

MORPHOLOGICAL CHANGES AMONG JUVENILES AND ADULTS OF SOME MARINE FISHES OF WEST BENGAL

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During the course of the systematic studies on the marine fishes of our country it has been observed that juveniles of some marine fishes differ morphologically with their adults. Some morphological characters that are taken into consideration for identification develop with the maturity of the fishes; some characters present in the young stages diminish and shape of some morphological characters change with the growth of the fishes. Further, the colour pattern and the teeth pattern of many fishes change remarkably with the maturity of the fishes. As a result identification of the juveniles of fishes is problematical. An attempt has, therefore, been undertaken to record the characteristics of the juveniles of some marine fishes of West Bengal.

SYSTEMATIC LIST OF JUVENILES OF SOME MARINE FISHES OF WEST BENGAL

Order 1 ANGUILLIFORMES

Family 1 ANGUILLIDAE

1. *Anguilla bengalensis bengalensis* (Gray)

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23. *Otolithes ruber* (Schneider)

Family 13 EPHIPPIDAE

24. *Ephippus orbis* (Bloch)

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Family 15 SCATOPHAGIDAE

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Family 17 SPHYRAENIDAE

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Family 18 SCOMBRIDAE

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Family 19 MONODACTYLIDAE

31. *Monodactylus argenteus* (Linnaeus)

SYSTEMATIC ACCOUNT

Keys to the orders of OSTEICHTHYS

- 1a. Body greatly elongate, cylindrical and eel-like; gill openings narrow, or gill cavity not enlarged on sides of head; fin spines absent *Anguilliformes*
- 1b. Body not very elongate nor eel-like, but if eel-like, then either gill openings not separate from each other (as in true eels) but united on ventral side of body near throat; or pelvic fins present, spiny rays in dorsal and anal fins 2
- 2a. Snout beak-like, with upper and/or lower jaws greatly prolonged or with enlarged wing-like pectoral and sometimes also pelvic fins; lateral line near ventral profile of body; single dorsal fin consisting of soft rays; pelvic fins abdominal *Beloniformes*
- 2b. Snout not beak-like without prolongation of upper or lower jaw; pectoral fins and pelvic fins not greatly elongated, if so, not wing-like 3
- 3a. Body without scales but a bony head shield often present; barbels well-developed, present around mouth; a strong spine usually present at front of dorsal and pectoral fins; an adipose fin often present *Siluriformes*
- 3b. Body with scales but a bony head shield generally absent; barbels generally absent, but if present, poorly developed; adipose fin generally absent *Perciformes*

Order 1 ANGUILLIFORMES

Key to families of order ANGUILLIFORMES

Body with minute embedded scales; dorsal, anal, pectoral and caudal fins well developed; branchial region and throat not swollen ANGUILLIDAE

Body naked; dorsal, anal, pectoral and caudal fins moderately developed; swollen branchial region and throat, supported by a basket of free branchial rays that overlap below
..... OPHICHTHIDAE

Family ANGUILLIDAE

1. *Anguilla bengalensis bengalensis* (Gray)

1834. *Muraena bengalensis* Gray, *Illust. Indian Zool.*, : pl. 95, fig. 5 (type-locality : Ganges).
1991. *Anguilla bengalensis bengalensis*, Talwar & Jhingran, *Inland Fish.*, 1 : 74 (Species description & distribution).

Common English name : Long-finned eel.

Diagnostic features : Body snake-like and cylindrical in shape. Mouth slightly oblique, extending beyond orbit. Teeth small, conical, present in both jaws and vomer, teeth on lower jaw divided by a longitudinal groove. Dorsal fin origin midway between gill opening and anal-fin base. Pectoral fins well developed. Body yellowish to olive or brown, mottled with dark brown, lighter below.

Distribution : India, Pakistan, Sri Lanka and Myanmar.

Characteristics of juveniles : The colour pattern of the species changes with growth. Body of the juvenile specimens not mottled (changes in colour and in sizes of the eye, mouth and snout with the growth of the fish). Juveniles are found in the seas and estuaries but its adult forms are inhabitants of the freshwaters.

Family OPHICHTHIDAE

2. *Pisodonophis boro* (Hamilton)

1822. *Ophisurus boro* Hamilton, *Fishes of Ganges* : 20, pl. 5, fig. 5 (type-locality : Hooghly estuary near Calcutta).
1984. *Pisodonophis boro*, Talwar and Kacker, *Commercial Sea Fish. India* : 249, fig. 130 (Species description and distribution).

Common English Name : Bengal's snake eel.

Diagnostic features : Body snake like, cylindrical, compressed only along extreme tail tip. Eyes relatively small. Anterior nostril tubular, posterior nostrils along lower edge of lip. Teeth on

jaws and vomer granular to molariform. Dorsal fin originating about a pectoral fin length behind tips of pectoral fins; pelvic fins absent. Lateral line inconspicuous.

Distribution : Indo-West Pacific.

Characteristics of juveniles : The teeth pattern of this species changes with the growth. Teeth on jaws in the juveniles sharper and more pointed.

Order 2 SILURIFORMES

Family ARIIDAE

Keys to species

Teeth on palate as a single patch on each side *Arius maculatus*

Teeth on palate in 2 or 3 patches on each side *Arius thalassinus*

3. *Arius maculatus* (Thunberg)

1792. *Silurus maculatus* Thunberg, *Kongl. Vet. Akad. Nya Handl. Stockholm*, **13** : 31, pl. 1, fig. 2 (type-locality : Japan).

1984. *Arius maculatus*, Talwar & Kacker, *Commercial Sea Fish. India* : 264, fig. 107 (Species description & distribution).

Common English Name : Spotted catfish.

Diagnostic features : Dorsal profile of head as a steep slope to first dorsal fin base. Three pairs of barbels around mouth, maxillary pair slightly shorter, not extending up to pectoral fin base. Teeth on palate granular or molariform, in a single large, fully elliptical or semioval patch on each side. First dorsal fin ray often produced into a long filament.

Distribution : India, Pakistan, Sri Lanka to Indo-Australian Archipelago, but not the Philippines and Australia.

Characteristics of the juveniles : The size of the maxillary barbels differs between its juveniles and adult forms. Maxillary barbels comparatively larger, extending up to pectoral fin base in the juveniles. The teeth pattern also differs between its juveniles and adults. Size of teeth patch small and far behind the jaws, the granular teeth few and sparse.

4. *Arius thalassinus* (Ruppell)

1837. *Bagrus thalassinus* Ruppell, *Neue. Wirbelth. Fische Rothen Meeres* : 75, pl. 20, fig. 2 (Type-locality : Mossaua, Red Sea).

1984. *Arius thalassinus*, Talwar & Kacker, *Commercial Sea Fish India* : 271, fig. 11 (Species description & distribution).

Common English Name : Giant marine catfish.

Diagnostic features : Dorsal profile of head sharply rising from occiput to first dorsal fin base. Head shields weakly granulated and rugose, a prominent preorbital conical protuberance tapering as a wide 'V' posteriorly. Teeth in jaws villiform, teeth on palate fine, in 3 patches on either side, forming a triangle, posterior patch longest, patches usually fused. Dorsal and pectoral fins each with a strong spine.

Distribution : Widespread in the Indo-West Pacific region.

Characteristics of juveniles : The teeth pattern of this species differs between its juveniles and adult forms. Teeth patches in the juveniles separate.

Order 3 BELONIFORMES

Family BELONIDAE

5. *Tylosurus crocodilus crocodilus* (Peron & Le Sueur)

1821. *Belone crocodila* Peron and Le Sueur, *J. Acad. Nat. Sci. Philad.*, 2(2) : 129 (type-locality : Isle of France).

1981. *Tylosurus crocodilus crocodilus*, Talwar and Kacker, *Commercial Sea Fish. India* : 326, fig. 134 (Species description and distribution).

Common English Name : Hound needlefish.

Diagnostic features : Body elongate, rounded in cross section. Upper and lower jaws greatly elongated and studded with sharp teeth. Dorsal fin with 22 or 23 soft rays. Anal fin with 18 to 21 soft rays. Caudal fin forked. A small black lateral keel on caudal peduncle. Body dark bluish green above, silvery below. A dark blue stripe along sides.

Distribution : A worldwide species in tropical and warm temperate seas.

Characteristics of juveniles : The teeth pattern of this species differs between its juveniles and adult forms. Teeth directed anteriorly in juveniles. An elevated black lobe in the posterior part of the dorsal fin present in the juveniles.

Order 4 PERCIFORMES

Keys to families of order PERCIFORMES

- 1a. Two short dorsal fins, widely separated 2
- 1b. Dorsal fin either one or two (when two, with continuous bases, but if (rarely) the fins are separate, the interspaces is negligible) 3
- 2a. Lateral line well developed; first dorsal fin with 5 spines; jaws with strong canine teeth *Sphyraenidae*
- 2b. Lateral line absent; first dorsal fin with 4 spines; teeth in jaws small, feeble, hidden or absent *Mugilidae*

- 3a. Dorsal and anal fins each with only soft rays, without spines 4
- 3b. Dorsal and anal fins each with spines and soft rays 5
- 4a. Head flattened with a characteristic transversely laminated, oval-shaped sucking disc *Echeneidae*
- 4b. Head without sucking disc *Coryphaenidae*
- 5a. Premaxillae fixed (non protrusible upper jaw) *Scombridae*
- 5b. Maxillary bones not very firmly attached to premaxillae, hence free to move forward 6
- 6a. First 2 anal fin spines detached from rest of fin (these are partially or completely embedded in large specimens); scutes on straight part of lateral line usually present *Carangidae*
- 6b. First 2 anal fin spines not detached from rest of fin; no scutes on caudal peduncle 7
- 7a. Anterior rays of soft dorsal and anal fins markedly elongated, giving both fins a sickle shape; pelvic fins usually small or vestigial *Monodactylidae*
- 7b. Anterior rays of soft dorsal and anal fins not elongated, when elongate they do not give either fin a sickle-shape; pelvic fins not small or vestigial 8
- 8a. Body very deep, its maximum depth more than half total length; single dorsal fin, spines clearly distinguishable 9
- 8b. Body oblong or fairly deep, its maximum depth less than half total length; when deep-bodied and with a single dorsal fin, there are no spines or spiny rays hard to distinguish from soft rays 11
- 9a. Anal fin with 4 spines; gill membranes narrowly united to isthmus *Scatophagidae*
- 9b. Anal fin with 3 spines; gill membranes broadly united to isthmus 10
- 10a. Mouth protractile; pectoral fins falcate, longer than head length. Maxillae distally exposed *Drepanidae*
- 10b. Mouth not protractile or scarcely so; pectoral fins short, rounded, short than head length; Maxillae distally hidden *Ephippidae*
- 11a. Pelvic fins without an axillary scale *Teraponidae*
- 11b. Pelvic fins usually with an axillary scale 12
- 12a. Anal fin with 2 spines *Sciaenidae*
- 12b. Anal fin with 3 spines 13
- 13a. Mouth moderately protractile *Lutjanidae*
- 13b. Mouth strongly protractile 14
- 14a. Head usually naked (but small scales on cheek in few species), upper surface with bony ridges with a nuchal spine on nape; gill membrane united with isthmus *Leiognathidae*
- 14b. Head entirely covered with clearly visible scales, upper surface smooth; gill membranes free from isthmus *Gerreidae*

Family TERAPONIDAE

6. *Terapon theraps* (Cuvier)

1828. *Terapon theraps* Cuvier, *Hist. Nat. Poiss.*, 3 : 129, pl. 53 (type-locality : Java, Mahe).
 1984. *Terapon theraps*, Talwar and Kacker, *Commercial Sea Fish, India* : 409, fig. 157 (Species description and distribution).

Common English Name : Largescaled terapon.

Diagnostic features : Body moderately deep, compressed. Jaws equal, gape slightly oblique. Preopercle serrate; lower opercular spine very long and strong, extending beyond opercular bone. Caudal fin emarginate. Body with 4 dark brown horizontal stripes; each caudal lobe with one transverse stripe.

Distribution : Indo-West Pacific.

Characteristics of juveniles : The extension of the upper jaw differs between its juveniles and adult forms. Rear end of upper jaw reaching to vertical through anterior margin of eye in the juvenile specimens.

Family ECHENEIDAE

7. *Echeneis naucrates* Linnaeus

1758. *Echeneis naucrates* Linnaeus, *Syst. Nat., ed.*, 10 : 261.
 1986. *Echeneis naucrates*, Heemstra, in Smith & Heemstra, *Smith's Sea Fishes*, : 562, pl. 82.

Common English name : Slender sucker fish.

Diagnostic features : Body elongate, its depth 8 to 14 times in standard length. Jaws broad, the lower projecting beyond upper. First dorsal fin replaced by a transverse laminated, oval cephalic disc (sucking disc) with 16 to 28 laminae; second dorsal long without spines. Anal fin with 29 to 41 rays. Pectoral fins short. Caudal fin almost truncate, middle rays elongated and filamentous in adult. Body with dark longitudinal band on sides bordered with white.

Distribution : Worldwide in tropical and temperate seas.

Characteristics of juveniles : The colour pattern differs between its juveniles and adult forms. Upper and lower margins of fins white. The shape of the caudal fin also changes between its juveniles and adult forms. In juveniles the shape of the caudal fin is lanceolate.

Family CARANGIDAE

Keys to genera and species of family CARANGIDAE

- 1a. Posterior part of lateral line with hardened scutes; pectoral fins long and falcate, generally longer than head 2
 1b. No scutes in lateral line (only pored scales, not enlarged); pectoral fins short and not falcate, shorter than head 7

- 2a. Pelvic fins inserted distinctly anterior to a vertical line through pectoral fin base *Parastromateus niger*
- 2b. Pelvic fins not inserted distinctly anterior to a vertical line through pectoral fin base 3
- 3a. Body superficially naked, scales minute and embedded when present; anterior soft rays of dorsal and anal fins filamentous in juveniles 4
- 3b. Small scales present over most of body; anterior soft rays of dorsal and anal fins not filamentous in juveniles 5
- 4a. Profile of nape and head broadly rounded; suborbital depth relatively narrow, 1.7 to 3.0 times in upper jaw length; gillrakers (excluding rudiments) on lower limb of first arch 12 to 17 *Alectis ciliaris*
- 4b. Profile of nape and head somewhat angular; suborbital depth relatively broad, 0.8 to 1.0 times in upper jaw length; gillrakers (excluding rudiments) on lower limb of first arch 21 to 26 *Alectis indicus*
- 5a. Tongue, roof and floor of mouth white, the rest dark; anal fin spines reduced or reabsorbed *Uraspis uraspis*
- 5b. Lining of mouth not distinctly white or dark; anal fin spines normal and movable 6
- 6a. Belly with a deep median groove, accommodating pelvic fins, anus and anal fin spines; pelvic fins conspicuously long and black, tip of appressed fins extending almost to base of anal fin *Atropus atropus*
- 6b. Belly without median groove; pelvic fins not conspicuously long and black *Gnathanodon speciosus*
- 7a. Posterior soft dorsal and anal fin rays not consisting of semidetached finlets; upper lip separated from snout at middle by a continuous deep groove *Trachinotus blochii*
- 7b. Posterior soft dorsal and anal fin rays consisting of semidetached finlets, distal ¼ to ½ of rays not connected by interradiation membrane; upper lip joined to snout at middle by a bridge of skin and crossed by a shallow groove 8
- 8a. Total gillrakers on first arch 11 to 15; lobe of dorsal fin uniformly pigmented *Scomberoides tala*
- 8b. Total gillrakers on first arch 21 to 27; distal half of dorsal fin lobe abruptly and heavily pigmented..... *Scomberoides lysan*

8. *Alectis ciliaris* (Bloch)

1788. *Zeus ciliaris* Bloch, *Naturges. Ausland. Fische*, 6 : 29, and pl. 119 (type locality : East Indies).
 1984. *Alectis ciliaris*, Talwar and Kacker, *Commercial Sea Fish, India* : 434 (Species description and distribution).

Common English Name : African pompano.

Diagnostic features : Body strongly compressed and deep. Profile of nape and head broadly rounded. Suborbital depth narrow. Upper jaw reaching to below vertical from front edge of middle of eye. Dorsal fin with 18 to 20 soft rays and anal fin with 15 to 17 soft rays. Body superficially naked, scales minute and embedded when present. Body and head silvery-blue above, silvery below.

Distribution : Worldwide in tropical marine waters.

Characteristics of juveniles : The shape of the dorsal and anal fins differs between its juveniles and adult forms. Anterior soft rays of dorsal and anal fin extremely long and filamentous in juveniles. Body with 5 to 7 dark transverse bands.

Remarks : Adults are usually solitary and frequently found in shallow coastal waters up to 100 m. depth. Juveniles are usually pelagic and drifting.

9. *Alectis indicus* (Ruppell)

1828. *Scyris indicus* Ruppell, *Atlas, Nordl. Afrika Fische Rothen Meeres* : 128, pl. 33, fig. 1 (type-locality : Djedda, Red Sea).

1984. *Alectis indicus*, Talwar & Kacker, *Commercial Sea Fish India* : 435, fig. 167 (Species description and distribution).

Common English Name : Indian threadfish.

Diagnostic features : Body deep and strongly compressed. Profile of nape and head somewhat angular. Suborbital depth broad. Dorsal fin with 18 to 20 soft rays and anal fin with 15 to 17 soft rays. Body mostly silvery with a dusky green tinge dorsally.

Distribution : Indo-West Pacific.

Characteristics of juveniles : The shape of the dorsal and anal fins differs between its juveniles and adult forms. Anterior soft rays of dorsal and anal fin extremely long and filamentous and the shape of pelvic fins are elongate and falcate in juveniles. Body of juveniles with dark bars and also on elongate parts of dorsal, anal and pelvic fins with dusky pits.

Remarks : Adults are in large shoals but juveniles are solitary and often enter estuaries.

10. *Atropus atropus* (Schneider)

1801. *Brama atropus* Schneider, *Syst. Ichth.* : 98 (type-locality : Tranquebar).

1984. *Atropus atropus*, Talwar and Kacker, *Commercial Sea Fish India* : 442, fig. 170 (Species description and distribution).

Common English Name : Cleftbelly trevally.

Diagnostic features : Body strongly compressed, more or less ovate. Abdomen with a deep median groove, accommodating pelvic fins, anus and anal fin spines. Pelvic fins considerably

long, tips of appressed fin extending almost to anal fin origin. Caudal fin forked. Head and body bluish-green above, silvery below. Membranes of pelvic fins black with the rays white basally.

Distribution : Widespread in the Indo-Pacific.

Characteristics of juveniles : The colour pattern of this species differs between its juveniles and adult forms. Body of juveniles with prominent dark bands and opercular spot.

11. *Gnathanodon speciosus* (Forsskal)

1775. *Scomber rim speciosus* Forsskal, *Descript. Animal.* : 54 (type-locality : *Red Sea, Arabia*).

1984. *Gnathanodon speciosus*, Talwar and Kacker, *Commercial Sea Fish. India* : 470, fig. 181 (Species description and distribution).

Common English Name : Golden trevally.

Diagnostic features : Body compressed, oblong. Lips noticeably papillose; upper jaw strongly protractile; no teeth in jaws. Caudal fin deeply forked. Breast completely scaled. Black bands fade with growth and replaced by a few black patches or spots on sides. Body colour becomes yellow-green dorsally, pale yellow below.

Distribution : Indo-West Pacific.

Characteristics of juveniles ; The teeth pattern of this species differs between its juveniles and adult forms. Lower jaw of juveniles with feeble teeth. The colour pattern also differs with its adult forms. Body colour of the juveniles silvery to yellow with 7 to 11 black bands, usually alternately broad and narrow.

12. *Parastromateus niger* (Bloch)

1795. *Stromateus niger* Bloch, *Naturges, ausland. Fische*, 9 : 93, pl. 422 (type-locality : "Malaisch" = Malaya).

1984. *Parastromateus niger*, Smith-Vaniz, in Fischer and Bianchi, *FAO species Identification Sheets*, FAO, Rome.

Common English Name : Black pomfret.

Diagnostic features : Body diamond-shaped, fairly deep and compressed. Dorsal and anal fins long and with spines. Pectoral fins long and falcate. Pelvic fins absent in adult specimens. Caudal fin forked. Scales on lateral line scute-like on caudal peduncle. Body uniformly silvery grey to bluish brown.

Distribution : Indo-West Pacific.

Characteristics of juveniles : The position of pelvic of this species differs with its juveniles and adult forms. Pelvic fins distinctly anterior to a vertical line through pectoral fin base in juveniles. Juveniles with dark vertical bars and long black jugular pelvic fins as well as dorsal and anal fins black.

13. *Scomberoides lysan* (Forsskal)

1775. *Scomber lysan* Forsskal, *Descript. Animal.*, : 54 (type-locality : Djedda and Lohaja, Red Sea).

1984. *Scomberoides lysan*, Talwar and Kacker, *Commercial Sea Fish. India* : 477 (Species description and distribution).

Common English Name : Doublespotted queenfish.

Diagnostic features : Body oblong to elliptical, strongly compressed, with a pointed snout and a slight depression over eyes. Upper lip joined to snout at midline by a bridge of skin except crossed by a shallow groove in juveniles. Adult specimens with teeth in inner row equal in size to those in outer row. No scutes; scales on midbody below lateral line partially embedded and lanceolate. No caudal peduncle grooves. Adult specimens with a double series of 6 to 8 dusky roundish blotches above and below lateral line.

Distribution : Widespread in the tropical Indo West Pacific.

Characteristics of juveniles : The teeth pattern of this species differs between its juveniles and adult forms. In juveniles lower jaw with 2 rows of teeth separated by a shallow groove. Dusky rounded blotches on body absent in juveniles.

14. *Scomberoides tala* (Cuvier)

1831. *Chorinemus tala* Cuvier, *Hist. Nat. Poiss.*, 8 : 377 (type-locality : Malabar).

1984. *Scomberoides tala*, Talwar and Kacker, *Commercial Sea Fish. India* : 478 (Species description and distribution).

Common English Name : Barred queenfish.

Diagnostic features : Body strongly compressed and elongate, with a concave profile and a pointed snout. Upper jaw extends slightly beyond posterior margin of orbit. Teeth in upper jaw in a single row and in two rows in lower jaw. Body without scutes. Scales on midbody below lateral line partly embedded and lanceolate. Head and body greenish-grey dorsally, grey to silvery below. Sides of adult 4 to 8 vertically elongate plumbeous blotches, most of which intersect lateral line.

Distribution : Widely distributed throughout the Indo-Australian Archipelago and the Bay of Bengal in the Indian Ocean.

Characteristics of juveniles : The teeth pattern of this species differs between its juveniles and adult forms. The anterior teeth in upper jaw enlarged and canine-like in the juveniles. Vertical blotches on sides of the juveniles either absent or indistinct.

15. *Trachinotus blochii* (Lacepede)

1801. *Caesiomorus blochii* Lacepede, *Hist. Nat. poiss.*, 3 : 92, 95, pl. 3, fig. 2 (type-locality : Madagascar).

1984. *Trachinotus blochii*, Talwar and Kacker, *Commercial Sea Fish. India* : 487, fig. 188 (Species description and distribution).

Common English Name : Snubnose pompano.

Diagnostic features : Body subovate and compressed, profile of snout broadly rounded. Both jaws with bands of small villiform teeth, absent in adults above 200 mm standard length. Tongue toothless. Dorsal fin dark, lobe of fin dusky orange. Anal fin dusky to dirty orange, lobe with a brownish anterior margin.

Distribution : Widespread in the tropical Indo-West Pacific.

Characteristics of juveniles : The teeth pattern of this species differs between its juvenile and adult forms. Juveniles with 2 or 3 slender teeth present on tongue. Body of juveniles silvery with pale fins, except lobes of median fins brownish to dirty orange.

16. *Uraspis helvolus* (Forster)

1775. *Scomber helvolus* Forster, *Descript. Animal.* : 414 (type-locality : Ascension Island Ocean).

1984. *Uraspis helvolus*, Talwar and Kacker, *Commercial Sea Fish. India* : 492 (Species description and distribution).

Common English Name ; White tongue jack.

Diagnostic features : Body oblong and compressed. Dorsal profile strongly convex. Snout broadly rounded. Teeth in both jaws numerous, conspicuous, acute and curved, uniserial in adult specimens. Detached 2 anal spines, almost embedded in adults. Pectoral fins in adults long and falcate reaching beyond join of curved and straight lateral line. Head dusky to black, with a large, diffuse black opercular blotch. Body dusky to black dorsally, lighter below and 6 to 7 wide, dark bars and narrow pale interspaces.

Distribution : The Red Sea, Gulf of Oman. India through the East Indies to New Zealand.

Characteristics of juveniles : The teeth pattern of this species differs between its juvenile and adult forms, Teeth in 2 or 3 rows only in the juveniles. The colour pattern also changes with the growth of this species, Dark bars on juveniles extend onto second dorsal and anal fins.

Family CORYPHAENIDAE

17. *Coryphaena hippurus* Linnaeus

1758. *Coryphaena hippurus* Linnaeus, *Systema Naturae*, ed. 10 : 261 (type-locality : Open seas).

1984. *Coryphaena hippurus*, Talwar and Kacker, *Commercial Sea Fish. India* : 493, fig. 190 (Species description and distribution).

Common English Name : Common dolphin fish.

Diagnostic features : Body elongate, compressed and very deep. Head profile becomes vertical with development of a bony crest, especially in male adult specimens Dorsal fin extending from above eyes almost to caudal fin. Anal fin concave, extending from vent almost to caudal fin.

Caudal fin deeply forked. Back brilliant metallic blue-green, flanks silvery with golden sheen, and a row of dark spots or golden blotches running beside dorsal fin. Pectoral and pelvic fins pale. Caudal fin silvery, with a golden sheen.

Distribution : Tropical and subtropical seas of the world.

Characteristics of juveniles : The shape of this species differs between its juveniles and adult forms. Body of the juveniles slender, elongate with head profile slightly convex. Tips of the caudal fin lobes white and pelvic fins black.

Family LEIOGNATHIDAE

Keys to genera and species

- 1a. Mouth oblique, pointed forward when protracted *Secutor ruconius*
- 1b. Mouth horizontal, pointing forward or downward when protracted 2
- 2a. Second dorsal fin spines or both second and anal fin spines distinctly elongated; no spot on caudal peduncle *Leiognathus brevirostris*
- 2b. Second dorsal and anal fin spines not elongated; a dark brown saddle on caudal peduncle present *Leiognathus equulus*

18. *Leiognathus brevirostris* (Valenciennes)

1835. *Equula brevirostris* Valenciennes, *Hist. Nat. Poiss.*, : 10 : 83 (type-locality : Malabar).

1984. *Leiognathus brevirostris*, Talwar and Kacker, *Commercial Sea Fish. India* : 506, fig. 196 (Species description and distribution).

Common English Name : Short nose pony fish.

Diagnostic features : Body oval and compressed. Dorsal and ventral profiles equally convex, dorsal profile showing a distinct notch at the commencement of the nuchal crest. Head and breast scaleless. Abdomen silvery. Back with dark, wavy vertical lines extending down to about lateral line. A brown blotch on nape. A prominent eye-sized, rather diffuse, golden yellow patch on abdomen. Spinous part of dorsal fin golden at mid-height, the distal half grey.

Distribution : Seas of India, Sri Lanka, through the East Indies, to China and the Philippines.

Characteristics of juveniles : The colour pattern of this species between its juveniles and adult forms. The distal half of spinous dorsal fin black in the juveniles.

19. *Leiognathus equulus* (Forsskal)

1775. *Scomber equula* Forsskal, *Descript. Animal* : 75 (type-locality : Red Sea).

1984. *Leiognathus equulus*, Talwar and Kacker, *Commercial Sea Fish. India* : 510, fig. 198 (Species description and distribution).

Common English Name : Common pony fish.

Diagnostic features : Body deep and compressed with a strongly humped back. Mouth pointing downward when protracted. Head and breast scaleless. Dorsal surface greyish, abdomen silvery and close-set faint bars on back and sides; a dark brown saddle on caudal peduncle.

Distribution : Widespread in the tropical Indo-West Pacific.

Characteristics of juveniles : In juveniles thin, closely arranged grey vertical lines descending from back to about mid-height. Membranes anal fin spines conspicuously yellow. Posterior margins of caudal fin lobe pale yellow.

20. *Secutor ruconius* (Hamilton)

1822. *Chanda ruconius* Hamilton, *Fish of Ganges* : 106, 371, pl. 12, fig. 35 (type-locality : estuary of the Ganges River).

1984. *Secutor ruconius*, Talwar and Kacker, *Commercial Sea Fish. India* : 519, fig. 205 (Species description and distribution).

Common English Name : Deep pugnose pony fish.

Diagnostic features : Body oval, very deep and compressed. Mouth small, pointing upward when protracted. Lateral line ending below about middle of soft portion of dorsal fin. Scales present on cheek. Body silvery with blue spots on upper half. A prominent curved black band running from lower margin of eye to beyond posterior angle of lower jaw. Underside of pectoral fin base black.

Distribution : Tropical Indo-West Pacific.

Characteristics of juveniles : In juveniles body with blue spots forming 10 to 12 vertical bars.

Family GERREIDAE

21. *Gerres abbreviatus* Bleeker

1850. *Gerres abbreviatus* Bleeker, *Nat. Tijdschr. Ned.-Indie*, 1 : 103 (type-locality : Batavia).

1984. *Gerres abbreviatus*, Talwar & Kacker, *Commercial Sea Fish. India* : 579, fig. 227 (Species description and distribution).

Common English Name : Deepbody mojarra.

Diagnostic features : Body deep, forming a sharp angle at dorsal fin origin. Mouth small, strongly protractile. Spines strong, particularly the second anal. Pectoral fin long, tip of depressed fin reaching to or past level of base of first anal spine. Caudal fin strongly forked. Body silvery, with indistinct, fine dark stripes following scale rows.

Distribution : Indo-West Pacific.

Characteristics of the juveniles : In juveniles 7 to 11 slender prominent dark bars along sides. Dorsal fin edged with black.

Family LUTJANIDAE

22. *Lutjanus johni* (Bloch)

1792. *Anthias johni* Bloch, *Naturges. Ausland. Fishche*, 6 : 113, 318 (type-locality : Surat).
1984. *Lutjanus johni*, Talwar & Kacker, *Commercial Sea Fish. India* : 541, fig. 212 (Species description and distribution).

Common English Name : John's snapper.

Diagnostic features : Body moderately deep, with head profiles straight or slightly convex. Interopercular knob absent. Second and third anal spines strong and about same length. Caudal fin very slightly concave. Scales fairly large; scales on head beginning above middle of eyes; soft dorsal and anal fins with a scaly sheath; longitudinal scales rows above lateral line parallel to it and those below lateral line horizontal. Body silvery green or bronze-red, with a distinct dark spot on each scale. A large dark blotch usually presents above lateral line at junction of spinous and soft dorsal fins.

Distribution : Indo-West Pacific.

Characteristics of the juveniles : The colour pattern of this species differs between its juvenile and adult forms. In juveniles the dark spot above lateral line at the junction of spinous and soft dorsal fins usually surrounded by a silvery ring, which disappears, with the growth of the fish.

Family SCIAENIDAE

23. *Otolithes ruber* (Schneider)

1801. *Johnius ruber* Schneider, *Syst. Ichth. Bloch* : 75, pl. 17 (type-locality : Tranquebar).
1984. *Otolithes ruber*, Talwar & Kacher, *Commercial Sea Fish. India* : 664, fig. 267 (Species description and distribution).

Common English Name : Tigertooth Croaker.

Diagnostic features : Body slender, depth 4 to 5 times in standard length. Mouth large, terminal, the lower jaw slightly projecting. Teeth in two rows in upper jaw with 1 or 2 pairs of strong canine teeth at front, a pair of canine teeth at tip of lower jaw. Anal fin with 2 spines and 7 soft rays, the second spine short and weak. Caudal fin rhomboid. Swimbladder with 32 to 36 pairs of arborescent appendages, none extending into the head. Body silvery, with no distinctive markings.

Distribution : East coast of Africa, throughout the Indian Ocean and the Indo-Australian Archipelago.

Characteristics of the juveniles : The shape of the caudal fin changes with the growth of this fish. In juveniles the caudal fin is pointed but in adults it is rhomboid in shape.

Family EPHIPPIDAE

24. *Ephippus orbis* (Bloch)

1787. *Chaetodon orbis* Bloch, *Naturges. ausland. Fische*, 3 : 81, pl. 202, fig. 2 (type-locality : East Indies).

1984. *Ephippus orbis*, Talwar & Kacker, *Commercial Sea Fish. India* : 700, fig. 284 (Species description and distribution).

Common English Name : Spadefish.

Diagnostic features : Body deep, almost circular, strongly compressed, and not angular at dorsal and anal fin origin. Mouth small, terminal, and not protractile. Teeth in bands, setiform, none on palate. Dorsal fin with one inconspicuous forwardly pointing spine. Gill cover with scale almost to its ventral edge. Body silvery, with 4 or 5 vertical black bars on body from dorsal fins almost to abdomen.

Distribution : Indo-West Pacific.

Characteristics of the juveniles : The colour pattern changes with growth. In juveniles two dark bars, one through eye and another one on nape present, disappear in adults.

Family SCATOPHAGIDAE

25. *Scatophagus argus* (Linnaeus)

1766. *Chaetodon argus* Linnaeus, *Systema Naturae*, ed. 12, 1 : 464 (type-locality : India).

1984. *Scatophagus argus*, Talwar and Kacker, *Commercial Sea Fish. India* : 704, fig. 286 (Species description and distribution).

Common English Name : Spotted scat.

Diagnostic features : Body quadrangular, strongly compressed. Forehead steep. Mouth small, with brush-like teeth. Dorsal fin with 11 spines, the membranes deeply incised between spines; middle of dorsal fin with a deep notch. Body greenish to silvery with numerous dark spots mainly restricted to upper part of sides; no bars on body.

Distribution : India, Sri Lanka, through the East Indies to China, Taiwan, the Philippines and Queensland.

Characteristics of the juveniles : The colour pattern changes with the growth of this fish. In juveniles bars present on the body which disappear in adults.

Family DREPANIDAE

26. *Drepane punctata* (Linnaeus)

1758. *Chaetodon punctata* Linnaeus, *Systema Naturae*, 1 (ed 10) : 273 (type-locality : Asia).

1984. *Drepane punctata*, Talwar & Kacker, *Commercial Sea Fish. India* : 697, fig. 283 (Species description and distribution).

Common English Name : Spotted sickle fish.

Diagnostic features : Head and body deep, strongly compressed. Mouth protrusible. Teeth pointed, slender, crowded together. Dorsal fin with 8 to 9 spines, fourth one longest. Pectoral fin long and pointed, reaching to base of caudal fin. 4 to 11 vertical bars of small black spots on upper half of body.

Distribution : Indo-West Pacific.

Characteristics of the juveniles : Juvenile specimens with a fringe of 4 to 6 short cirri ventrally on lower jaw. But cirri absent in adults.

Family MUGILIDAE

27. *Liza parsia* (Hamilton)

1822. *Mugil parsia* Hamilton, *Fish. Ganges* : 215, pl. 17, fig. 71 (type-locality : River Hooghly).

1984. *Liza parsia*, Talwar & Kacker, *Commercial Sea Fish. India* : 721 (Species description and distribution).

Common English Name : Goldspot mullet.

Diagnostic features : Body robust, head wide, dorsally flattened. Fatty tissue covers most of the posterior iris. Lips thin, lower lip with a high symphysial knob. Hind end of upper jaw reaching vertical between posterior nostril and anterior rim of eye. Mid-gape above horizontal line through entire of pupil. First dorsal fin origin nearer to snout tip than to caudal fin base. Second dorsal fin origin at vertical between 1/3 and 1/2 along the anal fin base. Pectoral axillary scales absent. Caudal fin slightly forked. Scale on body ctenoid. Body greenish-brown above, white to silvery below; a golden spot on upper gill cover.

Distribution : Seas and estuaries of India, Sri Lanka and Pakistan.

Characteristics of the juveniles : The scale pattern changes with growth. In juveniles cycloid scales cover body but in adults these are transformed into ctenoid scales.

28. *Liza tade* (Forsskal)

1775. *Mugil crenilabris tade* Forsskal, *Descript. Animal.* : 74 (type-locality : Arabia).

1984. *Liza tade*, Talwar & Kacker, *Commercial Sea Fish. India* : 723, fig. 292 (Species description and distribution).

Common English Name : Tade mullet.

Diagnostic features : Body slender and elongate. Head wide, much depressed and pointed. Fatty tissue covers most of the iris. Lips thin, lower lip with a high symphysial knob. First dorsal fin origin nearer to snout tip than the caudal fin base. Second dorsal fin origin at vertical through posterior half of anal fin base. Pectoral axillary scale absent. Caudal fin forked. Body greenish-brown above, silvery below, often with 5 to 7 indistinct longitudinal bands on upper half of body.

Distribution : Red Sea, Pakistan, India, Sri Lanka, Bangladesh, through the East Indies to China and Marianas.

Characteristics of the juveniles : The position of the first dorsal fin changes from juveniles to adults. In juveniles it is in midway between snout tip and caudal fin base but in adult form dorsal fin inserted nearer to snout tip than base of caudal fin. The colour pattern also changes with growth. In juveniles the longitudinal bands are absent but these bands are often present in adults.

Family SPHYRAENIDAE

29. *Sphyraena jello* Cuvier

1829. *Sphyraena jello* Cuvier, *Hist. Nat. Poiss.*, 3 : 258 (based on Russell's "Jellow"), pl. 174 (type-locality : Vizagapatnam).
1984. *Sphyraena jello*, Talwar & Kacker, *Commercial Sea Fish. India* : 741, fig. 302 (Species description and distribution).

Common English Name : Pickhandle barracuda.

Diagnostic features : Body elongate and more or less rounded. Head large, with a long, pointed snout. Mouth large, maxilla almost extends to front border of eye. Lower jaw projecting. No gillrakers on first arch. Upper and lower gill arch platelets rough, but without distinct spines. First dorsal fin inserted slightly behind pelvic fin origin. Body with small scales. Body blue black or brown above, sides silvery. A dark pattern of serpentine bars reaching a little below lateral line.

Distribution : Indo-West Pacific.

Characteristics of juveniles : The colour pattern change with the growth of this species. In juveniles bars on sides of this species is very distinct but in adults these bars are rather indistinct.

Family SCOMBRIDAE

30. *Scomberomorus commerson* (Lacepede)

1800. *Scomber commerson* Lacepede, *Hist. Nat. Poiss.*, 2 : 598, and pl. 20(1) (based on MS drawing by Commerson) (type-locality : Mauritius).
1984. *Scomberomorus commerson*, Talwar and Kacker, *Commercial Sea Fish. India* : 812, fig. 331 (Species description and distribution).

Common English Name : Narrow-barred Spanish mackerel.

Diagnostic features : Body elongate, rather strongly compressed. Upper jaw extending to hind border of eye or slightly beyond. Gillrakers 0 to 2 on upper limb and 1 to 8 on lower limb of first gill arch. Lateral line abruptly bent downward below end of second dorsal fin.

Body iridescent blue or grey, sides silver with bluish reflections, marked with 20 to 65 thin, wavy vertical bands.

Distribution : Widespread throughout the Indo-West Pacific and Mediterranean.

Characteristics of juveniles : The colour pattern differs between the juvenile and adult stage of this species. In juveniles large black blotches present on the body.

Family MONODACTYLIDAE

31. *Monodactylus argenteus* (Linnaeus)

1758. *Chaetodon argenteus* Linnaeus, *Systema Naturae*, ed. 10, 1 : 272 (type-locality : "Indies").

1984. *Monodactylus argenteus*, Talwar and Kacker, *Commercial Sea Fish. India* : 688, fig. 280 (Species description and distribution).

Common English Name : Silver moony.

Diagnostic features : Body oval, strongly compressed, covered with small deciduous scales extending onto median fins and head. Mouth small and terminal. Jaws with small villiform teeth in bands. Pelvic fins reduced to a short spine. Caudal fin with concave margin. Scales small, ctenoid. Body brilliant silvery, tips of dorsal fin lobe dusky.

Distribution : Widespread in the tropical Indo-Pacific.

Characteristics of juveniles : The pelvic fins of this species are prominent in juveniles but in adults pelvic fins reduced into short spines. The colour pattern also differs between its young and adult stage. In juveniles body with two dusky, curved stripes across head and tip of dorsal fin lobe orange.

SUMMARY

The present study has recorded juveniles of 31 species belonging to 4 orders and 19 families of the marine and estuarine fishes of West Bengal. The morphological features of these juveniles have been recorded under each species along with the diagnostic characteristics of these species, to facilitate their identification.

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