20 Classification of Exploited Demersal Finfishes of India: Pigface breams, lizardfishes and eels

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Demersal fishes are those fishes which live and feed on or near the bottom (the demersal zone) of seas . They occupy the sea floors, which usually consist of mud, sand, gravel or rocks. In coastal waters they are found on or near the continental shelf, and in deep waters they are found on or near the continental slope or along the continental rise. In India, demersal finfishes contribute about 26% to the total marine fish landings of the country, which is dominated by perches, croakers, catfishes, silverbellies, elasmobranchs, lizardfishes, flat fishes, pomfrets etc., in order of abundance. Most of the demersal finfishes in India are exploited by mechanised trawlers.

Taxonomic research on fishes in general and other taxa of the animal kingdom was conducted extensively in the earlier periods by various research and survey organisation of the country (James, 2010). The Central Marine Fisheries Research Institute (CMFRI), which is primarily concerned with research and development of marine organisms, from the production point of view, made several taxonomic contributions on marine invertebrates, fishes, reptiles and mammals, mostly in the 60s and 70s. However, the taxonomic research in general in the country appears neglected (James, 2010) and it is imperative to bring back the subject in order to conserve and rational utilisation of exploited marine fishery resource of the country. In the following sections, the classification of some of the demersal finfish resources such as pigface breams, lizardfishes and eels exploited along the coastal waters of India are described.

Pigface breams

Pigface breams belong to the family Lethrinidae. They are tropical marine perciforms found entirely in the Indo-Pacific, except one species that occurs only in the eastern Atlantic. They belong to the suborder Percoidei, a diverse group containing many families whose relationships are poorly understood. Within this suborder, lethrinids are included under the superfamily Sparoidea which also contains the families Sparidae (porgies), Centracanthidae and Nemipteridae (threadfin bream). Among percoids, sparoicis appear most closely related to the Lutjanoidea (includes the snappers or Lutjanidae and, fusiliers or Caesionidae) and the Haemuloidea (includes the grunts or Haemulidae and Inermiidae). There has been much confusion concerning the familial allocation of the genera and species amongst these groups.

Lethrinids are mostly reef fishes but their preferred habitat is sandy or rubble substrate. The reefs which they frequent can be shallow, coralline reefs or deep, rocky reefs. One species frequents the outer edges of the continental shelf and is caught to depths of 180 m. Lethrinids can be solitary or schooling and do not appear to be territorial. They often form large aggregations while spawning

Lethrinids are bottom-feeding, carnivorous, coastal fishes, ranging primarily on or near reefs. They generally possess large, strong jaws and food preference is correlated with the type of lateral jaw teeth and to a certain extent, the length and angle of the snout found in a particular species. For example, the humpnose big-eye bream, *Monotaxis grandoculis*, has large, well-developed molars, and a short, blunt snout. It consumes molluscs, sea urchins and other hard-shell invertebrates. At the other extreme, the longface emperor, *Lethrinus olivaceus*, has conical lateral teeth, and an elongate, gradually sloping snout. It feeds mainly on fishes and crustaceans. Between these extremes, species exhibit many intermediate lateral teeth types, from molar through rounded to conical, and snout shape also varies widely. Diet concommittantly varies between the extremes from primarily hard-shell invertebrates, to soft-shell invertebrates, to fishes, with combinations of these food items found in many species. There is also a great deal of selectivity for particular food items.

The problems previously encountered in identification of lethrinids are primarily due to the fact that many of the characters traditionally used to differentiate fishes are

Fig. 1. *Lethrinus nebulosus*, a commonly occurring species of pigface breams in India

relatively constant among certain species of lethrinids. When they are live or still fresh, colour can be very helpful for species determination. Body colours and markings also add to the confusion because they can change substantially according to the time of day, the emotional state of the fish, geographic locality, and state of freshness. Despite these problems, previous researchers have contributed to our understanding of the systematics of lethrinids and have revealed a number of characters that help differentiate species. For example, Sato (1978) found that the pattern of dark pigment cells, or melanophores, on the membranes of the pelvic fin, help differentiate some species which were previously difficult to separate.

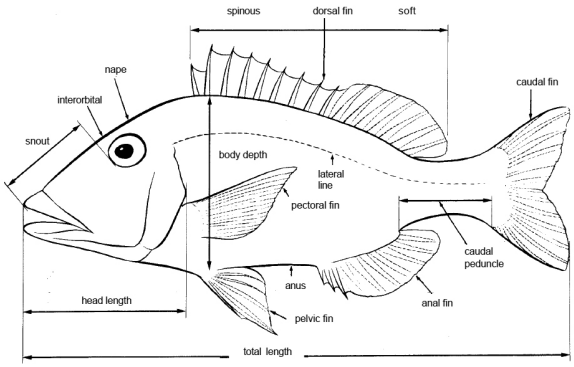


Fig. 2. External morphology measurements of Lethrinids

General characteristics of lethrinidae

- Perchlike fishes with a large head: lips often thick and Fleshy; maxilla concealed, without supplementary bone, mostly slipping below infraorbiital bones, but overlapping the premaxilla anteriorly;
- A single, continuous dorsal fin with 10 spines and 9 or 10 branched (soft) rays,
- Cheeks, upper surface of head and preorbital area scaleless in *Lethrinus*, but scales present on cheek in the other genera.

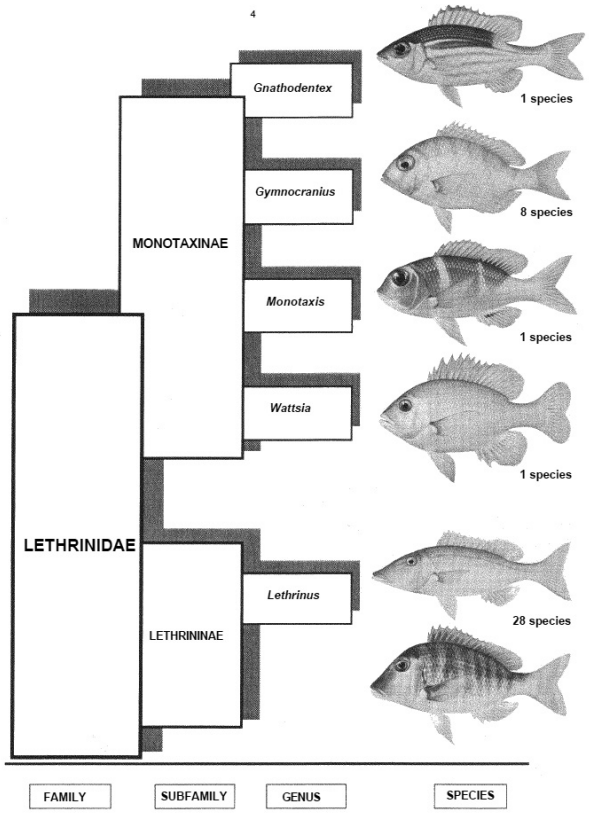
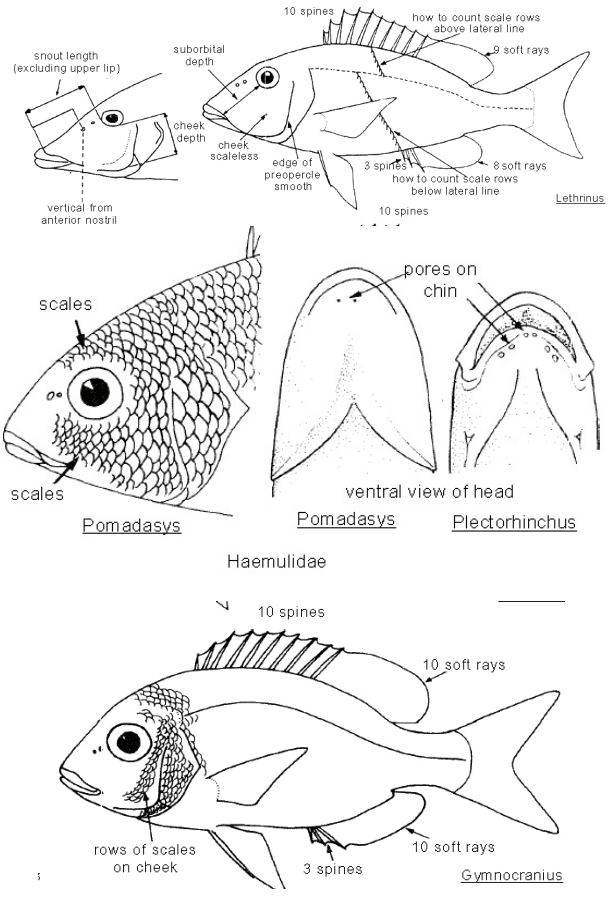


Fig. 3. A provisional classification of the subfamilies and genera of the family Lethrinidae (source: ftp://ftp.fao.org)



Similar families existing in the area

Lutjanidae (Lutianus)

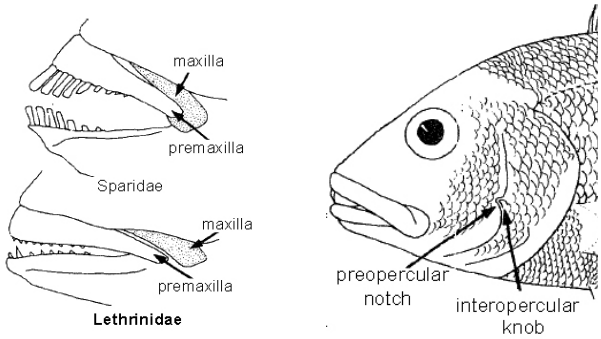
- cheek always scaled (naked in *Lethrinus*)
- a preopercular notch and an interopercular knob often present;

Haemulidae

- scales always present between eye and
- mouth (absent in that area in Lethrinidae); 2 or
- more pores present on chin;

Sparidae:

- posterior tip of premaxilla overlapping
- maxilla at hind end of mouth (maxilla overlapping
- premaxilla in Lethrinidae); usually more
- than 10 dorsal fin spines

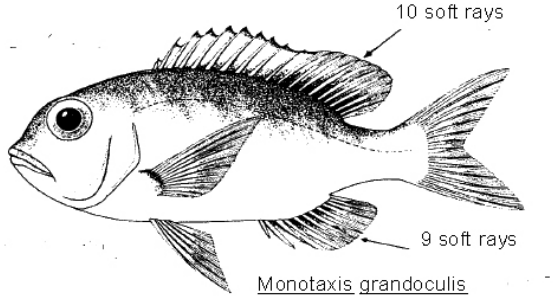


Key to the identification of major species of lethrinidae

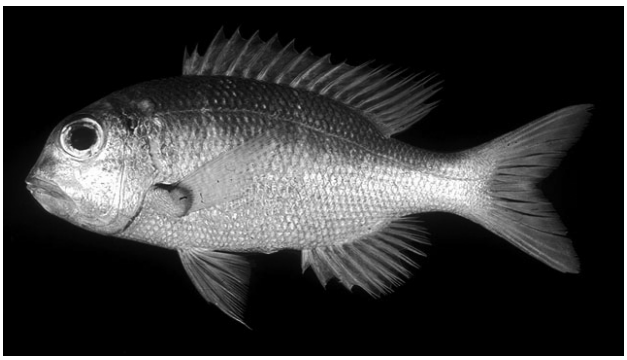
1a. Cheek with 4 to 6 vertical rows of scales (Fig.1a); 10 soft rays in dorsal fin; 9 or 10 soft rays in anal fin

2a. 9 soft rays in anal fin

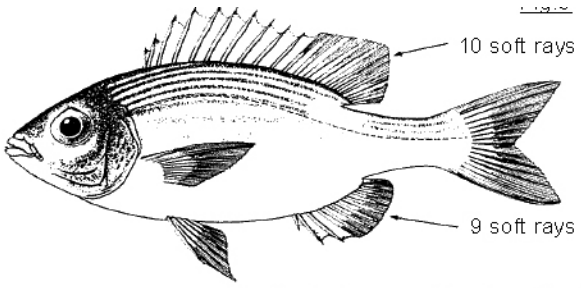
Profile of head in front of eye strongly convex (Fig.2); pectoral fin with 14 soft rays, inner surface of pectoral fin base scaled. No longitudinal stripes on body --------- *Monotaxis grandoculis*



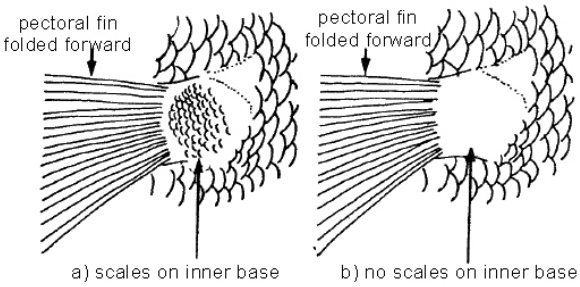
Monotaxis grandoculis

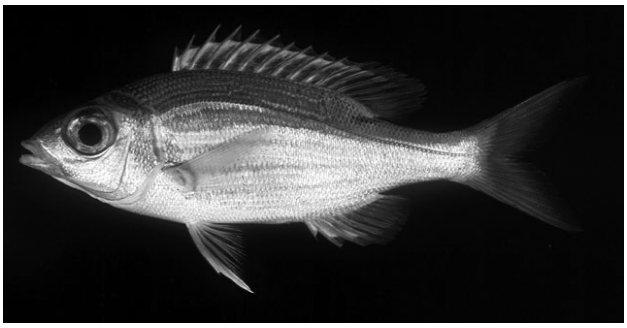


Profile of head in front of eye slightly convex or straight; pectoral fin with 15 soft rays; inner surface of pectoral fin base scaleless . yellow longitudinal stripes on body ---------- *Gnathodentex aurolineatus*



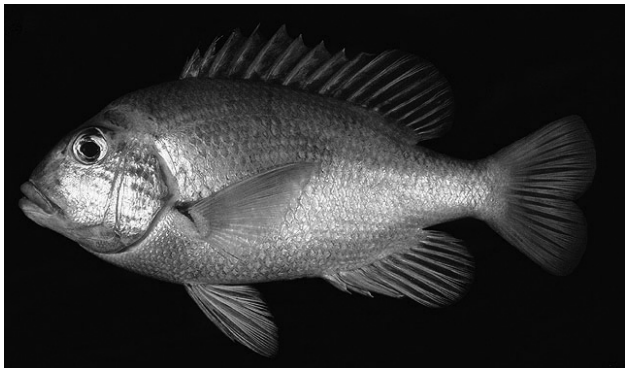
Gnathodentex aureolineatus Fig.4

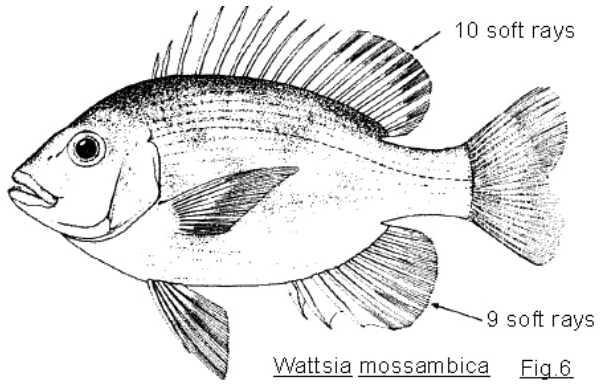




2b. 10 soft rays in anal fin

4a. Maxilla with a strong denticulated longitudinal ridge. caudal fin lobes rounded; body 2.2 times or less in standard length ..... *Wattsia mossambica*

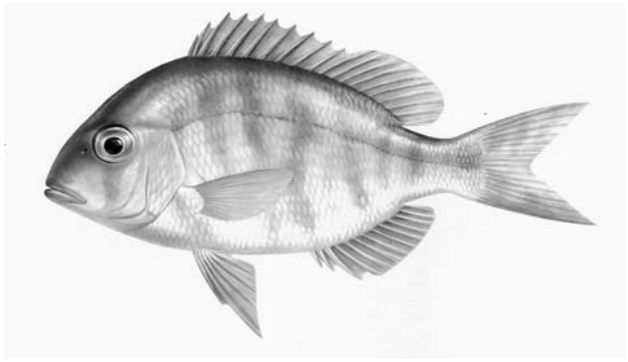


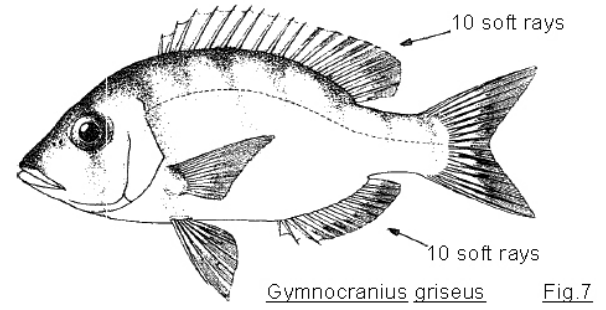


Wattsia mossambica Fig.6

4b. Maxilla surface smooth; caudal fin lobes pointed; body not as deep, 2.3 to 2.8 times in standard length (adults) (Figs.7,8)

5a. Anal-fin base 2.1 to 2.5 times longer than longest soft anal-fin ray; no wavy blue lines on cheek, snout or opercle (Fig.7) ..... *Gymnocranius griseus*

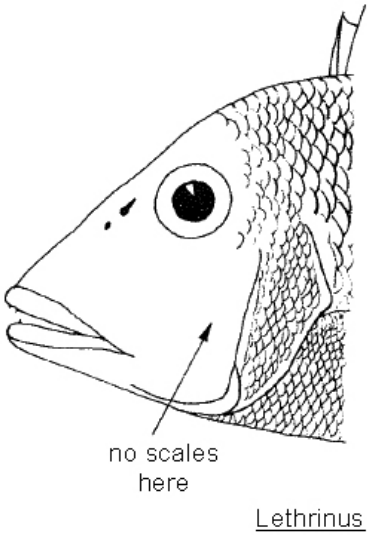




Gymnocranius griseus Fig.7

1b. Cheek naked (Fig.9); 9 soft rays in dorsal fin; 8 soft rays in anal fin

6a. Snout and head elongate; body depth less than head length, inner surface of pectoral fin base scaleless,



Lethrinus

7a. Upper margin of eye almost on dorsal profile; interorbital space concave, flat or only slightly convex

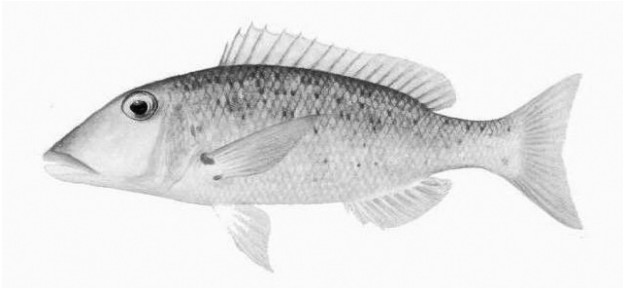
8a. No red coloration to opercle or pectoral fin base

9a. Posterior nostrils much closer to anterior nostril than to anterior margins of eye (Fig.11) ... *Lethrinus variegatus*

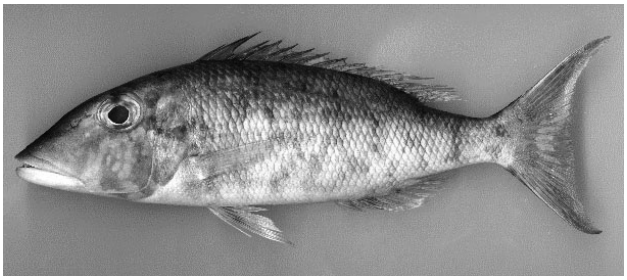
9b. Posterior nostril about halfway between anterior nostril and anterior margin of eye (Fig.12) ..... *Lethrinus semicinctus*

8b. Bright red coloration to opercle and/or pectoral fin base

10a. One or 2 red spots on pectoral fin base; opercular margin red (Fig.13) ..... *Lethrinus xanthochilus*



10b. No red spot on pectoral fin base; a conspicuous red spot on opercular edge (Fig.14) ..... *Lethrinus rubrioperculatus*



Spotcheek emperor

7b. Upper margin of eye well separated from dorsal profile; interorbital space moderately to strongly convex

11a. No red coloration present; oblique bluish lines from eye to snout tip, and a few broken streaks connecting eyes on top of head ....…….. *Lethrinus microdon (L elongatus)*

Smalltooth emperor

11b. Red coloration present on lips, pectoral fin base or opercular edge

12a. A single, bright red blotch above pectoral fin base; opercular edge and pectoral fir, base also red; lips large arid bright red; profile of snout concave, snout bulbous ..... *Lethrinus conchyliatus*

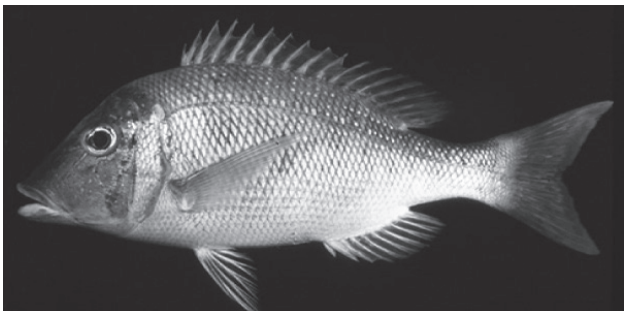
Redaxil emperor

12b. No red coloration on and above pectoral firs base or opercular edge; a red line sometimes present above and below lips; often 2 or 3 blackish streaks radiating from eye; profile of snout straight..... *Lethrinus elongatus (L microdon)*

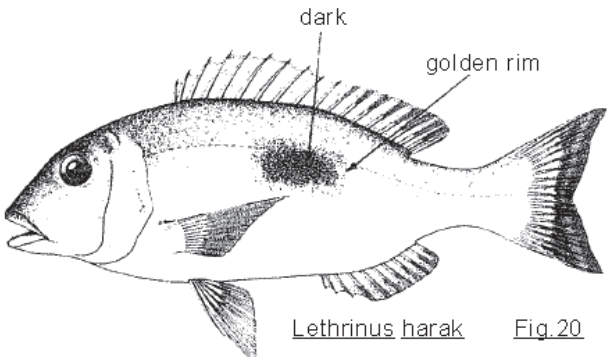
6b. Snout not elongate; body depth greater than head length

13a. A characteristic series of bright blue lines radiating across cheek from eye; centres of scales with white spots; often longitudinal yellowish streaks on body (Fig.19) .. .. *Lethrinus nebulosus*

13b. No blue radiating lines on head 14a. A persistent, oblong blotch present or, sides, usually encircled with a golden rim (Fig.20)



Spangled emperor



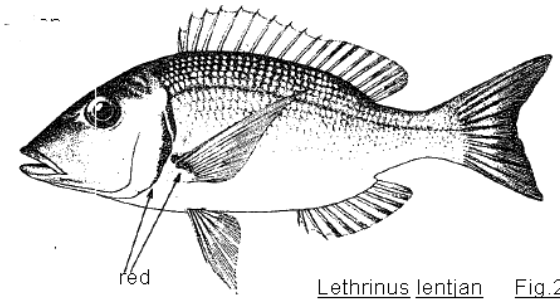
Thumbprint emperor

14b. No obvious large dark blotch present on sides of body

15a. Small orange spots on sides of head (Fig.22) ..... *Lethrinus kallopterus (Lethrinus erythracanthus)*

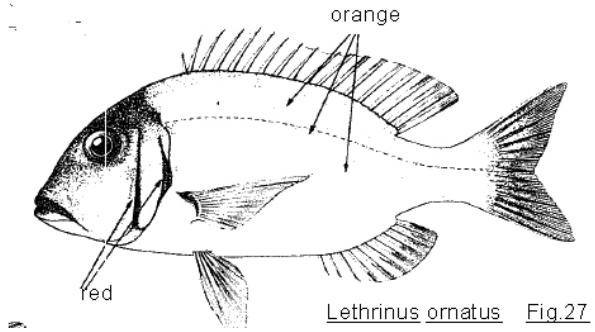
Orange-spotted emperor

15b. No orange spots on head 18a. red spot on opercular margin and on pectoral fin base; no conspicuous yellow stripes on body (Fig. 25) ..... *Lethrinus lentjan*



Lethrinus lentjan Fig.25

17b. Snout length (excluding upper lip) equal to, or less than cheek depth (Fig.24b)



Lethrinus ornatus Fig.27

19a. Several prominent bright orange stripes present on body; opercular and preopercular margins bright red (Fig.27) ..... *Lethrinus ornatus*

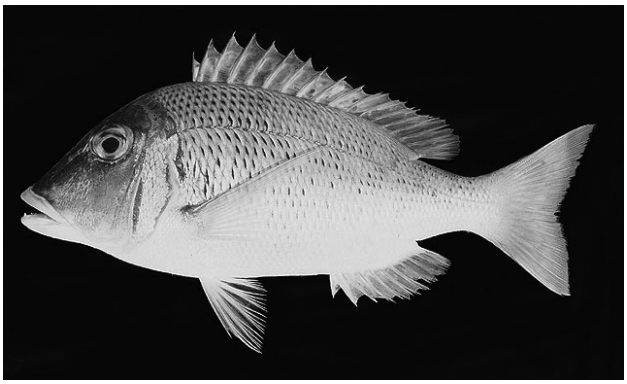
Ornate emperor

19b. No bright orange stripes on body; no red colour on preopercle

20a. Six scale rows between lateral line and median dorsal fin spines (Fig.28) ..... *Lethrinus mahsenoides (L. lentjan)*

20b. Less than 6 scale rows between lateral line and median dorsal fin spines; opercular margin not red

21a. Four scale rows between lateral line and median dorsal fir, spines (excluding the very small scales at base of dorsal fin) (Fig.29).....…….. *Lethrinus mahsena*



Sky emperor

21b. Five scale rows between lateral line and median dorsal fin spires (excluding the very small scales at base of dorsal fin) (Fig.30) .....……... *Lethrinus crocineus*

Yellowtail emperor

Lizardifshes

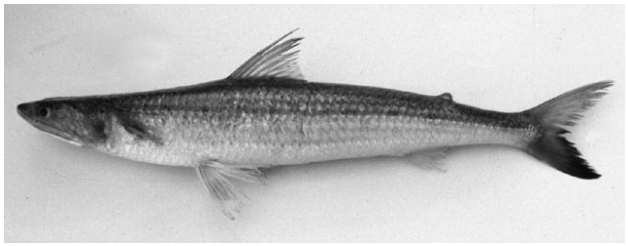
Lizardfishes, belonging to the Family Synodontidae, is an important demersal fishery resource the world over. This resource is distributed in the Indo-West Pacific; Red Sea and further east to Southeast Asia and Australia, Persian Gulf, East Africa to Japan and the Great Barrier Reef. Lizardfishes are found in the sublittoral zones above 100 m depth inhabiting muddy bottom and reef areas.

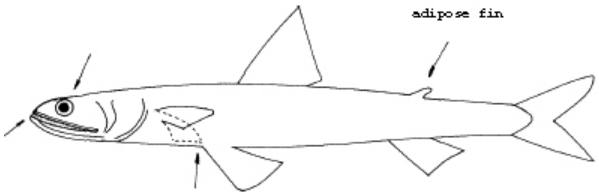
Studies on the systematics of lizardfishes dates back to early 20th century when Regan (1911) included them under the family Synodontidae of the order Iniomi. Later Berg (1940) revised the classification and included lizardfishes under the family Synodidae (Synodontidae, *Saurida*e) under the order Scopeliformes. Family Synodontidae includes Bombayduck (*Harpadon* spp.) and lizardfishes. Of these, lizardfishes are

included under four genera namely *Synodus* Gronow, *Saurida* Cuv. & Val., *Trachinocephalus* Gill and *Xystodus* Ogilby. While *Xystodus* is known only from Australian waters, the other three genera occur in the Atlantic, the Pacific and the Indian Ocean (Anderson et al., 1966).

Major characteristics

Body elongate, usually cylindrical
-with adipose fin.
-Head lizard-like.
-Mouth large and terminal, with rows of numerous small, slender teeth
-Teeth also on palate and tongue, those on palate in 1 or 2 bands.





The systematic position of the Family Synodontidae (Berg, 1940):

Phylum: Vertebrata
Sub Phylum: Craniata
Superclass: Gnathostomata
Series: Pisces
Class: Teleostomi
Sub Class: Actinopterygii
Order: Scopeliformes
Family: Synodontidae

Genus: *Saurida* Valenciennes, 1849

Body elongate, Snout obtusely pointed, short. Eyes with adipose lids. Head depressed. Cheeks and opercular bones scaled. Teeth in jaws in several rows. Teeth on palate in double bands on each side, vomerine teeth sometimes present, teeth present on tongue.13-16 branchiostegal rays, gill rakers rudimentary. Dorsal fin with 10-13 rays, adipose fin small above the anal; Anal with 9 - 13 rays its origin nearer to caudal base than to ventral base. Pectoral with 11-16 rays, pelvic 9 rayed, the inner not much longer than the outer. Caudal forked.

The following species were recorded under the genus *Saurida*:

1. *S. tumbil* (Bloch 1795)
2. *S. undosquamis* (Richardson1848)
3. *S. micropectoralis* Shindo &Yamada 1972
4. *S. longimanus* Norman, 1939
5. *S. nebulosa* Valenciennes in Cuv. & Val., 1849
6. *S. isarankurai* Shindo& Yamada, 1972
7. *S. pseudotumbil* Dutt & Vidyasagar, 1981.

Genus *Synodus* Gronow, 1763.

Body more or less depressed, covered by cycloid scales. Head depressed, with a flat triangular snout. Eyes of moderate size, anterior with adipose eyelid. Teeth in 2 or 3 rows in the jaws, single band of teeth in the palate. Teeth present on the tongue. Dorsal nearly in the middle of the body, with an adipose fin, which is opposite the short anal. Anal fin base shorter than dorsal base. Ventral 8 rayed; the longer inner rays much longer than outer rays. Branchiostegal rays 12-16.

The following four species were obtained under the genus *Synodus* from the west and east coasts of India.

1. *Synodus indicus* (Day 1873).
2. *S. binotatus* Schultz 1953.
3. *S. jaculum* Russell & Cressey, 1979
4. *S.variegatus* (Lacepede 1803).

Genus *Trachinocephalus* Gill, 1862

Body moderately compressed; snout short, eyes forward in the head, with rudimentary adipose eyelid. Snout obtuse and short. Mouth large, oblique with lower jaw slightly projecting. Teeth in 2-3 series on the jaws, a narrow band of 2 series of equal teeth on each side of the palate. Tongue toothed. Origin of dorsal nearer to snout than the small adipose fin, which is opposite to hinder half of anal. Pectoral reaching to about 10th scale of lateral line. Origin of ventral before the tip of pectoral and reaching beyond the base of dorsal fin. Anal fin base longer than dorsal fin base. Silvery yellow below, dark above with longitudinal stripes along the body. A black blotch at the upper end of the operculum.

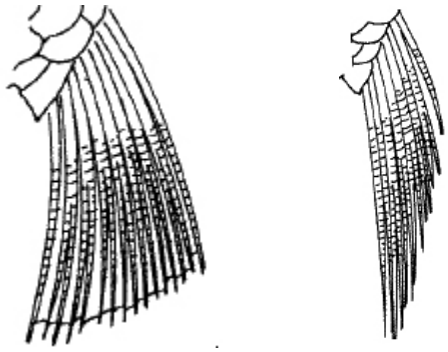
Genus *Trachinocephalus* is represented by a single species *T. myops* (Forster, 1801) which is distributed all along the Indian coast.

Key to identification of major Genus

1 a. 9 pelvic fin rays, inner barely longer than outer; palatine teeth in 2 pairs of bands. - *Saurida*

1 b. 8 pelvic fin rays, inner much longer than outer palatine teeth in 1 pair of bands

- 2 a. Eye opposite about midpoint of upper jaw; head depressed; anal fin base shorter than dorsal fin base - *Synodus*
- 2 b. Eye nearer to anterior end of upper jaw; head not depressed; anal fin base longer than dorsal fin base - *Trachinocephalus*



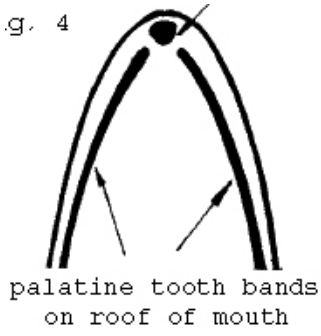


Fig. 5

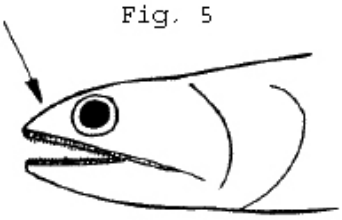


Fig. 6

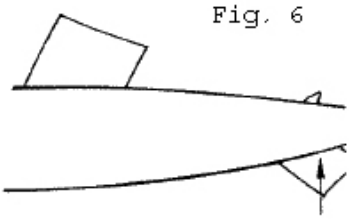
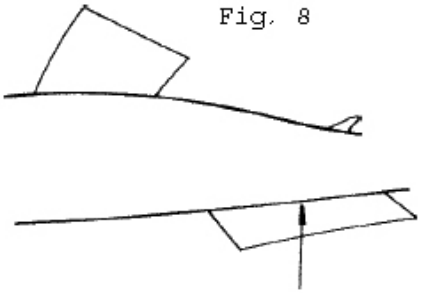


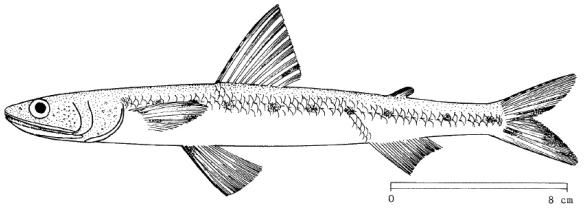
Fig. 7

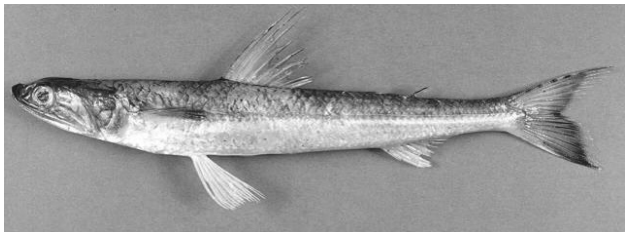
Fig. 8

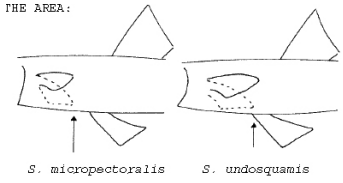


Saurida undosquamis

2 rows of teeth on anterior part of outer palatine tooth bands. Pectoral fins moderately long, reaching to level of pelvic fin base; 4 to 7 dark dots on upper edge of caudal fin;

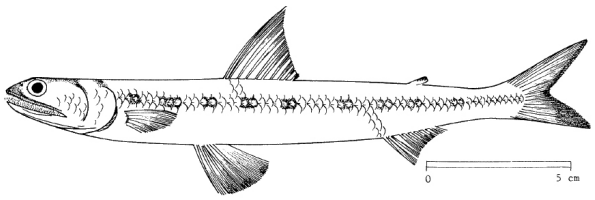






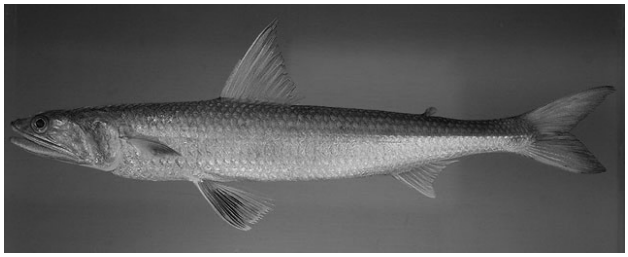
Saurida micropectoralis

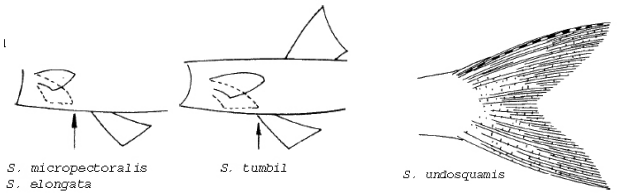
3 or more rows of teeth on anterior part of outer palatine tooth band. Pectoral fins short, their tips not reaching to level of pelvic fin origin; pelvic fin rays almost equal in length.

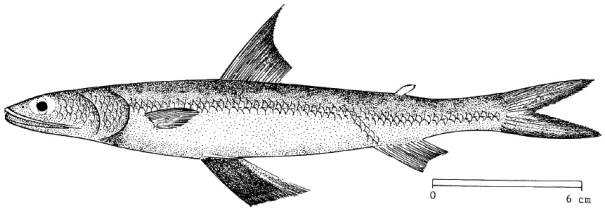


Saurida tumbil

3 or more rows of teeth on anterior part of outer palatine tooth bands. Pectoral fins just reaching to level of pelvic fin base; pelvic fin rays almost equal in length.

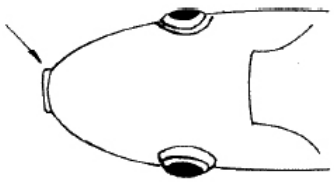






Saurida isarankurai

Lower jaw clearly projecting beyond tip of snout; also, lower caudal fin lobe smaller than upper.



(source: ftp://ftp.fao.org)

Saurida gracilis

Cross-bars or a series of dark patches present on all fins.

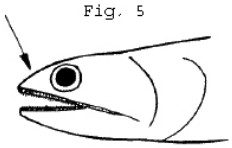
Saurida longimanus

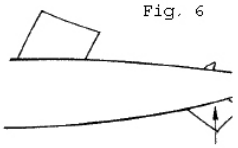
Very long pectoral fins (reaching far beyond level of first dorsal fin ray).

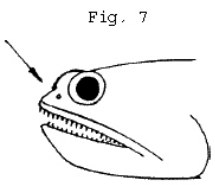
Synodus and *Trachinocephalus* species: inner pelvic fin rays much longer than outer ones (3 times longer; equal in *Saurida*).

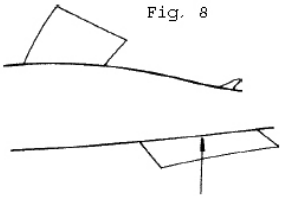
Trachinocephalus myops

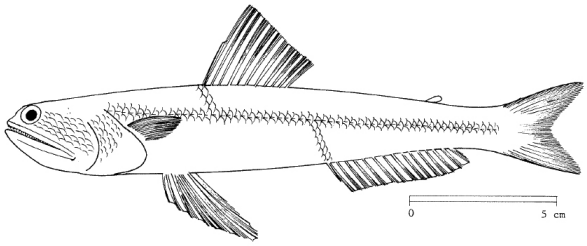
Eyes placed near to tip of snout (snout shorter than eye diameter); mouth large, with small, close-set teeth; palatine teeth in a single band on each side. Inner pectoral fin rays about 3 times longer than outer ones; anal fin base distinctly longer than dorsal fin base.











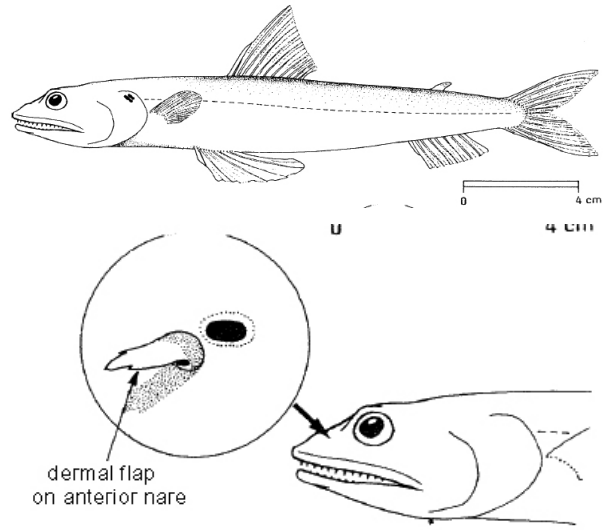
Genus *Synodus*

8 pelvic fin rays, inner much longer than outer; palatine teeth in 1 pair of bands

2 a. Eye opposite about midpoint of upper jaw (Fig. 5); head depressed; anal fin base shorter than dorsal fin base ..... *Synodus*

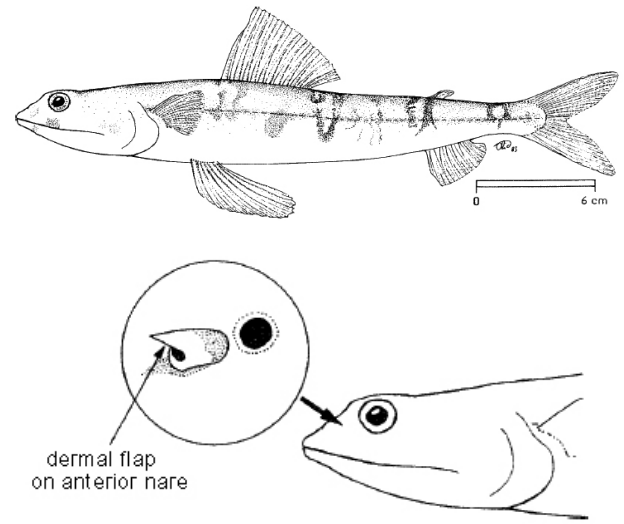
Synodus indicus

Dermal flap on anterior nares long, triangular, often notched distally. Dorsal fin rays 11 to 13 (average 11.9); anal fin rays 8 to 11 (average 9.4); 2 small pigment spots at upper distal corner of operculum;



Synodus englemani (S. variegatus)

Anterior palatine teeth long and forming a discrete group; dermal lap on anterior nares short, tubular. Dorsal fin rays 12 or 13 (average 12.7); anal fin rays 8 to 10.



Eels

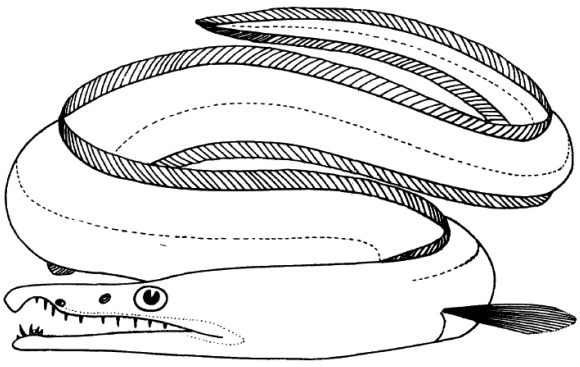
The Muraenesocidae, or pike congers, are a small family of marine eels found worldwide in tropical and subtropical seas. [1] Some species are known to enter brackish water. Pike congers have cylindrical bodies, scaleless skin, narrow heads with large eyes, and strong teeth. Their dorsal fins start above the well-developed pectoral fins. These rather aggressive fish range from 60 to 250 cm (2.0 to 8.2 ft) in length.

Members of the family Muraenesocidae are taxonomically nested within the monophyletic order Anguilliformes. This order comprises all "true eels" that share the synapomorphy of a particular larval form called a leptocephalus. *Muraenesox* eels of the Bombay-Saurashtra waters are known as "Wam" the most abundant and economically important being *Muraenesox talabonoides* (Bleeker), which occurs in both inshore and offshore catches landed at Sassoon Dock, Bombay. In India, the swim bladders of eels (*Muraenesox talabonoides* Bleeker), are of best quality and fetch very high market price owing to the huge export demand. Eel air bladder is mainly used for making isinglass. Silver conger eel *Muraenesox cinereus* is locally called as "Vilangu meen" and kadal bamboo and its air bladder is called as "netti". *M. cinereus* is the only species of Muraenesocidae family, observed in the landings at Chennai Fisheries Harbour. *M. cinereus* are mainly landed by multiday trawlers. The species is available throughout the year. Along the southwest coast of India, both *M. cinerius* and *M. bagio* are landed in mechanised trawlers throughout the year.

Family Muraenesocidae (Pike-congers)

Eel-like fishes, cylindrical in front, compressed towards tail. Large mouth with upper jaw extending well behind eye. Fangs (large canine teeth) on vomer (a median tooth-bearing bone on roof of mouth) and at front of lower jaw; tongue not free from floor of mouth. Gill openings large, separate and placed low on body. Pectoral fins present; dorsal and anal fins long, continuous with caudal fin; pelvic fins absent. Anus well behind pectoral fin and somewhat before midpoint of body. No scales.

Colour: grey, yellow or white, sometimes almost black on back.



Key to Genera

I a. Distinct bulge at bases of canine teeth on middle part of vomer ..... *Muraenesox*

1 b. Canine teeth on vomer conical, or if flattened, then not bulging at bases ..... *Congresox*

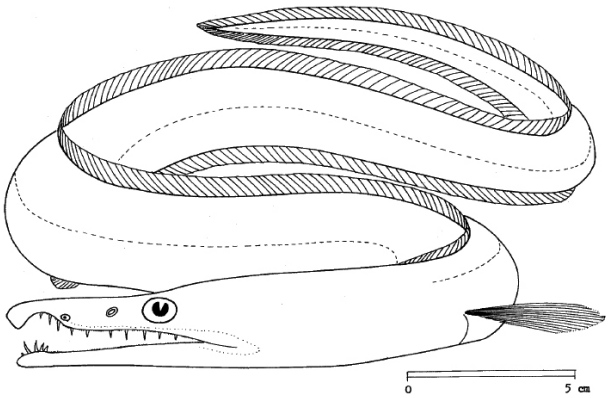
Congresox talabon (Cuvier, 1829)

English name - Yellow pike-conger

Distinctive characters:

Eel-shaped fish without scales. Mouth large, upper jaw ending well behind eye. Outer tooth row in lower jaw leaning outward; middle canines on vomer (roof of mouth) conical (needle-like, not blade-shaped). Dorsal and anal fins joined to caudal fin; pectoral fins well developed, their length about 3 times in, length of head.

Colour: head and body yellow.



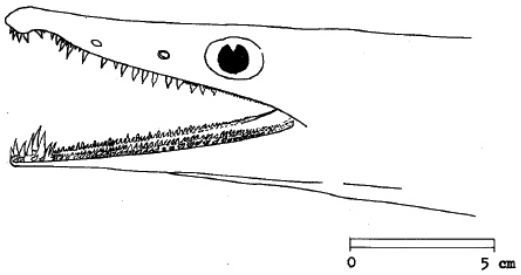
Congresox talabonoides (Bleeker, 1853)

English name - Indian pike-conger

Distinctive characters:

Eel-shaped fish without scales. Outer tooth row in lower jaw leaning outward; middle canines on vomer conical (needle-like, not blade-shaped). Dorsal and anal fins joined to caudal fin; pectoral fins well developed, their length at least 4 times in length of head.

Colour: head and body yellow.
Size: Maximum: 200 cm; common: 150 cm.



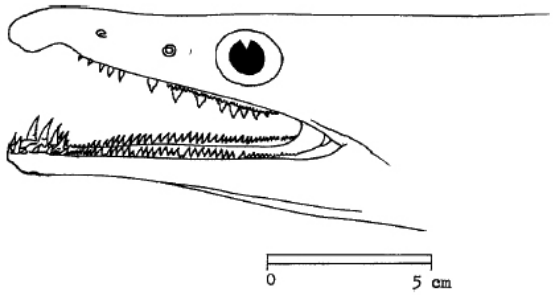
Muraenesox bagio (Hamilton-Buchanan, 1822)

English name - Common pike-conger

Distinctive characters:

Eel-shaped fish without scales. Posterior nostril only a little closer to eye than to anterior nostril; snout long; eye 3 times in length of snout. Mouth large, maxillary ending well behind eye; outer tooth row in lower jaw pointing straight upward; middle canines on vomer with distinct basal lobes, their bases sometimes in contact. Dorsal and anal fins joined to caudal fin; pectoral fins well developed; 35 to 38 pores in lateral line from head to above anus

Colour: head and body greyish



Muraenesox cinereus (Forsskå1, 1775)

English name - Daggertooth pike-Conger

Distinctive characters:

Eel-shaped fish without scales. Posterior nostril much nearer to eye than to anterior nostril. Snout short; eye 2.0 to 2.5 times in length of snout. Mouth large, upper jaw ending well behind eye. Outer tooth row in lower jaw pointing straight upward; middle canines on vomer (roof of mouth) with distinct basal lobes, their bases more or less in contact. Dorsal and anal fins joined to caudal fin; pectoral fins well developed; 39 to 47 pores in lateral line from head to above anus.

Colour: head and body normally quite dark to grey/black.