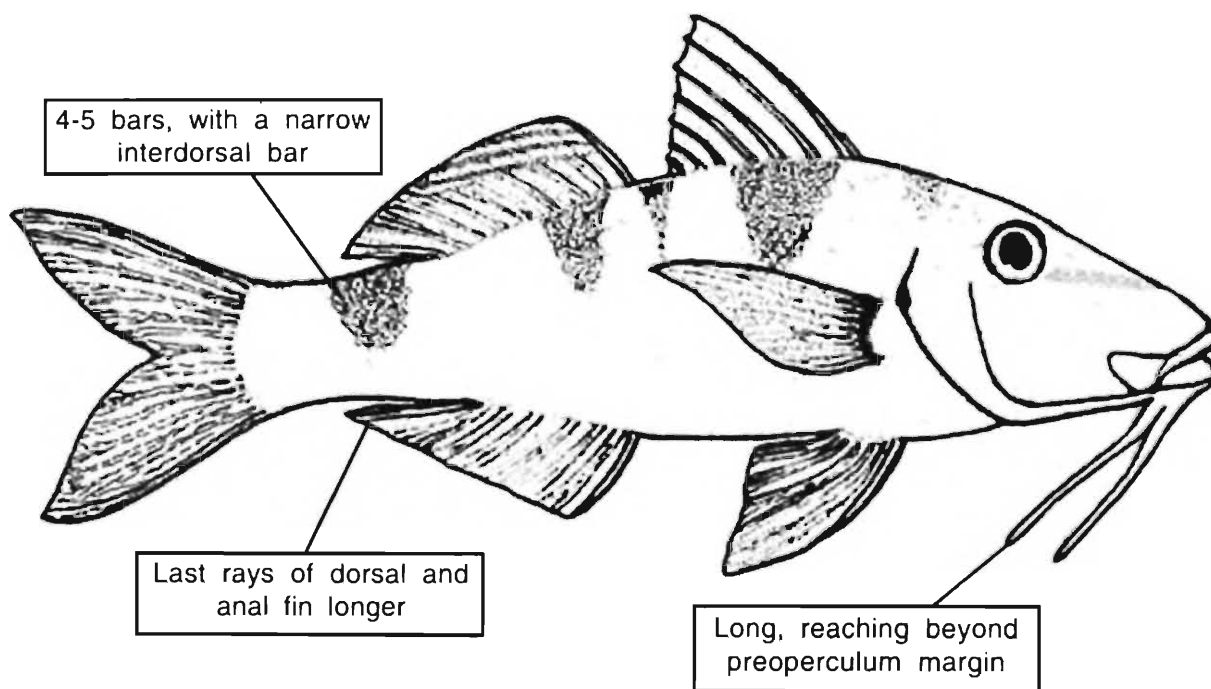
2004. *Parupeneus multifasciatus* Randall, *Indo-Pacific Fishes*, (36) : 42, fig. 9.

Material examined : Not examined by us.

English name : Many-bar goatfish.

Diagnostic features : Body elongate, its depth 3.1 to 3.6 times in standard length. Chin with a pair of barbels that extend to well past posterior margin of preopercle; their length 1.0 to 1.3 times in head length. Snout long, its length 1.7 to 1.9 times in head length.

Mouth small, lips thick and fleshy; maxilla extending about $\frac{1}{2}$ distance to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third and fourth spines longest, its length 1.5 to 1.7 in head in adult specimens; last dorsal soft rays notably longer than the penultimate ray. Pectoral fins with 15 to 17 rays. Lateral line with 28 to 30 scales; 2 to 3 rows of scales in interdorsal space; 8 to 9 rows of scales along upper part of caudal peduncle. Caudal peduncle depth 2.2 to 2.6 times in head length. Gillrakers on first arch 36 to 41, 7 to 10 on upper limb plus 28 to 33 on lower limb.



Colour : Body grey to red, the margins of the scales often yellow, with a broad black bar on caudal peduncle and one each beneath anterior part of second and first dorsal fins, the area between bars paler than rest of body; a narrow dusky bar often present below interdorsal space, and one or two broad dark bars may be present anteriorly on side of body. Snout usually with a dark longitudinal band which often continue through eye to upper end of gill opening. Caudal fin yellowish to pink with narrow blue longitudinal bands; basal half of second dorsal fin of adults dusky anteriorly, black posteriorly, the outer half with narrow dark-edged blue and yellow bands; anal fin like outer part of second dorsal fin.

Size : Maximum 35 cm total length.

Geographical distribution : Indo-West Pacific: from the Christmas Island in the eastern Indian Ocean to the Hawaiian, Line, Marquesan and Tuamoto islands, north to southern Japan, south to Lord Howe and Rapa Islands.

Interest to Fisheries : It is marketed fresh and of aquarium interest.

Remarks : Although we could not examine any specimen of this species, it is included here on the basis of Day (1875) where the description clearly indicates its difference from *P. trifasciatus*. The specimens described by Thomas (1969) from Minicoy Island as *P. trifasciatus* are undoubtedly *P. multifasciatus*, as they are said to have 4 to 5 dark vertical bands, the third band being in between spinous and soft dorsal fin.

9. *Parupeneus pleurostigma* (Bennett, 1831)

1831. *Upeneus pleurostigma* Bennett, *Proc. Zool. Soc., London* : 59 (Type-locality : Mauritius).

1967. *Parupeneus pleurostigma* Jones and Kumaran, *J. mar. biol. Ass. India*, 7(2) : 387, fig. 9

1969. *Parupeneus pleurostigma* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 63.

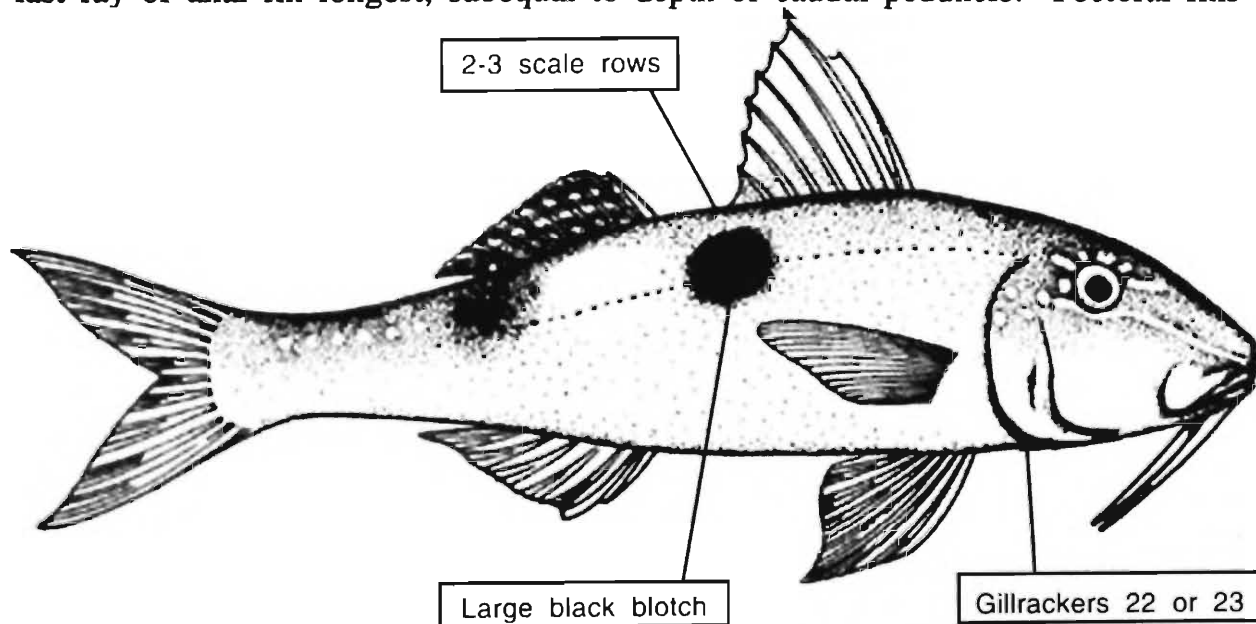
1986. *Parupeneus pleurostigma* Ben-Tuvia, *In* : Smith and Heemstra, *Smith's Sea Fishes* : 612, pl. 69.

2004. *Parupeneus pleurostigma* Randall, *Indo-Pacific Fishes*, (36) : 47, fig. 1, 10.

Material examined : 2 ex., 188-191 mm. SL, Reg. No.: 1681, Port Blair, South Andaman, D. V. Rao, 30.7. 1991; 1 ex., 187 mm SL, Reg. No.: 2194, Bambooflat, South Andaman, P. T. Rajan, 30.9.1992.

English name : Black spot goatfish.

Diagnostic features : Body more or less elongate, its depth 3.5 to 3.9 times in standard length. Chin with a pair of barbels, extend to rear margin of preopercle; their length 1.5 to 1.7 times in head length. Snout long, its length 1.8 to 2.1 times in head length. Mouth small, maxilla extending almost 3/4 distances to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small and third spine longest, its length 1.3 to 1.4 times in head length. Last dorsal and anal fin rays slightly elongate; the third ray and last ray of anal fin longest, subequal to depth of caudal peduncle. Pectoral fins with



15 to 17 rays. Lateral line with 27 to 28 scales; 2 or 3 vertical rows of scales in interdorsal space; 8 to 9 vertical rows of scales along upper part of caudal peduncle. Caudal peduncle depth 3.0 to 3.3 times in head length. Gillrakers on first arch 29 to 32, 6 or 7 on upper limb plus 22 to 25 on lower limb.

Colour : Body pinkish dorsally, lighter pink to whitish ventrally. A large round dark black spot on the lateral line below the posterior end of spinous dorsal fin; a broad dusky to reddish patch usually present on the dorsal side under rear part of second dorsal fin base; the area between these two patches pale to whitish. A row of pale blue spots on each scale above lateral line on caudal peduncle. A pale blue line from above mouth to lower edge of eye. Some pale blue spots and short lines around eye and on upper part of opercle. Base of second dorsal fin dark.

Size : Maximum 30 cm standard length.

Geographical distribution : Tropical Indo-Pacific, from east coast of Africa to the Hawaiian islands and French Polynesia.

Interest to Fisheries : It is marketed fresh.

10. *Parupeneus rubescens* (Lacepede, 1801)

1801. *Mullus rubescens* Lacepede, *Hist. nat. Poiss.*, 3 : 384, 408 (Type-locality: Mauritius).

1875. *Upeneus displurus* Day, *Fishes of India*, (1) : 125, pl. 31, fig.3.

1933. *Pseudupeneus fraterculus* Fowler, *Bull. U. S. natn. Mus.*, 12(100) : 302, fig. 25.

1969. *Parupeneus pleurotaenia* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 50.

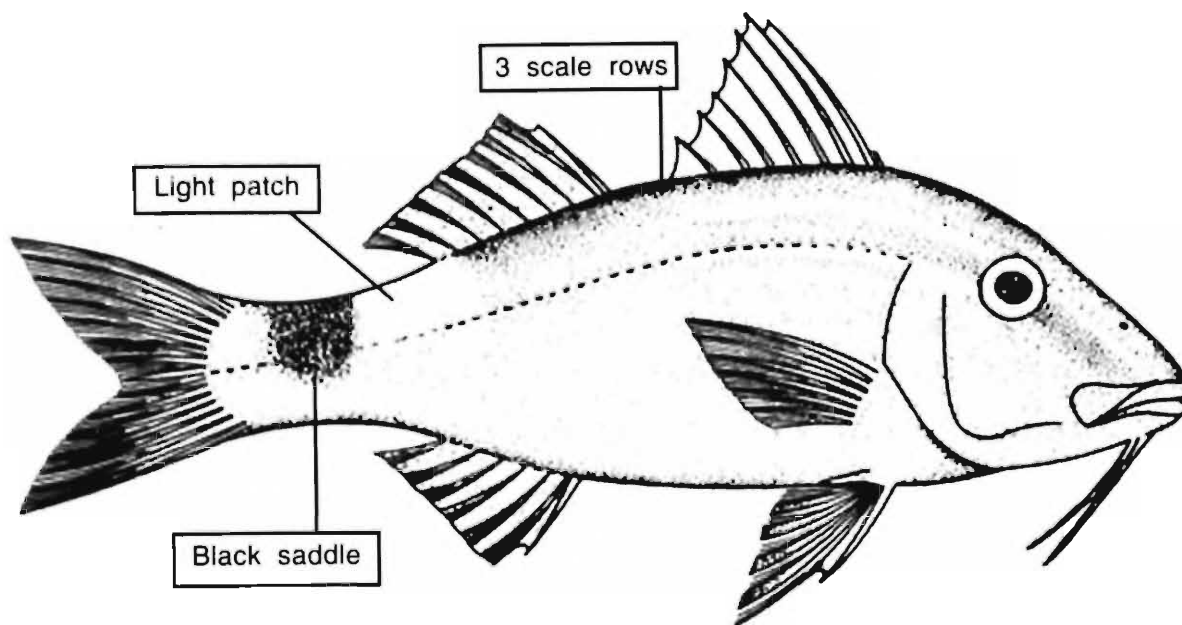
1986. *Parupeneus rubescens* Ben-Tuvia, In : Smith and Heemstra, *Smith's Sea Fishes* : 612, pl. 70, fig. 196.10.

Material examined : 2 ex, 120-131 mm SL, Reg. No. 334 & 335, Sind, 12/1877, purchased from Sir F. Day (labeled as *Upeneus displurus*).

English name : Rosy goatfish.

Diagnostic features : Body deep, compressed; depth 3.0 to 3.4 times in standard length. Chin with a pair of thin barbels, reaching almost to rear margin of opercle; their length 1.4 to 1.6 times in head length. Snout length 1.8 to 2.1 times in head length. Mouth small, maxilla extending about 2/3 distances to front margin of eye. A single row of well-spaced, stout, conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small and third spine longest, its length 1.4 to 1.7 times in head. Last dorsal and anal fin rays elongate; the third anal fin ray longer than last one. Pectoral fins with 15 to 17 rays. Lateral line with 27 to 29 scales; 3 vertical rows of scales in interdorsal space; 8 to 9 vertical rows of scales along upper part of caudal

peduncle. Caudal peduncle depth 2.4 to 2.8 times in head length. Gillrakers on first arch 29 to 31, 6 or 7 on upper limb plus 23 or 26 on lower limb.



Colour : Body colour variable with age and habitat. Usually reddish to greenish- brown dorsally, pale red ventrally. Large saddle-like blotch dorsally on posterior part of caudal peduncle, mostly above lateral line, preceded by whitish spot from behind second dorsal fin base. A pale edged dark brown band from snout through eye to a short distance anteriorly on body along lateral line, which often fades away on preservation. Fins pale, without markings.

Size : Maximum 30 cm standard length.

Geographical distribution : Indo-Pacific.

Interest to Fisheries : It is marketed fresh in other countries.

Remarks : *Parupeneus rubescens* was previously recorded as *Upeneus displurus* (Playfair and Gunther) from Sind, by Day (1875) and *Pseudupeneus fraterculus* (Valenciennes) from India (exact locality not known) by Fowler (1933). Both the records were brought under the synonymy of *Parupeneus pleurotaenia* (Playfair and Gunther) by Lachner (1960). Thomas (1969) followed Lachner (1960) to include *Parupeneus pleurotaenia* from India probably on the basis of Sind's specimens of Day (1875), since Thomas (1969) has not examined any specimen. Although there was no reliable record from the Indian coast, it is reported from Ceylon (Sri Lanka) by Munro (1955) (as *Pseudupeneus fraterculus*) and by de Bruin *et al.* (1995). Hence, considering it is likely to occur in our area, this species has been included in the present work.

11. *Parupeneus trifasciatus* (Lacepede, 1801)

1801. *Mullus trifasciatus* Lacepede, *Hist. nat. Poiss.*, 3 : 383, 404, pl. 15, fig.1 (Type-locality : No locality given, Probably Mauritius or Reunion)
1859. *Upeneus trifasciatus* Gunther, *Cat. Fish. Br. Mus.*, 1 : 407.
1964. *Parupeneus bifasciatus* Jones, *Proc. Symp. Scombroid Fish*, (2) : fig. 31.
1969. *Parupeneus bifasciatus* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 53, pl. 5, fig. A.
1984. *Parupeneus bifasciatus* Kumaran & Randall, In : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Paru 1.
2002. *Parupeneus trifasciatus* Randall and Myers, *Zool. Stud.*, 41(4) : 432.

Material examined : 1 ex., 185 mm SL, Reg. No.: 2531, Outram Island, Ritchie's Archipelago, D. V. Rao and party, 2.3.1994; 1 ex., 259 mm. SL, Reg. No.: 2523, Narcodam Island, North Andaman, D. V. Rao, 14.3.1994; 3 ex., 73-93 mm SL, ZSI F 9140/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 29.8.1997.

English name : Double-bar goatfish.

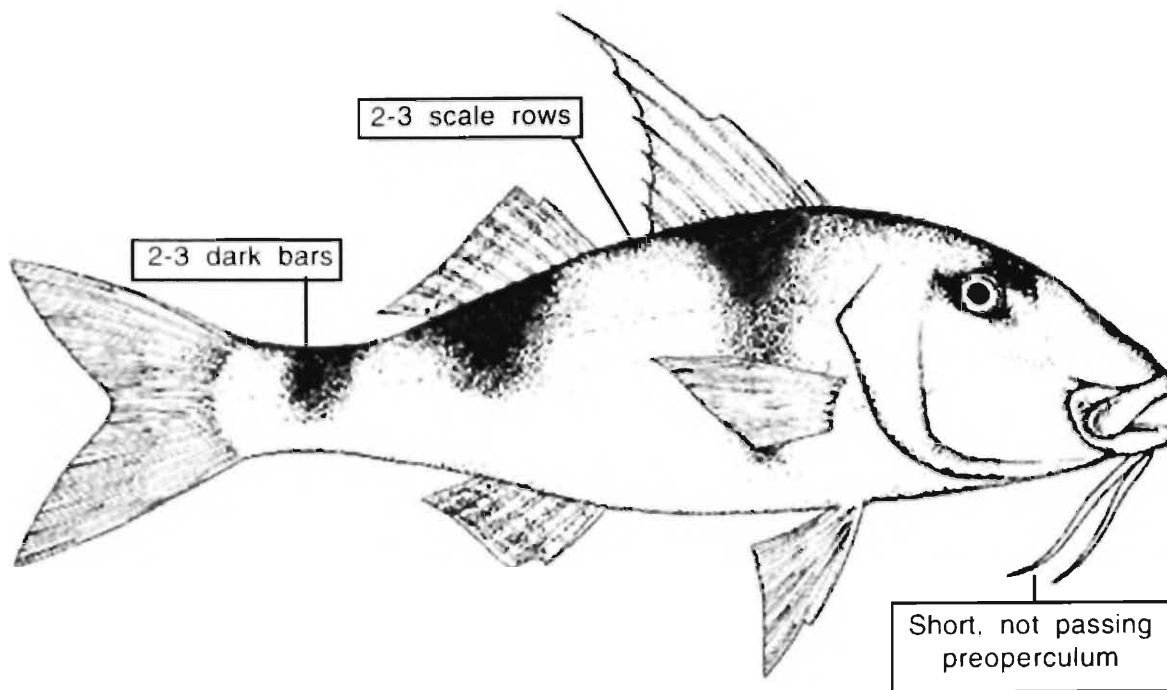
Diagnostic features : Body elongate, depth 2.8 to 3.2 times in standard length. Chin with a pair of barbels, generally not extend beyond rear border of preopercle; length of barbels 1.6 to 1.9 times in head. Snout length 1.8 to 2.2 times in head length. Mouth small, lips thick and fleshy; maxilla extending almost $\frac{1}{2}$ to $\frac{2}{3}$ distance to front margin of eye. A single row of well-spaced, stout conical teeth in jaws, no teeth on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine small; third and fourth spines longest, its length 1.4 to 1.6 in head in adult specimens. Pectoral fins with 15 to 17 rays. Lateral line with 28 to 30 scales; 2 to 3 rows of scales in interdorsal space; 8 to 9 rows of scales along upper part of caudal peduncle. Caudal peduncle depth 2.2 to 2.4 times in head length. Gillrakers on first arch 35 to 41, 7 or 8 on upper limb plus 27 or 30 on lower limb.

Colour : Body yellowish grey to brownish red shading to whitish ventrally. Three broad saddle-like dark bars present, first one below first dorsal fin, second below second dorsal fin and third one on middle of caudal peduncle. Some specimens may have only two well-defined bars. A dark area generally present surrounding the eye and extending through interorbital space. Second dorsal fin, anal fin and caudal fin sometimes with pale bands. Scales pale at the center on dorsal side.

Size : Maximum 35 cm standard length.

Geographical distribution : Restricted to the Indian Ocean.

Interest to Fisheries : It is marketed mostly fresh.



Remarks : This species was previously recorded as *Upeneus trifasciatus* (Lacepede) (Gunther, 1859), *Parupeneus bifasciatus* (Lacepede) (Jones, 1964; Thomas, 1969). In concurrence with the current nomenclature, the valid name of this species considered here is *Parupeneus trifasciatus* (Lacepede) (Randall and Myers, 2002).

Genus *Upeneus* Cuvier, 1829

1829. *Upeneus* Cuvier, *Hist. nat. Poiss.*, 3 : 448, (type-species : *Mullus vittatus* Forsskal).

Distinctive characters : Body elongate and compressed. Maxilla extends slightly beyond anterior border of eye. Operculum without spine. Band of villiform teeth on jaws, vomer and palatines. Small scales present on soft dorsal, anal and caudal fins; 3 to 6 rows of scales in interdorsal space; 11 to 12 scale rows between second dorsal fin and caudal fin. First dorsal fin with 8 spines, 1st spine very small or with 7 spines, 1st spine almost equal to 2nd spine. Both the dorsal fins with stripes, but anal fin without any stripe. Generally caudal fin with dark oblique bars. Often found in large shoals.

About 21 species recognized worldwide, 8 occur in our area.

1. *Upeneus guttatus* (Day, 1868) (Day's goatfish)
2. *U. luzonius* Jordan & Seale (Dark barred goatfish)
3. *U. moluccensis* (Bleeker) (Gold-band goatfish)
4. *U. sulphureus* Cuvier (Sulphur goatfish)

5. *U. sundaicus* (Bleeker) (Ochre-band goatfish)
6. *U. taeniopterus* Cuvier (Stripe-fin goatfish)
7. *U. tragula* Richardson (Freckled goatfish)
8. *U. vittatus* (Forsskal) (Striped goatfish)

Key to species

- 1a. First dorsal fin with 7 spines, the first spine longest *U. guttatus*
- 1b. First dorsal fin with 8 spines, the first spine very small 2
- 2a. Preorbital scales absent; 5½ scale rows in space between dorsal fins 3
- 2b. Preorbital scales present; 4½ scale rows in space between dorsal fins 6
- 3a. Oblique cross bars on caudal fin absent *U. sulphureus*
- 3b. Dusky oblique cross bars on caudal fin present 4
- 4a. Caudal fin with 5 or 6 dusky cross bars on upper lobe only, no cross bars on lower lobe *U. moluccensis*
- 4b. Caudal fin with black cross bars on both lobes 5
- 5a. Gillrakers 21 to 24; pelvic fins almost equal to pectoral fin length; upper caudal fin lobe with 6 bands and lower lobe with 4 or 5 dark bands *U. taeniopterus*
- 5b. Gillrakers 26 to 31; pelvic fins short, almost two-third of pectoral fin length; upper caudal fin lobe with 4 or 5 bands and lower lobe with 3 or 4 dark bands, the distal one the darkest and broadest *U. vittatus*
- 6a. Caudal fin lobes without cross bars, a characteristic dark brown triangular stripe prolonging the lateral band along lower fin lobe; a yellowish brown stripe from eye to of caudal fin base *U. sundaicus*
- 6b. Caudal fin with 2 to 7 dusky oblique cross bars on each lobe; usually with a reddish brown or blackish stripe from snout to middle of caudal fin base 7
- 7a. A large, dark saddle-like blotch dorsally on caudal peduncle just posterior to second dorsal fin; gillrakers 18 to 22 on first arch *U. luzonius*
- 7b. Saddle-like dark blotch on caudal peduncle absent; gillrakers 21 to 25 on first arch *U. tragula*

12. *Upeneus guttatus* (Day, 1868)

1868. *Upeneoides guttatus* Day, *Proc. Zool Soc., London*, 1867(3) : 938 (Type-locality : Madras).

1875. *Upeneoides bensasi* Day, *Fishes of India*, (1) : 121, pl. 30, fig. 5.

1889. *Upeneoides bensasi* Day, *Fauna Br. India, Fishes*, 2 : 27.

1969. *Upeneus bensasi* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 10, pl. 1, fig. B.

1984. *Upeneus* (Pennon) *bensasi* Talwar, *Commercial Sea Fishes of India* : 681.

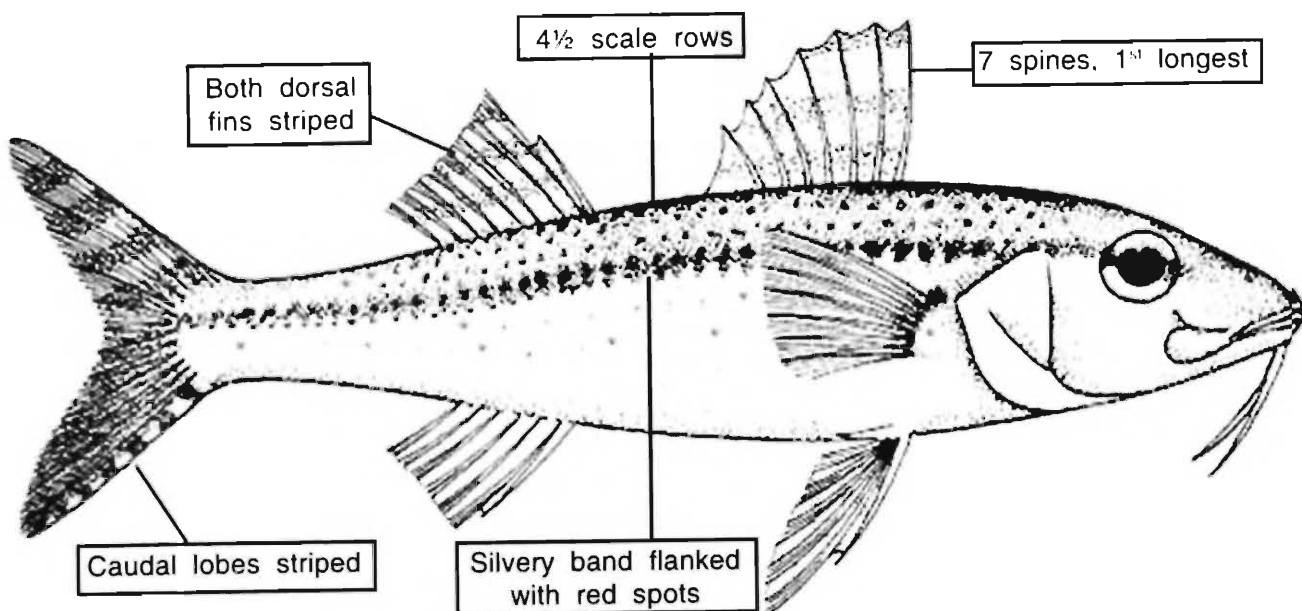
1984. *Upeneus bensasi* Kumaran & Randall, In : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Upen 4.

2000. *Upeneus guttatus* Randall, *Raffles Bull. Zool.*, (8) : 622.

Material examined : 2 ex., 110-112 mm SL, ZSI F 9700/2, Rameswaram, Tamil Nadu, R. P. Barman and party, 1.10.2002; 1 ex., 111 mm SL, ZSI F 9711/2, Kakinada, Andhra Pradesh, R.P. Barman and Party, 7.10.2002; 1 ex., 108 mm SL, Reg. No. 307, Madras, F. Day, date not given (said to be original of pl. XXX, fig. 5 of Day, 1875).

English name : Not known. This may be called as “Day’s goatfish”

Diagnostic features : Body elongate, depth 4.0 to 4.3 times in standard length. Chin with a pair of barbels, extend posterior to rear border of preopercle; their length 1.2 to 1.5 in head length. Mouth small, maxilla extend or extending slightly posterior to front margin of eye. Villiform teeth in jaws, on roof of mouth. Ectopterygoid without teeth. Two widely separated dorsal fins, first with 7 spines, the first spine longest. Pectoral fins with 13 to 14 rays (usually 14 rays). Pelvic fins slightly shorter than pectoral fins. Lateral line with 28 to 30 scales, 4 ½ vertical rows of scales in interdorsal space; 10 to 11 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 23 to 27.



Colour : Body greenish grey dorsally with longitudinal rows of brownish red spots shading to silvery white on sides and ventrally. A silvery stripe from eye to the middle of caudal fin base, with a row of red spots above and another row below it. Both dorsal fins with 2 to 4 brownish red stripes; tip of first dorsal fin black. Upper lobe of caudal fin with 4 to 5 transverse brownish red bands and lower lobe with about 7 brownish red bars. Peritoneum blackish brown.

Size : Maximum 20 cm standard length.

Geographical distribution : Tropical Indo-Pacific.

Interest to Fisheries : This species is mostly marketed fresh.

Remarks : Although, Day (1868) described this species, in his subsequent work (Day, 1875) he placed it under synonymy of *U. bensasi* (Temminck and Schlegel) which was followed by the later workers till date. In the current nomenclature *Upeneus bensasi* is considered to be a junior synonym of *Upeneus japonicus* (Hutton) which is said to be distributed in Western Pacific only (Randall *et al.*, 1993). It is also opined that specimens from India are probably *Upeneus guttatus* (Day) or *Upeneus sundaicus* (Bleeker) (Eschmeyer, 2005), that is mostly for Thomas (1969) who stated that “the specimens identified as *Upeneoides bensasi* by Day (1875) probably represent *U. sundaicus*”

U. japonicus is unlikely to occur in this region and differs from this species in having slightly longer barbel, toothed ectopterygoid and absence of silvery lateral band flanked with red spots above and below it. The other species with 7 spines on dorsal fin known to occur in Indian Ocean is *U. asymmetricus* Lachner, yet to be recorded from India, which is also have ectopterygoid without teeth, differs from this species in having short barbels, 1.4 to 1.8 times in head length; a dark saddle-like mark dorsally on caudal peduncle just behind second dorsal fin and silvery brown peritoneum (Kumaran and Randall, 1984). The specimens studied here are certainly not *U. sundaicus*.

With regard to *U. bensasi*, Lachner (1954) was probably correct in observing that “in the Western Indo-Pacific (East Africa, India) this species may be represented by another form entirely different that of the Philippine-Japan area” and commented on Day’s account that it ‘may include or represent an undescribed species’ Thomas (1969) also stated that “samples of *U. bensasi* from Philippines and Japan were much alike but differed significantly from samples of Mandapam area” but erroneously considered *U. bensasi* of Day (1875) as *U. sundaicus*. We have examined a specimen purchased from Sir F. Day collected from the type-locality and said to be original of pl. XXX, fig. 5 of Day (1875), to ascertain the differences. This specimen with only 7 dorsal fin spines, bands on upper caudal lobe and silvery lateral stripe, can never be *U. sundaicus* which has 8 dorsal fin spines and no band on upper caudal fin lobe. When the specimens of Philippines and Japan are considered as *U. japonicus*, it is more appropriate that the Indian coast species without having teeth in ectopterygoid to be known as *U. guttatus*.

13. *Upeneus luzonius* Jordan and Seale, 1907

1907. *Upeneus luzonius* Jordan and Seale, *Bull. Bur. Fish., Wash.*, **26** : 25, fig. 9 (Type-locality : Cavite).

1967. *Upeneus luzonius* Thomas, *J. mar. biol. Ass. India*, **7** (2) : 473.

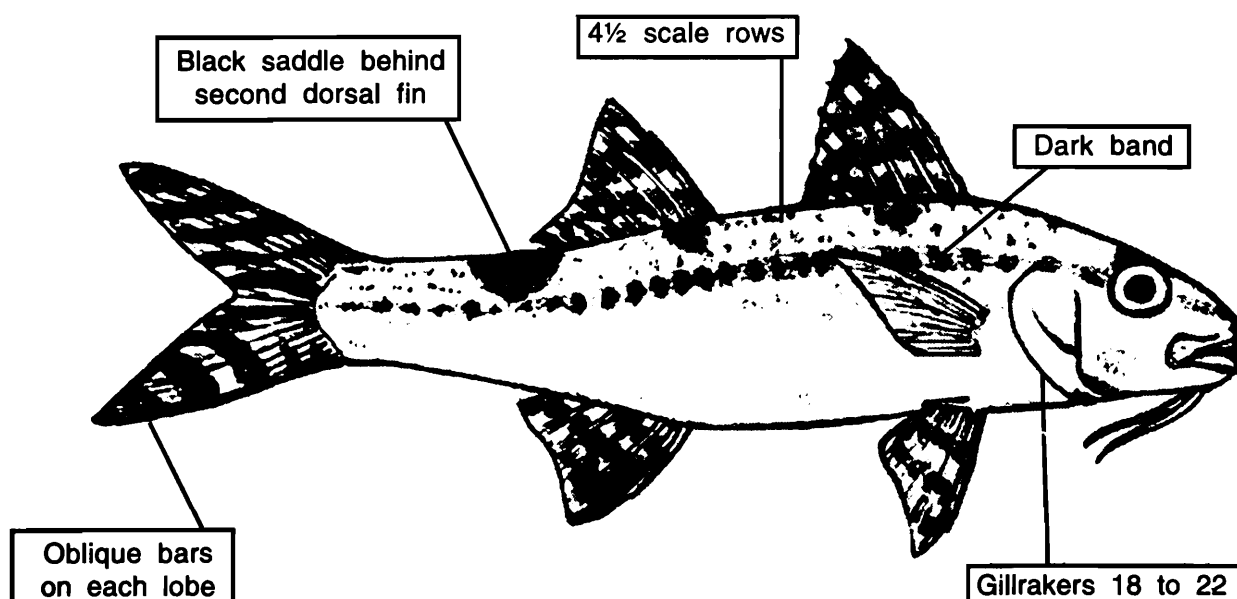
1969. *Upeneus luzonius* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 33.

Material examined : 2 ex., 120-122 mm SL, ZSI F 9696/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 30.9.2002; 6 ex., 70- 110 mm SL, ZSI F 9708-9/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 5.10.2002; 1 ex., 90.4 mm SL, ZSI F 9684/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 27.9.2002; 2 ex., 81-120 mm. SL, ZSI F 9691 & 9694, Tuticorin, Tamil Nadu, R.P. Barman and Party, 29 & 30.9.2002.

English name : Dark-barred goatfish

Diagnostic features : Body elongate, depth 4.0 to 4.3 times in standard length. Chin with a pair of barbels, extend posterior to rear border of preopercle; their length 1.2 to 1.5 in head length. Mouth small, maxilla extend or extending slightly posterior to front margin of eye. Villiform teeth on jaws and roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 13 to 14 rays. Pelvic fins slightly shorter than pectoral fins. Lateral line with 28 to 30 scales, 4 ½ vertical rows of scales in interdorsal space; 10 to 11 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 23 to 27.

Colour : Body yellowish grey to brownish red, shading to whitish ventrally. Three broad saddle-like dark bars present, first one below first dorsal fin, second below second dorsal fin and third one on caudal peduncle just behind second dorsal fin. A dark area generally present surrounding and extending dorsally from of eye. Second dorsal fin, anal fin and caudal fin with pale bands. Caudal fin with 2 to 7 dusky oblique bars on each lobe, those of lower lobe more prominent.



Size : Maximum 20 cm standard length.

Geographical distribution : Indo-West Pacific: from India to Philippines, Indonesia and northern Australia.

Interest to Fisheries : No information available.

Remarks : Mostly confused with *U. tragula*, hence, distributional and fisheries information in India is not clear.

14. *Upeneus moluccensis* (Bleeker, 1855)

1855. *Upeneus moluccensis* Bleeker, *Nat. Tijdschr. Ned-Indie*, **8** : 409 (Type-locality: Amboina).

1868. *Upeneoides fasciolatus* Day, *Proc. Zool. Soc. London* : 151.

1875. *Upeneoides sulphureus* (nec Cuvier) Day (*partim*), *Fishes of India*, (1) : 120.

1984. *Upeneus* (*Upeneus*) *moluccensis* Talwar, *Commercial Sea Fishes of India* : 683.

1984. *Upeneus moluccensis*, Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, **3** : MULL Upen 1.

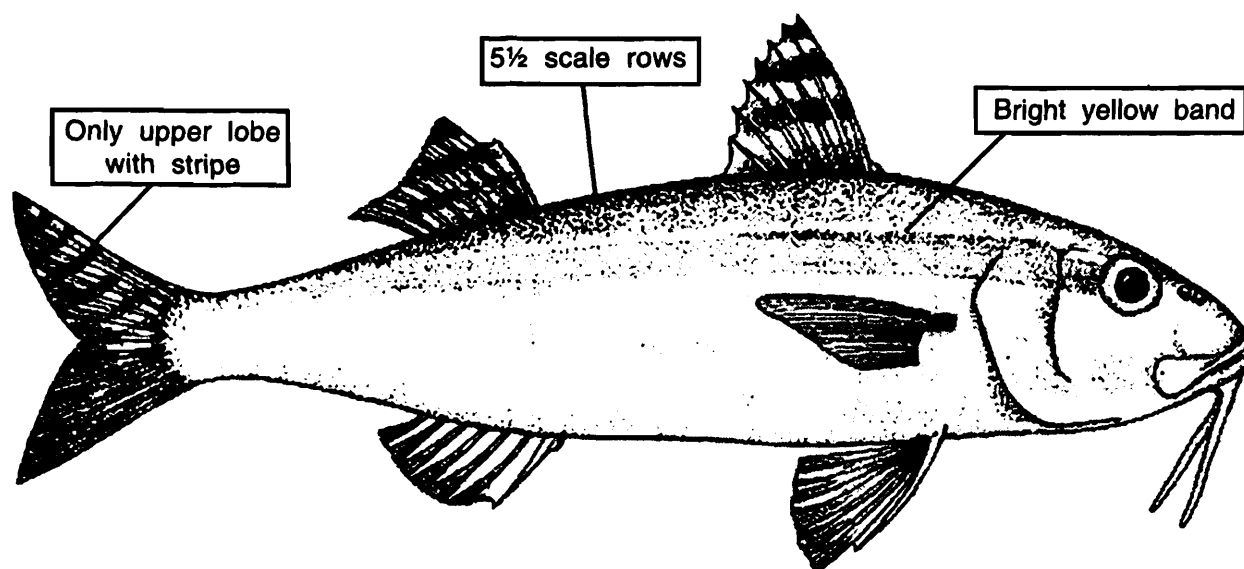
Material examined : 1 ex., 110.5 mm. SL, ZSI F 9683/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 26.9.2002; 2 ex. 120-120.2 mm SL, ZSI F 8529/2 & 8572/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 9.9.1994; 3 ex., 100-120.5 mm SL, ZSI F 8774/2 & 8788/2, Prakasham, Andhra Pradesh, R. P. Barman and party, 12 & 15.8.1995; 1 ex., 90.5 mm. SL, ZSI F 9304/2, Tuticorin, Tamil Nadu, R. P. Barman and Party, 21.8.1996; 2 ex., 140 –143 mm. SL, Reg. No.: F 9750/2, Paradip, Orissa, R. P. Barman and party, 16.11.2003.

English name : Gold-band goatfish.

Diagnostic features : Body elongate, depth 3.5 to 3.9 times in standard length. Chin with a pair of barbels, not extending to rear border of preopercle; their length 1.55 to 2.0 in head length. Mouth small, maxilla extending slightly posterior to front margin of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 15 to 18 rays. Pelvic fins almost 2/3 length of pectoral fins. Lateral line with 33 to 36 scales; 5 ½ vertical rows of scales in interdorsal space; 12 to 13 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 27 to 31.

Colour : Body silvery white, with a bright yellow horizontal band running through the eye to caudal fin. Both dorsal fins with 3 to 4 orange or red bars. Anal and pelvic fins pale. Upper lobe of caudal fin with 5 to 6 orange or black bars and lower lobe with plain yellow with dark margin.

Size : Maximum 20 cm standard length.



Geographical distribution : Indo-West Pacific: east coast of Africa to Southeast Asia and the northern coasts of Australia. Also reported from Japan and New Caledonia and the eastern Mediterranean from the Red Sea through the Suez Canal.

Interest to Fisheries : This species is of minor fisheries value.

Remarks : Imperfectly known from Indian coast, probably confused with other species.

15. *Upeneus sulphureus* Cuvier, 1829

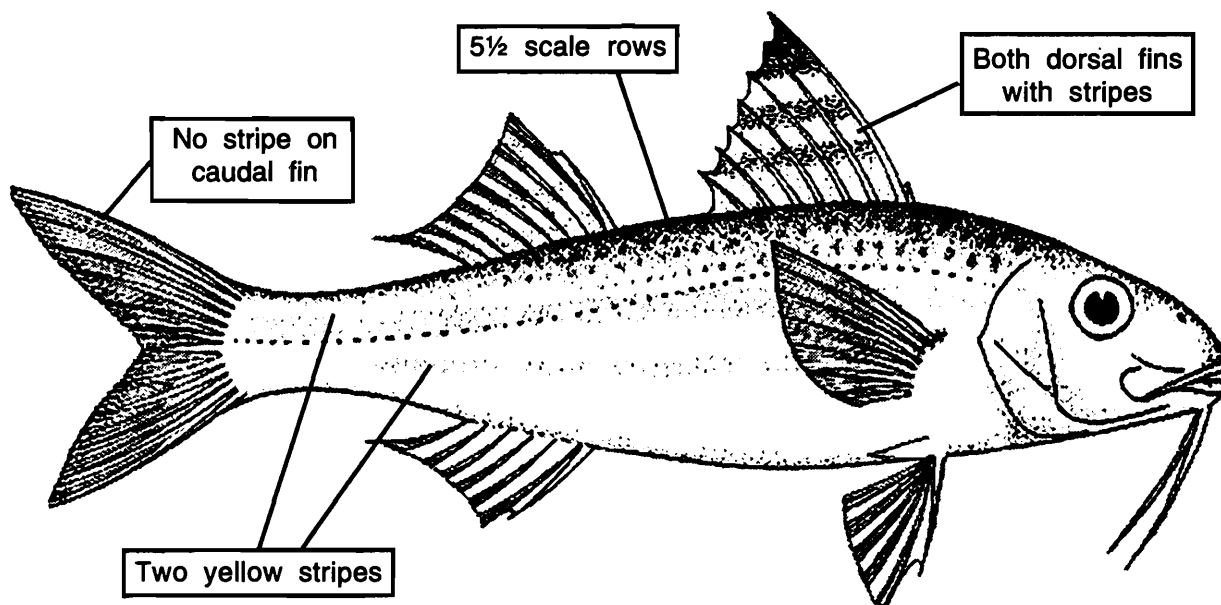
1829. *Upeneus sulphureus* Cuvier, 1829 *Hist. nat. Poiss.*, 3 : 450, 406 (Type-locality : Anjer Straits of Sunda).
1831. *Upeneus bivittatus* Valenciennes, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 7 : 520.
1867. *Upeneoides bivittatus* Day, *Proc. Zool. Soc., London* : 702.
1875. *Upeneoides sulphureus* Day (partim), *Fishes of India* : 120, pl. 30, fig. 3;
1889. *Upeneoides sulphureus* Day (partim), *Fauna Br. India, fishes*, 2 : 25.
1969. *Upeneus sulphureus* Thomas, *Mem. Mar. biol. Ass. India*, (3) : 17.
1984. *Upeneus (Upeneus) sulphureus* Talwar, *Commercial Sea Fishes India* : 685.
1984. *Upeneus sulphureus*, Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Upen 2.

Material examined : 1 ex., 140 mm SL, ZSI F 9690/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 28.9.2002; 1 ex., 135 mm SL, ZSI F 9714/2 Kannur, Kerala, R. P. Barman and party, 7.7.2002; 1 ex., 100 mm SL, ZSI F 9305/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 21.8.1996; 1 ex., 100 mm SL, ZSI F 8576/2 Kakinada, Andhra

Pradesh, R. P. Barman and party, 9.9.1994; 2 ex., 78-100 mm. SL, ZSI F 9720/2, Guntur, Andhra Pradesh, R. P. Barman and party, 10.7.2003; 7 ex., 90 –132 mm SL, Reg. No.: F 9746/2, Gopalpur, Orissa, R. P. Barman and party, 7.11.2003; 2 ex., 117-132 mm SL, Reg. No.: F 9748/2, Paradip, Orissa, R. P. Barman and party, 14.11.2003.

English name : Sulphur goatfish.

Diagnostic features : Body more or less elongate, depth 3.2 to 3.6 times in standard length. Chin with a pair of barbels, generally extend or extending beyond rear border of preopercle; their length 1.2 to 2.0 in head length. Mouth small, maxilla extend or extending slightly posterior to front margin of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 15 to 18 rays. Pelvic fins almost $\frac{3}{4}$ length of pectoral fins. Lateral line with 34 to 37 scales, $5\frac{1}{2}$ vertical rows of scales in interdorsal space; 12 to 13 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 26 to 32



Colour : Head reddish back greenish bronze and sides and abdomen yellow. Both dorsal fins with 2 to 3 olive bars and with black or dark tips. Pectoral, pelvic and anal fins pale. Two orange to yellow bands extend from the head to the caudal peduncle. Caudal fin plain dull yellow, its hind margin dusky, and its lower lobe tipped white.

Size : Maximum 23 cm standard length.

Geographical distribution : Indo-West Pacific: east Africa to Southeast Asia, northward to the coast of China and southward to the northern coast of Australia. New Caledonia to Fiji.

Interest to Fisheries : .It constitutes a fishery combined with *U. vittatus* along the coast of Andhra Pradesh, Kerala, Karnataka and Maharashtra. It also forms an important fishery in the Gulf of Mannar and Palk Bay.

16. *Upeneus sundaicus* (Bleeker, 1855)

1855. *Upeneoides sundaicus* Bleeker, *Hist. nat. Poiss.*, 3 : 384, 406 (Type-locality : Mauritius).

1966. *Upeneus sundaicus* Jones and Kumaran, *J. mar. boil. Ass. India*, 7(1) : 114, fig. 7.

1969. *Upeneus sundaicus* Thomas, *Mem. Mar. boil. Ass. India* (3) : 35.

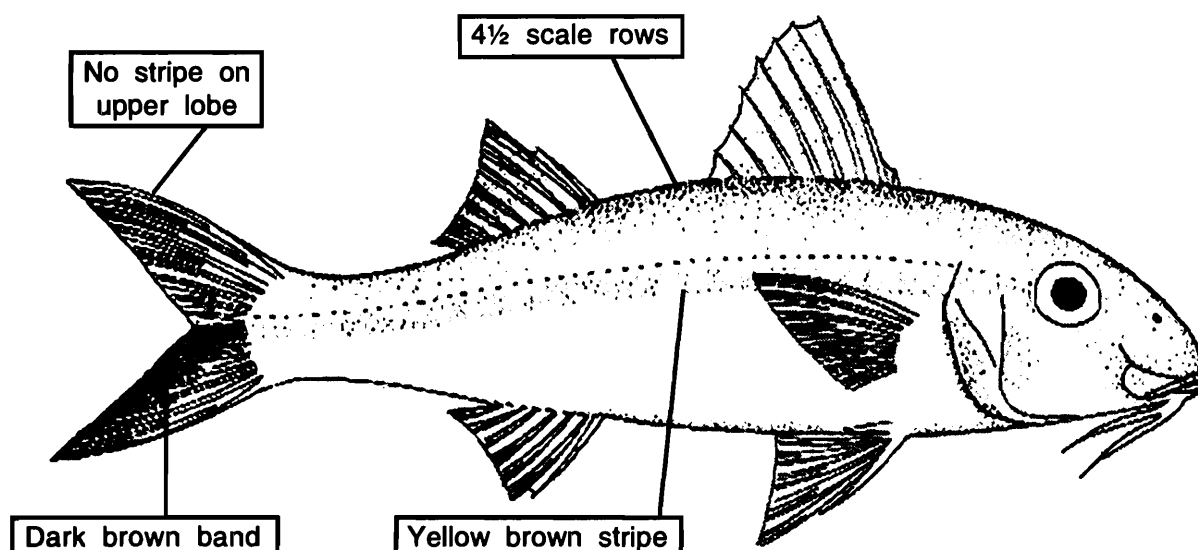
1984. *Upeneus sundaicus* Kumaran & Randall, In : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Upen 5.

Material examined : 1 ex., 110.5 mm SL, ZSI F 9682/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 26.9.2002; 3 ex., 90-110 mm SL, ZSI F 9704/2, Rameswaram, Tamil Nadu, R. P. Barman and party, 2.10.2002; 2 ex., 100-100.5 mm SL, ZSI F 9710/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 6.10.2002.

English name : Ochre-banded goatfish.

Diagnostic features : Body almost elongate, depth 3.7 to 4.0 times in standard length. Chin with a pair of barbels, extend or extending slightly beyond rear border of preopercle; their length 1.3 to 1.7 in head length. Mouth small, maxilla extend or extending slightly posterior to front margin of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 14 to 15 rays. Pelvic fins almost equal to pectoral fins. Lateral line with 31 to 32 scales, 4 ½ vertical rows of scales present in interdorsal space. Caudal peduncle deep, the least depth almost 8 times in standard length 10 to 11 vertical rows of scales present along upper part of caudal peduncle. Gillrakers on first arch 18 to 22.

Colour : Body bronze green dorsally, shading to yellowish or whitish ventrally, with a yellowish brown stripe from eye to above midbase of caudal fin. Barbels orange. Dorsal fins yellowish, sometimes with faint reddish stripes. Caudal fin brownish yellowish yellow, the lower lobe with a dusky posterior margin which is broad medially and narrows toward lobe tip.



Size : Maximum 22 cm standard length

Geographical distribution : Indo-West Pacific: from Pakistan, India and Sri Lanka, extending eastward to Indonesia; also from north-western Australia to Japan.

Interest to Fisheries : It is marketed fresh and is of commercial importance. Known to be fairly abundant along the Coromandel coast.

Remarks : Thomas (1969) had the opinion that the specimens identified as *Upeneoides bensasi* by Day (1875) probably refers to *Upeneus sundaicus*. We observed that some of the specimens included under *U. sulphureus* by Day (1875) are *U. sundaicus*, but none of the *U. bensasi* specimens, which should be considered as *U. guttatus* (Day). We have examined one specimen from Madras, purchased from Sir F. Day and said to be original of pl. XXX, fig. 5 of Day (1875) where the caudal fin with bands on upper lobe clearly visible which is certainly not a character of *U. sundaicus*.

17. *Upeneus taeniopterus* Cuvier, 1829

1829. *Upeneus taeniopterus* Cuvier, *Hist. nat. Poiss.*, 3 : 384, 406 (Type-locality : Mauritius).

1966. *Upeneus arge* Jones and Kumaran, *J. mar. biol. Ass. India*, 7(1) : 113, fig.8.

1969. *Upeneus arge* Thomas, *Mem. Mar. biol. Ass. India* (3) : 22.

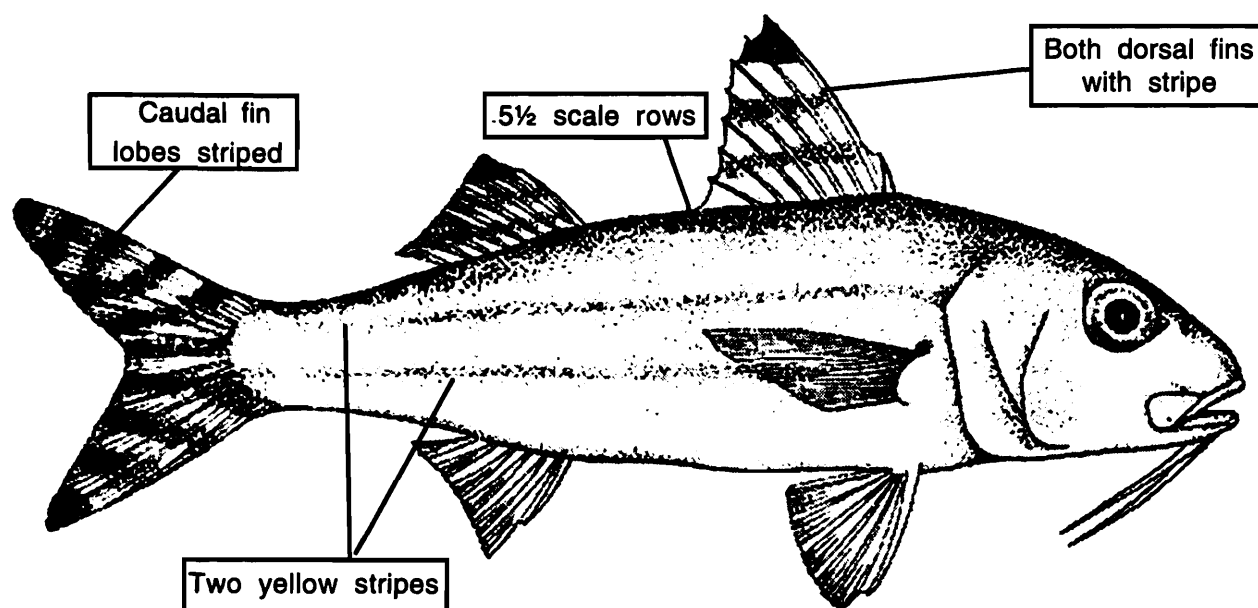
1984. *Upeneus taeniopterus* Kumaran & Randall, In : Fischer & Bianchi. *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Upen 8.

Material examined : 2 ex.; 45-47 mm SL, Reg. No.: F 9751/2, Puri, Orissa, R. P. Barman and party, 17.11.2003.

English name : Stripe-fin goatfish.

Diagnostic features : Body elongate, depth 3.6 to 4.2 times in standard length. Chin with a pair of barbels, nearly or just extend to rear border of preopercle; their length 1.3 to 1.7 in head length. Maxilla extending to below anterior third of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 13 to 14 rays. Pelvic fins almost equal to pectoral fins. Lateral line with 36 to 38 scales, 5 ½ vertical rows of scales in interdorsal space; 12 to 13 vertical rows of scales along upper part of caudal peduncle. Caudal peduncle deep, the least depth almost 8 times in standard length. Gillrakers on first arch 21 to 24.

Colour : Body silvery pink to orangish dorsally, shading to whitish and sides and ventrally, with 2 narrow yellow stripes (one at level of upper part of eye and the other at middle of pectoral fin base). Both dorsal fins with 3 transverse dark bands. Upper lobe caudal fin with 6 transverse blackish bands and lower lobe with 4 to 5 transverse bands.



Size : Maximum 33 cm standard length.

Geographical distribution : Indo-Pacific: East Africa to the Hawaiian, Line and Tuamotu Islands, north to the Yaeyamas, Ryukyu Islands and throughout Micronesia.

Interest to Fisheries : It is marketed fresh. A commercially important fish but rare in our coast.

Remarks : Previously recorded as *Upeneus arge* Jordan and Everman from Minicoy islands (Jones and Kumaran, 1966, 1980; Thomas, 1969). We could not examine the specimens of Jones and Kumaran (1966) and so, it could not be ascertained whether or not the specimens are truly *Upeneus arge*, a valid species. Kumaran and Randall (1984) possibly correct in considering it as *U. taeniopterus*. Both the species are more or less similar in structure and colouration, but the former is having a longer barbel that extends beyond posterior margin of preopercle.

18. *Upeneus tragula* Richardson, 1846

1846. *Upeneus tragula* Richardson, *Rep. Br. Ass. Advmt. Sci., 15th meet.* 1845: 220 (Type-locality : Canton, India).

1875. *Upeneoides tragula* Day, *Fishes of India* : 121, pl. 30, fig. 4.

1889. *Upeneoides tragula* Day, *Fauna Br. India, fishes, 2* : 26.

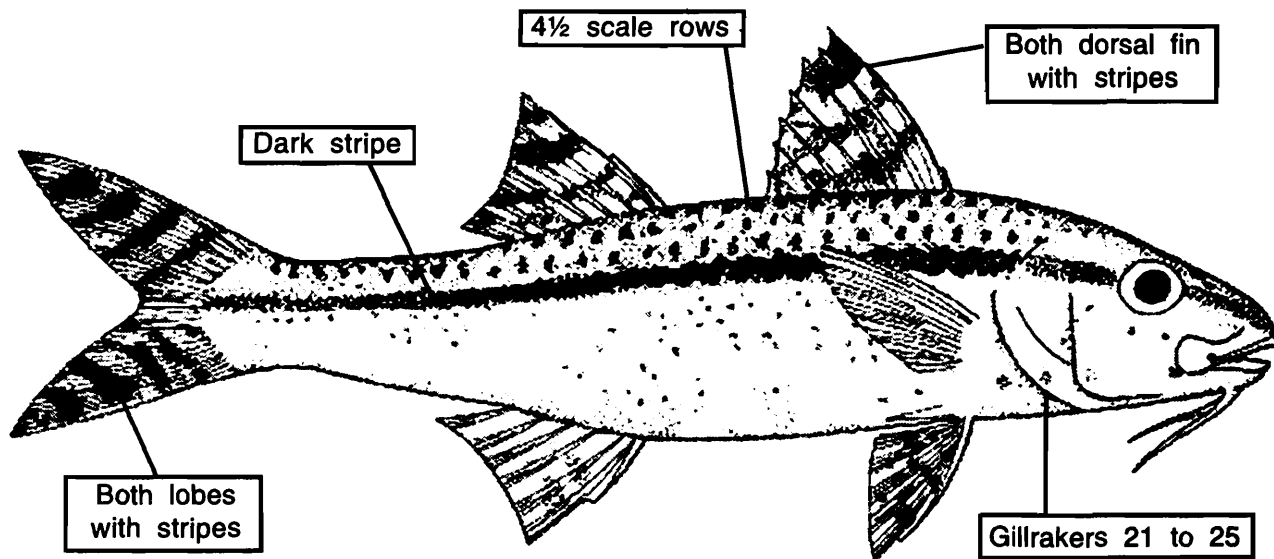
1984. *Upeneus (Pennon) tragula*: Talwar, *Commercial Sea Fishes of India* : 682.

1984. *Upeneus tragula* Kumaran & Randall, *In* : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51), 3* : MULL Upen 6.

Material examined : 4 ex., 110-200 mm SL, ZSI F 9685/2 & F 9687/2, Kanyakumari, Tamil Nadu, R. P. Barman and party, 27.9.2002; 2 ex., 70-120 mm SL, ZSI F 9693/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 29.9.2002; 1 ex., 178 mm SL, ZSI F 9693/2, Porbandar, Gujarat, R. P. Barman and party, 30.10.1993; 1 ex., 135 mm SL, ZSI F 8931/2 Kanyakumari, Tamil Nadu, R. P. Barman and party, 21.8.1996; 4 ex., 115-129 mm SL, ZSI F 9141/2, 9138/2 & 9303/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 20.8.1997, 29.8.1997 & 21.8.1996.

English name : Freckled goatfish.

Diagnostic features : Body elongate, depth 3.7 to 4.3 times in standard length. Chin with a pair of barbels that generally not extend to rear border of preopercle; their length 1.5 to 1.9 in head length. Maxilla extending to slightly posterior to anterior margin of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 12 to 14 rays. Pelvic fins almost equal to pectoral fins. Lateral line with 28 to 32 scales, 4 ½ vertical rows of scales present in interdorsal space. Caudal peduncle deep, the least depth almost 8 times in standard length; 10 to 12 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 21 to 25.



Colour : Body brownish to greenish grey dorsally, shading to whitish ventrally with a dark reddish brown to blackish stripe passing from front of snout through eye along upper side of body to above midbase of caudal fin; flecked with dark reddish brown or blackish, below white with rows of dark spots. Barbels yellow. Both dorsal fins with 2 to 3 transverse dark bands. Upper lobe of caudal fin with 4 to 6 blackish cross-bands and lower lobe with 5 to 7 cross-bands.

Size : Maximum 30 cm standard length.

Geographical distribution : Indo-Pacific : East Africa to Vanuatu, north to southern Japan; Palau in Micronesia.

Interest to Fisheries : It is marketed fresh and also used in the aquarium trade.

Remarks : This species has also been recorded as *Upeneus oligospilus* Lachner (Thomas, 1969), which is considered as junior synonym of *Upeneus tragula* (Richardson).

19. *Upeneus vittatus* (Forsskal, 1775)

1775. *Mullus vittatus* Forsskal, *Descript. Anim.* : 31(Type-locality : Djedda, Red Sea).

1803. *Mullus vittatus* Shaw, *General Zool.*, 4 : 616, pl. 89

1803. *Mullus bandi* Shaw, *General Zool.*, 4 : 615.

1829. *Upeneus vittatus* Cuvier, in Cuvier and Valenciennes, *Hist. nat. Poiss.*, 3 : 448.

1876. *Upeneoides vittatus* Day, *Fishes of India* : 120, pl. 30, fig. 26;

1889. *Upeneoides vittatus* Day, *Fauna Br. India, fishes*, 2 : 25.

1927. *Upeneoides vittatus* Fowler, *J. Bombay nat. Hist. Soc.*, 32(2) : 259.

1969. *Upeneus vittatus* Thomas, *Mem Mar. biol. Ass. India*, (3) : 23.

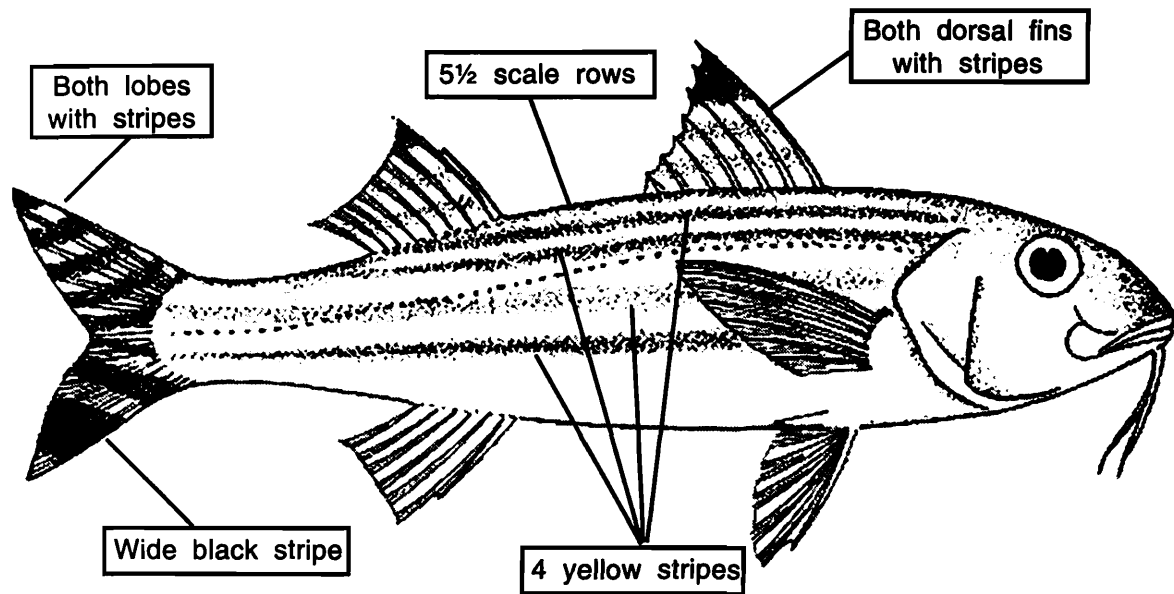
1984. *Upeneus vittatus* Kumaran & Randall, In : Fischer & Bianchi, *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, 3 : MULL Upen 3.

Material examined : 12 ex., 110-130 mm. SL, ZSI F 9688/2, 9692/2, 9695/2 & F 9699/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 28.9.2002, 29.9.2002, 30.9.2002 & 1.10.2002; 3 ex., 110-130 mm SL, ZSI F 9712/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 7.10.2002; 4 ex., 90-110.5 mm SL, ZSI F 9139/2, Tuticorin, Tamil Nadu, R. P. Barman and party, 29.8.1997; 2 ex., 170.-170 mm SL, ZSI F 8654/2, Porbandar, Gujarat, R. P. Barman and party, 30.10.1993; 1 ex., 130 mm SL, ZSI F 8530/2, Kakinada, Andhra Pradesh, R. P. Barman and party, 8.3.1995; 3 ex., 132- 135 mm SL, ZSI F 9715/2, Kannur, Tamil Nadu, 7.1.2002; 3 ex., 120-136 mm. SL, Reg. No.: F 9747/2, Chandipur, Orissa, R. P. Barman and party, 21.11.2003; 2 ex.; 118-121 mm. SL, Reg. No.: F 9747/2, Paradip, Orissa, R. P. Barman and party, 15.11.2003.

English name : Striped goatfish.

Diagnostic features : Body more or less elongate, depth 3.3 to 3.7 times in standard length. Chin with a pair of barbels, that generally not extending to rear border of preopercle; their length 1.5 to 2.2 in head length. Maxilla generally extending slightly posterior to anterior margin of eye. Villiform teeth in jaws, on roof of mouth. Two widely separated dorsal fins, first with 8 spines, the first spine very small. Pectoral fins with 15 to 17 rays. Pelvic fins almost 2/3 length of pectoral fins. Lateral line with 33 to 36 scales, 5 ½ vertical rows of scales in interdorsal space; 11 to 12 vertical rows of scales along upper part of caudal peduncle. Gillrakers on first arch 26 to 31.

Colour : Body greenish dorsally shading to white on sides and pale yellow ventrally, with 4 orange-yellow stripes. First dorsal fin with 3 broad dark stripes, the outermost near the tip of fin black. And second dorsal fin with 3 broad diagonal dark bands. C



Upper lobe of caudal fin with 4 to 5 and lower lobe with 3 to 4 dark bands, the most distal one is the broadest and darkest.

Size : Maximum 28 cm standard length.

Geographical distribution : Wide- spread in the Indo-Pacific region from the east coast of Africa to eastward to French Polynesia.

Interest to Fisheries : It is marketed fresh and also salted. Its flesh highly esteemed and considered excellent as food. It contributes an important fishery in the Gulf of Mannar and Palk Bay. It also forms a part of fishery along Andhra Pradesh, Kerala, Karnataka and Maharashtra coasts along with *Upeneus sulphureus*.

SUMMARY

The present work has recorded 3 genera comprising 18 species of goatfishes of the marine Fish family Mullidae from the coastal water of our country. Descriptive account of each species with their Geographical distribution is provided. Each species is provided with citation of records from the Indian coasts by various authors. This study also records change in nomenclature of one genus *Mulloides* Bleeker (= *Mulloidichthys* Whitley) and 3 species, *Parupeneus bifasciatus* (Lacepede) [= *P. trifasciatus* (Lacepede)], *Parupeneus cinnabarinus* (Cuvier) [= *P. heptacanthus* (Lacepede)] and *Upeneus bensasi* (Temminck and Schlegel) [= *U. guttatus* (Day)] for Indian region at par with the International Standard.

ACKNOWLEDGEMENTS

The authors are thankful to the Director and Sri A.K. Singh, Deputy Director, Zoological Survey of India, Kolkata for necessary facilities, permission and inspiration. They also extend their sincere thanks to the sectional staff for rendering their unhesitant help during the course of work.

REFERENCES

- Balan, V., 1959. Notes on a visit to certain islands of the Laccadive Archipelago, with special reference to fisheries. *J. Bombay nat. Hist Soc.*, **55**(2) : 297-306.
- Ben-Tuvia, A., 1986. Family No. 196 : Mullidae. In. Smith, M. M. and Heemstra, P. C. (eds.), *Smith's Sea Fishes*. Springer and Verlag, Berlin : 610-613.
- Day, F., 1865. *The fishes of Malabar*. London : 1-293. 20 pls.
- Day, F., 1868. On some new or imperfectly known fishes of India. *Proc. Zool Soc., London*, **1867**(3) : 935-942.
- Day, F., 1875. *The fishes of India, being a Natural History of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon*. William Dawson & Sons Ltd., London, (1) : 1-168, 1-40 pls.
- Day, F., 1889. *The Fauna of British India, including Ceylon and Burma, Fishes*. Taylor and Francis, London, **2** : 1-509.
- De Bruin, G. H. P., Russell, B. C. and Bogusch, A., 1995. *FAO species identification Field guide for fishery purposes*. The marine Fishery Resources of Sri Lanka. FAO Rome : 1-400, 32 pls.
- Eschmeyer, W. N., 2005. Catalog of fishes. Updated database version of May 2005. Catalog database as made available to FishBase in May 2005.
- Fowler, H. W., 1927. Notes on some shore fishes from Bombay. *J. Bombay nat. Hist Soc.*, **32**(2) : 253-257.
- Fowler, H. W., 1933. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Banjosidae, Lethrinidae, Sparidae, Girellidae, Kyphosidae, Oplegnathidae, Gerridae, Mullidae, Emmelichthyidae, Sciaenidae, Sillaginidae, Arripidae and Enoplosidae collected by the United States Bureau of fisheries steamer 'Albatross', chiefly in Philippines Seas and adjacent waters. *Bull. U.S. natn. Mus.*, **12**(100) : 1-165.
- Gunther, A., 1859. *Catalogue of the archipelagian fishes in the collection of the British Museum. I. Gasterosteidae, Berycidae, Percidae, Aphredoderidae, Pristipomatidae, Mullidae, Sparidae*. London, **1** : xxxi+525 pp.
- Jones, S., 1964. A preliminary survey of the common tuna bait fishes of Minicoy and their distribution in the Laccadive Archipelago. *Proc. Symp. on Scombroid Fishes. Mar. Biol. Ass. India*, (2) : 643-680, fig. 1-46.
- Jones, S. and Kumaran, M., 1959. The fishing industry of Minicoy Islands with special reference to the tuna fishery. *Indian J. Fish.*, **6**(1) : 30-57

- Jones, S. and Kumaran, M., 1965. New records of fishes from the Seas around India. Pt. II. *J. mar. biol. Ass. India*, 7(1) : 108-123, fig.1-18.
- Jones, S. and Kumaran, M., 1967. New records of fishes from the Seas around India. Pt. III. *J. mar. Biol. Ass. India*, 7(2) : 381-400, fig.1-21.
- Jones, S. and Kumaran, M., 1980. *Fishes of the Laccadive Archipelago*. Nature Conservation and Aquatic Sciences Service, Trivandrum : 1-760.
- Kumaran, M. and Randall, J. E., 1984. Mullidae. In : Fischer, W. and Bianchi, G. (eds.). *FAO Species Identification Sheets for Fishery Purposes. W. Indian Ocean (Fishing area 51)*, F.A.O., Rome, 3 : page var.
- Lachner, E. A., 1954. A revision of the goat fish genus *Upeneus* with description of two new species. *Proc. U. S. natn. Mus.*, 103(3330) : 497-532, pls. 13-14.
- Lachner, E. A., 1960. Fishes of Marshall and Marianas Islands, Family Mullidae. Goatfishes. *U. S. Nat. Mus. Bull.*, (202) 2 : 1-46, pls. 75-78.
- Myers, R. F., 1991. *Micronesian Reef Fishes* (2nd ed.). Coral Graphics, Barrigada, Guam : 1-298.
- Myers, R. F., 1999. *Micronesian Reef Fishes: a comparative guide to the coral reef fishes of Micronesia*, (3rd revised and expanded ed.). Coral Graphics, Barrigada, Guam : 1-330.
- Randall, J. E., 2000. Mullidae (goatfishes). In Randall, J. E. and Lim, K. K. P. (eds.). A check list of the fishes of the South China Sea. *Raffles Bull. Zool.*, (8) : 569-667.
- Randall, J. E., 2004. Revision of the goatfish genus *Parupeneus* (Perciformes: Mullidae), with description of two new species. *Indo-Pacific Fishes*, (36) : 1-64.
- Randall, J. E. and Myers, R. F., 2002. *Parupeneus insularis*, a new central Pacific species of goatfish (Perciformes : Mullidae) of the *P. trifasciatus* complex. *Zool. Stud.*, 41(4) : 431-440.
- Thomas. P. A., 1967. The occurrence of the red mullet (Goatfish) *Upeneus luzonius* Jordan and Seale, in the Indian Seas. *J. mar. biol. Ass. India*, 7(2) : 473-475.
- Thomas. P. A., 1969. The goat fishes (Family Mullidae) of the Indian Seas. *Mem. Mar. Biol. Ass. India*, (3) : 1-174, 8 pls.
- Weber, M. and de Beaufort, L. F., 1931. *The fishes of Indo-Australian Archipelago*. Leiden. 6 : 1-448.
- Whitley, G. P. 1929. Studies in Ichthyology. No. 3. *Rec. Aust. Mus.*, v. 17(3) : 101-143.



Fig. 1. *Mulloidichthys flavolineatus*



Fig. 2. *Mulloidichthys vanicolensis*



Fig. 3. *Parupeneus barberinus*



Fig. 4. *Parupeneus cyclostomus*



Fig. 5. *Parupeneus heptacanthus*



Fig. 6. *Parupeneus indicus*



Fig. 7. *Parupeneus macronemus*



Fig. 8. *Parupeneus multifasciatus*

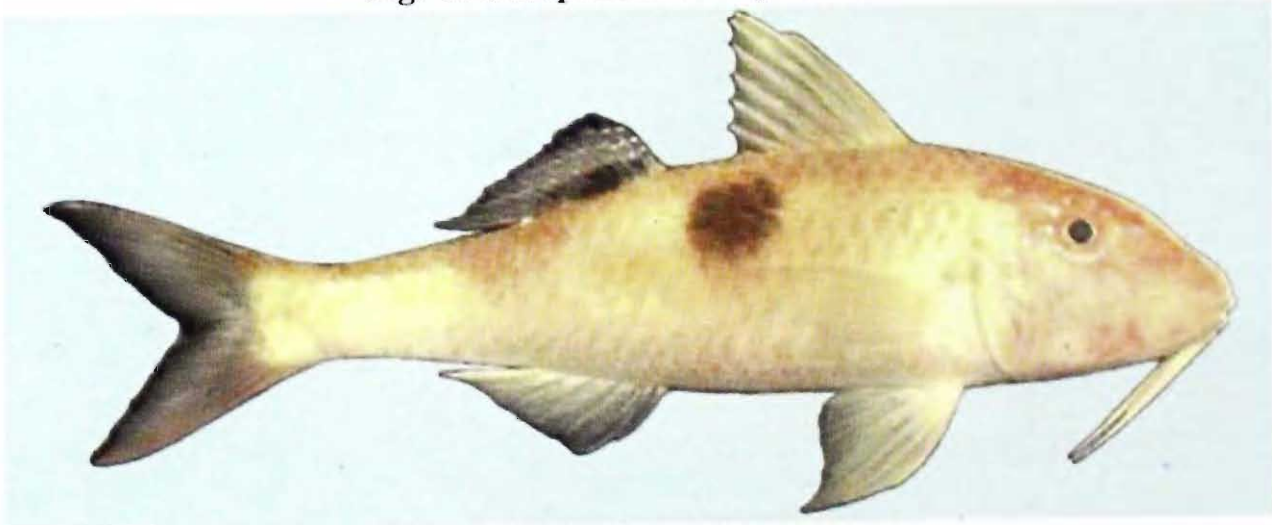


Fig. 9. *Parupeneus pleurostigma*

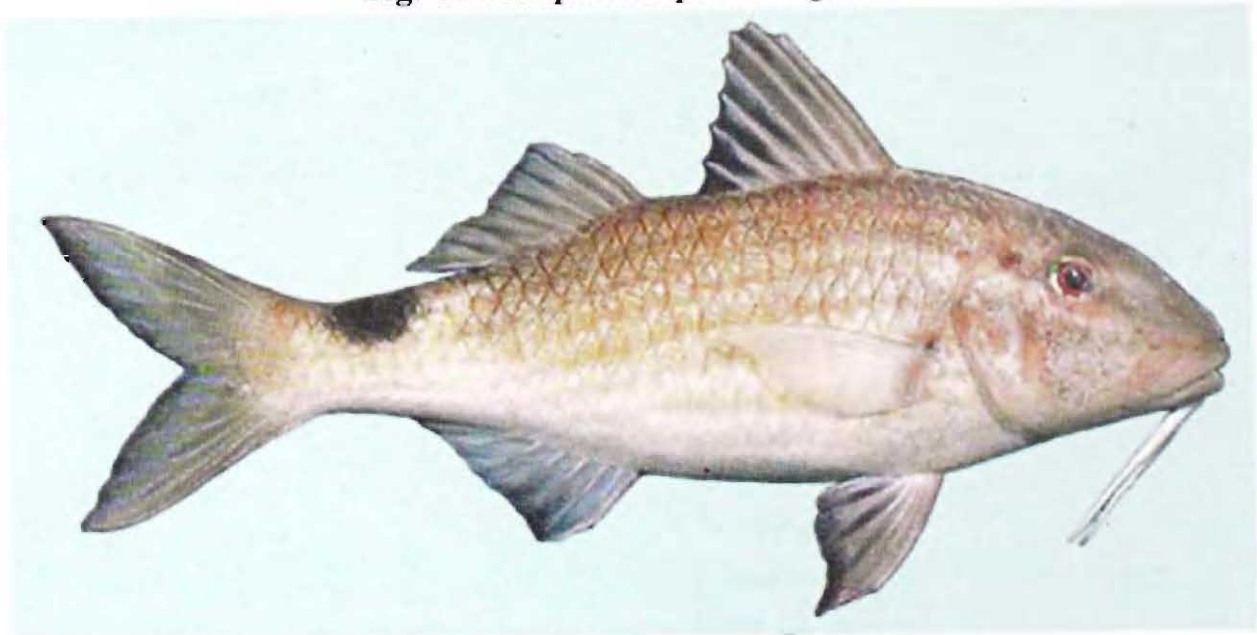


Fig. 10. *Parupeneus rubescens*



Fig. 11. *Parupeneus trifasciatus*

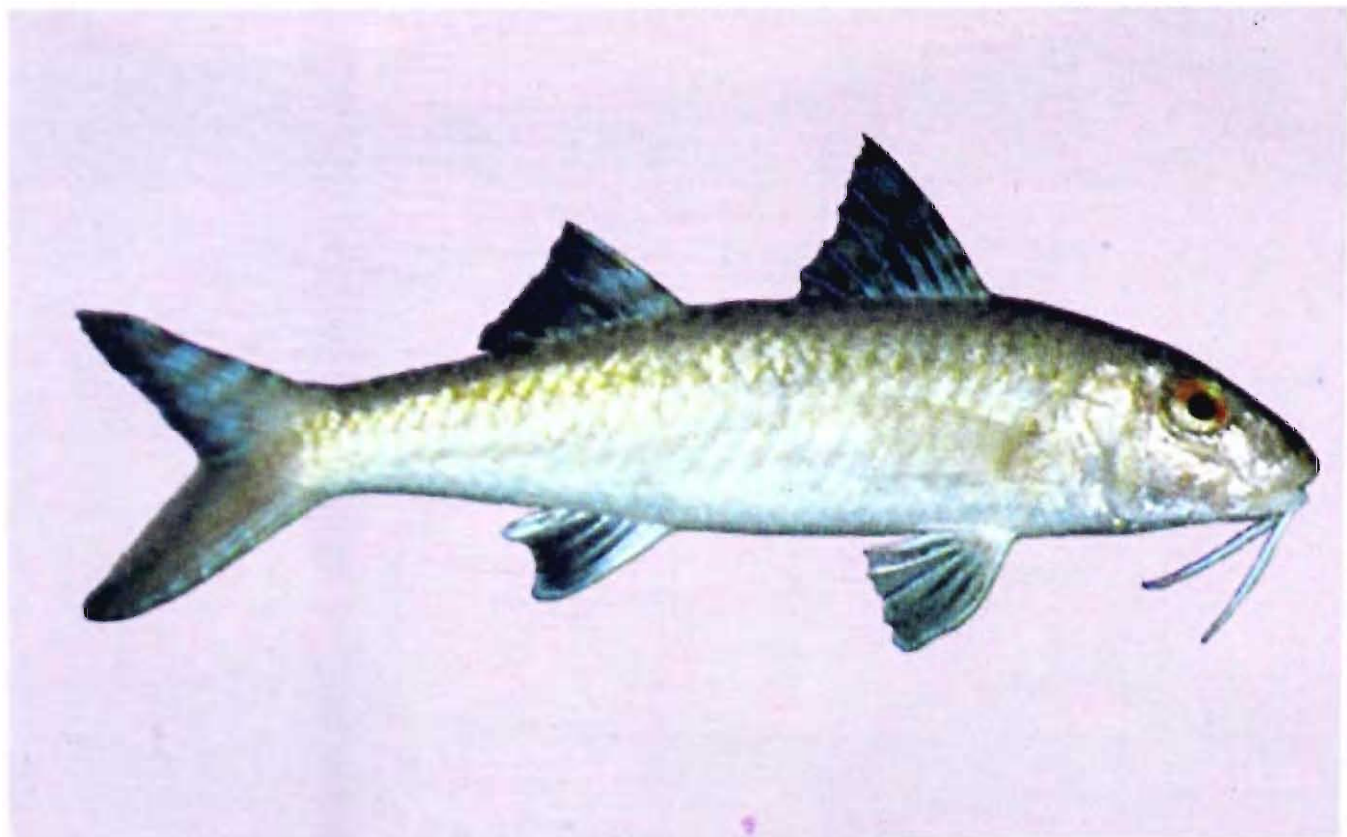


Fig. 12. *Upeneus guttatus*



Fig. 13. *Upeneus luzonius*



Fig. 14. *Upeneus moluccensis*



Fig. 15. *Upeneus sulphureus*



Fig. 16. *Upeneus sundaicus*



Fig. 17. *Upeneus taeniopterus*

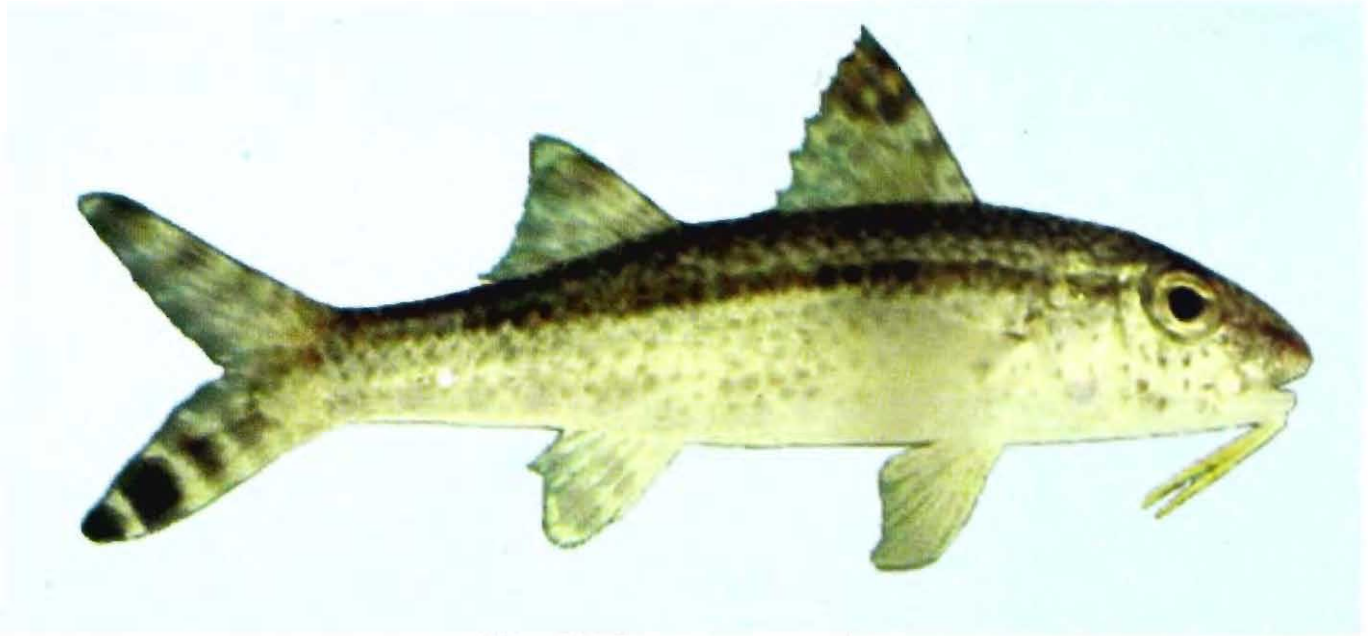


Fig. 18. *Upeneus tragula*



Fig. 19. *Upeneus vittatus*