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ON THE FISHES OF THE FAMILY PLATYCEPHALIDAE OF THE SEAS AROUND INDIA*

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ABSTRACT

The fishes of the family Platycephalidae† popularly called "Flatheads" widely distributed in the Indio-Pacific region are of some commercial importance. Thirteen species of flatheads are so far Known to occur in the Indian Seas as reported by Day (1878), Munro (1955), de Beaufort and Briggs (1962) and others. As to their taxonomy, especially at their generic level, opinions vary among ichthyologists who studied the group. In view of their fishery importance along some parts of the Indian Coast and because of the paucity of any detailed information on the species, a comprehensive study of the group has been made, based on the collections made by the author from different parts of the Indian Coast and the material available in the Indian Museum, Calcutta. These have been compared with the descriptions of the type specimens available in the Museum National d 'Histoire Naturelle, Paris and Rijksmuseum van Natuurlijke Historie, Leiden. Detailed descriptions, distribution, synonymy and key to identification of genera and species of flatheads occuring along the Indian Coast are given in this paper.

INTRODUCTION

THE FISHES of the family Platycephalidae (flatheads or crocodile fishes) are distributed throughout the tropical Indo-West Pacific region. Day (1878) recorded seven species from the coasts of India and Ceylon. Munro (1955) recorded eight species from Ceylon; de Beaufort and Briggs (1962) described eight species as occurring in Indian Seas. Rao (1966) described a new species from Visakhapatnam and Murty (1969 a), George (1970) and Jones and Kumaran (1971) reported one species each as new records from the Indian Seas. Some species contribute significantly to the groundfish catches especially along the southwest coast of India.

As pointed out by Schultz (1960) it has been extremely difficult to make accurate identifications of these fishes because the available descriptions are inadequate; the cranial ridges and spines which are shown to be taxonomically important were not given due importance. Further, there is no up-to-date comprehensive information on these fishes from Indian Seas; the available keys for identification of species are either inadequate or do not include all the known species from the region.

Studies on this group from outside India include the works of Bleeker (1878), Jordan and Richardson (1908), Jordan and Hubbs (1925) and Matsubara and Ochiai (1905).

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† The platycephalids dealt with in this paper do not include members of the families Bembradidae, Bembridae and Parabembridae which have recently been incorporated in the family Platycephalidae by Greenwood *et al.* (1966).

In view of the fact that the available species descriptions are inadequate and the consequent difficulty in identifying them correctly, it was felt that a detailed account of these fishes from this region giving adequate descriptions based on examination of fresh material, key for identification and their distribution, is necessary to provide a basic reference for more comprehensive fishery biological studies of some of the species.

The present study deals with thirteen species that are known to occur in the seas around India. There is considerable confusion in assigning species to their respective genera. Some authors (de Beaufort and Briggs, 1962) preferred to include all the species under the genus *Platycephalus* Bloch. Schultz (1960) gave a tentative key to the genera. In the present paper an attenpt is made to assign the species to their respective genera; since there are several nominal genera and the type specimens of the type species could not be examined, the present arrangement can only be treated as tentative.

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Material and Methods

The specimens for this study were collected from Visakhapatnam, Kakinada, Madras, Pondicherry, Tuticorin and Mandapam on the east coast and Bombay, Cochin and Neendakara on the west coast. In addition to these, the collections of this family in the Zoological Survey of India, Calcutta (ZSI) and National Museum, Sri Lanka were also examined. Morphometric and meristic data of the relevant type specimens in the Museum National d'Histoire Naturelle, Paris and Rijksmuseum van Natuurlijke Historie, Leiden also have been utilised for comparison. In taking measurements, total length (TL) was measured from tip of snout to the tip of caudal fin and Standard length (SL) from tip of snout to base of caudal fine. Head length was taken from tip of snout to the posterior margin of the operculum and head width between the bases of the upper preopercular spines of the two sides. Eye diameter is the horizontal diameter of bony orbit. L. tr. includes the count of scales from origin of first dorsal obliquely backwards to lateral line, the one in the lateral line and from origin of anal obliquely forwards to lateral line. Vertical rows of scales above lateral line are counted from above the lateral line from its origin to the end at the base of caudal fin. The nomenclature of various ridges on head is taken from Schultz (1960). No attempt has been made to include all the synonyms under each species; only the original reference and all the references

from the area under study are included. The species for which adequate descriptions are available from this region, are not described in this paper.

Specimens of the species collected by the author and utilised in this study have been deposited in the Reference collection Museum of the Central Marine Fisheries Research Institute (Murty, 1969 b).

KEY TO GENERA OF PLATYCEPHALIDAE FROM INDIA

1. Teeth on vomer in a continuous crescent-shaped band .... *Platycephalus* Bloch

   Teeth on vomer separated medially into two subovate patches by deep edentulous furrow 2

2. Suborbital ridges finely serrate 3

   Suborbital ridges not finely serrate; with distant spines or entirely smooth 4

3. Preopercle with strong antrorse spine on lower side..... .....*Rogadius* Jordan and Richardson

   No antrorse preopercular spine, preocular with 2–3 spines ....*Wakiyus* Jordan and Hubbs

4. Eye with a dermal cirrus (tentacle) .....*Thysanophrys* Ogilby

   Eye without a dermal cirrus 5

5. All lateral line scales spiny ..... *Gramnoplites* Fowler

   Only first few scales or anterior half of lateral line spiny.....*Suggrundus* Whitly

Genus: **Platycephalus** Bloch 1975

Platycephalus Bloch (1795). *Nat. Ausland Fische*, 9: 76 (Type species : *Platycephalus spathula* Bloch = *Callionymus indicus* Linnaeus).

Platycephalus indicus (Linnaeus)

Callionymus indicus Linnaeus (1758). *Syst. Nat. ed.* ,10: 250.
Platycephalus insidiator Day (1878). *Fish. India*, 276.
Thysanophrys indicus Munro (1955). *Marine and freshwater fishes of Ceylon*, 253. Misra, (1962). *Rec. Indian Mus.*, 57:304.
Platycephalus indicus de Beaufort and Briggs (1962). *Fish. Indo-Aust. Archipel.*, 11.

Material examined: 1 specimen 363 mm from Tuticorin (Gulf of Mannar); 4 specimens 191, 207, 243, 312 mm from Mandapam (Palk Bay); 2 specimens 156, 188 mm from Athankarai Estuary (Palk Bay) 1 specimen 362 mm from Madras (Day's collection) ZSI No. 112–115; 1 specimen 180 mm from Chilka Lake ZSI F. 11086/1; 4 specimens 216, 166, 373, 386 mm from Akyab, ZSI Dup. Cat. Nos. 47, 272, 398, and F. 1510/1; 1 specimen 215 mm from Burma ZSI F. 12079/1; 1 specimen 175 mm from Namkhana ZSI F. 4981/2; 1 specimen 175 mm from Philippines, ZSI F. 4222/2.

Description: D. IX, 13; A. 13; 18–19; V. 1, 5; Ll. pored 61-74; Vertical rows of scales above lateral line 105-136; L. tr. 11-15/1/25-38; G. R. 2 + 1 + 5.

Head 3.04-3.85 in SL, 3.50-4.02 in TL, body depth 9.17-17.18 in SL, 10.58-19.63 in TL. head width 1.24-1.63 in its length. Eye 5.00-8.08 in head; 1.37-2.25 in snout, head strongly compressed, maxilla reaches to below middle of eye. Interorbital space rather flat and wide, 0.62-1.26 times wider than eye diameter. Teeth villiform, those on upper jaw at the symphysial region pointed, in a cresent shaped band on vomer and in two narrow longitudinal bands on palatines; some on vomer and palatines slightly pointed (on vomer the pointed teeth are at the end of the crescent). Ridges between nostrils smooth, run parallel backwards up to middle of interorbital space. A short but strong spine on anterior orbital rim. Supraorbital ridge completely smooth, superior postorbital ridge also smooth, but in large specimens with single spine posteriorly; inferior postorbital ridge with a spine anteriorly and with two to four spines posteriorly, last one longer and in line with lateral line. Suborbital ridge, smooth sometimes with single spine below hind border of eye. Two strong sub equal preopercular spines, upper one at an angle to suborbital ridge. Opercular ridges flat and smooth, lower ridge not very prominent. A prominent triangular subopercular flap present. Head completely scaly. First lateral line scale keeled. First dorsal spine short, second and third spines more or less of same length, nineth spine not connected with eighth one; first ray of soft dorsal longest. Pectoral more or less rounded, 6.00 to 7.31 in SL; 6.92-8.31 in TL. Pelvic sometimes reaches anal origin; 4.83-5.90 in SL; 5.80-6.75 in TL. Caudal truncate.

Colour: Brown above and pale yellow below. Sometimes two cross bands on posterior dorsal side. Pectoral, pelvic and dorsal fins spotted. Caudal yellowish with two oblique black bands with white borders.

Distribution: Extends westwards from coasts of New Guinea, Philippines, seas of Japan, through Celebes, Borneo, Java, Sumatra, Burma, Andaman Coasts of India, and Sri Lanka to east coast of Africa and the Red sea.

Remarks: Cantor (1850) and Matsubara and Ochiai (1955) reported ten dorsal spines in this species and according to them first spine is very small or rudimentary and hidden. All other authors have reported only eight spines in first dorsal fin. In all the present specimens the author counted only nine spines. First rudimentary (Cantor, 1850) or isolated reclining spine (Matsubara and Ochiai, 1955), however, could not be seen even with a lens.

Genus: **Rogadius** Jordan and Richardson

Rogadius Jordan and Richardson, 1908. *Proc. U. S. Nat. Mus.*, 33:630. Type species: *Platycephalus asper* Cuvier.

Rogadius pristiger (Cuvier) (Pl. I)

Platycephalus pristiger Cuvier (1829). *Hist. nat. Poiss.*, 4:260; de Beaufort and Briggs (1962). *Fish. Indo-Auster. Archipel.*, 11:139-140.

Regadius asper Munro (1955). *Marine and freshwater fishes of Ceylon.* 251. (*nec.* Cuvier)

Material examined: 2 specimens 105 and 111 mm SL from Sri Lanka (collected at 34 fathoms) ZSI No. 11745; 3 specimens 97, 102 and 118 mm SL from off Ganjam Coast (Bay of Bengal) ZSI Nos. 12951, 12952, 12953; 1 specimen 56 mm SL from Andaman Sea (6 m) ZSI No. F. 424/2; 1 specimen 58 mm SL from Nicobar Island; ZSI No. F. 424/2; and 2 specimens 94 and 105 mm SL from Andaman Sea, ZSI F. 812/1 and 813/1.

Description: D. IX, 11; A. 11; p. 19-23; V. I, 5; Ll pored 52-54, vetical rows of scales above lateral line 54-58; L. tr. 6-7/1/20-21; G. R. 1 + 1 + 5–6.

Body depth 5.6-6.9, head 2.5-2.6 in SL. Head width 1.6-1.9, eye diameter 3.0-3.5 in head length, eye 1.0-1.1 in snout. Body width at the insertion of pelvics 5.00-5.60 in SL. Teeth in jaws villiform, on vomer in two distinct oval patches, on palatines in two narrow bands. Teeth on vomer and palatines pointed. Anterior nostril with a flap. Interorbital space narrow, 5.0-7.0 in eye diameter. Two completely serrated longitudinal parallel ridges between nostrils on both sides. A strong spine on anterior orbital rim. Supraorbital ridge smooth anteriorly, serrated posteriorly and continued to behind eye as superior postorbital ridge which also serrated ending in two spines. Anterior portion of inferior postorbital ridge serrated, posterior portion with two to three strong spines, last one in line with beginning of lateral line; suborbital ridge completely serrated ending in a long preopercular spine. Three to four spines below upper preopercular spine and a strong antrorse spine below. Opercle with two smooth ridges each ending in a spine. Opercle and preopercle with ctenoid scales. Lateral line smooth excepting anterior 4-6 scales which are spiny. First dorsal spine small, third spine longest equal to postorbital part of head. Pectoral rounded; pelvics reach anal origin.

Colour: Specimens preserved in alcohol brown above, light below. Spinous dorsal dark on distal half; rays of soft dorsal with faint longitudinal rows of spots. Pectorals with dark spots, pelvics and caudal dusky. Cross bands on body not clear.

Distribution: Known from Queensland, New Guinea, Philippines, Indonesia (Batjan), Ternate, Menado, Makassar, Lombok, Bali and Singapore in the Pacific; Andamans Islands, Sri Lanka, Visakhapatnam and Ganjam Coast (Bay of Bengal), Seychelles, Gulf of Oman and Gulf of Aden in the Indian Ocean.

Remarks: This species was described by Cuvier (1829) from Sri Lanka; Day (1878) did not include this species. To date there has not been published account of this species from the Indian Coasts except for a mention by Rao (1966). Hence the present description of this species happens to be the first from the Indian Coast.

Genus: **Wakiyus** Jordan and Hubbs, 1925

Wakiyus Jordan and Hubbs (1925). *Mem. carnegie Mus.*, 10:286 (Type species:*Platycephalus spinosus* Temmnick and Schlegel).
Sorsogona Herre (1934). *Fish. Zool. Mus. Stanford Univ.*, 1:67 (Type species *Sorsogona serrulata* Herre = *Platycephalus tuberculatus* Cuvier).

KEY TO SPECIES OF GENUS WAKIYUS FROM INDIA

D. IX, 11; A. 11-12; ridges of head finely serrated, 21-22 anterior scales of lateral line spiny..... .....*W. tuberculatus* (Cuvier)

D. IX, 12; A. 12; headridges serrated but destitute of spines; only 3-5 scales of the lateral line spiny .....*W. serratus* (Cuvier)

Wakiyus tuberculatus (Cuvier 1829) (Pl. II A, B)

Platycephalus tuberculatus Cuvier (1829). *Hist. nat. Poiss.*, 4: 258–259; Day (1878). *Fish. India.*, 275; de Beaufort and Briggs (1962). *Fish. Indo-Aust. Archipel.*, **11**:142-143: Misra, (1962). *Rec. Indian Mus.*, **57**:304.

Sorsogona serrulata Herre (1834). 67.
Suggrundus tuberculatus: Munro (1955). *Marine and freshwater fishes of Ceylon,* 252.

Material examined: 21 specimens ranging from 51-125 mm from Palk Bay and Gulf of Mannar near Mandapam; 3 specimens 105-124 mm from Madras; 3 specimens 72-81 mm from Pondicherry; 1 specimen 135 mm from Madras, ZSI No. 1856 (Day's collection); 1 specimen (length not recorded) ZSI No. 1857 Day's collection; and 1 specimen 94 mm from Sri Lanka, Ceylon National Museum No. F.M.94.

Description: D. IX, 11; A. 11-12; P.19-21; V. I, 5; Ll pored 52-56; vertical rows of scales above lateral line 53-59; L. tr. 5/1/13-16; G. R. 1 + 1 + 5–6.

Body depth 6.1-8.0 in SL, 7.2-9.6 in TL. Head 2.5-2.9 in SL, 3.11-3-46 in TL. Head width 1.35-1.77 in its length. Eye 3.37-4.40 in head, 1.00-1.40 in snout Interorbital space 3.2-5.0 in eye. Anterior nostril with a flap. Villiform teeth in jaws; in two oval patches on vomer and in two elongate bands on palatine. Some teeth on vomer and palatines pointed. Two longitudinal serrated ridges between nostrils. Two to four spines on anterior orbital rim; Supraorbital ridge completely serrated. Superior and inferior postorbital ridges denticulated former with last two spines slightly elongate and ending at origin of lateraline. Suborbital ridge finely serrate ending at base of strong preopercular spine which is short and not reached gill opening. Two to three smaller spines below upper preopercular spine. Lower opercular ridge finely serrated ending in a spine. 21-22 anterior scales of lateral line spiny. Opercle and preopercle scaly, rest of head naked. Some scales on opercle and preopercle tuberculate and small. First dorsal spine short, third spine longest as long as or just shorter than second ray of soft dorsal. Pectoral rounded, pelvics reach anal.

Colour: Brown above, light below. 2-5 broad transverse bands on upper side, region between pelvics and at anal origin pigmented black. Dorsal spines and rays with back spots. Pectorals and pelvics with black bands. Caudal black.

Distribution: Red Sea, coast of Natal, coasts of India, Singapore, Philippines and Queensland.

Remarks: Cuvier (1829) stated "La lingne laterale est presque aussi epineuse qu au *scaber*" but unlike in *scaber* the type of *tuberculatus* in the Paris Museum has only 25 spiny scales in lateral line, and in present specimens only anterior 21-22 scales of lateral line are spiny.

Cuvier (1829) gave a dorsal fin count of D. 9-1/11 and Day (1878) gave it as 1/7-8/11-12, but in all the specimens examined (including those of Day in the Indian Museum) the present author could count only 9 spines and 11 rays.

De Beaufort and Briggs (1962) considered *Sersogona serrulata* Herre as a doubtful synonym of *tuberculatus Cuvier.* In the present description it is considered as a synonym of *W. tuberculatus.* Schultz (1960) recognised *Sorsogona* Herre as a valid genus with *S. serrulata* as its type. However, since there are 2-4 preocular spines and suborbital ridge completely serrated in *tuberculatus*—the characters of *Wakiyus* Jordan and Hubbs (1925), genus *Sorsogona* Herre is considered as asynonym of *Wakiyus* Jordan and Hubbs. Ridge of lower opercular spine distinctly serrated in *tuberculatus.* This character alsofound in *serratus* belonging to *Wakiyus:* in *rodericensis* which is assigned to genus *Suggrundus* Whitly here, the

author found this ridge spiny at least anteriorly. Hence it is felt that this character does not provide a 'decided gap' (Mayr, 1969) of generic significance.

Wakiyus serratus (Cuvier 1829)

Platycephalus serratus Cuvier (1829). *Hist. nat. Poiss.*, 4:259-260; Peters (1876). *Akad. Wiss. Berlin. Monatsb.*, 839 (1876); Day (1878), *Fish. India*, 276.
Suggrundus serratus: Munro (1955). *Marine and freshwater fishes of Ceylon*, 252.

Material examined: 6 specimens 115-124 mm from Laccadive Sea ZSI F. 896/1; 901/1-904/1 and F. 906/1.

Description: D. IX, 12; A. 12; P. 19-20; V. 1, 5; Ll pored 42-50; vertical rows of scales above lateral line 55-65; L. tr. 6/1/17-19; G. R. 1+1+7–8.

Body depth 5.8-6.7 in SL, 6.6-8.8 in TL. Head 2.6-2.7 in SL, 3.0-3.2 in TL. Head width 1.8-1.9 in its length. Eye 3.3-3.9 in head and equal to snout. Interorbital space 2.7-3.5 in eye diameter. Body subcylindrical and head depressed. Teeth in jaws villiform, a few pointed; those on vomer slightly pointed and curved, arranged in two oval patches; similar teeth on palatines in two longitudinal banks. Two longitudinal serrated ridges on either side of median line between nostrils, which extend back to interorbital space. Anterior orbital rim elevated, preocular with two to three spines. Supraorbital ridge and superior postorbital ridge serrated completely the latter ending in a spine. Inferior postorbital ridge serrated with two moderate spines posteriorly at beginning of lateral line. Suborbital ridge serrated completely ending at beginning of strong preopercular spine which is 1.9-2.2 in eye; 3 moderate spines below upper preopercular spine, no trace of an antrorse spine below. All serrated ridges are destitute of spines. Anterior part of lower opercular ridge serrated, posterior part smooth ending in a spine; upper ridge completely smooth. Opercle and preopercle scaly.

First dorsal spine short 1.3-1.6 in eye; third spine longest and 2.2-2.3 in head. Lateral line smooth except first 3-5 scales which are spiny.

Colour: Specimens preserved in alcohol - body brown above and light below; spinous dorsal with a dark blotch; second dorsal with dark spots on rays. Pectorals with dark irregular spots on rays; pelvics dark.

Distribution: First described from Sri Lanka (Trincomale) and subsequently recorded from New Ireland. The present description from the Laccadive Sea is first from the seas around India.

Remarks: Cuvier (1829) described this species from east coast of Sri Lanka and subsequently Peters (1876) reported it from New Ireland. There does not seem to be any other authentic record of this species from anywhere else. De Beaufort and Briggs (1962) did not include this species. None of the available descriptions is adequate for correct identification of the species.

The present specimens conform the description of Cuvier (1829) except that according to him there are 11 rays in anal fin whereas in all present specimens there are 12 rays. It appears that Cuvier had a doubt with regard to the presence of at least very small antrorse preopercular spine but in present specimens there is no trace of such a spine.

Genus: **Thysanophrys** Ogilby, 1889

Thysanophrys Ogilby (1889). *Proc. Linn. Soc. N. S. W.*, 23: 40. (Type species: *Platycephalus cirronasus* Richardson).

Key to Species of Genus *Thysanophrys* from India

Anterior part of the supraorbital ridge smooth, posterior portion serrated; vertical rows of scales above lateral line 82–97.....*T. carbunculus*

supraorbital ridge completly serrated; vertical rows of scales above lateral lines about 68.....*T. cantori.*

Thysanophrys carbunculus (Valenciennes) (Pl. II C)

Platycephalus carbunculus Valenciennes (1833). *Hist. nat. Poiss.*, **9**: 461; De Beaufort and Briggs (1962). *Fish. Indo-Australian Archipel.*, 11.
Suggrundus carbunculus: Munro (1955). *Marine and freshwater fishes of Ceylon*, 253.

Material examined: 13 specimens 82-162 mm from Palk Bay and Gulf of Mannar near Mandapam; 1 specimen 102 mm from Bay of Bengal, ZSI F. 421/1; 6 specimens 77-139 mm SL from Arakan Coast (Burma), ZSI cat. 123.

Description: D. IX, 11-12; A. 12-13; P. 18-19; V. I. 5; Ll pored 51-55; vertical rows of scales above lateral line 82-97; L. tr. 9-11/1/25-29; G. R. 1+1+3–4.

Body depth 7.0-9.6 in SL; 9.1-10.1 in TL. Head 2.8-3.2 in SL; 3.4-3.9 in TL. Eye 3.4-4.2 head; 1.0-1.1 in snout. Teeth villiform, in two distinct oval patches on vomer, in two narrow bands on palatines. Maxillary reaches to below anterior border of pupil. Anterior nostril with a flap. A ridge on either side of median line between nostrils, bearing 1-2 spines. Anterior orbital rim with a short spine. Supraorbital ridge smooth anteriorly and serrated from above anterior border of pupil, serrations more prominent posteriorly; superior postorbital ridge with 3-4 spines, last one generally at a distance from others and slightly longer; inferior postorbital ridge with 5–6 spines, last one longer than others and in line with lateral line. Suborbital ridge with a spine at its beginning, one or two below middle of eye and three to four spines behind this, last one at the base of upper preopercular spine which is short, not reaching gill opening. Two small spines below upper preopercular spine. Opercle with two smooth ridges ending in spines. Opercle and preopercle scaly. A small simple tentacle on eye above middle of pupil. Lateral line smooth except for anterior 2-4 spiny scales. Subopercular flap not prominent.

First dorsal spine small, 2.00-2.30 in eye, third spine longest and equal to or slightly smaller than postorbital part of head. Pectoral rounded, 4.7-5.6 in SL; 5.7-6.7 in TL. Pelvics reach anal, 4.2-4.7 in SL; 5.1-5.6 in TL. Caudal rounded.

Colour: Body dark brown above and white below. Four broad dark brown bands on dorsal side: one near posterior end of spinous dorsal, another near beginning of second dorsal; third near posterior end of second dorsal and fourth one on caudal peduncle. These bands extend to sides also but divided into irregular blotches there. Two crossbands from eye over cheek, posterior broader than anterior, another band from preopercular angle below. Spinuous dorsal with abroad brown band distally; second dorsal and anal rays with brown spots. Pectoral with small spots on rays forming irregular crossbands. Pelvics with three or four rows of spots on rays and caudal with 4 cross bands.

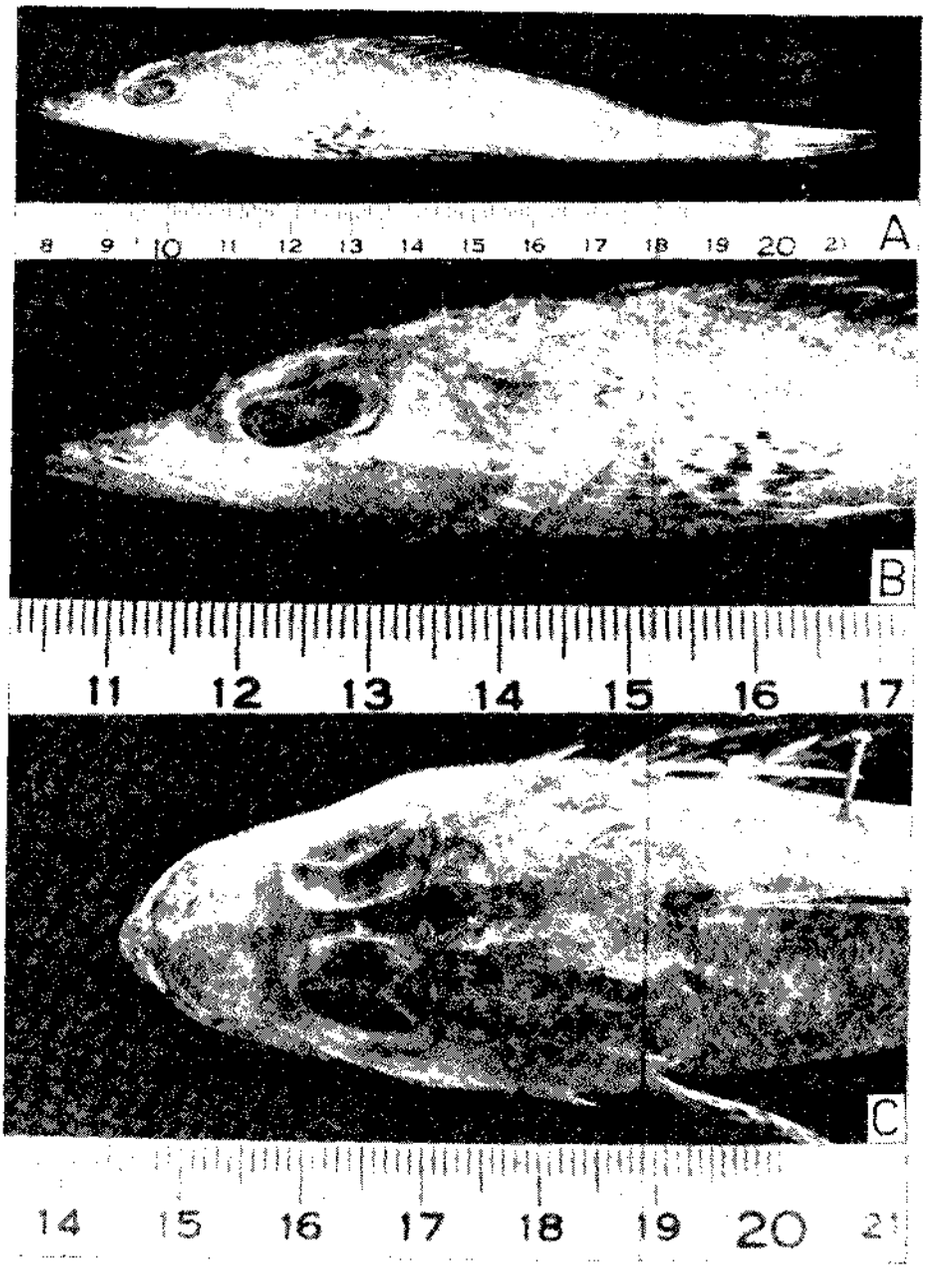

PLATE I. *Rogadius pristiger* (Cuvier) — A. Lateral view, B. Anterior lateral side enlarged to show the antrorse preopercular spine and C. Dorsal side of head.

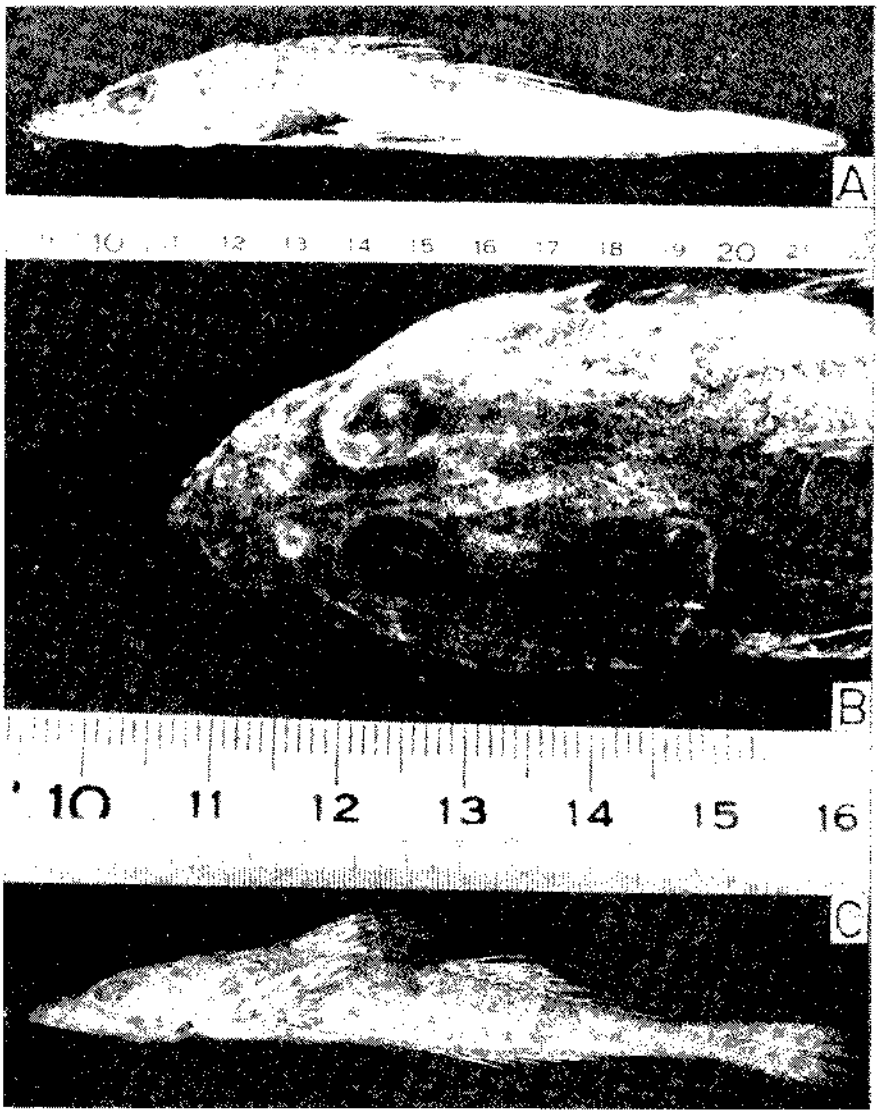

PLATE II A. *Wokiyus tuberculatus* (Cuvier) – lateral view. B. *W. tuberculatus* – dorsal view of head and C. *Thysanophrys carbunculus* (Valenciennes) – lateral view

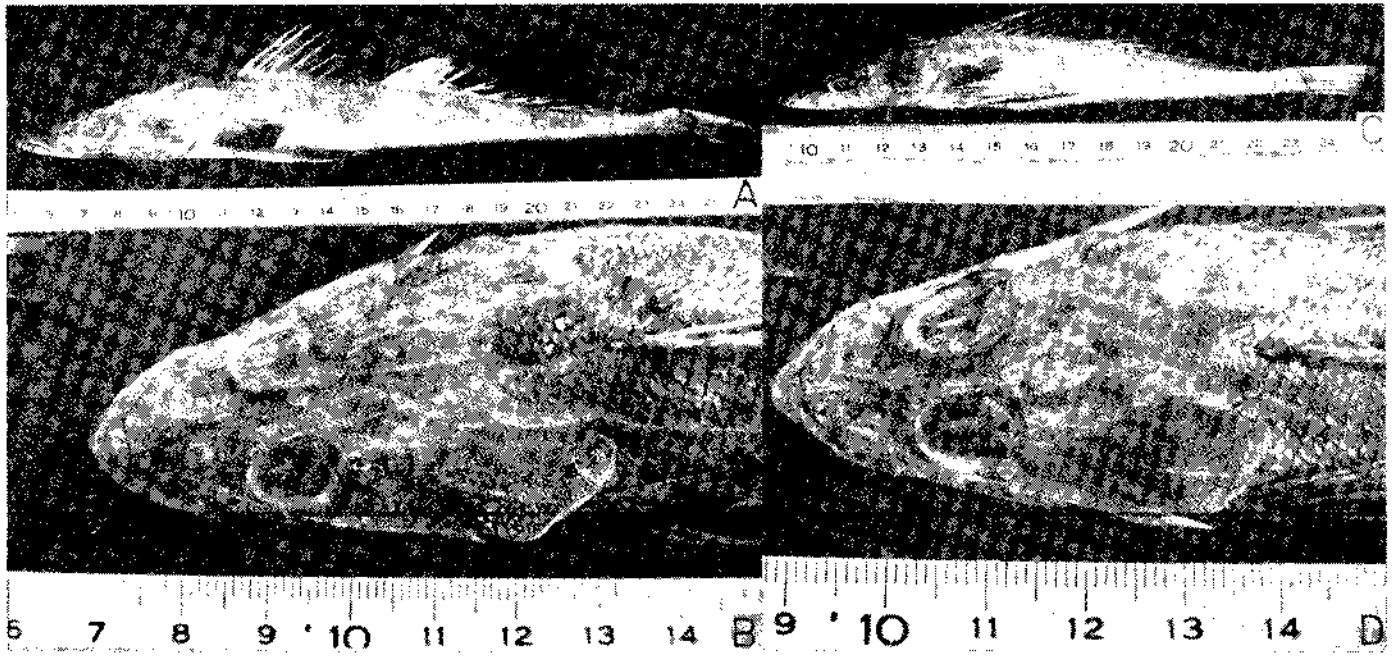

PLATE III A. *Grammoplites scaber* (Linnaeus) – lateral view. B. *G. scaber* – dorsal view of head. C. *Suggrundus rodericensis* (Cuvier) – lateral view and D. *S. rodericensis* – dorsal view of head.

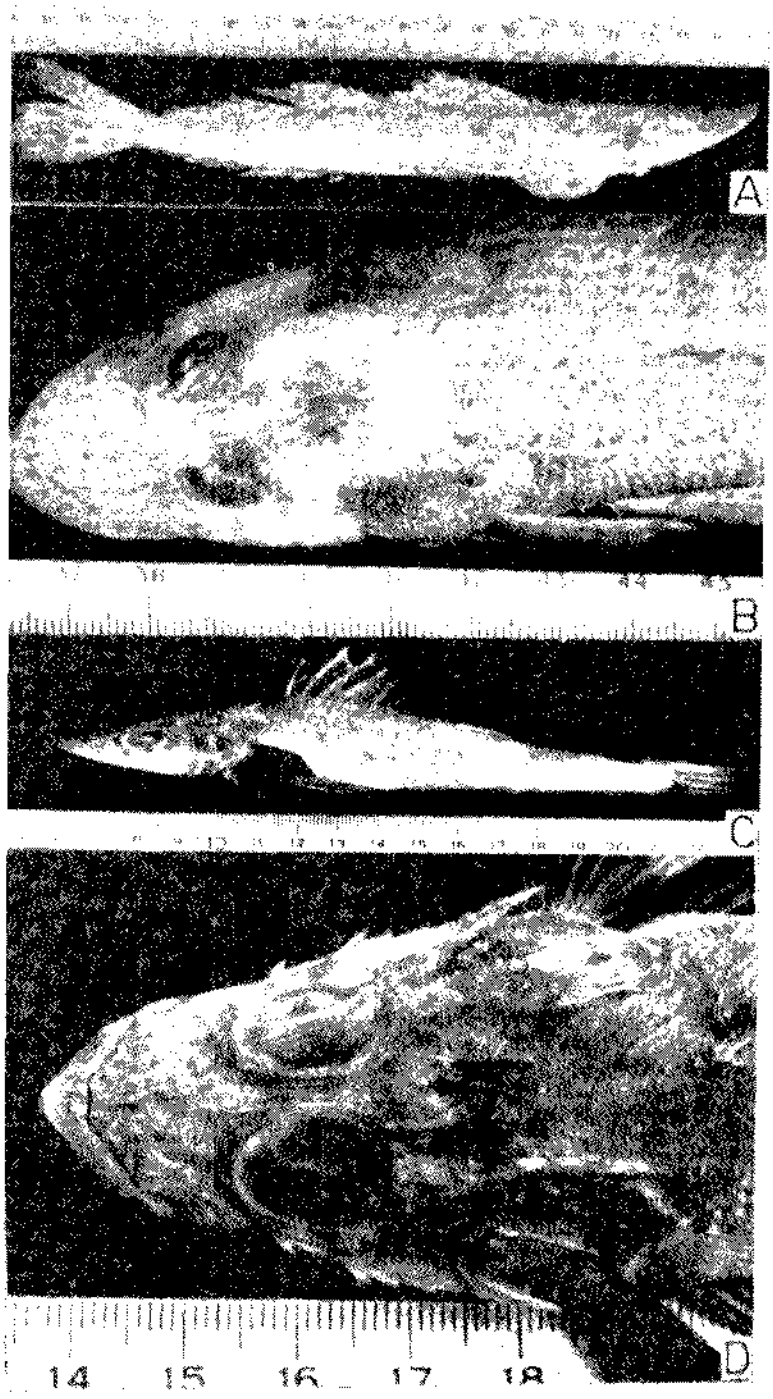

PLATE IV A. *Sutgrundus lysanthus* (Cuvier) – lateral view. B. *S. lysanthus* – dorsal view of head. C. *S. bengalensis* (Raut) – lateral view and D. *S. benaglensis* – dorsal view of head.

Distribution: Known from Singapore, Bintang, Banka, Java, Borneo, Celebes, Aru Islands, Tonkin and Bombay.

Remarks: Valenciennes (1833) first described this species from Bombay. So far there is no other report of this species from Indian Coast; present report is the first from Bay of Bengal and south east coast of India. Also this happens to be the first record for coast of Burma (ZSI Cat. 123.)

Of twenty specimens of this species examined only two specimens (199 mm SL from Arakan Coast, and 115 mm SL from Mandapam) have 13 rays in the anal and one specimen (137 mm SL from Mandapam) has 12 rays in the second dorsal which are different from counts given by Valenciennes for this species (D. IX, 11; A. 12). None of the authors gave any range for these counts, but for Bleeker (1878) who gave "11 (12)" and "12 (13)" for second dorsal and anal respectively. However, present specimens agree with *carbunculus* Valenciennes in all other essential characters.

De Beaufort and Briggs (1962) did not include *carbunculus* described by Munro (1955) under synonmy of this species. The description given by Munro is inadequate to come to any conclusion since it does not give the essential characters: tentacle on eye, serrations on head ridges, etc.

Thysanophrys cantori Bleeker

Platycephalus cantori Bleeker, (1878). *Verh Akad. Amsterdam* (Revision *Platycephalus)*, 19:26. De Beaufort and Briggs. *Fish. Indo-Australin Archipel.*, 11:149-151.
Platycephalus carbunculus: Cantor, 1849. *J. Asiatic Soc. Bengal,* 18: 1021; 1850. Valenciennes Day (1878). *Fish. India.* 278 *nec.* Valenciennes.
Platycephalus malabaricus: Günther. *Cat. Br. Mus,. II:* 181 (proparte) *(nec.* Cuvier).

Platycephalus carbunculus described by Cantor (1850) from Pinang was considered as a new species *P. cantori* by Bleeker (1878). Day (1878) followed Cantor in giving the description of what he called *P. carbunculus* Cuvier and Valenciennes and gave the distribution of this species as western coast of India to Malay Archipelago. De Beaufort and Briggs (1962) in a note under the description of *P. cantori* remarked that "It is not known whether Day saw the specimens of what he called *carbunculus* but his description resembles that of *carbunculus* of Cantor and hence referable to *cantori.*" They gave the distribution for this species as western coast of India, Madras and Pinnang.

The present author could not collect at least one specimen of this species from the Indian Coasts. It is possible that Day (1878) followed Cantor (1850) for the description of *carbunculus* and that on the basis of the report of *carbunculus* by Valenciennes from Bombay and that of Cantor from Pinang, gave the distribution as western coast of India to Malay Archipelago for his *Carbunculus* There is however no authentic report of *cantori* from India and its occurrence in the area is doubtful especially since "it is not known whether Day saw specimens of what he called *carbunculus".* Hence the occurrence of *cantori* from India needs confirmation.

Genus: **Grammoplites** Fowler, 1904

Grammoplites Fowler, 1904. *J. Acad. nat. Sci. Philadelphia,* 12:550. (Type species: *Cottus scaber* Linnaeus).

KEY TO SPECIES OF GENUS *GRAMMOPLITES* FROM INDIA

Upper preopercular spine long and strong reaching to gill opening; a black blotch posteriorly on the distal half of the spinous dorsal between 6th and 9th spines; the spines on the lateral line not very prominent especially posteriorly .....*Grammoplites maculipinna* (Regan)

Upper preopercular spine short not reaching gill opening, the distal half of spinous dorsal completely dark; the spines on the lateral line very prominent more so posteriorly.....*Grammoplites scaber* (Linnaeus)

Grammoplites maculipinna (Regan) 1905

Platycephalus maculipinna Regan, 1905. *J. Bombay nat. Hist. Soc.*, 16: 318–324; George, 1970. *J. mar. biol. Ass. India*, 10: 355–356.
Thysanophrys scaber: Flower, 1928. *J. Bombay nat. Hist. Soc.*, 33: 117.

Material examined: 12 specimens 175-270 mm from Neendakara (Kerala Coast); 2 specimens 127 and 175 mm from Bombay 1 specimen 240 mm from Alleppey Coast, ZSI F. 5352/2.

Description: D. IX, 12-13; A. 13; P. 21-23; V. I, 5; Ll pored 53-56; vertical rows of scales above lateral line 91-101; L. tr. 10-11/1/31-38; G. R. 1+1+6–7.

George (1970) gave a detailed description of this species.

Remarks: The specimens examined conform to the original description by Reagan (1905) in all characters: in only one specimen (175 mm from Bombay) the soft dorsal has 13 rays as against the count given by Regan (12) and in all the specimens examined by the present author.

Distribution: From Muscat (Gulf of Oman) through Bombay to Kerala Coast.

Grammoplites scaber Linnaeus (Pl. III A, B)

Cottus scaber Linnaeus (1785). *Syst. nat.*, ed. 10, 264.
Platycephalus scaber Day (1878). *Fish. India*, 275; De Beaufort and Briggs 1962. *Fish. Indo-Aust. Archipel.*, **11**: 140–142.
Grammoplites scaber Munro (1955). *Marine and fresh-water fishes of Ceylon*, 251.

Material examined: 10 specimens 105-182 mm from Palk Bay and Gulf of Mannar near Mandapam; 4 specimens 127-280 mm from Neendakara (Arabian Sea); 2 specimens 137, 180 mm from Madras; 2 specimens 152, 161 mm from Laccadives, ZSI F. 898/1, and 899/1; 3 specimens from Madras, ZSI 1858; ZSI 1852-55 (Day's collection); ZSI 1181/2 from Karaikal; ZSI F. 5146/2 from Cochin; ZSI F. 2208/1, 2210/1 from Orissa Coast; ZSI F. 532/2 from river Hooghly; ZSI 9121 from Pinang; ZSI 11217 from Orissa Coast; ZSI F. 1180/2 from Sankuppam and ZSI F. 1183/2 from Karaikal.

Description: D. IX, 12; A. 12-13; P. 19-22; V. I, 5; Ll pored 52-55; vertical rows of scales above lateral line 99-108; L. tr. 10-11/1/29-32; G. R. 1+1+4–6.

Body depth 9.33-13-87 in SL, 10.55-15.87 in TL. Length of head 2.97-3.42 in SL, 3.42-3.96 in TL. Head width 1.66-2.31 in its length; eye diameter 4.14-5.38 in head, 1-12-1.57 in snout. Interorbital space 1.80-3.50 in eye. Maxillary

reaches to below middle of eye; anterior nostril with a flap. Teeth villiform in two distinct oval patches on vomer and in two elongate bands on platines. Ridges between anterior nostrils with a spine on each, between these two ridges from posterior part, two smooth ridges extend parallel upto anterior part of interorbital. A strong pointed spine on anterior orbital rim. Supraorbital ridge smooth in its anterior half, serrated posteriorly and continued as fan-like diverging low ridges, central one forming superior postorbital ridge which has 3-6 spines. Inferior postorbital ridge with 5 spines at its beginning; 3 spines below anterior half of eye, one spine below middle of eye, one spine below posterior border of eye and 2-3 spines behind it, last one at base of upper preopercular spine which is short and does not reach gill opening, 1.16-2.50 in eye and 6.16-10.00 in head length; two small spines below it. Opercle with two smooth ridges ending in spines. Opercle and preopercle scaly. First dorsal spine small, third spine longest and equal to or slightly smaller than first ray of second dorsal. Height of anal slightly less than that of second dorsal. Pectorals rounded 6.93-8.51 in SL, 7.93-9.65 in TL. Pelvics 4.94-5.68 in SL, 5.58-6.56 in TL. Caudal rounded. Lateral line completely spiny, spines strong and very prominent posteriorly.

Colour: Brown above and light below, about 4 dark vertical bands on dorsal side which extend to sides also. First dorsal with minute dark spots and black on distal half. Second dorsal, anal, caudal and pectoral with small spots; pelvic dark with minute black pigment spots.

Distribution: Coasts of Natal and Zululand, Madagascar, Reunion, coasts of India, Sri Lanka, Singapore, Sumatra, Nais, Banka, Java, Borneo, Celebes and Sulu Islands. Enters estuaries also.

Genus: **Suggrundus** Whitly

Suggrundus Whitly (1930). *Mem. Queesland Mus.*, 10:26 (Type species: *Platycephalus rudis* Günther = *Platycephalus meerdervoorti* Bleeker).

Key to Species of Genus *SUGGRUNDUS* from India

18-24 anterior scales of lateral line spiny.....*Suggrundus rodericensis* (Cuvier)

Only 3-5 anterior scales of lateral line spiny vertical rows of scales above lateral line 62-67. D. IX, 11; suborbital ridge with 4-6 spines.....*Suggrundus malayanus* (Bleeker)

D. IX, 12; suborbital ridge with 3 spines .....*Suggrundus isacanthus* (Cuvier)

Vertical rows of scales above lateral line 72-81, no black spots on body, D. IX, 11; A. 12 .....*Suggrundus bengalensis* (Rao)

Vertical rows of scales above lateral line 92-109, several black spots on head and body, D. IX, 11-12; A. 11.....*Suggrundus crocodilus* (Tilesius)

Suggrundus rodericensis (Cuvier) (Pl. III C, D)

Platycephalus rodericensis Cuvier (1829). *Hist. nat. Poiss.*, 4:253. De Beaufort and Briggs (1962). *Fish. Indo-Australian Archipel.*, 11:144-145.

Platycephalus timoriensis Cuvier (1829). *Hist. nat. Poiss.*, 4:254.

Platycephalus macracanthus Bleeker (1878). *Verh. Akad. Amsterdam*, 19, (Revision *Platycephalus*): 22-23. Day (1878). *Fish. India*, 276.

Platycephalus scaber Günther (1868). *Cat. Br. Mus*, 2: 187 *(nec.* Linnaeus).
Thysanophrys macracanthus Fowler (1929). *J. Bombay nat. Hist. Soc.*, 33:117.
Suggrundus macracanthus Munro (1955). *Marine and Freshwater fishes of Ceylon*, 252

Material examined: 9 specimens 184-212 mm from Visakhapatnam; 6 specimens 130-183 mm from Kakinada; 10 specimens 100-188 mm from Madras; 1 specimens 155 mm from Madras, ZSI F, 2351/2; 1 specimen 156 mm SL from Karachi, ZSI F. 422/2 and 1 specimen 160 mm from Porto Novo, ZSI F. 1179/2.

Description: D. IX, 12-13; A. 12-13; P. 21-23, V. I. 5; Ll pored 51-57; Vertical rows of scales above lateral line 78-93; L. tr. 7-10/1/17-20; G. R. 1+1+5-7.

Body depth 7.50-10.85 in SL, 8.85-12.57 in TL. Head 2.86-3.68 in SL, 3.40-4.31 in TL. Width of head 1.09-1.85 in its length. Eye 3.15-4.54 in head, 1.11-1.27 in snout. Interorbital 2.33-3.76 in eye. Maxillary reaches to below anterior part of eye. Teeth villiform in two oval patches on vomer and in two elongate bands on palatines. Two spines one on either side of median line between anterior nostrils. A strong spine on anterior orbital rim. Supraorbital ridge smooth anteriorly with 4-5 spines on posterior portion. Superior postorbital ridge with two spines, one immediately behind eye and another at end of ridge. Inferior postorbital ridge with 4-5 spines. Suborbital ridge with a spine at beginning, one below middle of eye and 2-4 behind this ending at base of long and strong preopercular spine which reaches gill opening. Two short spines below longest preopercular spine. Inferior opercular ridge with 4-5 spines anteriorly, remaining portion smooth ending in a spine. A triangular skin flap on subopercle. Head completely rugose, with scales on opercle and preopercle; otherwise head naked. 18-24 scales of lateral line spiny. First dorsal spine short; third spine longest as long as or slightly longer than longest ray of the second dorsal. Pectorals rounded 6.58-7.63 in SL; 7.64-9.09 in TL. Pelvics 4.68-5.72 in SL; 5.48-6.45 in TL. Caudal more or less rounded.

Colour: Body dark brown above and light below. Four faint cross bands - one near posterior region of spinous dorsal another near middle of second dorsal, a band near posterior side of second dorsal and a band on caudal peduncle. Spinous dorsal dark with small scattered black spots. Second dorsal with black spots on rays. Pectoral black with small spots on rays. Pelvics dusky, anal pale, caudal black.

Distribution: Reunion, coats of India, Sri Lanka, Singapore, Ambon, Timor, Sulu Islands, Philippines and Formosa.

Remarks: Of 28 specimens examined, in only two of them (ZSI F. 2351/2 and 1179/2) there are 13 rays in the second dorsal fin. Type specimens of *rodericensis, timoriensis* and *macracanthus* have only 12 rays in second dorsal; all authors gave 12 rays consistantly for *rodericensis*. In two other specimens of *rodericensis* examined (196 and 202 mm from Visakhapatnam) there are 13 rays in anal whereas description and type specimens of *rodericensis* and *timoriensis* show only twelve rays. Type specimen of *macracanthus*, however, seems to have 13 rays in anal as also given by De Beaufort and Briggs (1962).

Suggrundus malayanus (Bleeker) 1853

Platycephalus malayanus Bleeker (1853), *Nat. Tij. Ned. Indie*, 5:498. *Verh. Akad. Amsterdam*, 19: 27-28; 1879. *Atlas Ichth.*, 9, tab, 419, fig. 2. De Beaufort and Briggs (1962). *Fish. Indo-Aust. Archipel.*, 11 : 152-153. Jones and Kumaran, 1971. *J. mar. biol. Ass. India*, 12:187-196.

Material examined: 9 specimens 64-169 mm from Kavarathi (Laccadives).

Description: D. IX, 11; A. 12; V. I, 5; Ll pored 52-56; vertical rows of scales above lateral line 62-67; L. tr. 8/1/28; G. R. 1 + 1 + 4-5.

The description is given by Jones and Kumaran (1971).

Distribution: Known from Queensland, New Guinea, Banda, Ambon, Philippines, Borneo and Java in the Pacific and from Padang (Sumatra) and Laccadives in the Indian Ocean.

Suggrundus isacanthus (Cuvier) 1829 (Pl. IV A, B)

Platycephalus isacanthus (Cuvier, 1829). *Hist. nat. Poiss.*, 4:246; Murty (1968). *J. mar. biol. Ass. India*, 10 (1): 126–132.

Material examined: 30 specimens ranging from 144-211 mm from Palk Bay and Gulf of Mannar on the southeast coast of India.

Description: D. IX, 12; A. 12; P. 19-20; V. 1,5; Ll pored 55-57; L. tr. 8-10/1/14-17; G. R. 1 + 1 + 3 - 4.

Distribution: West wards from Northern Australia and Waigeu through Philippines, Macao (south of Hong Kong) and Tourane (Vietnam) to Singapore and further west wards to the southeast coast of India (Mandapam).

Suggrundus bengalensis (Rao) 1966 (Pl. IV C, D)

Platycephalus bengalensis (Rao, 1966). *Ann. Mag. nat. His.*, Ser. 13; 9:123–127.

Material examined: 25 specimens 123-194 mm from Visakhapatnam and Kakinada 1 specimen 141 mm from Madras, 2 specimen (caudal fin broken) 89 mm S.L. from Tannesserim Coast of Burma.

Description: The following meristic data were taken (Table 1).

TABLE 1. *Meristic data of specimens from different localities*

Character	Localities		
	Visakhapatnam and Kakinada	Madras	Burma
Dorsal fin	IX, 11	IX, 11	IX, 11
Pectoral fin	19–20	19	19
Pelvic fin	1, 5	1, 5	1, 5
Anal fin	12	12	12
Ll pored	54–57	53	53
Vertical rows of scales above lateral line	77–83	81	81

Distribution: First recorded from Visakhapatnam. The present report extends the distribution southward to Madras and eastward to the Tanasserim Coast of Burma.

Remarks: The specimen of this species in the collections of Zoological Survey of India contains a label with the following details: *Platycephalus malayanus*

F. 423/2 off Tenasserim Coast of Burma "Endeavour" (Indian Survey) Sta. No. 396; 9–11–1911. Rao (1966) described this species for the first time on the basis of his collections from Visakhapatnam. Although the specimen from Burma was collected 55 years before the species was first described, the present report happens to be the first from Burma because the specimen was registered under a different name (*P. malayanus)* in the Zoological Survey of India.

Suggrundus crocodilus (Tilesius) 1812

Platycephalus crocodilus Tilesius, 1812. *Krusenstern's* Reise, Pl. 59, fig. 2.
Platycephalus punctatus Cuvier, 1829. *Hist. nat. Poiss.*, 4:243.
Platycephalus malabaricus Cuvier, 1829. *Ibid,* Day, 1865. *Fish Malabar*, 45.
Thysanophrys crocodilus Munro, 1955. *Marine and Freshwater fishes of Ceylon*, 253.

Material examined: 2 specimens 96, 189 mm from Tuticorin, 2 specimens 267, 268 mm from Visakhapatnam; 1 specimens 185 mm from Madras; 3 specimens 121, 241, 262 mm from Malabar (Day's collection) ZSI, Reg. No. 1849, 1850, 1851; 1 specimen 139 mm from Pillai Bay, Mergui Archipelago, ZSI No. 10946.

Description: D. IX, 11; A. 11; P. 18-22- V. I, 5; Ll. 54-58; vertical rows of scales above lateral line 92-109; L. tr. 11-13/1/24-33; G. R. 1 + 1 + 4–5.

Head length 2.91-3.16 in SL; 3.42-3.70 in TL; body depth 7.9-10.4 in SL, 9.25-12.1 in TL. Head width 1.66-2.18 in its length. Eye 3.84-4.85 in head; 1.22-1.50 in snout. Maxilla reaches to below anterior border of eye. Teeth villiform, arranged in two ovate patches on vomer and in two elongate narrow bands on palatines. Anterior nostril with a flap. Two spines between anterior nostrils. Two smooth ridges run parallel from between anterior nostrils upto beginning of interorbital space and then becomes indistinct. A strong spine on anterior orbital rim. Supraorbital ridges serrated posteriorly from behind middle of eye and end in a fan-like low radiating ridges behind eye and one of them on either side continued as superior postorbital ridge with a single spine. The inferior postorbital ridges with 5 spines each, last two elongate and last one ends at beginning of lateral line. Suborbital ridge with a spine in its begining, a spine below middle of eye and another below hind border of eye; behind this ridge is smooth, sometimes about three spines present ending in a long spine on preopercular angle. A single spine below this. Subopercular flap rather feeble. Opercle with two smooth ridges each ending in a spine. Preopercle and opercle scaly. 14–16 rows of scales before dorsal. First dorsal spine short and third spine longest; second dorsal higher than anal. Pectorals rounded 5.66-6.57 in SL, 6.61-7.65 in TL. Pelvics 4.25-5.34 in SL, 4.84-6.23 in TL.

Colour: Body reddish brown above, light below. Dorsal side of head and body with several black dots which extend to sides also. 2-3 broad dark bands on dorsal side. Outer three fourths of spinous dorsl black. Rays of soft dorsal with small black spots; pectoral rays with black spots which form irregular bands; pelvics black; anal whitish; caudal dark with two or three longitudinal black bands.

Distribution: The known distribution of this species extends from coasts of New Guinea westward through Japan, Philippines, Ambon, Timor, North Celebes, Borneo Java and Banka to Singapore in the Pacific and from Nias, Andaman Sea, coats of Sri Lanka and India, Madagascar, Natal and Zululand in the Indian Ocean.

Remarks: The present specimens conform to the original descriptions of *Platycephalus punctatus* Cuvier and *Platycephalus malabaricus* Cuvier in all respects

but differ in the soft dorsal and anal fin rays. Counts of these fins for above two species as given by Cuvier 12 and 12 respectively whereas in all the present specimens 11 and 11. Day (1878) gave D. 1/8/12; A. 11-12, while there are 11 rays each in second dorsal and anal fins in specimen of his collection in the Zoological Survey of India.

All the meristic counts of the specimens in the present study agree with Matsubara and Ochiai (1955) but according to them the "interopercular flap" is absent which character they have utilised even to distinguish genera; in all the present specimens this flap *is* present though rather feeble.

Other than the thirteen species dealt with in the present paper the following twelve species (not so far recorded from the Indian Seas) are known to occur in the Indian Ocean region. No attempt was made to study the descriptions of these species so as to refer them to different genera; they are given under the generic name *Platycephalus*.

Platycephalus longiceps Cuvier (Singapore, Java, Delagoa bay, Mozambique, Zanzibar and Red Sea)
P. bataviensis Bleeker (Singapore)
P. sundaicus Bleeker (Singapore, Sumatra, Java)
P. boschei Bleeker (Singapore)
P. nematophthalmus Günther (Singapore, western Australia)
P. nigripinnis Regan (Muscat)
P. towensendi Regan (Karachi, Muscat)
P. subfasciatus Günther (Muscat)
P. pristis Peters (Mozambique)
P. grandideri Sauvage (Madagascar, Durban)
P. portuguesus Smith (Mozambique)
P. borboniensis Sauvage (Madagascar)

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