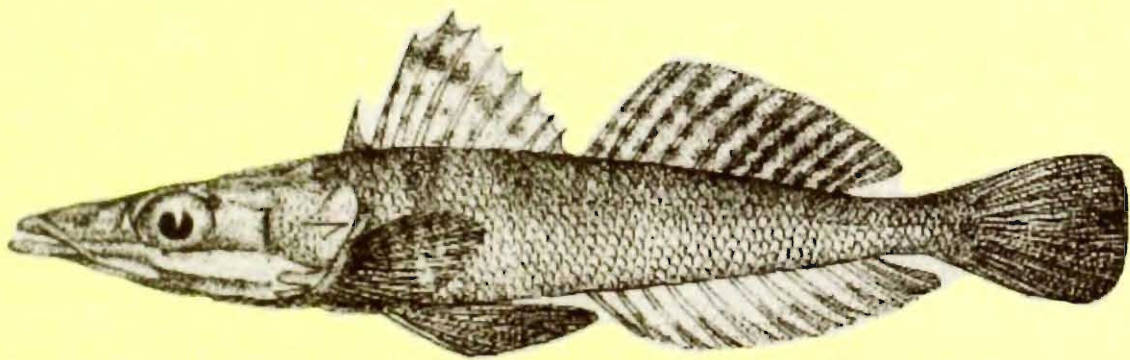


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**TAXONOMIC REVISION OF THE FLATHEADS
(PLATYCEPHALIDAE : PISCES)
OF INDIA**

**V. SRIRAMACHANDRA MURTY
Y. MANIKYAM**



ZOOLOGICAL SURVEY OF INDIA

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OF THE
ZOOLOGICAL SURVEY OF INDIA**

**Taxonomic Revision of the Flatheads
(Platycephalidae : Pisces) of India**

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INTRODUCTION

The fishes of the family Platycephalidae are restricted (excluding one species each in the Atlantic and Mediterranean, see Knapp, 1981) to the Indo-Pacific, represented by a total of about 70 valid species. A perusal of the literature on the taxonomy shows that excepting a few instances (e.g. Matsubara and Ochiai, 1955; De Beaufort and Briggs, 1962; Schultz, 1966; Murty, 1982; Knapp 1973, 1987), attention has not been paid either to examine adequate number of specimens or to study the important characters (e.g. the ridges on head) that provide the basis for distinguishing genera/species in the family. As is well known, the earlier authors, particularly the original authors, did not provide adequate descriptions of the species in most cases. Further, several genera were erected on inadequate grounds. Consequently, some authors preferred to include all the species under a single genus : *Platycephalus* (e.g. De Beaufort and Briggs, 1962; Talwar and Kacker, 1984) while in several instances the species were assigned to genera with uncertainty. Though the few taxonomic studies in the recent past (Matsubara and Ochiai, 1955; De Beaufort and Briggs, 1962; Murty, 1982; Kuitert, 1994; Imamura, 1996) added considerably to the knowledge of the family, there is still need for further research since it has been noticed that :

- i. the classification of the family into different genera is still in confusion,
- ii. the type specimens of all the nominal species in the family, particularly those of the type species of various nominal genera, were not redescribed subsequently (except De Beaufort and Briggs, 1962, who examined and prepared *some* species descriptions on the basis of type material) leading to problems of inadequate understanding of the valid genera, species and their synonyms,
- iii. there are practically no biometric data of individual species from particular localities based on adequate samples, to facilitate comparison of material from different localities either for determination of geographic variation or for understanding whether infraspecific categories exist, and
- iv. as revealed by certain recent studies, lack of fresh material for research and too much of dependence on a few specimens in the museum collections also contributed significantly to the inadequacies in the understanding of genera and species.

In the light of the above, a revision of the family from India has been undertaken using fresh collections and the results are presented in this paper.

MATERIAL AND METHODS

Specimens for the present study were largely collected from the commercial trawl landings during 1986-1988 from off Kakinada (Andhra Pradesh). Specimens were also collected from other landing centres along the country's mainland coast and Lakshadweep Islands. Moreover, the specimens in the collections of the Zoological Survey of India (ZSI), Kolkata and those in the Reference Collection Museum of the Central Marine Fisheries Research Institute (CMFRI) at Mandapam Camp, were also examined.

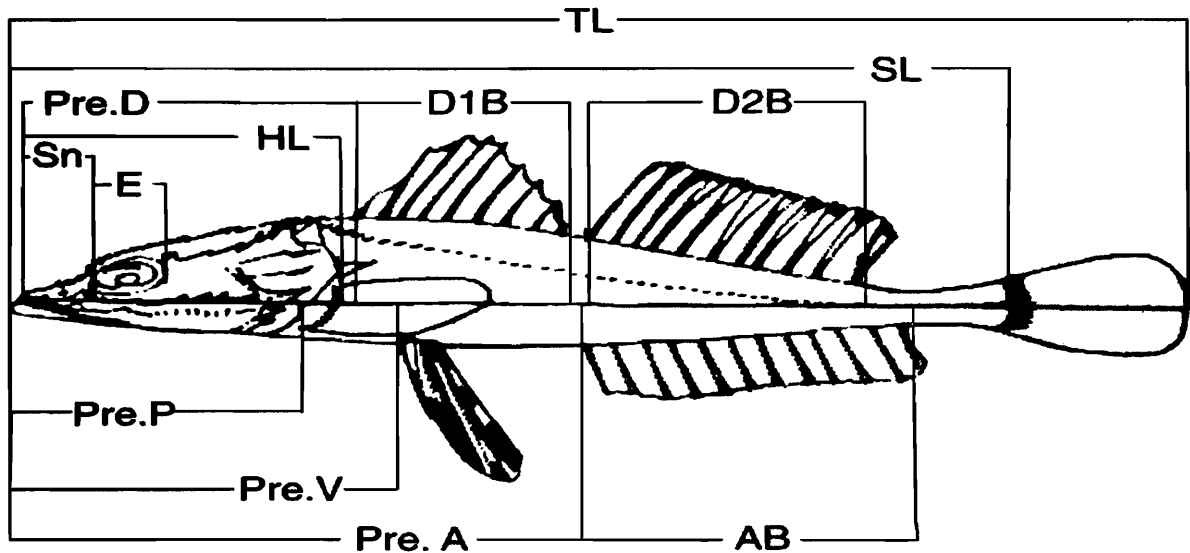
The relevant type specimens in the British Museum Natural History (BMNH) London, National Museum of Natural History (RMNH) Leiden, were examined and, the data on types in the National Museum of Natural History (MNHN) Paris obtained earlier (Murty, 1982) were utilised.

After noting the fresh colour and pigmentation in the landing place, the specimens were injected 5% formalin and preserved for further studies. In the laboratory, all relevant biometric data of specimens from different localities separately, were taken. After taking the biometric data, the belly was cut open to note the sex.

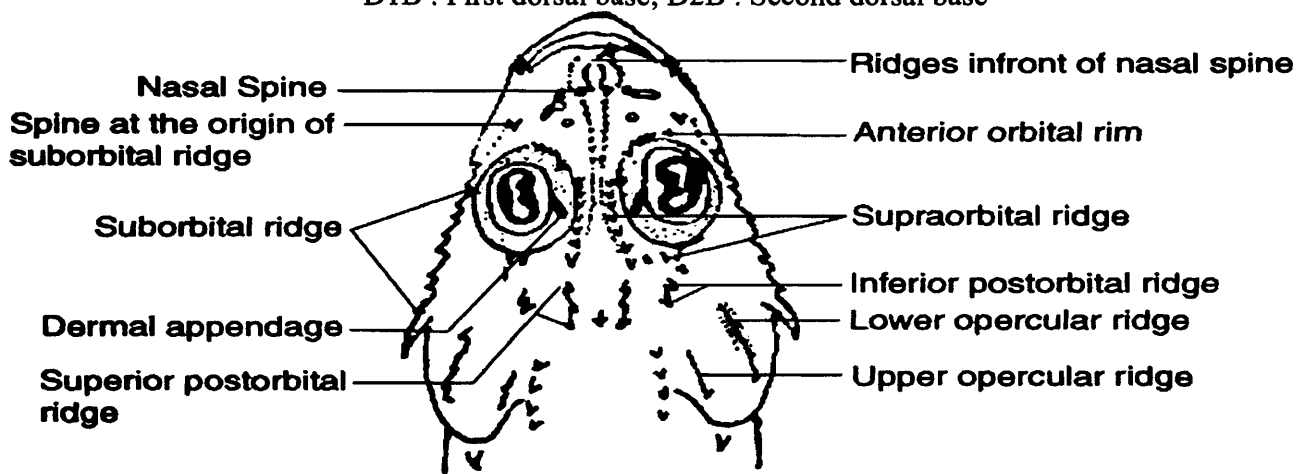
In taking meristic and morphometric data, the methodology of Hubbs and Lagler (1958) was followed; all the linear measurements were made in the median longitudinal axis (Fig. 1a). Examination of the ridges on head and the counts of scales and fin rays were always made under a binocular stereozoom microscope. For uniformity, counts of pectoral rays, pelvic rays, lateral line scales and gill rakers in the first gill arch were made on the left side. Lateral line scale count represents the number of pored scales. L.tr shows the count of scales in a row from the origin of first dorsal obliquely backwards to the lateral line plus the scale in lateral line plus the scales in a row from the anal origin obliquely forwards to the lateral line. In describing the various ridges and spines on the head, different nomenclatures were followed by the earlier authors. In the present work, the nomenclature followed by De Beaufort and Briggs (1962) and Murty (1982) was adopted; the details are shown in figure 1b. The abbreviations of Hubbs and Lagler (1958) were used for various meristic characters except pectoral and pelvic fins, which are cited as P and V respectively. In the pectoral, the unbranched rays are indicated by lower case Roman numerals and branched rays by Arabic numerals (e.g. P.ii, 14, iii meaning the presence of two unbranched rays above, followed by fourteen branched rays and three unbranched rays below, in the pectoral fin). The count of caudal fin rays is that of all the branched rays plus two unbranched rays one above and the other below. The number of gill rakers is shown as for example 2+1+4 meaning that there are two gill rakers on the upper limb, one in the angle and four on the lower limb (Fig. 1c). Under each species description, the material examined is shown as:

Material examined : Only specimens shown against this were used for the description.

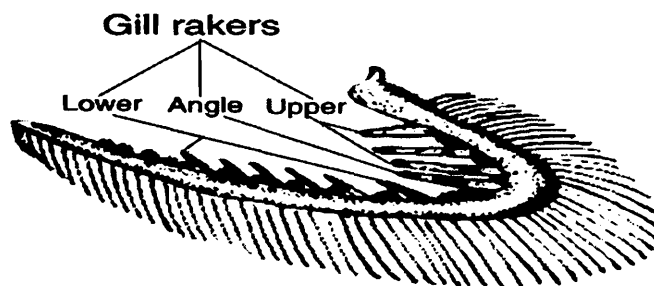
Additional material examined : Specimens collected from localities other than those mentioned in the "Material examined" and those examined in the museums of ZSI and CMFRI are shown against this. The data of these specimens were used for comparisons where necessary.



a. Showing measurements taken TL : Total length; SL : Standard length; HL : Head length; E : Eye diameter; Sn : Snout length; Pre. P : Prepectoral length; Pre. V : Prepelvic length; Pre. A. : Preanal length; AB : Length of anal base; D1B : First dorsal base; D2B : Second dorsal base



b. Dorsal view of head showing different ridges and spines



c. Outer gill arch

Fig. 1 A typical flathead

Certain body proportions, for each species, are expressed as percentage of standard length and certain proportions in the head as percentage of head length, the means are given in parentheses following the range for each proportion (the expressions used are head for head length, depth for highest body depth, predorsal for predorsal length, prepectoral for prepectoral length, prepelvic for prepelvic length, preanal for preanal length, pectoral for pectoral fin length, pelvic for pelvic fin length, caudal peduncle for least depth of caudal peduncle, eye for horizontal eye diameter and snout for snout length).

Colour description was always based on specimens just landed; however, specimens of certain species were not available in fresh condition, in such cases colour descriptions were made from formalin-preserved specimens.

Always the original description of each species and the descriptions by all later authors were consulted for purpose of identification of a species. Additionally, as far as possible, the original and subsequent descriptions of the nominal species considered as junior synonyms of a valid species by earlier workers were also consulted. Under each species description, the original reference is cited; the complete list of synonyms is not given but all references from India and the references of certain nominal species which are considered as junior synonyms in the present work are given. The classification adopted by Nelson (1976) is followed.

THE GENERA OF FLATHEADS

A large number of genera were described in the family (Table 1). According to Smith (1953:377) "Numerous genera have been proposed, but no competent review of the family has established them"(p. 317). Munro (1955) included eight Sri Lankan species under four genera. Reviewing the work on the taxonomy of Platycephalidae particularly with reference to the genera from Japan, Matsubara and Ochiai (1955) observed that: "there is no concert of opinions among ichthyologists respecting the taxonomy of this group"(p.2). They, however, referred the ten species described by them to eight genera. According to De Beaufort and Briggs (1962: 128) "The genus *Platycephalus* has been divided into a number of genera by recent authors but the general habitus of all species is so alike, that I [*sic*] prefer to keep them in one genus." Marshall (1964) described sixteen species under four genera from Great Barrier Reef and coastal waters of Queensland. According to Schultz (1966:45) "the identification of species referable to this family is extremely difficult because there are numerous names available without adequate figures and descriptions, especially of the cranial ridges and spines, also lacking are important counts of the scales and fin rays" Munro (1967) included the thirteen species from New Guinea under eight genera. According to Hughes (1981) "little agreement on the validity of various genera and subgenera has been found in previous works" in the family Platycephalidae. Murty (1982) tentatively referred twelve Indian species to six genera. Talwar and Kacker (1984) referred all the species to the single genus *Platycephalus*. Masuda *et al.* (1984) described twelve species under nine genera from Japan. Knapp (1983) included twentyfour species from the western Indian Ocean

region under ten genera. According to Knapp (1986: 482), there are “approximately 12 genera with a total of 60 species;” in the family; he included the eleven species from South Africa under seven genera. Imamura (1996) recognised seventeen genera (including the three newly described by him) of the family as valid and Eschmeyer (1998) listed twenty genera as valid.

The literature shows that even the type species of several genera were referred to other genera even after establishing those particular genera and with inadequate or no justification. This is the situation in regard to all the type species of all the genera with the exception of *Kumococius* Matsubara and Ochiai, 1955; *Papilloculiceps* Fowler and Steinitz, 1956; and the three genera erected by Imamura (1996). The literature also reveals that each of the species was included under different genera by different authors in most cases without offering any reason. Even the species belonging to very distinct and well-defined genera like *Rogadius* Jordan and Richardson, 1908 and *Grammoplites* Fowler, 1904 were referred to other genera. The lack of consistency in assigning species to genera appears to be the consequence of erecting several genera (Table 1), in most cases on inadequate grounds. This being the background, it was thought that a study of the available descriptions of all the type species and examination of their type specimens (wherever possible) would help refer at least the Indian species to their respective genera with reasonable accuracy. The lack of data on the type specimens of the type species of some genera and the limitations in obtaining the type specimens of all type species, proved to be a handicap in making objective assessment of the status of certain genera. Nevertheless, an attempt has been made to understand the characters of the genera and determine the valid genera with the hope that this work would facilitate intensive studies from wider geographical areas in the regions of distribution of this family.

Genera with forked caudal fin

The platycephalids fall under two major categories; one possessing a forked caudal fin and the other without such a fin. In the former category, there are two genera : *Elates* Jordan and Seale, 1907 and *Hyalorhynchus* Ogilby, 1910. The genus *Hyalorhynchus* is a junior synonym of *Elates* Matsubara and Ochiai, 1955.

Genera without forked caudal fin

In the category of platycephalids without a forked tail, there are two major groups : one having a deep depression (pit) behind eye and the other without such a depression. The species of the genus *Cymbacephalus* Fowler, 1938 (Plate IA) fall under the first group and this character alone provides the basis to recognise this genus as distinct and valid.

In the group of flatheads without a deep pit behind eye, two major subgroups are recognised: one having vomerine teeth in a continuous band and the other having the same in two separate patches.

Table 1 : Genera/sub genera of the family Platycephalidae and the type species

Sl. No.	Genera	Type species
1.	<i>Platycephalus</i> Bloch, 1795	<i>Platycephalus spathula</i> Bloch, 17 = <i>Callionymus indicus</i> Linnaeus, 1758
2.	<i>Calliomorus</i> Lacépède, 1800	<i>Callionymus indicus</i> Linnaeus, 1758
3.	<i>Centranodon</i> Lacépède, 1803	<i>Centranodon japonicus</i> Lacépède 1803 = <i>Callionymus indicus</i> Linnaeus, 1758
4.	<i>Neoplatycephalus</i> Castelnau, 1872	<i>Neoplatycephalus grandis</i> Castelnau, 1872 = <i>Platycephalus richardsoni</i> Castelnau 1872
5.	<i>Thysanophrys</i> Ogilby, 1898	<i>Platycephalus cirronasus</i> Richardson, 1848
6.	<i>Grammoplites</i> Fowler, 1904	<i>Cottus scaber</i> Linnaeus, 1758
7.	<i>Elates</i> Jordan and Seale, 1907	<i>Elates thompsoni</i> Jordan and Seale, 1907 = <i>Platycephalus ransonneti</i> Steindachner, 1876
8.	<i>Rogadius</i> Jordan and Richardson, 1908	<i>Platycephalus asper</i> Cuvier, 1829
9.	<i>Hyalorhynchus</i> Ogilby, 1910	<i>Hyalorhynchus pellucidus</i> Ogilby, 1910 = <i>Platycephalus ransonneti</i> Steindachner, 1876
10.	<i>Inegocia</i> Jordan and Thompson, 1913	<i>Platycephalus japonicus</i> Tilesius, 1812
11.	<i>Onigocia</i> Jordan and Thompson, 1913	<i>Platycephalus macrolepis</i> Bleeker, 1854
12.	<i>Wakiyus</i> Jordan and Hubbs, 1925	<i>Platycephalus spinosus</i> Temminck and Schlegel, 1842
13.	<i>Ratabulus</i> Jordan and Hubbs, 1925	<i>Thysanophrys megacephalus</i> Tanaka, 1917
14.	<i>Suggrundus</i> Whitley, 1930*	<i>Platycephalus rudis</i> Gunther, 1880 = <i>Platycephalus meerdervoorti</i> Bleeker, 1860
15.	<i>Cacumen</i> Whitley, 1931a	<i>Platycephalus speculator</i> Klunzinger, 1872
16.	<i>Repotrudis</i> Whitley, 1931b**	<i>Platycephalus macracanthus</i> Bleeker, 1867 = <i>Platycephalus rodericensis</i> Cuvier, 1829
17.	<i>Leviprora</i> Whitley, 1931b	<i>Platycephalus inops</i> Jenyns, 1840
18.	<i>Planiprora</i> Whitley, 1931b	<i>Platycephalus fuscus</i> Cuvier, 1829
19.	<i>Trudis</i> Whitley, 1931b	<i>Platycephalus bassensis</i> Cuvier, 1829
20.	<i>Longitrudis</i> Whitley, 1931b	<i>Platycephalus longispinis</i> Macleay, 1884
21.	<i>Levanaora</i> Whitley, 1933	<i>Platycephalus isacanthus</i> Cuvier, 1829
22.	<i>Sorsogona</i> Herre, 1934	<i>Sorsogona serrulata</i> Herre, 1934 = <i>Platycephalus tuberculatus</i> Cuvier, 1829
23.	<i>Colefaxia</i> Whitley, 1935**	<i>Platycephalus macrodon</i> Ogilby, 1885 = <i>Platycephalus richardsoni</i> , Castelnau, 1872
24.	<i>Cymbacephalus</i> Fowler, 1938	<i>Platycephalus nematophthalmus</i> Günther, 1860
25.	<i>Cociella</i> Whitley, 1940***	<i>Platycephalus crocodilus</i> Tilesius, 1812
26.	<i>Cumbel</i> Whitley, 1952	<i>Platycephalus haackei</i> Steindachner, 1883
27.	<i>Kumococius</i> Matsubara and Ochiai, 1955	<i>Inegocia detrusus</i> Jordan and Seale, 1905a
28.	<i>Papilloculiceps</i> Fowler and Steinitz, 1956	<i>Platycephalus grandideri</i> Sauvage, 1873
29.	<i>Eurycephalus</i> Imamura, 1996	<i>Thysanophrys arenicola</i> Schultz, 1966
30.	<i>Ambiserrula</i> Imamura, 1996	<i>Insidiator jugosus</i> McCulloch, 1914
31.	<i>Solitas</i> Imamura, 1996	<i>Platycephalus gruveli</i> Pellegrin, 1905

* Whitley (1930), gave a new name *Suggrundus* for the genus with the same type species as the genus name *Insidiator* Jordan and Snyder (1900) is preoccupied.

** Originally erected as subgenus

*** Whitley (1940) gave a new name *Cociella* for the genus with the same type species, as the genus name *Cocius* Jordan and Hubbs (1925) is preoccupied

Genera with single band of teeth on vomer

The species of 8 genera : *Platycephalus* Bloch, 1795; *Calliomorus* Lacépède, 1800; *Centranodon* Lacépède, 1803; *Neoplatycephalus* Castelnau, 1872; *Cacumen* Whitley, 1931a; *Planiprora* Whitley, 1931b; *Trudis* Whitley, 1931b; *Longitrudis* Whitley, 1931b; and the subgenus *Colefaxia* Whitley, 1935, fall under this subgroup.

The genus *Platycephalus* Bloch with its type species *Platycephalus spathula* Bloch, 1795 (= *Callionymus indicus* Linnaeus, 1758) is characterised by a crescent-shaped band of teeth on the vomer. This species is also characterised by the lower preopercular spine being longer than the upper. Lacépède (1800, 1803) erected the genera *Calliomorus* and *Centranodon* with *Callionymus indicus* Linnaeus and *Centranodon japonicus* Lacépède (= *C. indicus* Linnaeus) respectively as type species. Since the type species of these genera and that of the genus *Platycephalus* Bloch are conspecific, the above two genera are synonyms of *Platycephalus* Bloch.

Castelnau (1872, p. 87) created the genus *Neoplatycephalus* with *N. grandis* Castelnau as its type species. According to Paxton *et al.* (1989) *N. grandis* is a junior synonym of *Platycephalus richardsoni* Castelnau 1872 (p. 82). Whitley (1931a) erected the genus *Cacumen* but later (Whitley, 1935) treated it as a synonym of *Neoplatycephalus*. Whitley, (1935), described *Colefaxia* for *Platycephalus macrodon* Ogilby, 1885; this species was later (Whitley, 1952) shown to be a synonym of *P. richardsoni* Castelnau. According to Castelnau (1872:87) *Neoplatycephalus* is a “Form of *Platycephalus*, but distinguished by the dentition” This genus is characterised by the presence of large canines in jaws, vomer and palatines; on the basis of this single difference from *Platycephalus*, *Neoplatycephalus* cannot be treated as a valid genus. Knapp (1987) treated *Neoplatycephalus* Castelnau as subgenus of *Platycephalus* Bloch. However according to Paxton *et al.* (1989) these two are congeneric.

The remaining three genera in this group : *Planiprora* Whitley, 1931b; *Trudis* Whitley, 1931b and *Longitrudis* Whitley, 1931b, were not adequately defined. The characters of these genera briefly mentioned (interorbital sunken, broader than transverse diameter of eye in *Planiprora*; lower preopercular spine considerably longer than upper, no enlarged teeth in jaws in *Trudis*; and lower preopercular spine more than twice the length of the upper, teeth small and uniform size in *Longitrudis*) suggest that they can only be, if at all, important at species level. Further, the statements :

- lower preopercular spine “considerably longer than upper” in *Trudis* and “more than twice the length of upper” in *Longitrudis* and
- “no enlarged teeth in jaws” in *Trudis* and “teeth small and of uniform size” in *Longitrudis* by Whitley (1931b : 327) suggest that there is no difference worth considering at genus level between them and that these two genera are synonymous, *Trudis* being the senior. Since teeth in the jaws are not enlarged and lower preopercular spine is longer than upper in *Platycephalus* also, the genus *Trudis* Whitley is only a synonym of *Platycephalus* Bloch.

Platycephalus fuscus Cuvier (type of the genus *Planiprora*), according to the original description, is characterised, among others, by the two preopercular spines being nearly equal in length. The figure given by Gregory (1933 : 333, fig. 211) however, shows that the lower preopercular spine is longer than the upper and a few enlarged teeth in the upper jaw. Günther (1872) described *P. cinereus* from southern Australia; Mc Culloch (1929) treated it as a queried synonym of *P. fuscus* Cuvier, 1829. There are caniniform teeth in the vomer and palatines in the type specimen of *P. cinereus* in the British Museum. These characters suggest that the genus *Planiprora* Whitley is a synonym of *Platycephalus* Bloch.

Thus, of the eight genera and one subgenus described under the category of flatheads having a single band of teeth in the vomer, only the genus *Platycephalus* is valid.

Genera with two separate patches of teeth on vomer

The species of the 19 genera : *Thysanophrys* Ogilby, 1898; *Grammoplites* Fowler, 1904; *Rogadius* Jordan and Richardson, 1908; *Inegocia* Jordan and Thompson, 1913; *Wakiyus* Jordan and Hubbs, 1925; *Onigocia* Jordan and Thompson, 1913; *Ratabulus* Jordan and Hubbs, 1925; *Suggrundus* Whitley, 1930 (replacing *Insidiator* Jordan and Snyder, 1900, which is preoccupied); *Repotrudis* Whitley, 1931b; *Leviprora* Whitley, 1931b; *Levanaora* Whitley, 1953; *Sorsogona* Herre, 1934; *Cociella* Whitley, 1940 (replacing *Cocius* Jordan and Hubbs, 1925, which is preoccupied); *Cumbel* Whitley, 1952; *Kumococius* Matsubara and Ochiai, 1955; *Papilloculiceps* Fowler and Steinitz, 1956; *Eurycephalus* Imamura, 1996; *Solitas* Imamura, 1996 and *Ambiserrula* Imamura, 1996, belong to the category of platycephalids having two patches of teeth on vomer. The fishes of this subgroup can be further divided into three on the basis of the suborbital ridge being :

- finely serrate,
- completely smooth, or
- armed with varying number of spines at distances

Genera with finely serrate suborbital ridge

The species of the genera *Rogadius* Jordan and Richardson, *Sorsogona* Herre and *Ambiserrula* Imamura belong to this category. *Rogadius* is distinct from the other two genera in having a well-defined antrorse preopercular spine.

The diagnostic characters of *Ambiserrula* are : "Dorsal surface of head with spines only; suborbital ridge finely serrated; lateral line scales about 50, with two exterior openings posteriorly; iris lappet long branched; ocular flaps absent, interopercular flap present, sensory tubes on cheek region well-developed" (Imamura, 1996 : 215). The number of lateral line scales being "about 50" is also seen in species of *Rogadius*, *Sorsogona* and *Inegocia* (Table 7). It has also been observed that the shape of the iris lappet is not useful for classifying genera. Similarly the presence or absence of ocular flaps is also not valid for classifying genera because of the intraspecific variation. In regard to the presence of "well-developed

sensory tubes” in the cheek region, all the known species of the family from India reveal that they are similar in all of them and it is difficult to distinguish genera on the basis of this character, particularly since the expressions “well-developed” and “not well-developed” are not totally objective and therefore could lead to confusion. Hence it was believed reasonable to treat *Ambiserrula* Imamura as a synonym of *Sorsogona* Herre. On available knowledge, hence, the species with finely serrate suborbital ridge and antrorse preopercular spine are referable to the genus *Rogadius* and those with finely serrated suborbital ridge but without antrorse preopercular spine to the genus *Sorsogona*.

Genera with smooth suborbital ridge

The type species of the genera *Thysanophrys* Ogilby, *Papilloculiceps* Fowler and Steinitz, *Leviprora* Whitley and *Cumbel* Whitley possess smooth suborbital ridge. The first two genera are characterised by the presence of dermal appendages on the skin above eye (also called as ocular cirrus, orbital tentacle or tentacle on eye) in *Papilloculiceps*, and above and below the eye in *Thysanophrys*. The differences between them do not warrant considering them as belonging to different genera on available evidence.

The two characters taken into account to erect the genus *Leviprora* Whitley are : “no exposed bony ridges on upper surface of cranium; eye larger than interorbital” According to Günther (1860 : 180), “the praeopercular [*sic*] spines are very short and inconspicuous, of equal length, the lower one rounded off almost to nothing” in *P. inops* Jenyns (1840) which is the type species of the genus *Leviprora*. The expressions “of equal length” and “the lower one rounded off almost to nothing” in regard to the two preopercular spines in *P. inops* by Günther (1860) are clearly contradictory. According to Kuiter (1994), “each preopercle with two spines at angle” in *P. inops*. Whitley (1952) erected the genus *Cumbel* for *P. haackei* Steindachner (1883). However, *P. haackei* is a synonym of *L. inops* (see Kuiter 1994) and therefore the genus *Cumbel* Whitley is a synonym of *Leviprora* Whitley.

The characters of the genera *Leviprora* and *Thysanophrys* as detailed above do not provide adequate basis for treating them as distinct. Schultz (1966) already treated these two as synonyms. Hence, *Thysanophrys* Ogilby seems to be the only valid genus under the category of species with smooth suborbital ridge.

Genera with the suborbital ridge having spines at distances

The remaining 12 genera : *Grammoplites* Fowler, 1904; *Inegocia* Jordan and Thompson, 1913; *Onigocia* Jordan and Thompson, 1913; *Wakiyus* Jordan and Hubbs, 1925; *Ratabulus* Jordan and Hubbs; *Suggrundus* Whitley, 1930; *Repotrudis* Whitley, 1931b; *Levanaora* Whitley 1933; *Cociella* Whitley, 1940; *Kumococius* Matsubara and Ochiai, 1955; *Eurycephalus* Imamura 1996 and *Solitas* Imamura 1996 are characterised by the suborbital ridge having spines at distances, the number and position of the spines being variable between different species and even within each species. These 12 genera can be placed in two categories :

- one characterised by all the scales in the lateral line bearing spines, and

the other with only some anterior lateral line scales bearing spines.

Genera with all scales in the lateral line bearing spines

The type species of the genus *Grammoplites* Fowler (1904) (*Cottus scaber* Linnaeus, 1758) is characterised by lateral line being spiny in its entire length with the spines in the posterior region more prominent; the lateral line actually appears as a ridge in its entire length with the posterior portion more elevated.

The genus *Solitas* Imamura (1996) with *Platycephalus gruvelli* Pellegrin, 1905 as the type, is also characterised by all the scales in the lateral line bearing spines. According to Imamura (1996 : 213) "Judging from the phylogenetic analysis, *P. gruvelli* is not closely related to *G. scaber*" and "*Solitas* is easily distinguishable from *Grammoplites* in having lateral line scales with two exterior openings (vs. one in *Grammoplites*) and lacking posterior ctenii (vs. with ctenii)," Imamura (1996) therefore believed that a "new genus is necessary for its [*P. gruvelli* Pellegrin, 1905] accommodation" However, posterior ctenii are absent in *G. scaber* examined in the present work (Fig. 3 A). The other major difference between these two genera: two exterior openings in the lateral line scales in *Solitas* against one in *Grammoplites*, does not appear to be adequate to retain *Solitas* as valid as there are several species of flatheads with two exterior openings in the lateral line scales (eight species in India referable to the genera *Rogadius*, *Sorsogona* and *Inegocia*, Fig. 2-4). It may also be noted that the lateral line scales in *Platycephalus indicus* (Fig. 2) and *Inegocia supposita* (Fig. 3) also lack posterior ctenii and have only one exterior opening.

Genera with only some anterior scales in the lateral line bearing spines

Of the 10 genera in this category, *Onigocia* and *Wakiyus* are characterised, among others, by the presence of one or more ocular cirri on eye. The genus *Wakiyus* (type species *P. spinosus* Temminck and Schlegel) is distinct from *Onigocia* (type species *P. macrolepis* Bleeker) in having more than one spine in the anterior orbital rim whereas in *Onigocia*, there is only one spine. However, this character is also seen in some species which do not possess ocular cirrus on eye and which possess finely serrate suborbital ridge, as for example, *P. serratus* Cuvier and *P. tuberculatus* Cuvier. Hence the presence of more than one spine in the anterior orbital rim is variable and may not be useful for distinguishing genera. Now the question is whether the presence of ocular cirri, merits consideration at generic level particularly because species of five nominal genera possess this character. In *P. carbunculus* Valenciennes, 1833, in the present study, instances of variations in this character were observed: some having one, some having two ocular cirri above eye, one of them bifid in some specimens. In addition to these, in some instances, some projections appearing as ocular cirri are also present. Further, in some instances, such projections are noticed below eye also. Thus, this character shows intraspecific variation. Moreover it is also seen in *C. nematophthalmus* Günther, 1860, the type of the genus *Cymbacephalus* which is distinct from all other known platycephalid genera by having a deep pit behind eye, and *P. cirronasus* Richardson, 1848 and *P. grandideri* Sauvage, 1873, which are characterised by smooth

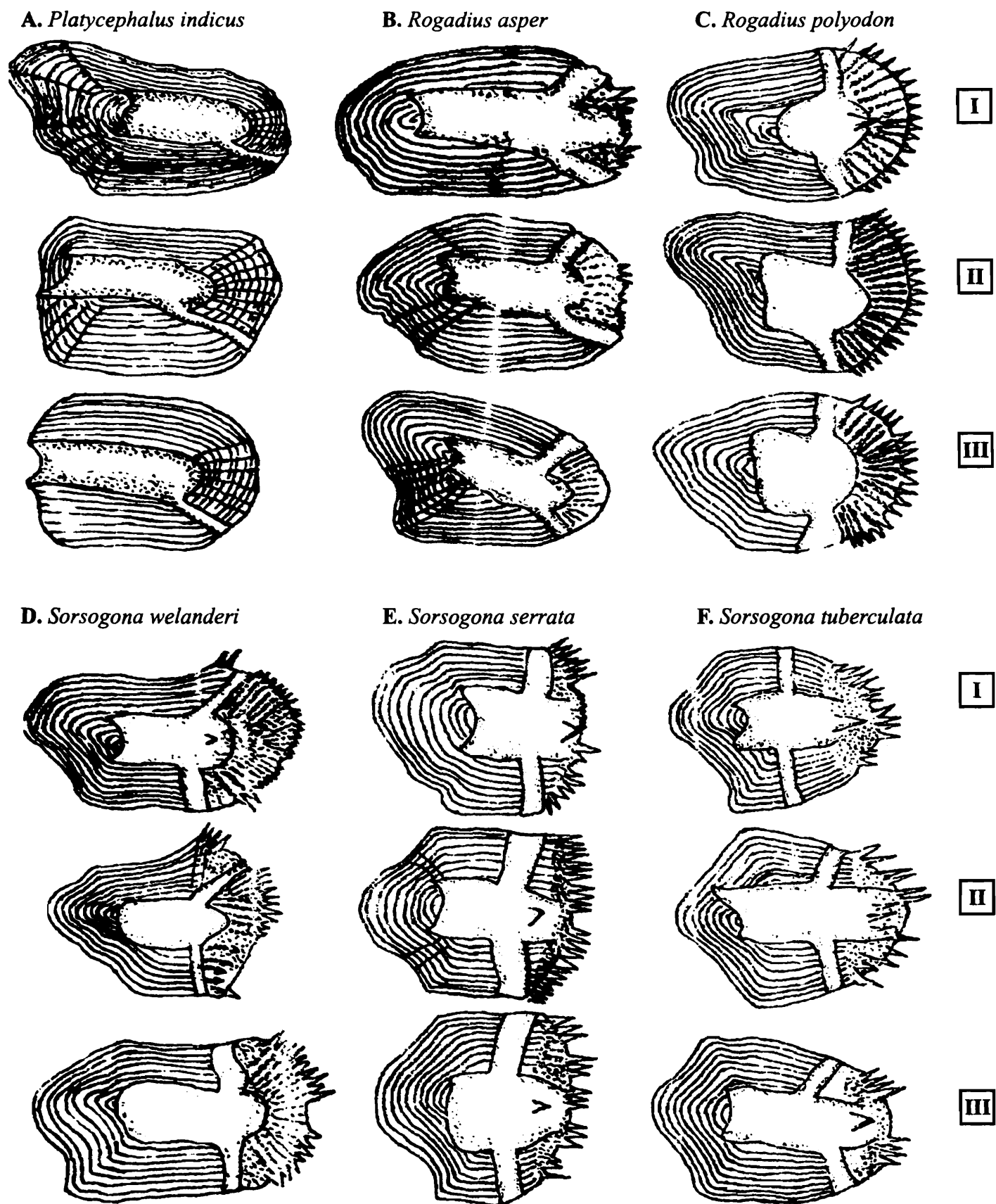


Fig. 2. Drawings of pored lateral line scales (5th, 10th 15th) of different flathead species from India (I-fifth scale, II - tenth scale, III fifteenth scale)

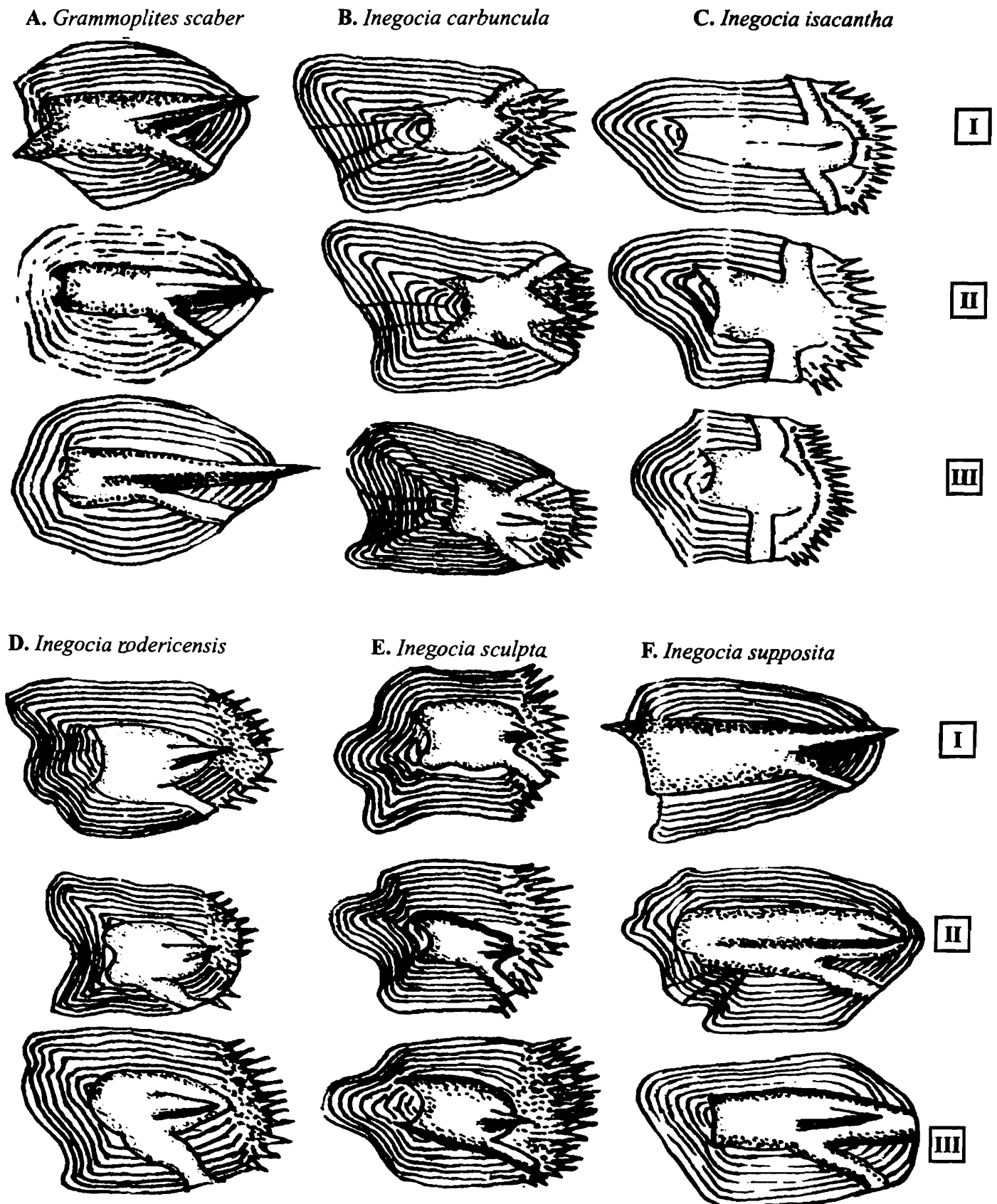


Fig. 3. Drawings of pored lateral line scales (5th, 10th 15th) of different flathead species from India (I-fifth scale, II - tenth scale, III fifteenth scale)

A. *Inegocia crocodila*

B. *Inegocia malayana*

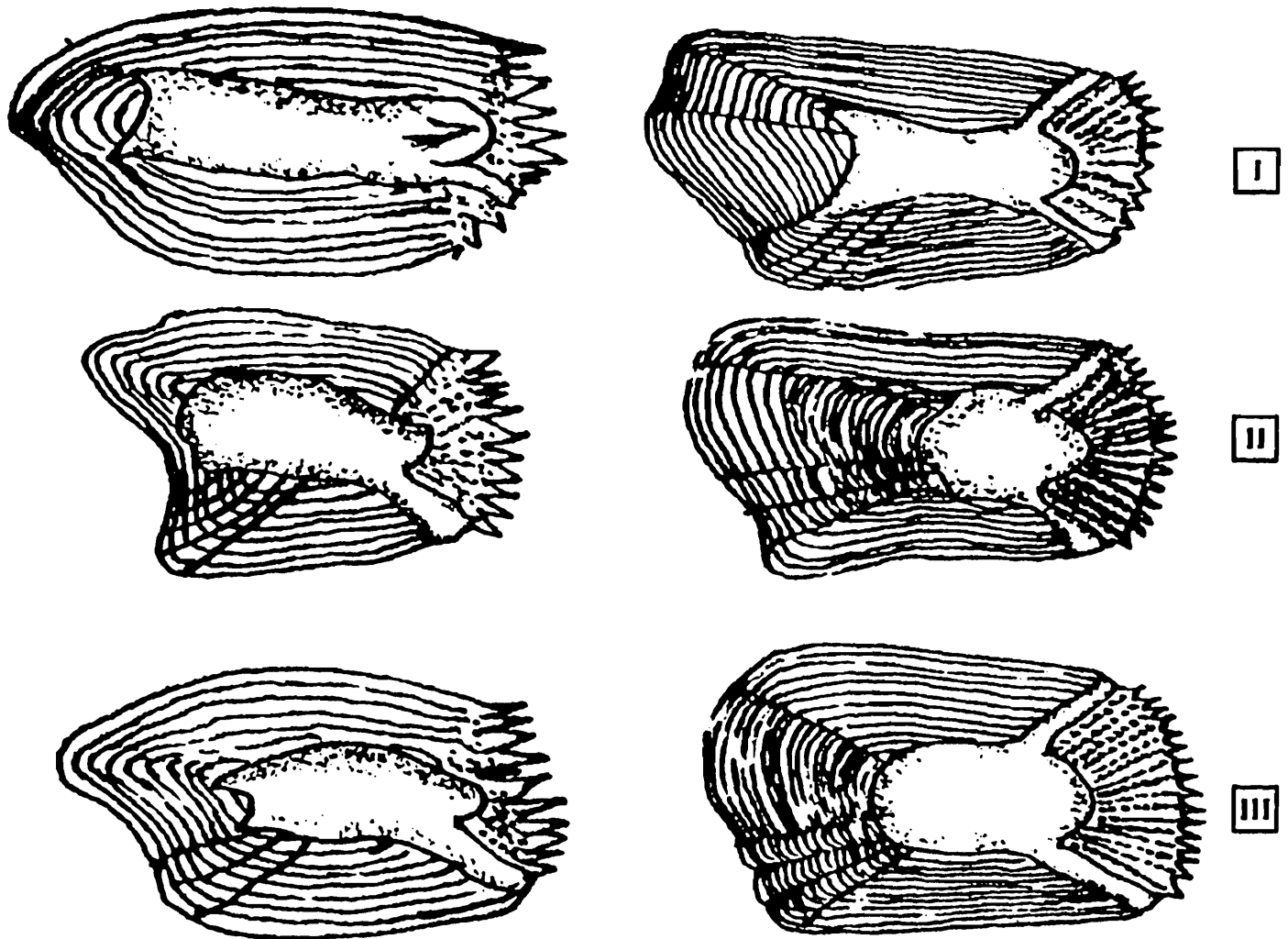


Fig. 4. Drawings of pored lateral line scales (5th, 10th 15th) of different flathead species from India (I-fifth scale, II - tenth scale, III - fifteenth scale)

suborbital ridge. The ocular cirrus also, hence does not seem to offer any basis for the classification of genera of Platycephalidae. According to Imamura (1996), *Onigocia* and *Wakiyus* are congeneric.

Of the remaining eight genera, *Inegocia* was established by Jordan and Thompson (1913) on the basis of "unarmed lateral line" However, according to Matsubara and Ochiai (1955), the anterior 6-8 lateral line scales are spiny in the type species of this genus. The lateral line, indeed, is armed at least with a limited number of spine-bearing scales in all the genera of platycephalids and hence the ground on which this genus was founded is inadequate.

According to Whitley (1930), the genus *Insidiator* Jordan and Snyder, 1900, is preoccupied and he therefore gave a new name *Suggrundus* for the genus with the same type species *P. rudis* Günther, 1880 (= *P. meerdervoorti* Bleeker, 1860) (see Whitley 1930:26). According to Jordan and Snyder (1900:368) "*Insidiator* (type, *rudis*) differs from *Platycephalus* in having 3 preopercular spines instead of 2, and in the larger scales and rougher head" The characteristics of the type species of the genus *Insidiator* (*Platycephalus rudis* Günther, 1880 no. 1879.5.14.221, in the British Museum Plate I b) do not show any difference of generic importance from the type species of *Inegocia*.

Ratabulus was erected by Jordan and Hubbs (1925) on the basis of "highly specialised teeth resembling those of a *Synodus*; infraorbital ridge with one spine on preorbital, two below front of eye (the posterior one enlarged), three below posterior part of orbit, the last very strong, and turned upward, and followed by three small spines; no continuous ridge from orbit to occiput; inner edge of premaxillary expanded inward, but not backward, as a thin flexible lobe" The figures of upper and lower jaws of *R. megacephalus* in Matsubara and Ochiai, however, show that the teeth pattern is not different from other species of platycephalids and there is intraspecific variation in the number of spines on suborbital ridge.

Whitley (1930) described *Repotrudis* as a subgenus of *Suggrundus* Whitley, 1930, with *Platycephalus macracanthus* Bleeker, 1869, as its type species. According to Whitley (1930:27) *Repotrudis* is characterised by interorbital space less than vertical diameter of eye; upper preopercular spine enlarged, about equal in length to longitudinal diameter of eye and anterior third of lateral line with distinct upstanding spines. These characters are not of any value at generic level. However, *Repotrudis* was recognised only as a subgenus of *Suggrundus*, which is shown to conform to *Inegocia* (*vide supra*).

The genus *Levanaora* Whitley, 1933 was established with *P. isacanthus* Cuvier as its type; this species resembles *P. japonicus* Tilesius (type of *Inegocia*) in all the characters except in the shape of cirri in umbraculum (*vide infra*) and this difference does not provide the decided gap of generic significance. Hence the genus *Levanaora* is a synonym of *Inegocia*.

The genus *Cociella* Whitley, 1940 was created in the place of *Cocius*, which is preoccupied, with the same type species (*P. crocodilus*). Jordan and Thompson (1913) suggested the

genus *Inegocia* for *P. crocodilus* Tilesius along with *P. japonicus* Tilesius. While erecting the new genus *Cocius*, Jordan and Hubbs (1925 : 286) stated : “opercular margin without a membranous flap; a sharp spine constantly present on preorbital; main preopercular spine of moderate length, about two fifths as long as orbit, eleven rays in dorsal and anal.” The basis for erecting the genus is inadequate because there is a small membrane on the opercular margin in Indian *P. crocodilus*, a sharp spine on preorbital is seen in certain other species which are referable to other genera and the “main preopercular spine of moderate length, about two fifths as long as orbit” is also seen in other Indian platycephalids referable to different genera. It therefore appears that the characters considered for erecting the genus *Cocius* and hence *Cociella* are not adequate for the purpose.

The key character considered for establishing the genus *Kumococius* Matsubara and Ochiai (type species *Insidiator detrusus* Jordan and Seale) is that “Anterior nostril not fringed with dermal flap.” Even though enough evidence is deduced in the present work (*vide infra*) to show that the absence of anterior nasal flaps in this case may well be an abnormality, the observation of Matsubara and Ochiai cannot be disputed, in view of their assertion that these flaps *were* indeed absent in all the 46 specimens examined by them. Even if it were accepted that the nasal flaps were really absent in all the specimens examined by Matsubara and Ochiai, the close resemblance otherwise, between *I. detrusus* Jordan and Seale and *K. detrusus* Matsubara and Ochiai, would not permit erecting a new genus to include one of the above species. Therefore, *Kumococius* Matsubara and Ochiai is not recognised as valid. The diagnostic characters of the genus *Eurycephalus* Imamura, 1996, suggest that they are not unique but are shared by other genera mentioned above.

The twelve genera considered above, thus, share the important character of suborbital ridge being provided with spines at distances. Though some recent authors (e.g. Knapp, 1983) considered the position and number of spines on the suborbital ridge as helpful in identifying genera, the present work shows that there is no consistency in the position and number of spines in suborbital ridge. There are instances (*vide infra*) where the number and position of spines on suborbital ridge vary within a species and therefore do not serve any purpose even in distinguishing species leave alone genera. The only consideration that one can have in this category is that the suborbital ridge has spines at different and varying positions; the above mentioned 12 genera fall under this category. Though this group can be divided into two: one with fishes having ocular cirrus and the other with those not having such cirrus, as shown above, this character is also not valid to distinguish genera. Though Matsubara and Ochiai (1955) believed that umbraculum was useful for generic distinction, in the absence of knowledge on this on all the type species of different genera, it is not possible to state anything on this. However the available information on umbraculum of certain species suggests that this character may not be useful to distinguish genera. There are no other characters which show a decided gap of generic significance between these twelve genera. It is therefore believed that all these twelve genera could be treated as synonyms and the oldest among these genera being *Inegocia* Jordan and Thompson (1913), the same is considered as valid in this category.

Thus, of the 29 genera and 2 subgenera so far erected in the family, only 8 appear to be valid on available evidence; all these genera except *Elates* Jordan and Seale, *Cymbacephalus* Fowler and *Thysanophrys* Ogilby are distributed in India. Though a regrouping with the help of the type of opening of lateral line scales, morphology of umbraculum, airbladder the nature of sensory tubes in the cheek region and such other characters was believed possible by some workers, the results of the present study do not suggest such a possibility. A thorough study of all species through a concerted joint effort by flathead taxonomists from different geographic regions only will offer the solution to this problem. The list of valid genera and their synonyms as determined in the present study are given below.

VALID GENERA AND THEIR SYNONYMS

1. *Platycephalus* Bloch, 1795

1795. *Platycephalus* Bloch, type species : *Platycephalus spathula* Bloch, 1795; by monotypy = *Callionymus indicus* Linnaeus, 1758.
1800. *Calliomorus* Lacépède, type species *Callionymus indicus* Linnaeus, 1758; by Monotypy
1803. *Centranodon* Lacépède, type species *Centranodon japonicus* Lacépède, 1803; by monotypy; regarded as unidentifiable by Jordan, 1917.
1872. *Neoplatycephalus* Castelnau, type species *Neoplatycephalus grandis* Castelnau, 1872; by monotypy = *Platycephalus richardsoni* Castelnau, 1872.
1931. *Cacumen* Whitley, type species *Platycephalus speculator* Klunzinger, 1872; by original designation, also monotypic.
1931. *Trudis* Whitley, type species *Platycephalus bassensis* Cuvier, 1829; by original designation, also monotypic.
1931. *Longitrudis* Whitley, type species *Platycephalus longispinis* Macleay, 1884; by original designation, also monotypic.
1931. *Planiprora* Whitley, type species *Platycephalus fuscus* Cuvier, 1829; by original designation, also monotypic.
1935. *Colefaxia* Whitley, type species *Platycephalus macrodon* Ogilby, 1885; by original designation, also monotypic = *Platycephalus richardsoni* Castelnau, 1872

2. *Grammoplites* Fowler, 1904

1904. *Grammoplites* Fowler, type species *Cottus scaber* Linnaeus, 1758; by original designation, also monotypic.
1996. *Solitas* Imamura type species *Platycephalus gruvelli* Pellegrin, 1905; by original designation, also monotypic.

3. *Elates* Jordan and Seale 1907

1907. *Elates* Jordan and Seale, type species *Elates thompsoni* Jordan and Seale, 1907; by original designation also monotypic.

1910. *Hyalorhynchus* Ogilby type species *Hyalorhynchus pellucidus* Ogilby, 1910; by monotypy.

4. *Rogadius* Jordan and Richardson, 1908

1908. *Rogadius* Jordan and Richardson, type species : *Platycephalus asper* Cuvier, 1829; by original designation.

5. *Inegocia* Jordan and Thompson, 1913

1913. *Inegocia* Jordan and Thompson, type species *Platycephalus japonicus* Tilesius, 1812; by original designation.

1913. *Onigocia* Jordan and Thompson, type species *Platycephalus macrolepis* Bleeker, 1854; by original designation, also monotypic.

1925. *Wakiyus* Jordan and Hubbs, type species *Platycephalus spinosus* Temminck and Schlegel, 1842; by original designation, also monotypic.

1925. *Ratabulus* Jordan and Hubbs, type species *Thysanophrys megacephalus* Tanaka, 1917; by original designation, also monotypic.

1930. *Suggrundus* Whitley, type species *Platycephalus rudis* Günther, 1880 = *Platycephalus meerdervoorti* Bleeker, 1860. by replacement of *Insidiator* Jordan and Snyder, 1900, preoccupied by *Insidiator* Oken, 1842; by original designation.

1931. *Repotrudis* Whitley, type species *Platycephalus macracanthus* Bleeker, 1869; = *Platycephalus rodericensis* Cuvier, 1829, by original designation, also monotypic.

1933. *Levanaora* Whitley, type species *Platycephalus isacanthus*, Cuvier, 1829; by original designation, also monotypic.

1940. *Cociella* Whitley, type species *Platycephalus crocodilus* Tilesius, 1812; by replacement of *Cocius* Jordan and Hubbs, 1925, preoccupied by *Cocius* Navas1821; by original designation.

1955. *Kumococius* Matsubara and Ochiai, type species *Inegocia detrusus* Jordan and Seale, 1905; by original designation, also monotypic.

1996. *Eurycephalus* Imamura type species *Thysanophrys arenicola* Schultz, 1966; by original designation.

6. *Sorsogona* Herre, 1934

1934. *Sorsogona* Herre, type species *S. serrulata* Herre, 1934 = *P. tuberculatus* Cuvier, 1829; by original designation, also monotypic.

1996. *Ambiserrula* Imamura, type species *Insidiator jugosus* McCulloch, 1914; by original designation, also monotypic.

7. *Cymbacephalus* Fowler, 1938

1938. *Cymbacephalus* Fowler, type species *Platycephalus nematophthalmus* Günther, 1860; by original designation.

8. *Thysanophrys* Ogilby, 1898

1898. *Thysanophrys* Ogilby, type species *Platycephalus cirronasus* Richardson, 1848; by original designation, also monotypic.
1956. *Papilloculiceps* Fowler and Steinitz, type species *Platycephalus grandidieri* Sauvage, 1873: by original designation, also monotypic.
1931. *Leviprora* Whitley, type species *Platycephalus inops* Jenyns, 1840; by original designation, also monotypic.
1952. *Cumbel* Whitley, type species *Platycephalus haackei* Steindachner, 1884; by original designation, also monotypic = *Platycephalus inops* Jenyns, 1840.

On the basis of the above analysis, a key for the genera recognised as valid in the present study, is given below :

Key for the Genera of the Family PLATYCEPHALIDAE

- A. Caudal fin forked *Elates*
- B. Caudal fin not forked
- C. Teeth on vomer in a crescent-shaped band *Platycephalus*
- D. Teeth on vomer in two separate oval patches
- a. A deep pit behind eye *Cymbacephalus*
- b. No deep pit behind eye
- c. Suborbital ridge smooth *Thysanophrys*
- d. Suborbital ridge finely serrate
- d₁. Antrorse preopercular spine present *Rogadius*
- d₂. Antrorse preopercular spine absent *Sorsogona*
- e. Suborbital ridge not serrate, with a few spines at distances
- e₁. All lateral line scales armed with spines *Grammoplites*
- e₂. All lateral line scales not armed with spines *Inegocia*

DESCRIPTION OF SPECIES

Genus *Platycephalus* Bloch, 1795

Diagnosis : Anterior orbital rim with one spine, two preopercular spines of more or less same length, the upper one at an angle to the suborbital ridge. Umbraculum with one tapering upper lobe. *Vomerine teeth in a single crescent-shaped band*; Lateral line scales cycloid with single opening directed downward to the exterior (Fig. 2A); anterior 1 or 2 scales bearing spines.

Platycephalus indicus (Linnaeus, 1758)

(Fig. 2A, 5, Tables 2, 3, 4, 6, 8, 10)

1758. *Callionymus indicus* Linnaeus, (type locality India).1829. *Platycephalus insidiator* Cuvier, (type locality Pondicherry); Günther, 1860 : Ganges; Day, 1878 : Madras.1955. *Thysanophrys indicus* : Munro, (Gulf of Mannar).1982. *Platycephalus indicus* : Murty, (Tuticorin and Mandapam); Knapp, 1984 : (W.Indian Ocean).

Material examined : 50 specimens (2 juveniles, 25 females, 23 males) ranging from 114 mm to 472 mm total length (juveniles 40 mm and 48 mm total length) from Kakinada.

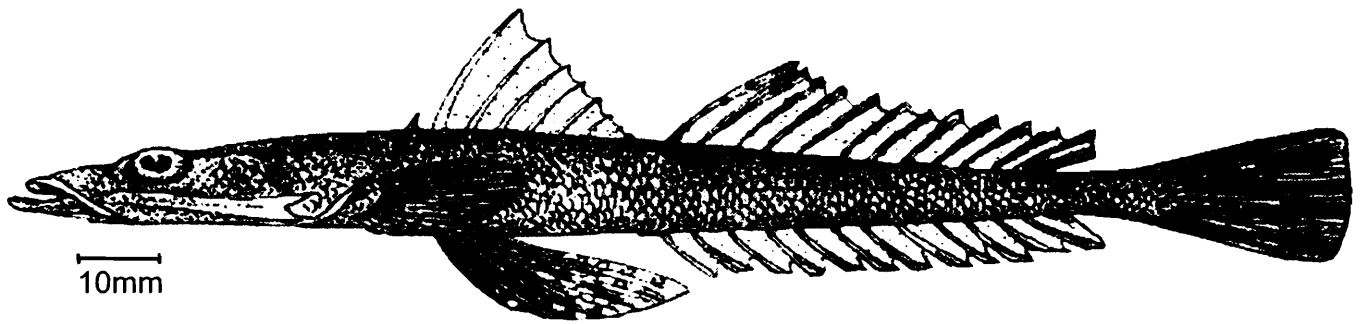
Additional material examined : 9 specimens (8 females, 1 male) ranging from 167 mm to 333 mm total length, from Mandapam; 1 specimen (female) 272 mm total length from Cochin. One specimen (male) total length 220 mm from Ernakulam (ZSI. Reg. No. F 2617/2); three specimens (one female, two males) total length 370 mm, 268 mm and 217 mm respectively from Akyab Burma, collected by Dr. Day (ZSI. Duplicate Cat. Nos. 47, 272, 398).

Description : D. VIII-IX, 12-13; P. i-ii, 11-14, iv-vi; V. I, 5; A. 12-13; C. 13-14; Ll. 68-80; spine bearing scales in lateral line 1-2. Vertical scale rows: above lateral line 92-110, below lateral line 75-95; L.tr. 13-15/1/30-35; GR. 1-2 + 1 + 4 -7.

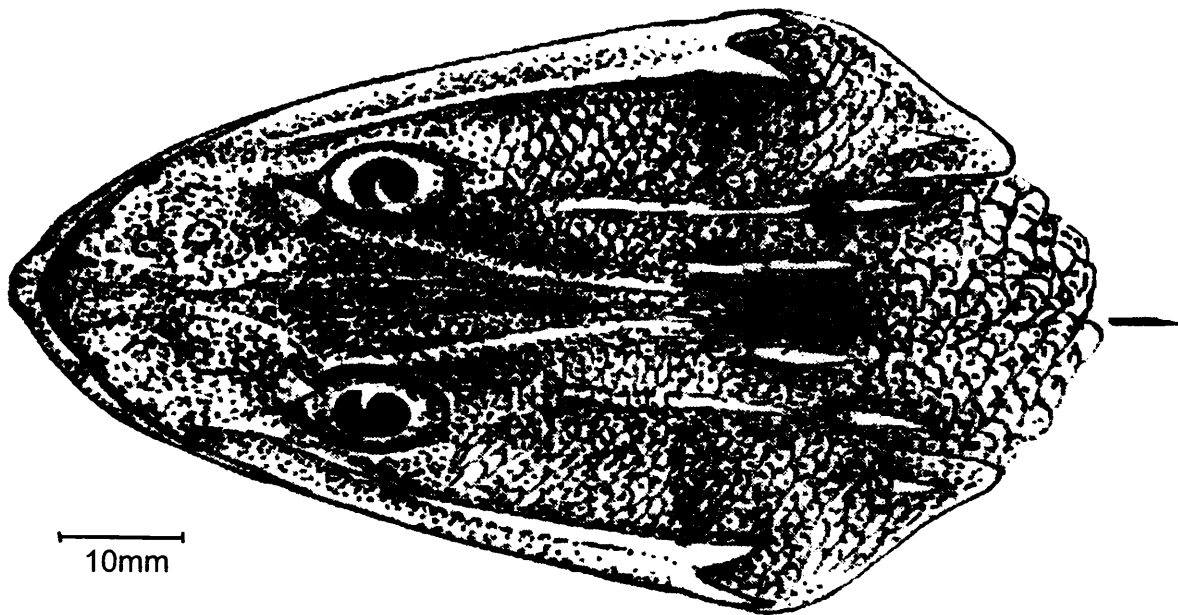
As percent of standard length : Head 28.8–37.3 (30.3); depth 6.9–11.9 (9.5); predorsal 31.4–38.8 (33.0); prepectoral 22.7–29.9 (24.9); prepelvic 30.9–34.7 (32.5); preanal 51.9–57.0 (54.5); first dorsal base 17.7–22.9 (20.3); first dorsal height 11.4–15.0 (13.2); second dorsal base 32.1–38.80 (34.9); second dorsal height 10.5–13.2 (12); anal base 36.7–41.4 (38.4); anal height 5.9–8.5 (7.2); pectoral 12.5–20.9 (14.5); pelvic 18.0–24.4 (20.0); caudal peduncle 3.7–5.9 (4.3).

As percent of head length : Head width 60.0–86.7 (70.0); eye 12.0–20.0 (15.5); snout 24.1–33.3 (27.3); interorbital 11.8–18.8 (15.1).

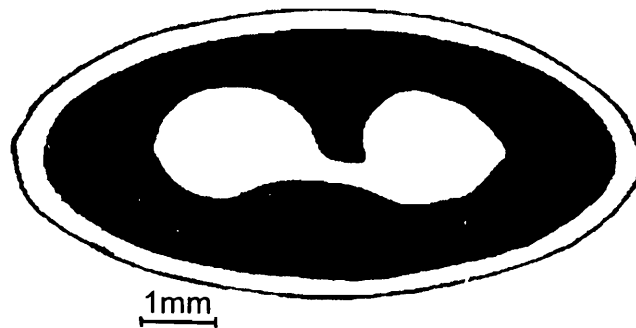
Body elongate depressed, head much compressed and side of head bicarinate. Anterior nostril with a flap. Dorsal side of head with smooth ridges, limited number of depressed and flattened spines; these ridges become less prominent as the fish attains larger lengths. A pair of curved ridges together appearing as a sphere between the first pair of nostrils; in smaller specimens each one of them possesses a spine posteriorly. These ridges continue more or less as parallel lines between posterior pair of nostrils and to interorbital space. Anterior orbital rim with one spine, interorbital space narrow anteriorly becoming broad posteriorly. Supraorbital ridge smooth anteriorly with blunt spines in its posterior half; superior postorbital ridge with two spiny projections, one at the beginning and the other in the middle of posterior half; 2-3 radiating ridges at the anterior part. The inferior postorbital ridge with 5-11 spines at unequal distances; in some specimens there are 1-5 spines only. The suborbital



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 5. *Platycephalus indicus* (Linnaeus, 1785)

ridge is devoid of spines, in smaller specimens, however, there are 3 spines one below anterior border of eye, one below middle and the other below posterior border of eye; this ridge ends at two strong subequal preopercular spines of which the upper one makes an angle to the suborbital ridge. Opercular ridges flat and smooth, lower ridge less prominent. Teeth in several rows in jaws, vomer and palatines. The vomerine teeth form a crescent-shaped band; those on palatines in a narrow elongate band. Lateral line scales cycloid with single opening to the exterior directed downward (Fig. 2 A). First dorsal spine short second and third spines more or less of same length, last spine very short and cannot be seen easily. Pectoral more or less round, caudal truncate. Pelvic fins in some specimens do not reach anal and in others extend up to third anal ray origin. Head and body covered by ctenoid scales; membranous flap along opercular margin. The upper lobe in the umbraculum with narrow blunt end (Fig. 5c).

Colour : Dorsal and dorsolateral sides dark brown with four bands, ventral white, yellow on ventrolateral sides from pelvic to caudal. The dorsal fin spines and rays with dark brown spots, membranes pale. Pectoral rays spotted, they give the appearance of irregular narrow bands. Pelvic rays spotted dorsally, pale ventrally. Caudal with oblique black, white and yellow bands.

Distribution : Reported from off southwest coast of north America, northwest coast of south America, West coast of Africa, East coast of Africa, Red sea, Mediterranean sea, Persian gulf, Gulf of Oman, coast of Pakistan the seas and estuaries in India); Andaman sea, coast of Sri Lanka, Penang, Indonesia, Malayan peninsula, Singapore, Borneo, Aru islands, Burma, Sumatra, Philippines, Java, Celebes, coastal waters of New Guinea, Eastern coast of Australia and Queensland.

Remarks : Günther (1860) reported 7-8 spines in the first dorsal; Cuvier (1829), Day (1878), Munro (1955), De Beaufort and Briggs (1962) reported 8 spines; Murty (1982) reported 9 spines; Cantor (1850) and Matsubara and Ochiai (1955) reported 10 spines, whereas 8-9 spines are observed in the present specimens.

Genus *Rogadius* Jordan and Richardson, 1908

Diagnosis : Ridges on head serrated, *suborbital ridge serrated* with radiating serrated ridges near its origin. 6-8 spines in preopercle of which upper most is the strongest and longest; *antrorse preopercular spine present*. in two separate oval patches on vomer; pointed and arranged in a longitudinal band on palatines. Lateral line scales with two exterior openings (Fig. 2 B, C).

Key to the species of the genus *Rogadius* from India

- A. Antrorse preopercular spine weak and thin, minute spines present at the base of preocular spine, six vertical bands on body *Rogadius polyodon*

- B. Antrorse preopercular spine strong and thick, minute spines absent near the base of preocular spine, four vertical bands on body *Rogadius asper*

Rogadius asper (Cuvier, 1829)
(Fig. 2B, 6, Tables 2, 3, 4, 7, 9, 11, 12)

1829. *Platycephalus asper* Cuvier, type locality Japan; Talwar and Kacker, 1984.

1829. *Platycephalus pristiger* Cuvier, type locality New Guinea; De Beaufort and Briggs, 1962.

1955. *Rogadius asper* : Munro, Sri Lanka.

1982. *Rogadius pristiger*: Murty, Sri Lanka, Ganjam coast, Andaman sea

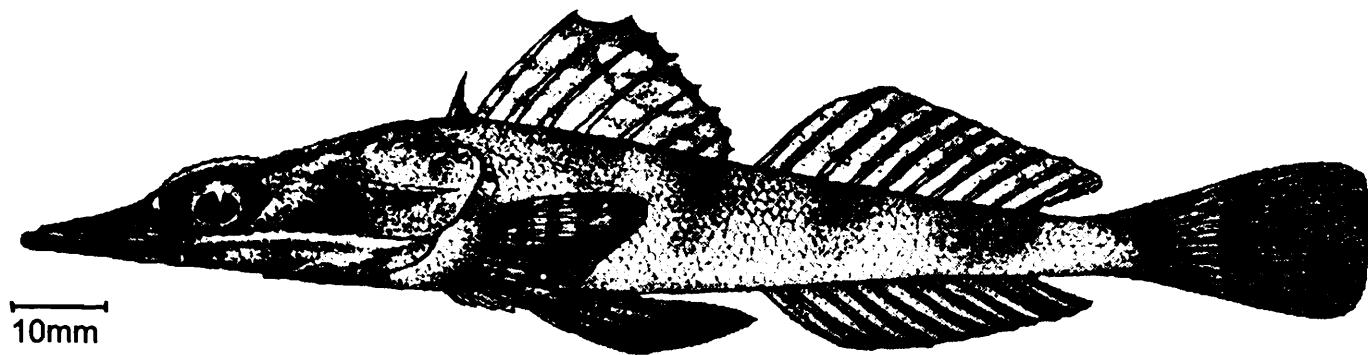
Material examined : 80 specimens (50 females, 30 males) ranging from 66 mm to 183 mm total length from Kakinada. *Additional material examined*: 9 specimens Reg. Nos. ZSI. F 82/1 (female) total length 122 mm; F 813/1 (female) total length 108 mm labelled *Platycephalus* species from Andaman sea; F 424/2 (indeterminate) total length 67 mm labelled *P. serratus* from Nicobar islands; 12949 (female) total length 112 mm, labelled *P. asper* from Andaman sea; 12950-12953 four specimens (females) total length 139 mm, 118 mm, 112 mm, 140 mm respectively from Ganjam coast labelled *P. asper*; 11745 two specimens (females) total length 95 mm, 110 mm, from off Ceylon labelled *P. asper*. 5 specimens (females), ranging from 106 mm to 196 mm total length from Visakhapatnam.

Description : D. IX-X, 10-12; P. ii, 11-13, vii-x; V. I, 5; A. 10-11; C. 13-15; Ll. 52-57; spine bearing anterior scales in lateral line 6-14; vertical rows of scales: above lateral line 55-60, below lateral line 49-55; L.tr. 6-8/1/16-22; GR. 1 + 1 + 4 - 6.

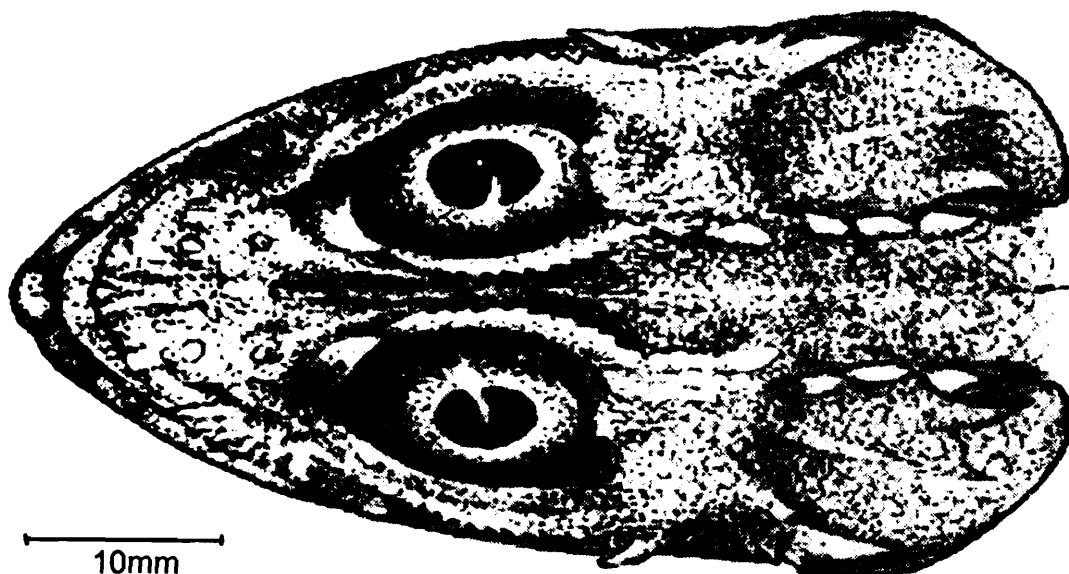
As percent of standard length : Head 37.4-42.6 (39.2); depth 11.9-16.3 (14.2); predorsal 35.8-40.8 (35.5); prepectoral 29.8-35.8 (32.2); prepelvic 38.8-43.2 (40.4); preanal 60.9-68.3 (63.5); first dorsal base 19.2-23.6 (22.1); first dorsal height 12.5-16.4 (14.7); second dorsal base 24.4-27.7 (25.8); second dorsal height 13.3-16.4 (14.9); anal base 25.0-28.9 (26.6); anal height 8.4-11.1 (9.5); pectoral 15.8-20.9 (18.5); pelvic 21.9-27.0 (24.5); caudal peduncle 4.5-6.3 (5.1).

As percent of head length : Head width 48.4-60.4 (54.2); eye 26.0-35.0 (29.2); snout 25.8-30.9 (28.8); inter orbital 4.3-7.6 (5.9).

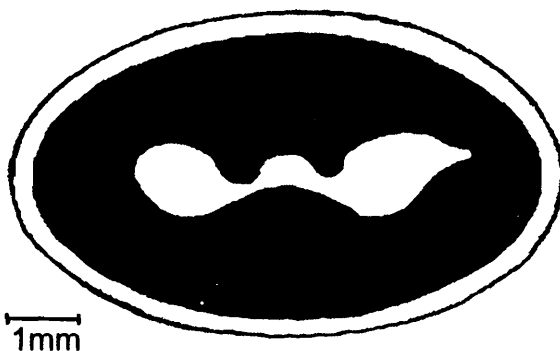
Body subcylindrical, side of head unicarinate. Anterior nostril with a flap. Two nasal spines between anterior pair of nostrils. From the inner side of nasal spines on either side of the median line between nostrils extend serrated ridges to the interorbital space and converge in some specimens. Preocular with a single spine. Supraorbital ridge serrated, one or two small additional rows of small spines lie on the inner side of posterior part of supraorbital ridge. Anterior half of superior postorbital ridge serrated, posterior half spiny with one spine in the beginning followed by 2-4 spines. Anterior part of inferior postorbital ridge serrated or spiny, middle part with 1-5 ridges and posterior part smooth. Suborbital



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 6. *Rogadius asper* (Cuvier, 1829)

ridge serrated with five radiating ridges from its origin of which two end in spines. Small spiny projections on the margin of preorbital and suborbital. 6-8 spines in preopercle of which upper most is the strongest and longest below which lay 5-7 spines with progressively declining lengths. The lower most is the antrorse spine. A supplemental spine at the base of longest spine. Two smooth ridges on opercle, which end in spines; small, serrated ridges above and below the anterior part of lower opercular ridge. Teeth in jaws in several rows and villiform, on vomer they are pointed and arranged in two separate oval patches; pointed and arranged in a longitudinal band on palatines. Lateral line scales with two openings to the exterior, anterior lateral line scales ctenoid, posterior ones cycloid (Fig. 2 B). First dorsal spine shortest, third dorsal spine longest. Pelvic reaches anal origin or extends up to 4th anal ray. Ctenoid scales on preopercle, opercle, dorsal and dorsolateral sides of body. 3-9 rows of scales behind pectorals and pelvics, one row of scales around anal base, scales in front of anal fin base cycloid. Umbraculum with two lobes on upper side (Fig. 6c).

Colour : Dorsal and dorsolateral sides brown, ventral side pale. Four broad vertical bands on body. Upper half of first dorsal dark, second dorsal with spots on rays. Pectoral spotted, pelvic dark. Anal pale, posterior half of caudal dark.

Distribution : Known from Tanzania, Mozambique, Seychelles, Gulf of Aden, Gulf of Oman, Red sea, Pakistan coast, Maldives, Sri Lanka, east coast of India- Kakinada, Visakhapatnam, Ganjam coast, Andaman sea; China, Singapore, Bali, Lombok, Java, Makasan, Indonesia, Moluccas, Celebes, Menado, Ternate, Luzon, Manila Bay, Negros, Japan, Bouru, Ambon, East Indies, South of New Guinea, Australia.

Taxonomic note : A comparison of the descriptions of *Platycephalus asper* Cuvier (1829) from Japan and *P. pristiger* Cuvier (1829) from New Guinea (Table 12) shows that the anterior one third of the lateral line scales are spiny in *P. asper* and the lateral line scales are completely smooth in *P. pristiger* and, while there is no mention of the supplemental spine in preopercle of *P. pristiger* the same is mentioned as present in *P. asper*. But for these two, there is no difference worth mentioning between these two species as described by Cuvier. Though Cuvier (1829) described the lateral line in *P. pristiger* as completely smooth, the data of the syntype (no. 6855) in the Paris Museum (Murty 1982) reveals that the first seven lateral line scales are spiny, indicating that these two species do not differ in this character. Moreover, it has been observed that in all the species of flatheads examined now, at least a few anterior scales in the lateral line bear spines. In the case of supplemental spine, the present study has shown that in some species it may be present or absent, in some species there is more than one spine and in some other species only one spine is present. In the case of *R. asper*, the present study has not revealed any variation in this character; always only one supplemental spine is present. Since Cuvier did not mention the presence of supplemental spine in *P. pristiger* and certain amount of variation in this (*vide supra*) has been observed in some species in the present study and since *P. asper* and *P. pristiger* Cuvier (1829) do not differ in other characters, it appears reasonable to treat these two species as conspecific. Knapp (1983) indicated that *P. pristiger* Cuvier is a synonym of *P. asper* Cuvier. A critical study of the descriptions of *P. pristiger* Cuvier by De Beaufort and Briggs (1962) and Murty (1982) clearly shows that the species referred to by them is only *R. asper* (Cuvier).

Rogadius polyodon (Bleeker, 1853)

(Fig. 2C, 7, Plate II A-C, Tables 2, 3, 4, 7, 9, 11, 13)

1853a. *Platycephalus polyodon* Bleeker, type locality Batavia.

Material examined : 3 specimens (females) ranging from 110 mm to 128 mm total length from Kakinada.

Description : D. IX, 11; P. ii, 14-15, vi; V. I, 5; A. 11; C. 13; Ll. 55 - 57; spine bearing scales in lateral line 5 - 9; vertical rows of scales: above lateral line 58; below lateral line 55 - 57; L.tr. 8-9/1/21-23; GR. 1 + 1 + 5.

As percent of standard length : Head 36.4-38.3 (37.6), depth 11.7 -12.5 (12.0), predorsal 35.0-37.0 (36.2), prepectoral 30.9-32.6 (31.8), prepelvic 39.1-43.6 (41.7), preanal 62.7-63.8 (63.2), first dorsal base 20.7-22.7 (21.9), first dorsal height 14.9-15.2 (15.0), second dorsal base 24.5-25.5 (25.0), second dorsal height 14.5-15.2 (14.9), anal base 25.0-26.6 (26.0), anal height 9.1-10.1 (9.7), pectoral 16.0-17.3 (16.5), pelvic 23.9-25.5 (24.7), caudal peduncle 4.5-5.2 (4.8).

As percent of head length : Head width 47.2-51.4 (49.0), eye 26.3-27.1 (26.6), snout 29.2-30.0 (29.7), interorbital 5.0-5.7 (5.6).

Body subcylindrical, side of head bicarinate. Anterior nostril with a flap. Two serrated ridges between anterior nostrils each ending in a backwardly directed spine. These ridges are serrated in two specimens and smooth in one specimen. Two serrated ridges, one on either side of the median line between nostrils, extend towards and converge at the beginning of interorbital space. Preocular with one prominent spine and small spines near its base. Supraorbital ridge smooth in its anterior one third and serrated in the remaining portion. Superior postorbital ridge serrated ending in a small spine; serrated diverging ridges around its anterior and posterior ends. Inferior postorbital ridge serrated, interrupted in the middle. Suborbital ridge serrated with 5-6 radiating serrated ridges near its origin. 5-6 preopercular spines of which the upper most is the longest and strongest, 3-4 spines of gradually decreasing lengths lie below, the lower most being the antrorse spine. Supplemental spine at the base of longest spine. Membranous flap along opercular margin. Two smooth ridges on opercle, which end in spines. Villiform teeth in jaws in several rows, relatively long, pointed inward and arranged in two patches each having 3-4 rows on vomer. Teeth on palatines are also long and pointed inward and arranged in a longitudinal band. Lateral line scales ctenoid with two openings to the exterior (Fig. 2 C). Pectoral fin rounded, caudal fin truncate. Third dorsal spine longest and last dorsal spine shortest. Pelvic fin reaches origin of third anal fin ray. All scales ctenoid except a few rows of scales below pectorals, below pelvics, one row of scales around anal base which are cycloid. Umbraculum with two lobes on upper side (Fig. 7c).

Colour : Body dark brown on dorsal side and white on ventral side with scattered black pigment spots on posterior side. There are six black vertical bands on the dorsal side; one

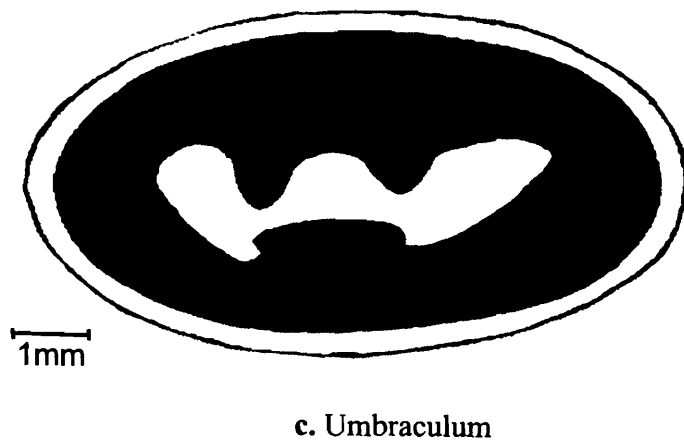
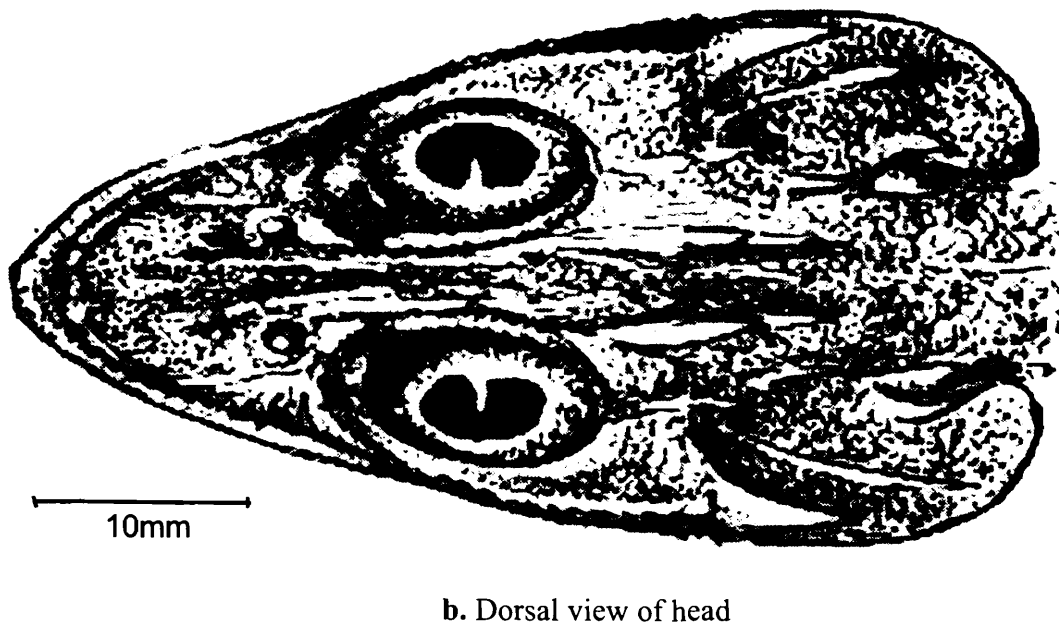
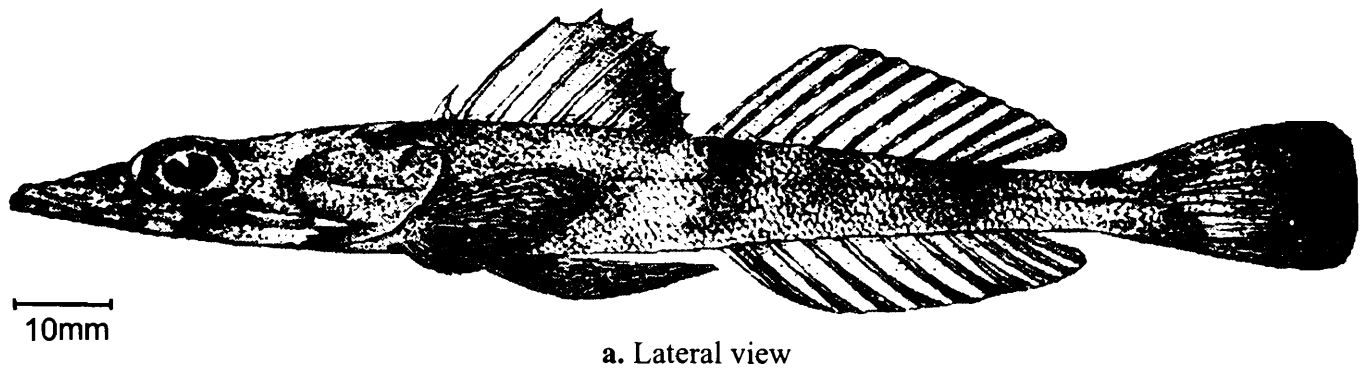


Fig. 7. *Rogadius polyodon* (Bleeker, 1853)

above the eyes, one from the origin of first dorsal to the origin of second dorsal, one from the base of fifth dorsal ray to the end of second dorsal fin, one on the caudal peduncle, one at the base of caudal fin and last one on the posterior border of caudal fin. Posterior margin of opercle black. First dorsal with a black blotch on the upper two thirds; dorsal rays with 3-4 black spots. Pectoral and pelvic black. Anal pale with black pigment spots on the posterior part of rays.

Distribution : Batavia, Java, Celebes, Ceram, Ambon, Philippines, Luzon, Batangas, East Indies and Kakinada (India). This is the first report from India.

Taxonomic note : The present specimens agree with the holotype¹ of *Platycephalus polyodon* Bleeker (1853a) and the descriptions given by De Beaufort and Briggs (1962) (Table 13). De Beaufort and Briggs (1962) stated that they examined "typical specimen" of *P. polyodon* in the Leiden Museum measuring 180 mm. The type specimens (Plate II, A-C) of this species measure only 115 mm. In fact Bleeker (1853a : 462) mentioned the length as "Longitudo speciminis unice 120" in his original description which is close to the length (115 mm) of types in the Leiden Museum. The status of the "typical specimen" measuring 180 mm referred to by De Beaufort and Briggs (1962) is unknown.

Genus *Grammoplites* Fowler, 1904

Diagnosis : All ridges on head bear spines. Preopercle with three spines, the upper one is the longest; supplemental spine at the base of upper preopercular spine. Vomerine teeth in two patches. *All pored scales in the lateral line with one spine each, the spine size increasing towards the posterior end of lateral line giving the appearance of a ridge that is more prominent on the posterior side. Lateral line scales cycloid with one downwardly directed exterior opening* (Fig. 3 A).

Grammoplites scaber (Linnaeus, 1758)

(Fig. 3A, 8, Tables 2, 3, 5, 7, 9, 11)

1758. *Cottus scaber* Linnaeus, type locality Sumatra.

1801. *Platycephalus scaber* : Bloch, India; Cuvier, 1829: Pondicherry; Day, 1878: Madras.

1955. *Grammoplites scaber* : Munro, Gulf of Mannar; Murty, 1982: Palk bay, Gulf of Mannar and other Locations in India.

Material examined : 98 specimens (54 females, 44 males) ranging from 89 mm to 248 mm total length from Kakinada.

Additional material examined : 6 specimens (all females) ranging from 179 mm to 228 mm total length from Visakhapatnam. 11 specimens, (10 females, 1 male) total length 113

¹ The label of the type specimens in the Leiden Museum reads "RMNH 5992 *Platycephalus polijodon* Blkr, 2 specimens TL 115 mm, one is holotype of the species"

mm to 179 mm from Rameswaram and 1 specimen (male) total length 226 mm from Mandapam. One specimen (female) total length 199 mm from Orissa coast (ZSI. Reg. No. 12217), two specimens total length 80 mm, 173 mm from Madras (ZSI. Reg. No. 2353/2)

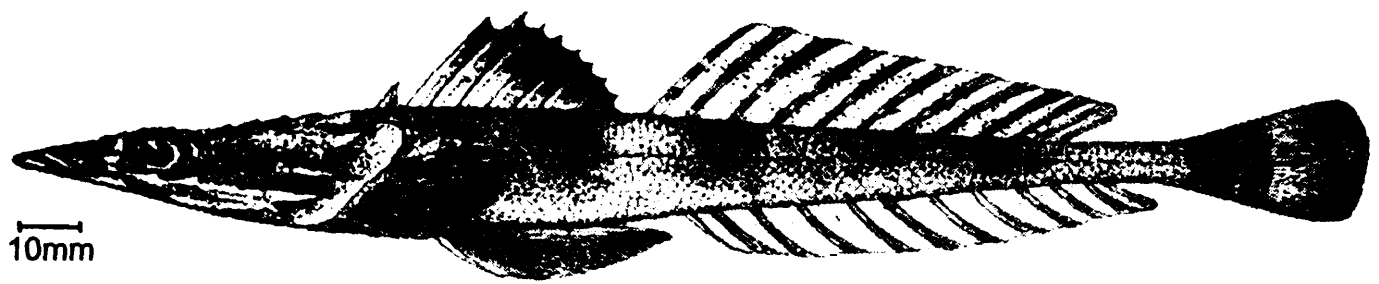
Description : D. VIII-X; 12-13; P. ii, 10-13, v-xii; V. I, 5; A. 11-13; C. 12-14; Ll. 53-57; spine bearing scales in lateral line 53-57; vertical scale rows: above lateral line 56-65, below lateral line 53-62; L.tr. 8-12/1/24-38; GR. 1 + 1 + 3 - 5.

As percent of standard length : Head 29.6-33.3 (31.5); depth 7.2-13.0 (9.4); predorsal 29.7-34.3 (32.0); prepectoral 23.5-29.1 (26.1); prepelvic 29.7-25.1 (31.9); preanal 52.6-59.6 (55.8); first dorsal base 17.4-22.5 (20.2); first dorsal height 9.7-13.9 (11.9); second dorsal base 32.9-38.9 (34.9); second dorsal height 10.7-14.6 (12.3); anal base 34.2-38.9 (36.6); anal height 5.9-8.9 (7.1); pectoral 10.7-14.0 (12.4); pelvic 17.1-22.8 (19.3); caudal peduncle 2.6-4.2 (3.3).

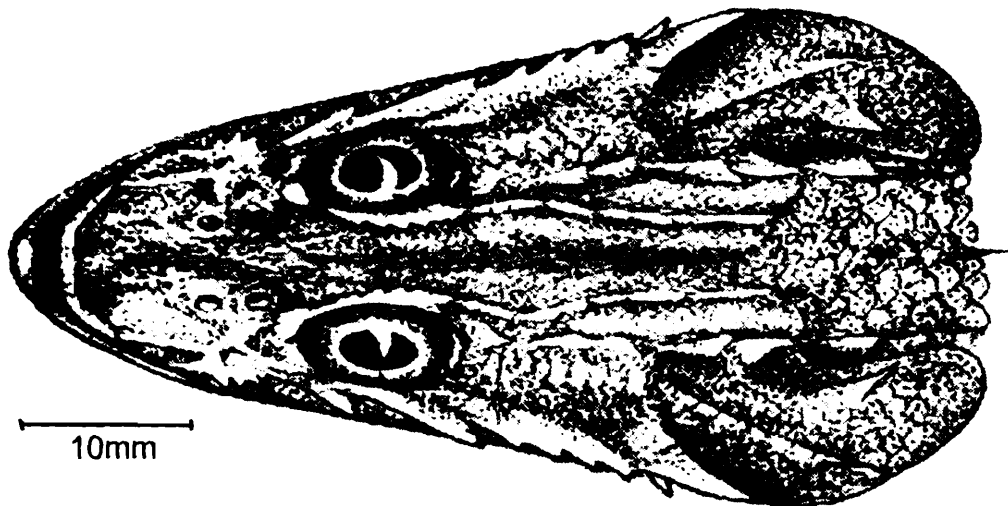
As percent of head length : Head width 43.8-60.0 (52.8); Eye 17.6-26.7 (20.7); snout 24.2-31.6 (28.0); interorbital 6.7-13.6 (10.0).

Body elongate, subcylindrical, side of head bicarinate, anterior nostril with a flap. A pair of curved ridges together appearing as a sphere between the first pair of nostrils and each of them ends in nasal spine posteriorly (these spines are indistinct in specimens of total length more than 187 mm). From behind nasal spines, on either side of the median line between nostrils, extend ridges into the interorbital space; preocular with one spine. Supraorbital ridge smooth anteriorly and spiny posteriorly with 3-8 spines. Additional spiny ridge is observed on the inner side of supraorbital ridge in some specimens. Superior and inferior postorbital ridges with some spines; in both the ridges one spine at the beginning, 0-3 spines in the anterior half and 1-3 spines in the posterior half. A median ridge between the posterior halves of superior postorbital ridges. Suborbital ridge spiny with three prominent spines and with or without small spines between; first spine at the origin, second spine below the middle of eye and the third spine below the posterior margin of eye. Small parallel smooth ridges on either side of the anterior part of suborbital ridge. Preopercle with three spines, upper most is the strongest and longest. A supplemental spine at the base of the first spine. Two smooth ridges on opercle which end as spines. Teeth in jaws in several rows, villiform, those in the innermost row and near maxillary symphysis are pointed and directed inwards; on vomer they are pointed in some specimens and villiform in other specimens and are arranged in two separate oval patches. Teeth on palatines are pointed and arranged in a longitudinal band. First dorsal spine smallest, third one longest. Pectoral and caudal fins rounded. Lateral line completely spiny, the spines being more prominent posteriorly. The lateral line scales cycloid with one opening to the exterior directed downward (Fig. 3 A). Umbraculum without lobes or cirri (Fig. 8c).

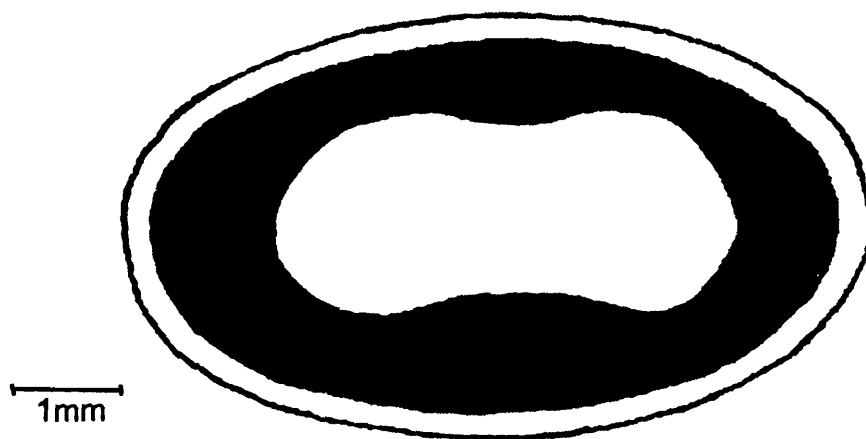
Colour : Head and body dark brown dorsally and dorsolaterally, pale yellow ventrally. Five dark bands on the dorsal side extending to sides; upper half of first dorsal black. Each ray of second dorsal with brown spots. The rays of pectoral bear spots in 5 rows; lower



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 8. *Grammoplites scaber* (Linnaeus, 1758)

margin of fin yellow with black spots. Pelvic fin yellow basally, pale ventrally and dark dorsally. Anal yellow with white distal border. Caudal with three vertical bands anteriorly, dark posteriorly whereas middle part yellow.

Distribution : Known from Natal, Zulu, Madagascar, Reunion, Pakistan, India (Cochin, Quilon, Muttom, Gulf of Mannar, Palk Bay, Madras, Kakinada, Visakhapatnam); Sri Lanka, China, Formosa, Andaman sea, Singapore, Sumatra, Siam, Nias, Bangkok, Java, Borneo, Madura, Celebes, Timor and Sulu.

Genus *Sorsogona* Herre, 1934

Diagnosis : *Supraorbital ridge, superior postorbital ridge, anterior part of inferior postorbital ridge and suborbital ridge finely serrate.* Preopercle with 3-6 spines, *no antrorse preopercular spine*, supplemental spine at the base of uppermost spine. Umbraculum with 1-2 upper lobes, when there is only one lobe, its margin wavy. Vomerine teeth in two distinct patches. Lateral line scales ctenoid with two openings to the exterior (Fig. 2, D-F) anterior 6 to 31 scales bear one spine each.

Key to the species of the genus *Sorsogona* from India

Airbladder present; umbraculum with two upper lobes, spine-bearing scales in lateral line 12-31 *Sorsogona serrata*

Airbladder absent; spine-bearing scales in lateral line 18-27, suborbital ridge elevated, finely serrated with the serrations appearing like the teeth of a saw, umbraculum with one upper lobe having wavy margin *Sorsogona tuberculata*

Airbladder absent; spine-bearing scales in lateral line less than 15, suborbital ridge not elevated, umbraculum with one upper lobe but without wavy margin,
..... *Sorsogona welanderi*

Sorsogona tuberculata (Cuvier, 1829)

(Fig. 2F, 9, Tables 2, 3, 4, 7, 9, 11)

1829. *Platycephalus tuberculatus* Cuvier, type locality ~~Tincomalee~~ ~~Malabar~~ ~~India~~; Günther, 1860: Madras; Day, 1878: Seas of India.

1955. *Suggrundus tuberculatus* : Munro, Gulf of Mannar and Sri Lanka.

1982, *Wakiyus tuberculatus* : Murty, Palk Bay, Gulf of Mannar.

1934. *Sorsogona serrulata* Herre, type locality Luzon, Philippines.

1983. *Sorsogona tuberculata* : Knapp, Western Indian Ocean.

Material examined : 60 specimens (30 females, 30 males) ranging from 42 mm to 132 mm total length from Kakinada.

Additional material examined : 6 specimens (females) ranging from 66 mm to 128 mm total length from Rameswaram.

Description : D. IX-X, 11-12; P. ii, 11-13, vi-ix; V. I, 5; A. 10-12; C. 12-13; Ll. 50-55; spine-bearing scales in lateral line 18-27; vertical rows of scales: above lateral line 51-56, below lateral line 48-54; L.tr. 13-18/1/19-26; GR. 1-2 + 1 + 5-7.

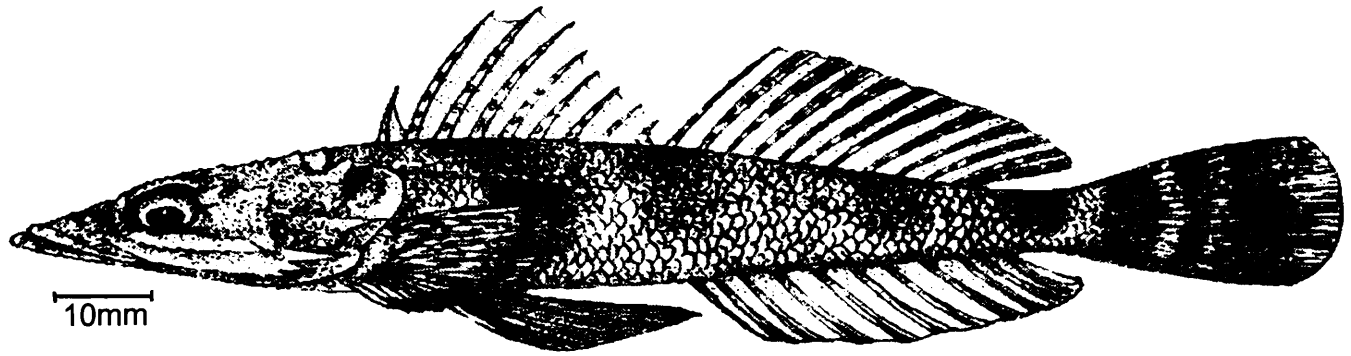
As percent of standard length : Head 35.2-40.5 (36.9); depth 10.2-14.8 (12.4); predorsal 34.9-40.5 (36.3); prepectoral 26.7-33.33 (30.5); prepelvic 35.2-44.4 (38.9); preanal 55.7-64.3 (60.3); first dorsal base 18.5-23.4 (21.0); first dorsal height 12.7-17.2 (14.5); second dorsal base 24.3-32.5 (27.4); second dorsal height 12.4-16.3 (14.7); anal base 28.1-36.5 (30.9); anal height 8.3-10.8 (9.6); pectoral 13.8-20.6 (16.1); pelvic 20.9-26.2 (23.3); caudal peduncle 4.3-6.5 (5.3).

As percent of head length : Head width 55.0-69.1 (63.4); eye 22.9-31.9 (26.5); snout 27.7-33.3 (29.8); interorbital 5.9-11.1 (8.5).

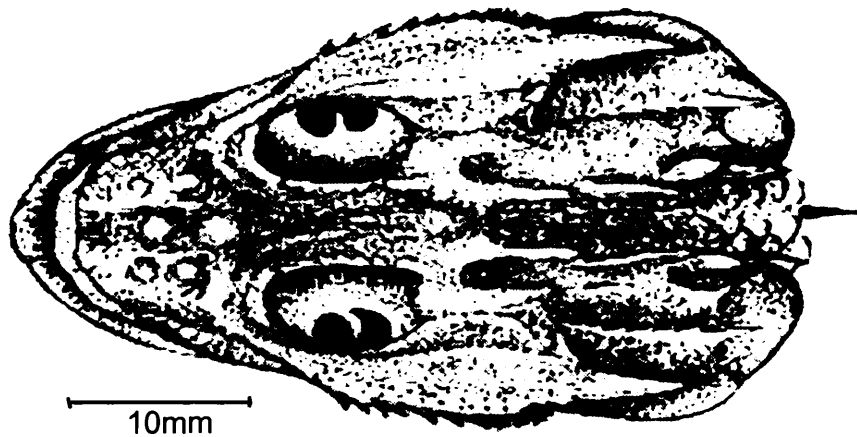
Body short, subcylindrical, head depressed, side of head unicarinate. Anterior nostril with a flap. Two nasal spines between anterior pair of nostrils. Two spiny ridges one on either side of the median line between nostrils extending from nasal spines towards the beginning of interorbital space. 2-3 spines on preocular. Supraorbital ridge serrated, in smaller specimens anterior part smooth. Superior postorbital ridge spiny throughout with 5-9 spines or, divided into 2 parts, anterior part with 5-7 spines and posterior part with 6-8 spines; divergent serrated ridges around anterior and posterior parts. A small median spiny ridge with 2-4 spines between posterior parts of superior postorbital ridge. Inferior postorbital ridge in 3 parts, each part with 3-6 spines, the posterior part in line with lateral line. Suborbital ridge elevated, characteristically serrated throughout with 5 radiating serrated ridges at its origin. 4-6 spines in preopercle of which the uppermost the longest and strongest lying in line with suborbital ridge; supplemental spines at the base. Membranous flap along opercular border. Two ridges on opercle ending in spines, the lower ridge longer and serrated throughout, upper ridge short and curved, smooth or with 1-2 spines. Teeth in jaws villiform, in several rows, those near maxillary symphysis and the innermost row in lower jaw and in the two patches on vomer pointed; pointed and arranged in a longitudinal band on palatines. First dorsal spine shortest, third longest. Pelvic fins reach second or third anal ray. Lateral line scales ctenoid, with two openings to the exterior (Fig 2 F). Umbraculum with one lobe with the margin showing undulations (Fig. 9c).

Colour : Body dark brown dorsally and dorsolaterally, pale ventrally. Five vertical bands on body. First dorsal dark, second dorsal rays with brown spots. Pectoral with brown spots on rays giving the appearance of 5-6 stripes; lower half of pectoral and pelvic dark. Anal pale, caudal with 3 vertical stripes.

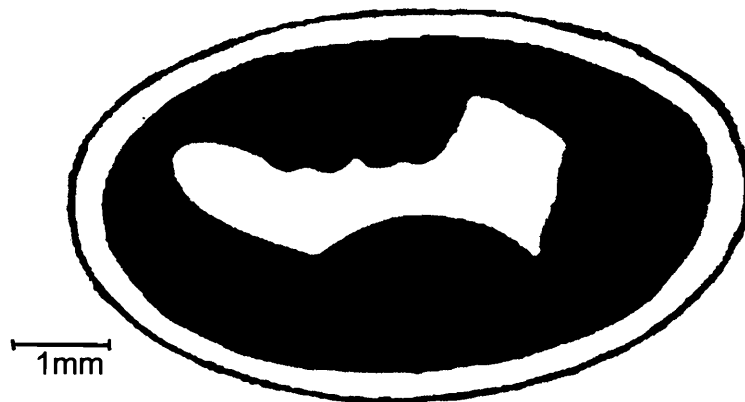
Distribution : Known from Durban, coast of Natal, Delagoa Bay, Red sea, Pakistan, west and east coasts of India; Maldives, Sri Lanka, Thailand, Singapore, Indonesia, Luzon, Philippines, Formosa, Aru Islands, North-western Australia.



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 9. *Sorsogona tuberculata* (Cuvier, 1829)

Taxonomic Note : Herre (1934) described *Sorsogona serrulata* from Philippines on the basis of one specimen (70 mm). De Beaufort and Briggs (1962) considered this species as a queried synonym of *P. tuberculatus* Cuvier (1829) stating "judging from the description *Sorsogona serrulata* belongs to this species" (p.143). Murty (1982) treated this as a synonym of *tuberculatus* following de Beaufort and Briggs (1962). According to Herre (1934:68) "at the angle of the preopercle are three spines, the upper one 2.33 times in the eye and twice as large as next one; the lower most is quite small and has a rudimentary spine below it." This clearly suggests that there are actually four preopercular spines as against three mentioned by Herre. It may be noted that the preopercular spines in *S. tuberculata* (Cuvier, 1829) range from 4 to 6. In *S. tuberculata* the side of head is uncarinate whereas according to Herre (1934), it is bicarinate in *S. serrulata*. While it was not possible to examine the type specimen of *S. serrulata*, it is only believed that the above difference is due to inadequate observation as in the case of the number of preopercular spines mentioned above, particularly since the size of the single specimen on the basis of which this species was described, was very small. There are no other differences of importance between *S. tuberculata* and *S. serrulata*.

***Sorsogona serrata* (Cuvier, 1829)**

(Fig. 2E, 10, Plate II, D, Tables 2, 3, 4, 7, 9, 11, 14)

1829. *Platycephalus serratus* Cuvier, type locality Trincomale, Sri Lanka.

1860. *Platycephalus serratus* : Günther, Trincomale; Day, 1878 : Trincomale.

1955. *Suggrundus serratus* : Munro, Sri Lanka.

1982. *Wakiyus serratus* : Murty, Lakshadweep.

1905. *Platycephalus nigripinnis* Regan, type locality Muscat.

1987. *Sorsogona melanoptera* Knapp and Wongratana, type locality Gulf of Oman, India : Madras and Andaman.

Material examined : 200 specimens (113 females, 87 males) ranging from 77 mm to 148 mm total length from Kakinada.

Additional material examined : 6 specimens (5 females, 1 male) ranging from 82 mm to 126 mm total length from Lakshadweep (ZSI Reg. Nos. F.896/1, F. 901, F. 902, F. 903/1, F. 904/1, F. 906/1; 4 specimens (females, part of the type material of *S. melanoptera* Knapp and Wongratana) ranging from 121 mm to 138 mm total length from off west coast of India; 1 specimen (female) 101 mm total length from Cochin.

Description : D. VIII-IX, 11-13; P. ii-iii, 10-15, v-x; V. I, 5; A. 11-13; C.14-16; L1. 51-58; spine bearing scales in lateral line 12-31; vertical scale rows: above lateral line 52-60, below lateral line 52-59; L.tr. 5-8/1/16-22; GR. 2-3 + 1 + 6-10.

As percent of standard length : Head 32.9-40.2 (35.5); depth 12.8-18.8 (15.8); predorsal

31.8-38.8 (35.5); prepectoral 27.2-32.6 (29.9); prepelvic 34.9-42.9 (38.8); preanal 56.4-62.9 (60.1); first dorsal base 18.9-24.8 (22.5); first dorsal height 13.0-17.3 (15.3); second dorsal base 27.1-31.7 (27.9); second dorsal height 12.4-16.2 (14.5); anal base 27.3-33.7 (30.5); anal height 8.4-11.9 (10.2); pectoral 13.5-18.8 (15.9); pelvic 19.1-25.0 (22.2); caudal peduncle 5.1-7.1 (6.3).

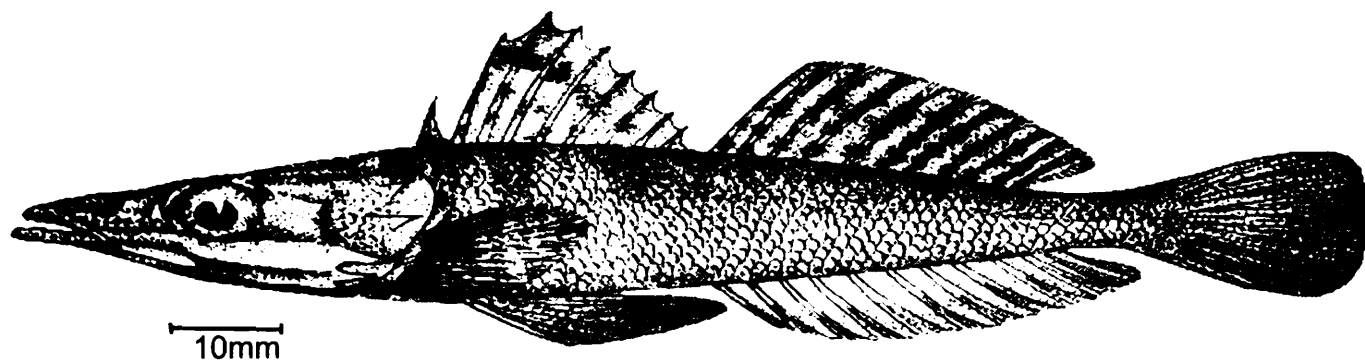
As percent of head length : Head width 49.1-62.5 (55.7); eye 22.1-8.8 (25.2); snout 25.0-31.8 (28.7); interorbital 8.3-12.8 (10.4).

Body subcylindrical, head moderately depressed, side of head bicarinate. Anterior nostril with a flap. Two serrated ridges on either side of the median line between the nostrils extending into the interorbital space. Preocular with one spine towards the inner side and 3-4 small spines. Supraorbital ridge, superior postorbital ridge and inferior postorbital ridge serrated. Two ridges in the suborbital: the upper one completely serrated the lower one with minute spiny projections on the lower side. About five radiating ridges in the preorbital region of which at least two end as spines. Three spines in the preopercle, the upper most is strongest and longest with a supplemental spine at its base. Membranous flap along opercular border. Two ridges on opercle which end as spines: the lower ridge longer and smooth or serrated partly or completely; upper ridge always smooth. Teeth in jaws in several rows and villiform, those in the inner most row pointed and directed inwards; on vomer they are pointed and arranged in two separate oval patches; pointed and arranged in a longitudinal band on palatines. Third dorsal spine longest, last dorsal spine shortest. Pectoral fin and caudal fin rounded. The pelvic fins reach anal fin or extend up to the 3rd anal fin ray. Lateral line scales ctenoid with two openings to the exterior (Fig. 2 E). Umbraculum with one bifid lobe on the upper side (Fig. 10c). Airbladder present.

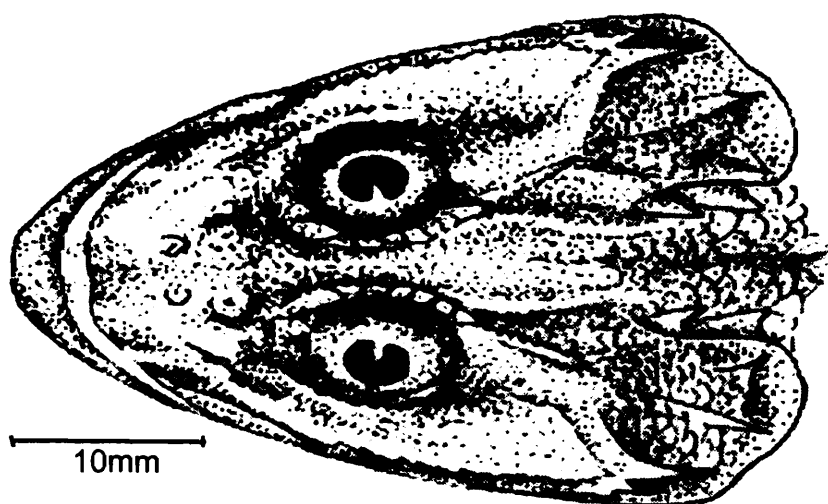
Colour : Body and head dark brown dorsally, silvery white ventrally and ventrolaterally. Black blotch on the upper three fourths of the first dorsal. Each ray of the second dorsal with 3-4 black dots which appear as 3-4 horizontal lines on the fin. Pectoral dark, pelvic black. Anal black on its outer border. Caudal dark.

Distribution : Known from Sri Lanka, Coasts of India, Andaman sea, Lakshadweep, Gulf of Oman, Bangkok, Southern Thailand; New Guinea.

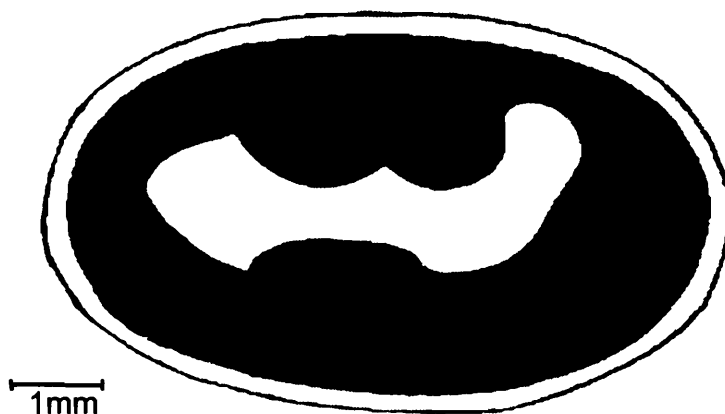
Taxonomic Note : Cuvier (1829) described *Platycephalus serratus* from Trincomale (Sri Lanka) on the basis of a 7-inch (178 mm) long specimen. The descriptions given by Günther (1860) and Day (1878) resemble the one given by Cuvier (1829). Munro (1955) also followed Cuvier (1829). Though De Beaufort and Briggs (1962) stated that they examined the type specimens of some platycephalid species of Cuvier and Valenciennes in the Paris Museum (e.g. *P. asper*, *P. tuberculatus*, *P. rodericensis*, *P. isacanthus*, *P. carbunculus*; see pages 140, 143, 145, 155, 157 respectively in De Beaufort and Briggs, 1962) and the holotype (No. 6847) of *Platycephalus serratus* is available in this Museum, they did not include this species nor did they make any comment on the validity or otherwise of this species. Fowler (1928) and Munro (1967) reported this species (these descriptions resemble the one given



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 10. *Sorsogona serrata* (Cuvier, 1829)

by Day, 1878) evidently based on a report (only name) by Peters (1876) from New Ireland because according to Munro (1967:527), *P. serratus* is “a Ceylonese species, once recorded from New Ireland, possibly wrongly identified” Apparently no subsequent description of this species is based on any new material.

Murty (1982) described *Wakiyus serratus* (Cuvier) on the basis of six specimens from Lakshadweep (available in the Zoological Survey of India, Calcutta) sea. In the absence of any description of this species subsequent to the one given by Cuvier (1829) one has to, perforce, depend upon the original description or holotype only for correct identification of the species. Murty (1982) came to the conclusion that the six specimens from Lakshadweep were indeed *Platycephalus serratus* Cuvier on the basis of the fact that the ridges on head are serrate but without spines - an important diagnostic character of *Platycephalus serratus* as given by Cuvier (1829). Cuvier, however, did not notice the second ridge in the suborbital region. In the present study the six specimens from Lakshadweep used by Murty (1982) were examined again and in all the six specimens the second suborbital ridge is present. This is another important diagnostic feature of this species. According to Cuvier (1829): “the principal crest of second suborbital which armours the cheek is elevated and finely denticulated; below there is another one less salient and smooth”² Day (1878), however, stated: “the ridge from the eye to the angle of the preopercle is elevated and finely denticulated; above it is another less pronounced and smooth.” Actually the second suborbital ridge as mentioned by Cuvier and found in the present specimens also, is only the lower border of the circumorbital 3, which only appears as a ridge below the usual suborbital ridge. This is not smooth in the specimens examined in the present study, but bears minute projections. The present specimens agree well with the original description of Cuvier (1829) as well as the holotype (Table 14).

Regan (1905) described *Platycephalus nigripinnis* from Muscat on the basis of one specimen measuring 165 mm length (excluding caudal). The relevant data of the holotype (No. 1904.5.25.145 British Museum) are presented in table 14 and the photograph of this specimen is given in plate II, D. This agrees well in all essential characters with the specimens identified as *S. serrata* in the present work and therefore *P. nigripinnis* Regan (1905) is treated as a junior synonym of *P. serratus* Cuvier (1829).

Tarp and Kailola (1984) and Sainsbury *et al.* (1985) described “*Suggrundus* sp-2” from northwestern Australia, which formed the basis for the description of a new species *Rogadius patriciae* by Knapp (1987). In addition, Knapp (1987:55) examined three specimens from Indonesia apparently labelled as *Rogadius serratus* in Bernice P. Bishop Museum and stated that his *Rogadius patriciae* “is separated from *Rogadius serratus* (Cuvier, 1829) in having 12 rather than 11 soft dorsal fin rays”, thus indicating that the specimens named as “*Rogadius serratus*” in Bernice, P. Bishop Museum do not differ from *Rogadius patriciae* in other characters. Though a difference of only one in the number of dorsal rays between these two “species” should not be taken as valid in distinguishing species because in all the platycephalids

² English translation of the French text of Cuvier (1829)

examined in the present study, this character is not constant (e.g. see Table 2). The colour pattern of *Rogadius patriciae* (vide: figures of *Suggrundus* sp.2, in Tarp and Kailola, 1984, Sainsbury *et al.*, 1985) is different from that of *Platycephalus serratus* Cuvier that of (1829) as available from the original description and subsequent descriptions made by Günther (1860) and Day (1878) and also the present specimens. Hence the specimens named as "*Rogadius serratus*" in Bernice P. Bishop Museum are not referable to *Platycephalus serratus* Cuvier, 1829.

Knapp and Wongratana (1987) described *Sorsogona melanopectera* on the basis of material from different regions in the Indian ocean; according to them "It is probable that the description of *Platycephalus tuberculatus* (Cuvier, 1829) in Blegvad (1944) and that for *Wakiyus serratus* (Cuvier, in Cuvier and Valenciennes, 1829) by Murty (1982) refer to *Sorsogona melanopectera*" (p. 381); they, treated *W. serratus* Murty as queried synonym of *S. melanopectera*. They also treated *P. nigripinnis* of Norman (1939) (not of Regan 1905) as a synonym of *S. melanopectera*. Nowhere in the text did they give justification for treating the above species as synonyms of their *S. melanopectera*. The specimens used in the present study (which also include specimens of *W. serratus* Murty 1982) are referable to *P. serratus* Cuvier on the basis of the evidence deduced above. The four specimens of *S. melanopectera* received from Dr. Knapp (Table 14) from off Indian west coast and the details given in the original description by Knapp and Wongratana (1987) clearly show (Table 14) that *Sorsogona melanopectera* Knapp and Wongratana (1987) is a junior synonym of *S. serrata* (Cuvier, 1829).

***Sorsogona welanderi* (Schultz, 1966)**
(Fig. 2D, 11, Table 2, 3, 4, 7, 9, 11, 15)

1966. *Wakiyus welanderi* Schultz, type locality Rongelap Island : Marshall and Marianas Islands.

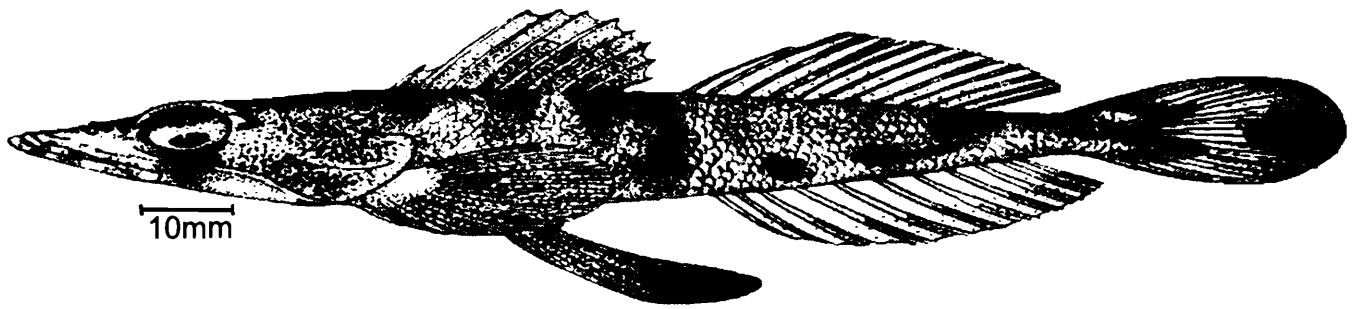
Material examined : one specimen (female) 138 mm total length from Lakshadweep.

Description : D. IX, 11; P. ii, 17, iv; V. I, 5; A. 11; C. 13; Ll. 56; spine-bearing scales in lateral line 6; vertical scale rows: above lateral line 58, below lateral line 53; L.tr. 9/1/23; GR.1 + 1 + 5.

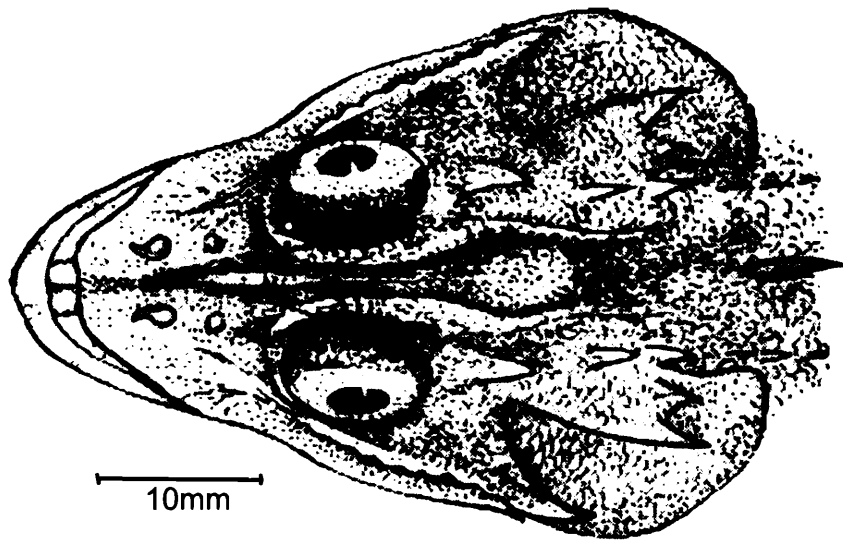
As percent of standard length : Head 36.4; depth 14.4; predorsal 35.6; prepectoral 31.4; prepelvic 37.3; preanal 63.6; first dorsal base 22.9; first dorsal height 14.4; second dorsal base 25.8; second dorsal height 14.4; anal base 26.3; anal height 11.0; pectoral 17.8; pelvic 25.4; caudal peduncle 5.1.

As percent of head length : Head width 67.4; eye 25.6; snout 30.2; interorbital 5.8.

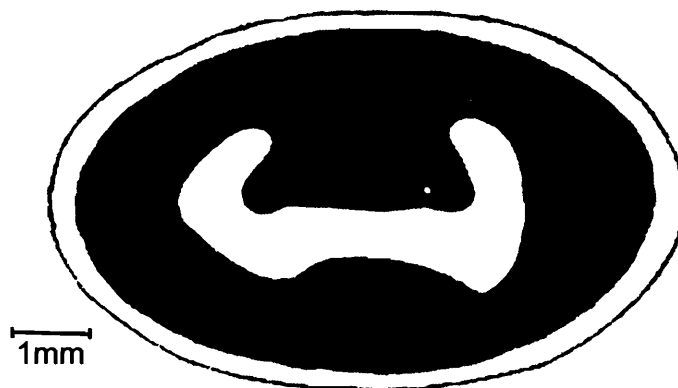
Body subcylindrical, head moderately depressed, side of head unicarinate. Anterior nostril with a flap. Two nasal spines lie between the first pair of nostrils at the end of two serrated ridges. Two serrated ridges on either side of the median line between nostrils extend from the inner side of nasal spines to interorbital space and converge. Preocular with two spines; one prominent short and blunt and second smaller one lies at the base of the larger spine.



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 11. *Sorsogona welanderi* (Schultz, 1966)

Anterior third of supraorbital ridge smooth, remaining serrated. Superior postorbital ridge serrated at the beginning, remaining part interrupted and spiny. Inferior postorbital ridge interrupted; anterior half serrated and ends in a small spine, posterior part serrated and ends in a spine in line with lateral line. Suborbital ridge serrated (with two slight interruptions first at the anterior corner of orbit and second below orbit). No spine at the origin of suborbital ridge but four diverging serrated ridges at the origin. Preopercle with three spines; upper one longer and stronger extends to middle of opercle, middle one short and blunt, the third one is like a minute spiny projection. Supplemental spine present. Two smooth ridges on opercle which end as spines; lower ridge longer. A thin membranous flap along opercular border. Teeth in jaws in several villiform rows, those in the innermost row of lower jaw and some near symphysis in upper jaw long and pointed; on vomer they are pointed and arranged in two separate patches. The teeth on palatines are pointed and arranged in a longitudinal band. Pectoral and caudal fin rounded. Third dorsal spine longest first dorsal spine shortest. Pelvics extend up to the base of fourth anal ray. Lateral line scales ctenoid with two openings to the exterior (Fig. 2 D). Umbraculum with one upper lobe (Fig. 11c). Air bladder absent.

Colour : (in formalin-preserved specimen) Head and body dark brown, pale ventrally, 4 broad vertical bands on body. First dorsal dark, second dorsal with 6-7 brown spots on each ray. Pectoral and pelvic black with white borders on ventral and posterior margins. Anal pale basally, black distally with white border. Anterior part of caudal pale, posterior part with a vertical dark band and posterior margin white.

Distribution : Marshall and Marianas Islands, Lakshadweep.

Taxonomic Note : A comparison of the present specimen from the Lakshadweep with the description of the species given by Schultz (1966) (Table 15) shows that the former agrees very well with the latter. After Schultz (1966) described this as new species, the present report from Lakshadweep happens to be the only subsequent report of this species and hence the first from the Indian Ocean.

Genus *Inegocia* Jordan and Thompson, 1913

Diagnosis : Vomerine teeth in two separate patches. *Suborbital ridge smooth; with spines at distances*. Preopercular spines 3-4, including the supplementary spine. Lateral line scales with one or two exterior openings (Fig. 3, 4); some anterior scales bear spines.

Key to the species of the genus *Inegocia* from India

- A. Ocular cirrus present *Inegocia carbuncula*
- B. Ocular cirrus absent
 - C1. Papillae on lips *Inegocia malayana*
 - C2. No papillae on lips

- D1. Upper lobe of umbraculum cirrose with cirri having round ends.....
 *Inegocia isacantha*
- D2. Upper lobe of umbraculum not cirrose
- E1. Upper preopercular spine short, the tip not reaching hind border of opercle
- F1. Small black spots on head and body, pectoral without any ocellus like mark, vertical scale rows above lateral line 72-81
 *Inegocia crocodila*
- F2. No black spots on head and body, pectoral dark with round, pale, ocellus in the middle (Fig.), vertical scale rows above lateral line 54-59
 *Inegocia sculpta*
- E2. Upper preopercular spine long, the tip reaching beyond hind border of opercle
- G1. Spine-bearing lateral line scales 5-29 *Inegocia rodericensis*
- G2. Spine-bearing lateral line scales 47-53 *Inegocia supposita*

Inegocia carbuncula (Valenciennes, 1833)
 (Fig. 3B, 12, Plate III, Tables 2, 3, 4, 7, 9, 11, 16)

1833. *Platycephalus carbunculus* Valenciennes, type locality Bombay; Cantor, 1850: (Sea and estuaries of Penang); Day, 1878: West coast of India; De Beaufort and Briggs, 1962.

1955. *Suggrundus carbunculus* : Munro, Sri Lanka.

1982. *Thysanophrys carbunculus* : Murty, Palk Bay, Gulf of Mannar and Bay of Bengal
Platycephalus malabaricus : Günther, 1860 (*nec* Cuvier) Moluccas, Malayan Peninsul.

1860. *Platycephalus bobosok* Bleeker, type locality Singapore.

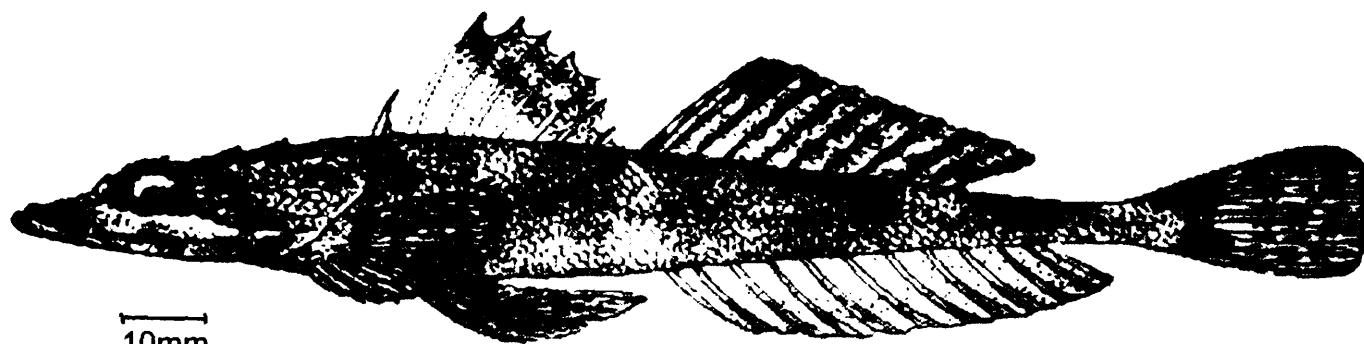
1879. *Platycephalus cantori* Bleeker, type locality Penang and Moluccas, De Beaufort and Briggs, 1962.

Material examined : 50 specimens (28 females, 22 males) ranging from 89 mm to 211 mm total length from Kakinada.

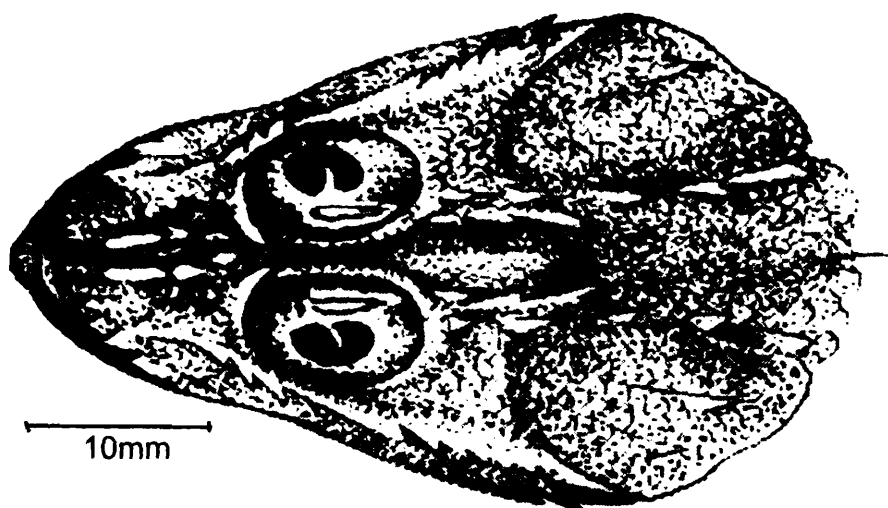
Additional material examined : one specimen (female) 148 mm total length from Rameswaram and one specimen (male) 101 mm total length from Vodalarevu.

Description : D. VIII-IX, 10-12; P. ii, 11-17, i-vi; V. 1,5; A. 11-13; C. 11-14; Ll. 50-56; spine bearing scales in lateral line 7-26; vertical rows of scales: above lateral line 52-61, below lateral line 42-56; L.tr. 7-12/1/24-34; Gr. 1 + 1 + 3-5.

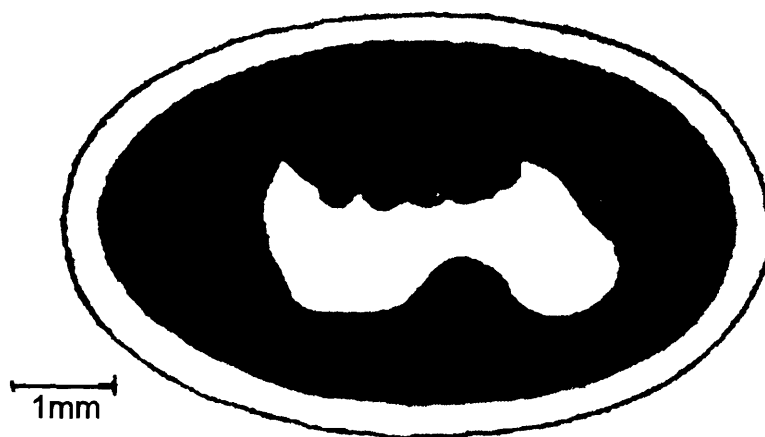
As percent of standard length : Head 20.8-36.3 (32.2); depth 10.7-15.0 (13.1); predorsal 30.4-35.9; prepectoral 22.8-28.6 (25.1); prepelvic 31.5-36.3 (33.4); preanal 53.6-59.6 (56.6); first dorsal base 18.1-23.7 (20.9); first dorsal height 10.9-8.8 (13.7); second dorsal base



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 12. *Inegocia carbuncula* (Valenciennes, 1833)

27.1-31.0 (29.1); second dorsal height 11.5-15.4 (12.9); anal base 30.5-36.2 (34.2); anal height 6.8-9.1 (8.1); pectoral 13.9-18.8 (15.8); pelvic 18.9-23.8 (21.1); caudal peduncle 3.9-5.5 (4.6).

As percent of head length : Head width 50.0-70.6 (60.0); eye 22.6-28.1 (25.5); snout 25.0-30.3 (27.2); interorbital 5.3-9.1 (6.7).

Body subcylindrical, head moderately depressed with relatively short snout, side of head unicarinate. Anterior nostril with a flap. 1-3 pairs of nasal spines between anterior pair of nostrils, two spiny ridges each with 1-3 small spines on either side of the median line between nostrils which may or may not extend into interorbital space (in some specimens ridges are absent, only spines present). Preocular with 1-2 backwardly directed spines. Supraorbital ridge spiny in smaller specimens serrated in larger specimens; in some specimens only a part of the ridge serrated. Superior postorbital ridge with 3-5 spines. Inferior postorbital ridge spiny with 4-7 spines. Suborbital ridge with varying number of spines; one spine at its origin surrounded by 5-6 diverging smooth ridges of which two end in spines; smooth or with 1-3 spines in front of orbit, 1-5 spines below middle of orbit, a strong spine followed by 3-4 small spines behind hind border of eye. 3-4 spines in preopercle, the uppermost is the longest and strongest; supplemental spine absent in some specimens. Two ridges on opercle which end as spines. A narrow membranous flap along opercular border. Teeth in jaws in several rows those in 1 or 2 rows near maxillary symphysis are long pointed and directed backwards; on vomer they are arranged in two patches and on palatines they are villiform and arranged in a band. First dorsal spine shortest, third dorsal spine longest, pectoral and pelvic fins rounded. The longest pelvic ray reaches anal fin origin or second anal ray. Lateral line scales ctenoid with two openings to the exterior (Fig. 3 B); some scales bear two or bifid spines. The upper lobe of umbraculum with five small semicircular lobes (Fig. 12c). Ocular cirrus present (Fig. 12b); 1-2 small ocular cirri occasionally bifid in front or behind the main ocular cirrus in some specimens.

Colour : Head and body dark brown dorsally and dorsolaterally, light ventrally up to anal origin, light yellow from anal origin to caudal peduncle. Four dark vertical bands on body inter connected at different places by dark spots; these bands give mottled or blotchy appearance due to incomplete pigmentation. Black blotch on the upper half of first dorsal; upper half of second dorsal dark, 4-5 black dots on each dorsal ray. Pectorals golden yellow with dark spots on rays; pelvics golden yellow ventrally and with black pigment spots dorsally. Anal yellowish, each ray with 2 black spots. Caudal dark with 5-6 black spots on each ray giving the appearance of indistinct vertical bands.

Distribution : Known from India; Sri Lanka; Penang; Moluccas, Singapore, Java, Bangkok, Bintang, Tongkin, Sandakan, Borneo and Celebes.

Taxonomic Note : *Platycephalus carbunculus* was first described by Valenciennes (1833) based on one specimen from Bombay. The present specimens conform to the original description and also to the holotype No.6875 in the Paris Museum. Cantor (1850) described

P. carbunculus from the “sea and estuaries of Penang” Cantor’s specimens are available as two skins in British Museum (No.1860.3.19.268-9, plate III). The details of these skins are presented in the Table 16. Excepting the absence of ocular cirrus, which might have been broken during the process of stuffing or obscured due to heavy varnishing; these two skins agree with *P. carbunculus* Valenciennes (1833) in all characters. The details from original description of Cantor (1850) are also presented in the Table 16.

Günther (1860) described *P. malabaricus* Cuvier based on one specimen from Moluccas and the two specimens of *P. carbunculus* of Cantor from Penang. He treated *P. carbunculus* Valenciennes and *P. carbunculus* Cantor as its synonyms. The description of *P. malabaricus* given by Günther agrees with *P. carbunculus* but for the absence of ‘ocular cirrus’ This ocular cirrus is absent in specimens of *P. carbunculus* Cantor presumably because of damage in varnishing (*vide supra*). *P. malabaricus* Cuvier is a synonym of *P. crocodilus* Tilesius (see De Beaufort and Briggs, 1962). Cantor’s specimens of *P. carbunculus* (in the form of skins in the BMNH) bear the original label “*P. carbunculus* Cuvier and Valenciennes (1833)” and Günther added *malabaricus* on the reverse of the label. Bleeker (1879) described *P. cantori* based on Cantor’s specimens of *P. carbunculus*. According to De Beaufort and Briggs (1962:150-151) Bleeker was “perfectly right in saying that Cantor’s species [*P. carbunculus*] was neither *carbunculus* nor *malabaricus* but represented a new species which he called *cantori*” They also stated : *P. cantori* is allied to *carbunculus* and *bataviensis*, differing from both in having the whole supraorbital ridge finely serrated. In the present specimens of *P. carbunculus*, however, it has been observed that the supraorbital ridge is serrated completely in some specimens and only the posterior portion is serrated in some other specimens; it is also observed that the supraorbital ridge was denticulated in some specimens. Thus there is a wide individual variation in this character in *P. carbunculus*. This leads to the conclusion that the creation of *P. cantori* on the basis of one character: whole supraorbital ridge is finely serrated, is not valid. The details of two skins of Cantor’s *P. carbunculus* (which are types of *P. cantori* Bleeker) (Table 16) clearly show that Cantor’s *carbunculus* is indeed *P. carbunculus* Valenciennes and therefore *P. cantori* Bleeker is a junior synonym of *P. carbunculus* Valenciennes. Knapp and Imamura (1997) also treated these species as synonyms. *Platycephalus bobossok* Bleeker (1860) was treated as synonym of *P. carbunculus* Valenciennes by De Beaufort and Briggs. The holotype of *P. bobossok* Bleeker (1860) RMNH No. 5919 was examined (Table 16). The details show that De Beaufort and Briggs were right in considering *P. bobossok* Bleeker as a synonym of *P. carbunculus* Valenciennes.

***Inegocia isacantha* (Cuvier, 1829)**

(Fig. 3C, 13, Plate IV, V, Tables 2, 3, 4, 7, 9, 11, 17)

1829. *Platycephalus isacanthus* Cuvier, type locality Waigeu; Murty, 1968 : Palk Bay and Gulf of Mannar.

1982. *Suggrundus isacanthus* : Murty, Palk Bay and Gulf of Mannar.

1853b. *Platycephalus bataviensis* Bleeker, type locality Batavia.

1983. *Inegocia japonica* : Knapp, (*nec* Tilesius) : Western Indian Ocean.

Material examined : 100 specimens (58 females, 42 males) ranging from 104 mm to 234 mm in total length from Rameswaram.

Description : D. IX-X, 11-13; P. i-ii, 9-13, v-viii; V. I, 5; A. 11-13; C. 12-14; Ll. 50-56; spine bearing scales in lateral line 3-14; vertical scale rows: above lateral line 54-60, below lateral line 45-55; L.tr. 9-11/1/16-25; GR. 1 + 1 + 2-4.

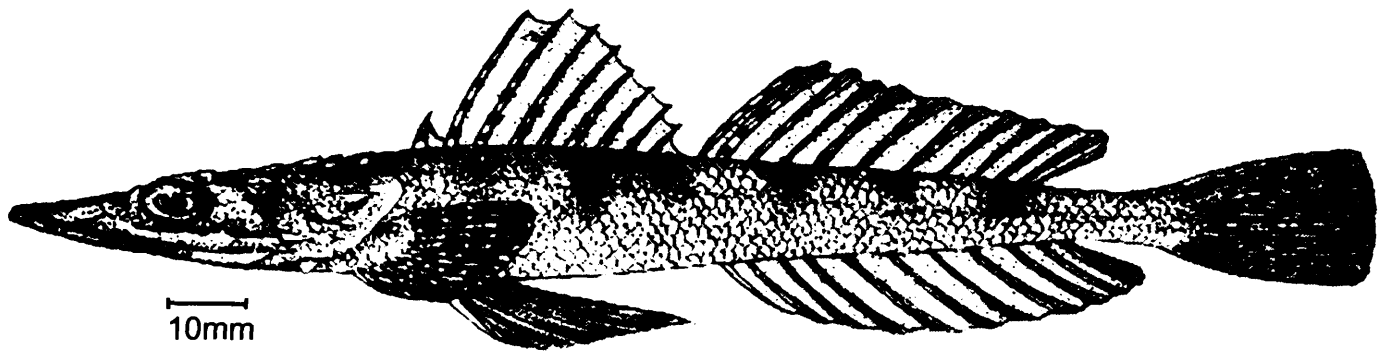
As percent of standard length : Head 32.1-36.3 (33.6); depth 8.8-12.0 (10.3); predorsal 32.6-36.8 (34.5); prepectoral 25.3-30.3 (27.6); prepelvic 33.3-40.1 (36.1); preanal 57.8-65.9 (61.4); first dorsal base 19.0-24.3 (21.6); first dorsal height 11.7-16.4 (13.9); second dorsal base 26.4-30.9 (28.7); second dorsal height 10.9-14.4 (12.8); anal base 27.6-31.7 (29.9); anal height 6.0-9.0 (7.7); pectoral height 6.0-9.0 (7.7); pectoral 12.0-16.0 (14.1); pelvic 10.1-24.7 (22.4); caudal peduncle 4.5-6.0 (5.2).

As percent of head length : Head width 50.0-61.3 (55.5); eye 20.4-27.4 (23.5); snout 26.8-31.1 (29.2); interorbital 6.4-9.8 (8.0).

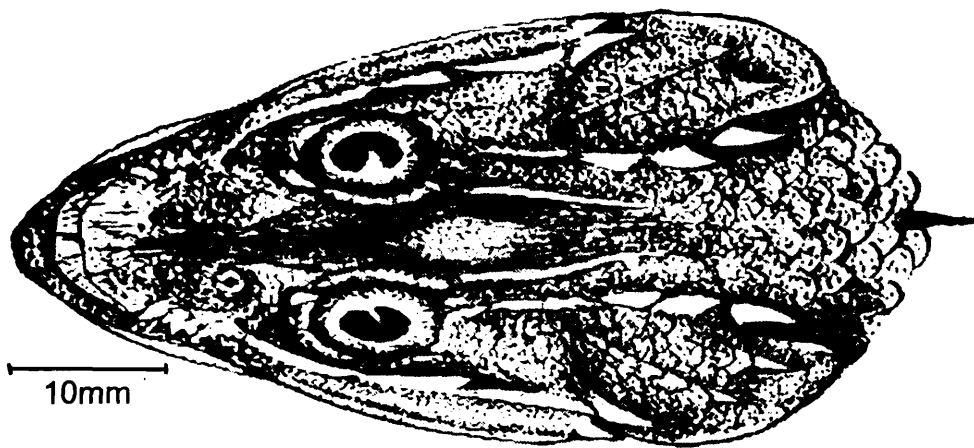
Dorsal side of body convex, ventral side flat; head depressed, side of head uncarinate. Anterior nostril with a flap. Two small crescent-shaped ridges before anterior pair of nostrils, each with one spine at the posterior end; two ridges on either side of the median line between the nostrils extend from these spines to the interorbital space. Preocular with one spine. Supraorbital ridge smooth anteriorly and serrated posteriorly. Superior postorbital ridge with 2-3 spines, inferior postorbital ridge with 4-7 spines on its anterior and posterior sides. Suborbital ridge with 6-7 diverging ridges at its origin, two spines below middle of eye and 1-2 spines behind hind border of eye only in some specimens. Preopercle with three spines of which the upper one is the stronger and longer; supplemental spine absent in some specimens. A triangular subopercular flap present. Two smooth ridges on opercle which end in spines; the upper one curved. Teeth in jaws in several rows, those in the innermost row and near maxillary symphysis longer, pointed and directed inwards; on vomer and palatines they are villiform in 4-7 rows in a narrow longitudinal band on the latter. First dorsal spine shortest, third one longest. Pectoral and caudal fins rounded. Lateral line scales ctenoid with two openings to the exterior (Fig. 3 C). Upper lobe of umbraculum cirrose with the cirri having round ends (Fig. 13c).

Colour : Body brown dorsally, dorsolaterally and pale ventrally. Dorsal spines and rays with 3-5 brown spots, pectoral light brown with 4-6 small dark brown spots on each ray making its appear to be narrow bands on the fin. Pelvic brown with three brown spots on each ray. Anal rays with brown spots. Caudal dark with 3-4 brown spots on each ray giving the appearance of irregular vertical bands.

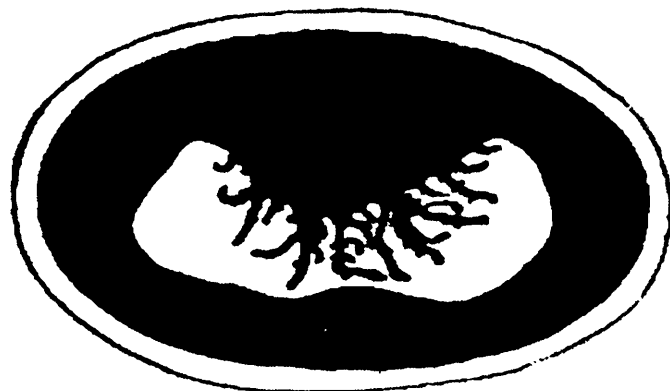
Distribution : India (Palk Bay, Gulf of Mannar) Singapore, Bati, Tourane, Macao, the Philippines, Waigeu, Bourou, New Guinea; northern and northwestern Australia.



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 13. *Inegocia isacantha* (Cuvier, 1829)

Taxonomic Note : Tilesius (1812) "described" *Platycephalus japonicus*³ from Japan (Nagasaki). Though several later authors either listed or described this species (Cuvier, 1829; Bleeker, 1867; Günther, 1860; Jordan and Richardson, 1908; Jordan and Thompson, 1913; Jordan and Hubbs, 1925; Boeseman, 1947; Tarp and Kailola, 1984; Sainsbury *et al.*, 1985), a very detailed description was given only by Matsubara and Ochiai. A comparison of *I. japonica* of Matsubara and Ochiai with the present specimens of *I. isacantha* (Cuvier), shows that they agree very well with each other in all characters but differ in the umbraculum: whereas the tips of cirri are pointed in *Inegocia japonica* (Tilesius) Matsubara and Ochiai, they are rounded in the present specimens (Fig. 13c).

Knapp (1983) described *Inegocia japonica* (Tilesius, 1812) and treated *P. isacanthus* Cuvier (1829) as its junior synonym. The description and the figure given by him agree well with the present specimens.

It is clear from the above that *I. japonica* of Matsubara and Ochiai (1955) and the present specimens identified as *I. isacantha* (Cuvier) resemble in all external characters but differ in the shape of the cirri of umbraculum. Presently there is no information on the shape of these cirri in the type specimens of *P. japonicus* Tilesius (1812) and *P. isacanthus* Cuvier. However, since Matsubara and Ochiai, described cirri in the umbraculum as having pointed tips in *I. japonica* (Tilesius) and they are round in the present specimens, the latter cannot be considered as representing *P. japonicus* Tilesius. The present specimens are only referable to *I. isacantha* (Cuvier), on the basis of present knowledge though there is no information on the nature of umbraculum in the original description. Only an examination of the umbraculum in the type specimens of *P. japonicus* and *P. isacanthus* will reveal the true situation. Since it is not known whether the type specimens of Tilesius are available (*vide supra*) and, Matsubara and Ochiai gave the figure of umbraculum of *Inegocia japonica* (assuming that the specimens so identified do really belong to *P. japonicus* Tilesius, 1812 particularly in view of the fact that the type material of this species is not available), it needs to be examined only in the types of *P. isacanthus* Cuvier. If the umbraculum in the types of *P. isacanthus* has pointed cirri, this species becomes a junior synonym of *P. japonicus* Tilesius as already so considered by Sauvage (1873) and later by Knapp (1983). In that case, the present specimens will be referable to another species only on the basis of tips of cirri of umbraculum being round; the specimens referred to *Inegocia japonica* (Tilesius) by

³ According to Cuvier (1829:255-266), the details of spines on head of the two fish (*Platycephalus japonicus* and *P. crocodilus*) represented in the atlas pl.59 of Krusenstern could not be described by him apparently in the absence of a description by Tilesius. Further, Fowler (1928) and De Beaufort and Briggs (1962), cited the reference of Tilesius with reference to *P. japonicus* as pl.59 and fig. 1 but did not cite any page number. Though Matsubara and Ochiai (1955: 80, 108) quoted this reference as p.59, pl.59, fig.1 the citation of page 59 for this appears to be incorrect because: a) they did not see the original reference of Tilesius and b) quoted the reference as having page numbers 71-88; naturally there is no page bearing no. 59. Smith and Heemstra (1986) also cited the page numbers as 71-88. It is believed that Tilesius (1812) published only the figure of this species along with its name. It is not known whether types of Tilesius are available as specimens.

Knapp (1983) from Western Indian Ocean will also be referable to this species. It is for this reason that *I. japonica* Knapp is considered as a synonym of *I. isacantha* in the present work.

The type specimens⁴ of *Platycephalus bataviensis* (plate IV, A and B) in the British Museum agree well with the present specimens in all characters including the triangular subopercular flap. The umbraculum in the type specimens is not visible (unlike certain other types examined in the British Museum; the details are given elsewhere in this work) and it was not attempted then to cut open the eye for fear of damaging the type specimen.

Examination of three type specimens (status not known) of *P. bataviensis* Bleeker (1853a) in the Leiden Museum shows that the umbraculum in these specimens is cirrose with cirri having round tips (plate V, B), thus agreeing with the present specimens. The data of types of *P. bataviensis* Bleeker in the British Museum and Leiden Museum and of those given by De Beaufort and Briggs, the data of syntype of *P. isacanthus* Cuvier in the Paris Museum, the particulars of *I. japonica* given by Matsubara and Ochiai and Knapp (1983) and of present specimens of *I. isacantha* are furnished in the table 17. The close agreement between them (except *I. japonica* for reasons mentioned above) clearly suggests that *P. bataviensis* and present specimens identified as *I. isacantha* belong to the same species. Now, the issue is whether the present specimens are referable to *P. japonicus* Tilesius, *P. isacanthus* Cuvier or *P. bataviensis* Bleeker. If the umbraculum in the types of *P. isacanthus* Cuvier is cirrose with cirri having round tips, the present specimens are referable to *P. isacanthus* Cuvier; *P. bataviensis* Bleeker then becomes its junior synonym. If however, the tips of cirri in the umbraculum of types of *P. isacanthus* are pointed, the present specimens are referable to *P. bataviensis* Bleeker and *P. isacanthus* Cuvier becomes a junior synonym of *P. japonicus* Tilesius. Until information on types of *P. isacanthus* becomes available, the present specimens can be safely referred to *P. isacanthus* Cuvier because of the resemblances otherwise between this species and *P. bataviensis* and also the priority. *P. japonicus* cannot be the name for the present specimens, however (*vide supra*).

In this connection it is important to mention that there is no variation in the shape and structure of umbraculum within species studied in the present work. According to Matsubara and Ochiai (1955:4-5) “the degree of development and the general form of this organ [the umbraculum] may serve at least for the delimitation of the genera and further may probably throw light on the relationships or the phyletic significance, although the shape and extension of the organ are more or less variable in some species.” Though it is not clear what they meant by stating “more or less variable in some species”, Matsubara and Ochiai did not mention any variation in the “shape and extension” of the umbraculum within any platycephalid

⁴ Though there are 3 specimens in the bottle (no.1880.4.21.102-4) in the British Museum, only two specimens belong to this species, there is also a label in the bottle reportedly written by L.W. Knapp on 6-11-1978, which states “the largest and smallest specimens are *Inegocia japonica* the middle sized specimen is *Cociella crocodila*” These two specimens (the largest and smallest) in the bottle have total length 172 mm, 101 mm respectively.

species dealt with by them. Perhaps they meant difference in this, between species and it is precisely such difference that is taken into account in the above discussion.

Inegocia sculpta (Günther, 1880)
(Fig. 3E, 14, Plate VI; Tables 2, 3, 4, 7, 9, 11, 18)

1880. *Platycephalus sculptus* Günther, type locality Arafura Sea.

1905. *Insidiator detrusus* Jordan and Seale, type locality Hong Kong.

1955. *Kumococius detrusus* : Matsubara and Ochiai, Urado, Shikoku, Japan.

1966. *Platycephalus bengalensis* Rao, type locality Visakhapatnam.

1982. *Suggrundus bengalensis* : Murty, Visakhapatnam, Kakinada and Madras, Burma.

1983. *Suggrundus rodericensis* : Knapp, (*nec* Cuvier, 1829) : South Africa; Tarp and Kailola, 1984 (*nec* Cuvier, 1829): Indonesia and north-western Australia; Sainsbury *et al.*, 1985 (*nec* Cuvier, 1829) : northern and north-western Australia.

Material examined : 115 specimens (64 females, 51 males) ranging from 58 mm to 195 mm total length from Kakinada.

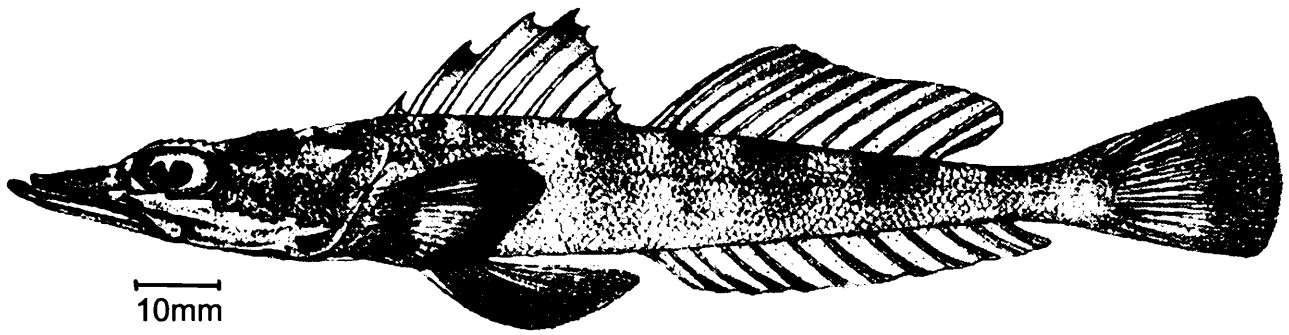
Additional material examined : 7 specimens (females) ranging from 109 mm to 153 mm total length from off Puri (ZSI. Reg. No.F.423/2); one specimen standard length 91 mm from Burma (labelled *P. malayanus* ZSI. Reg. No. F.582/2); one specimen (female) total length 161 mm from Bay of Bengal (labelled *P. carbunculus*, ZSI. Reg. o.F.1184/2); one specimen total length 118 mm from Madras (labelled *P. scaber* (Lin), ZSI. F.447/1); one specimen standard length 216 mm from Gulf of Martaban Burma (labelled *T. punctatus*).

Description : D. IX-X, 10-12; P. ii, 11-13, vi-viii; V. I, 5; A. 11-12; C.12-15; Ll. 50-56; spine bearing scales in lateral line 3-15; vertical rows of scales: above lateral line 54-59, below lateral line 50-55; L.tr.8-12/1/18-25; Gr. 2 + 1 + 6-8.

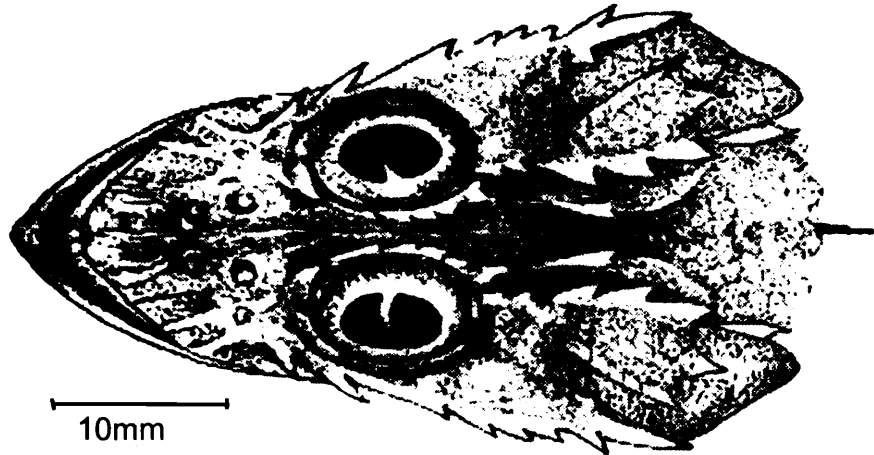
As percent of standard length : Head 32.0-38.3 (34.4); depth 9.3-13.8 (11.5); predorsal 32.7-38.7 (34.9); prepectoral 26.2-32.3 (29.0); prepelvic 33.3-38.3 (35.4); preanal 56.6-62.7 (59.4); first dorsal base 20.0-24.6 (22.4); first dorsal height 11.8-16.7 (14.1); second dorsal base 25.0-28.7 (26.9); second dorsal height 11.9-15.9 (14.1); anal base 28.6-36.9 (32.5); anal height 4.8-8.7 (7.4); pectoral 14.3-20.4 (17.3); pelvic 17.8-22.4 (20.5); caudal peduncle 4.7-6.4 (5.6).

As percent of head length : Head width 46.5-63.6 (57.2); eye 22.9-9.6 (26.2); snout 22.0-34.3 (29.2); interorbital 5.8-9.1 (7.4).

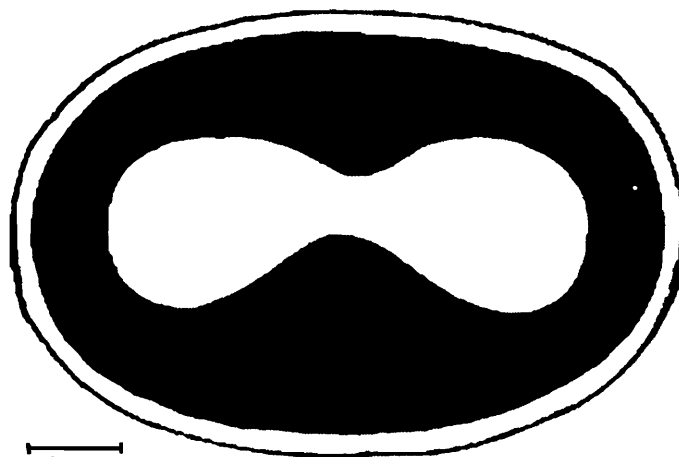
Body subcylindrical, head depressed, side of head bicarinate. Anterior nostril with a flap. Nasal spines two. Two ridges one on either side of median line between the nostrils extending from nasal spines into the interorbital space; another pair of interrupted ridges on either side



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 14. *Inegocia scupta* (Günther, 1880)

of the first pair, preocular with a spine. Except a small portion anteriorly, supraorbital ridge spiny. Superior postorbital ridge with a spine at the origin and another spine at the end; diverging rugose ridges present around the bases of these two spines. Inferior postorbital ridge with 5 spines of which second spine is always smaller; the last spine in line with lateral line. Suborbital ridge with 4-6 spines; one spine at the origin, two spines below middle of orbit and one to three spines behind orbit. Four spines in preopercle of which the upper most is the longest and slightly curved inwards, supplemental spine present. The lower opercular ridge long without or with 1-3 small spines anteriorly, upper ridge smooth. Teeth in jaws in several villiform rows, those in the innermost 1-2 rows in upper jaw and one row in lower jaw pointed and directed inwards; on vomer they are pointed and arranged in two patches, the teeth are pointed and arranged in a longitudinal band on palatines. First dorsal spine shortest, fourth one longest. Pectoral fin nearly falcate. Largest pelvic fin ray reaches anal origin in some specimens. Lateral line scales ctenoid with one opening directed downward to the exterior (Fig. 3 E). The umbraculum with one upper lobe (Fig. 14c).

Colour : Body dark brown dorsally and dorsolaterally, pale ventrally with minute black pigment spots. Upper 1/4 of first dorsal black. Second dorsal pale with dark upper margin, membrane between first and second rays black. Pectoral dark leaving a round pale area in the middle which gives the appearance of an ocellus, pelvic black. Anal pale with white margin. Caudal black.

Distribution : Seas around India, eastern Indian Ocean, Australia and Japan.

Taxonomic Note : The present specimens (Plate VI, B) conform to the original description of *Platycephalus sculptus* Günther (1880) in all characters except that according to Günther (1880) there are two preopercular spines and 70 lateral line scales in this species. However, there are three preopercular spines and 58 lateral line scales in the "type"⁵ (plate VI, A) and three preopercular spines and 60 lateral line scales in the "syntype (?)" of *P. sculptus* Günther (1880) in the British Museum, which is in agreement with the present specimens. The relevant particulars from the original description and the data on the two types are shown in Table 18.

Jordan and Seale (1905) described *Insidiator detrusus* from Hong Kong. Matsubara and Ochiai described *Kumococius detrusus* from Japan; the description and the figure given by them for this species resemble the types of *P. sculptus* Günther as well as the present specimens in all characters including the pale, ocellus-like portion in the middle of pectoral fin, but differ from them in not having the flap on anterior nostrils. It is only for this reason

⁵ There are 2 bottles containing the type specimens of *P. sculptus* in the British Museum, London. The labels in one bottle have the following particulars: *Platycephalus sculptus* Günther 1880, 1879.5.14.224.261. Type, Arafura Sea, "Challenger" This bottle contains 2 specimens of which the larger one was reportedly identified as *Kumococius rodericensis* and the smaller specimen as *Sorsogona tuberculata* by L.W.Knapp on 6-11-1978. In the other bottle, there is only one specimen and the label has the following particulars: No.219. *Platycephalus sculptus* (Syntype?) 90.2.26.62, Arafura Sea, "Challenger" L.W.Knapp reportedly identified this specimen as *K. rodericensis*.

that Matsubara and Ochiai erected a new genus *Kumococius* with *Insidiator detrusus* Jordan and Seale as its type species; according to them (p.90) : “this species alone among all members of the family Platycephalidae lacks any trace of the anterior nasal flap and the posterior margin of the pectoral fin is shallowly concave instead of being roundish.” They also stated (p.94) that the figure of *I. detrusus* Jordan and Seale showed anterior nasal flap but did not show “interopercular flap” Since all the 46 specimens examined by them did not possess the anterior nasal flap and there was an interopercular flap in all of them, they were “inclined to regard these discrepancies between their [of Jordan and Seale, 1905] figure and our [of Matsubara and Ochiai, 1955] specimens as draughtsman’s mistake” They however did not mention whether Jordan and Seale, in their original description of *I. detrusus*, stated that anterior nasal flap was present and interopercular flap was absent. In all the present specimens and in the types of *P. sculptus* Günther (1880), a pair of anterior nasal flaps and a triangular subopercular flap are present.

It is interesting that Matsubara and Ochiai *did* recognise that their *K. detrusus* was “more akin to *P. sculptus* of Günther (1880, p.41, pl.17, fig. A) than to any other species of flatheads” (p.94), but treated them as distinct because according to Günther there are 70 scales in lateral line and nearly half of the lateral line scales are spiny in *P. sculptus* whereas in *K. detrusus* there are 46-55 scales in lateral line and the lateral line scales are “nearly smooth”, the anterior nasal flap, of course, is present in *P. sculptus* and absent in *K. detrusus*. As stated earlier, there are 58 and 60 lateral line scales in the types of *P. sculptus* as against 70 stated by Günther. The number of spine-bearing scales in lateral line ranges from 3 to 15 in the present specimens and there are 17 such scales in the lateral line of types of *P. sculptus*. The expression of “nearly smooth” lateral line in *K. detrusus* by Matsubara and Ochiai can be taken to indicate that there are some spiny scales in lateral line of their specimens thus agreeing with the above range. In fact Matsubara and Ochiai stated that the first 1 or 2 scales in the lateral line are spiny in this species. Thus the only difference between *K. detrusus* (Jordan and Seale, 1905) of Matsubara and Ochiai and *P. sculptus* Günther is that there is a pair of nasal flaps in the latter whereas it is not present in the former.

There are instances of some characters being absent in individual fishes (see Dawson, 1964, 1966, 1971, Dawson and Heal, 1977) as abnormalities and there are also instances of a particular character (e.g. pelvic fins with girdles) being absent in a population of fishes (Thompson and Adams, 1936) also as an abnormality. There are also instances of new species being described taking into account abnormal specimens as for example: Srivastava (1968) described a new species *Cirrhinus chaudhryi* on the basis of the presence of a pair of barbels in maxillaries in addition to the usual pair of rostral barbels (in 4 specimens) in a carp, which was later (Dutt and Murty, 1971) shown to be represented by abnormal specimens of *C. mrigala* (Hamilton, 1822). On the basis of examination of a large number of specimens of *C. mrigala*, Dutt and Murty (1971) showed that some specimens had only one maxillary barbel either on left side or on right side (infact according to Dutt and Murty the paratype of *C. chaudhryi* does not have the maxillary barbel on right side) and some

specimens had two maxillary barbels; there was however, no variation in the rostral barbels. Thus in this case the presence of one, two or both the maxillary barbels in some specimens is only an abnormality (Dutt and Murty) and hence this character cannot be used to erect a new species. While it is not possible to take that the flaps on the anterior nostrils of *K. detrusus* of Matsubara and Ochiai were broken while being caught because, the authors examined 46 specimens and they were sure that the flaps *were* absent in all of them, the possibility that these flaps were absent as an abnormality cannot be ruled out. Since the specimens of *K. detrusus* Matsubara and Ochiai and types of *P. sculptus* Günther agree in all the characters including colour excepting the absence of flaps on anterior nostrils in the former, *K. detrusus* Matsubara and Ochiai is treated as a synonym of *P. sculptus* Günther, in the present work. Though Matsubara and Ochiai did not mention what Jordan and Seale stated about the nasal flaps in the original description, it is felt that treating *I. detrusus* Jordan and Seale as a synonym of *P. sculptus* Günther is reasonable as Jordan and Seale clearly described nasal flaps in their *I. detrusus*. According to Imamura (1996), “the holotype of this species has a flap on the anterior nostril (Jordan and Seale 1905; pers. Obs.)”.

It is interesting in this connection to note that “*Thysanophrys sculptus*” of Kamohara (1952), also from Japan, was included as a synonym of *K. detrusus* by Matsubara and Ochiai stating that it was an “erroneous identification” by Kamohara. The specimens identified as *T. sculptus* by Kamohara had anterior nasal flaps and they could only be taken as representing *P. sculptus* Günther. Rao (1966) described *P. bengalensis* on the basis of specimens collected from Visakhapatnam (Bay of Bengal). An examination of the specimens collected from the type locality (Table 18) shows that they agree in all characters with *P. sculptus* Günther and therefore *P. bengalensis* Rao is a junior synonym of *P. sculptus* Günther. Knapp (1983) described “*Suggrundus rodericensis* (Cuvier, 1829)” and included *S. bengalensis* (Rao) in the category of “other scientific names still in use” However the description and figure given by him agree with *P. sculptus* Günther (Table 18) and therefore are referable only to *P. sculptus* Günther.

***Inegocia rodericensis* (Cuvier, 1829)**
(Fig. 3D, 15, Tables 2, 3, 4, 7, 9, 11)

1829. *Platycephalus rodericensis* Cuvier, type locality Bourbon.

1982. *Suggrundus rodericensis* : Murty, Madras, Kakinada and Visakhapatnam.

1869. *Platycephalus macracanthus* Bleeker, type locality Ambon, Moluccas, Indonesia; Day 1878: Madras.

1928. *Thysanophrys macracanthus* : Fowler, Bombay.

1955. *Suggrundus macracanthus* : Munro, Gulf of Mannar.

Material examined : 90 specimens (47 females, 43 males) ranging from 67 mm to 196 mm total length from Kakinada.

Additional material examined : 10 specimens (6 females, 4 males) ranging from 111 mm

to 191 mm total length from Visakhapatnam. One specimen (female) (ZSI Reg. No. F.2351/2), 158 mm total length from Madras. One specimen (female) (ZSI Reg. No. F.422/2) 183 mm total length from Karachi. One specimen (female) (ZSI. Reg. No. F.1179/2) 161 mm total length from Port Novo.

Description : D. VIII-IX, 12; P. ii, 11-14, vi-x; V. I, 5; A. 11-13; C. 12-15; Ll. 50-56; spine bearing scales in lateral line 15-29; vertical scale rows: above lateral line 53-62, below lateral line 49-56; L.tr. 8-12/1/16-22; GR. 1 + 1 + 5-7.

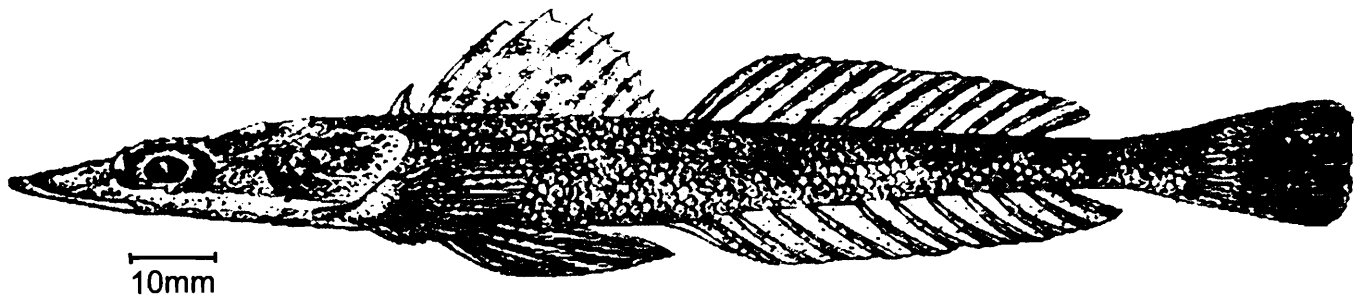
As percent of standard length : Head 32.1 - 39.3 (34.3); depth 8.3 - 12.5 (10.6); predorsal 31.9 - 39.3 (33.9); prepectoral 24.8 - 31.9 (28.1); prepelvic 32.1 - 37.7 (34.8); preanal 47.3 - 63.9 (56.9); first dorsal base 18.7 - 23.5 (21.2); first dorsal height 11.8 - 15.6 (13.9); second dorsal base 28.3 - 32.9 (31.2); second dorsal height 11.1 - 14.8 (13.3); anal base 31.0 - 38.5 (36.0); anal height 6.8 - 9.4 (7.8); pectoral 11.8 - 16.4 (13.8); pelvic 17.2 - 22.9 (20.2); caudal peduncle 3.8 - 5.3 (4.4).

As percent of head length : Head width 45.0 - 65.3 (55.7); eye 22.0 - 28.0 (24.6); snout 24.3 - 33.3 (27.9); interorbital 6.1 - 10.0 (8.1).

Body subcylindrical, head moderately depressed, side of head bicarinate. Anterior nostril with a flap. Dorsal side of head rugose. Two nasal spines between anterior pair of nostrils. 1-2 serrated ridges on either side of the median line between nostrils extend from nasal spines to the beginning of interorbital space. Preocular with one spine. Except a small portion anteriorly, the supraorbital ridge spiny, with 3-6 spines of which the last 1-2 spines are always smaller. Superior postorbital ridge with 2 spines. Several diverging ridges near anterior portion of superior postorbital ridge. Inferior postorbital with 4-5 spines, the last one at the beginning of lateral line. Suborbital ridge with one spine at its origin, one spine below middle of eye, 2-5 small spines in front of or behind the second spine. 3-4 spines in preopercle of which the upper most is the longest and strongest and reaches opercular margin. Supplemental spine present. The lower opercular ridge longer and bears 1-5 small spines, the upper ridge indistinct. Teeth in jaws in several villiform rows, those in the inner most row near maxillary symphysis and in lower jaw are pointed and directed inwards; on vomer they are pointed and arranged in two patches and on palatines they are pointed and arranged in longitudinal band. First dorsal spine shortest third spine longest. Pectoral rounded. Pelvic reaches anal origin. Lateral line scales ctenoid with one opening directed downward to the exterior (Fig. 3 D). Umbraculum with 4-5 indistinct lobes on the upper side, giving a wavy appearance for the lobe (Fig. 15c).

Colour : Body and head dark brown above, white below. One or two black spots on the interspinous membrane of the first dorsal. Each ray of the second dorsal with 2-3 black spots. Pectoral dark, pelvic yellow, fin membrane with black spots. Anal white and caudal dark.

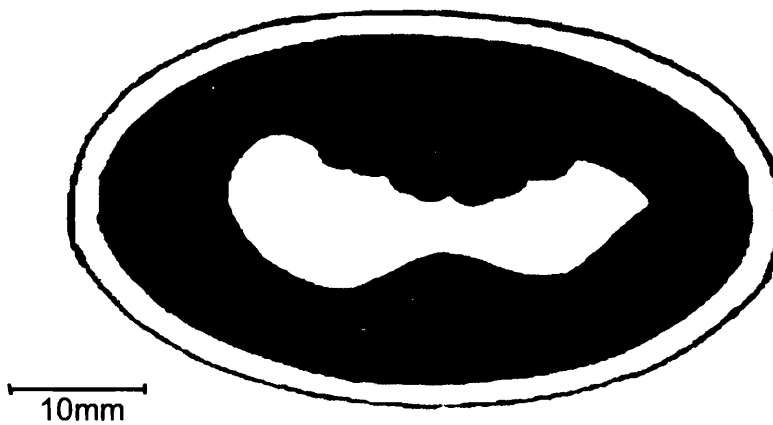
Distribution : Known from Bourbon; Gulf of Oman, Pakistan; seas around India, Sri Lanka, Singapore, Sulu, Formosa, Philippines, Amboine, Timor; Queensland; Japan.



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 15. *Inegocia rodericensis* (Cuvier, 1829)

Taxonomic Note : Cuvier (1829) described *Platycephalus rodericensis* on the basis of one specimen from Bourbon. The present specimens conform to the original description; they also agree with the syntype of this species (No.6838 in the Paris Museum) and with the description given by De Beaufort and Briggs, differing from the latter only in the count of scales: De Beaufort and Briggs gave the count as Sq.1.73-84 whereas in the present specimens such high scale count was not observed in pored lateral line scales, scale rows above lateral line or scale rows below lateral line (Tables 7, 9, 11). Knapp (1983) described *Suggrundus rodericensis* (Cuvier) and included *Suggrundus bengalensis* (Rao) under it, in the category of 'other scientific names still in use', indicating that the latter is a junior synonym of the former. This, however, is incorrect because as mentioned earlier, *P. bengalensis* Rao is a synonym of *P. sculptus* Günther and *P. rodericensis* Cuvier is different from it. A critical examination of the description and the figure given by Knapp (1983) reveals that he was referring to *P. sculptus* Günther and not *P. rodericensis* Cuvier. The fact that: 1) he treated *P. bengalensis* Rao as a synonym of his "*S. rodericensis*" and reportedly labelled the type specimen of *Platycephalus sculptus* Günther in the British Museum as *Kumococius rodericensis* adds support to this. This clearly suggests that Knapp (1983) had specimens of *P. sculptus* only (which were referred to *P. rodericensis* Cuvier) before him when he prepared the description and figure for the FAO species identification sheets. It is because of this he included Arabian Sea for its distribution whereas *P. sculptus* Günther is so far not reported from this region. *P. rodericensis* Cuvier is surely known from the Arabian Sea. Knapp (1983) believed that *S. macracanthus* (evidently of Bleeker, 1869) is different from *P. rodericensis* Cuvier because, according to him:

- there are 11 rays in the second dorsal fin and the fin is dusky in *S. rodericensis*, whereas in *S. macracanthus* there are "usually 12 second dorsal fin rays" and the fin with brown spots.
- in *S. macracanthus*, the pectoral fin lacks falcate margin whereas in his "*S. rodericensis*", the pectoral fin is falcate.

It may be noted that *P. macracanthus* Bleeker is a junior synonym of *P. rodericensis* Cuvier, (*vide* De Beaufort and Briggs). Actually there are 12 rays in and black spots on the second dorsal fin in *P. rodericensis* Cuvier and there are 10-12 rays in second dorsal fin and the fin is dusky in *P. sculptus* Günther. The above confusion crept in because Knapp (1983) considered specimens of *P. sculptus* Günther as representing *P. rodericensis* Cuvier and apparently believed that *P. rodericensis* and *P. bengalensis* (= *I. sculpta*) were synonyms. Continuing with this, Knapp (1992) attempted deduction of evidence to show that "the original types of *P. rodericensis* were lost and replaced with other specimens" but at the same time observed, "Despite apparent discrepancies, I feel that Cuvier's description of *P. rodericensis* was probably based on the putative types." (three specimens from Reunion which were suspected as the replaced 'types'). He "interpreted" (without any proof) that *P. rodericensis* Cuvier as the senior synonym of, among others, *P. sculptus* Günther, *I. detrusus* (Jordan and Seale) and *P. bengalensis* Rao, which however is erroneous (*vide supra*). Imamura (1996) compared the holotype of *I. detrusus* Jordan and Seale and 15 specimens of "*P.*

rodericensis” collected from Thailand and believed that Knapp was right in treating these two ‘species’ as synonyms, though he also recognised that “no reasons were given” by Knapp (1992) for his action. As in the case of Knapp (1983), Imamura also treated *P. sculptus* and *P. rodericensis* as conspecific as evidenced from the figures of the species given by him and this led him to adopting *Kumococius* for *rodericensis*.

***Inegocia supposita* (Troschel, 1840)**
(Fig. 3F, 16, Tables 2, 3, 5, 7, 9, 11, 19)

1840. *Platycephalus suppositus* Troschel, type locality not known, but according to Eschmeyer 1998 one syntype is from Bombay; Talwar and Kacker, 1984 : Cochin.

1984. *Grammoplites supposita*: Knapp, W. Indian Ocean.

1905. *Platycephalus maculipinna* Regan, type locality Muscat.

1970. *Platycephalus maculipinna*: George, Cochin and Quilon.

1982. *Grammoplites maculipinna*: Murty, Kerala coast and Bombay.

1928. *Thysanophrys scaber* : Fowler, (*nec* Linnaeus) : Bombay

Material examined : 50 specimens (30 females, 20 males) ranging from 125 mm to 279 mm total length from Cochin.

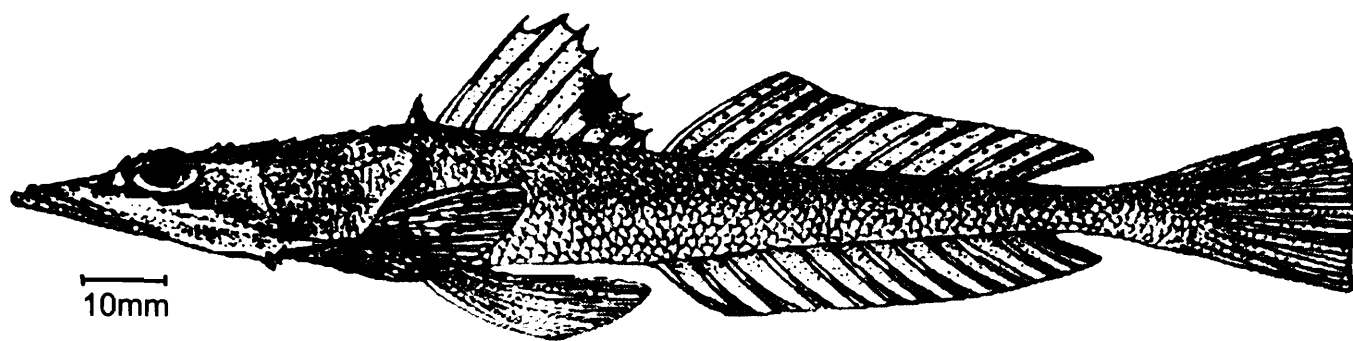
Additional material examined : 16 specimens (10 females, 6 males) ranging from 195 mm to 261 mm total length from Mangalore; ZSI. Reg. Nos. F.898/1, F.900/1, F.905/1, F.907/1, F.909/1, F.911/1, F.912/1, F.913/1, F.914/1; 9 specimens (5 females, 4 males) ranging from 109 mm to 176 mm from Lakshadweep; F.5352/2 3 specimens (females) ranging from 167 mm to 241 mm total length from Alleppey coast.

Description : D. IX, 11-12, P. i-ii, 11-15, v-x; V. I, 5; A. 13-14; C. 13-15; Ll. 53-56; spine bearing scales in lateral line 47-53; vertical rows of scales: above lateral line 57-68, below lateral line 52-63; L.tr. 10-15/1/32-40; GR. 1 + 1 + 6-8.

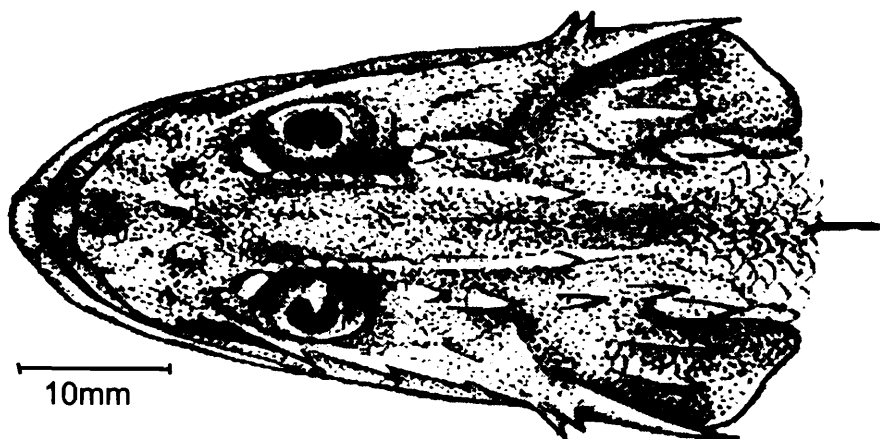
As percent of standard length : Head 31.6 - 36.5 (32.6); depth 9.2 - 14.5 (11.0); predorsal 30.9 - 37.1 (33.1); pectoral 25.4 - 29.5 (27.5); prepelvic 31.8 - 35.8 (33.8); preanal 51.9 - 50.5 (56.8); first dorsal base 18.7 - 22.7 (20.9); first dorsal height 12.3 - 19.1 (14.2); second dorsal base 25.4 - 32.5 (30.7); second dorsal height 11.1 - 14.4 (12.9); anal base 32.7 - 37.5 (35.2); anal height 6.5 - 8.5 (7.4); pectoral 11.6 - 14.3 (12.9); pelvic 18.3 - 21.9 (20.1); caudal peduncle 4.1 - 5.3 (4.7).

As percent of head length : Head width 49.4 - 61.7 (54.9); eye 17.5 - 21.4 (19.4); snout 25.5 - 29.3 (27.2); interorbital 10.2 - 13.4 (11.8).

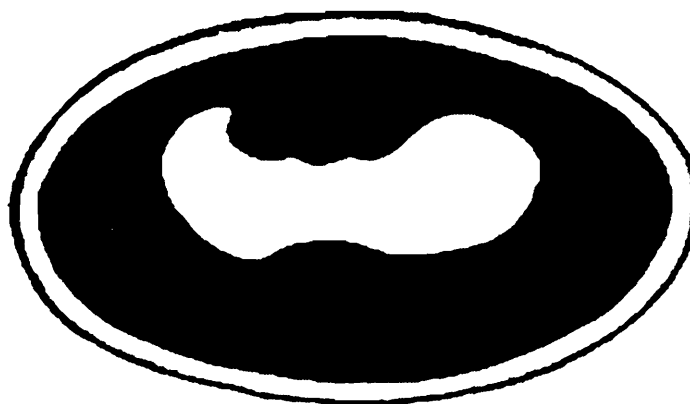
Body robust, subcylindrical, head moderately depressed, side of head unicarinate. Anterior nostril with a flap. Dorsal side of head rugose and spiny. 3-7 ridges between anterior pair



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 16. *Inegocia supposita* (Troschel, 1840)

of nostrils with or without 1-2 spines. 3-6 ridges on either side of the median line between nostrils extending into the interorbital space, in some specimens they extend to the posterior part of the interorbital space. Supraorbital ridge with 3-4 spines, superior postorbital and inferior postorbital ridges with 2 and 4 spines respectively. Suborbital ridge spiny, anterior part with 3 spines, first spine at the origin, second spine below the middle of eye and third spine below the posterior border of eye. Posterior part smooth with or without a small spine, 2-3 minute ridges below and many above. Preopercle with 3-4 spines, the upper one is the longest and is in line with suborbital ridge and extends beyond opercular margin, 1-2 short spines below the longest spine. Supplemental spine at the base of longest spine. A membranous flap along opercular border. Two ridges on opercle which end as spines; upper ridge smooth or rugose, lower ridge smooth. Teeth in jaws villiform in several rows, those in the innermost row pointed and directed inwards. Vomerine teeth pointed and arranged in 2 patches. On palatines the teeth are pointed and arranged in longitudinal bands. First dorsal spine smallest, fourth one longest. Pectoral rounded. Pelvics do not reach anal in some specimens and reach first anal ray in other specimens. Lateral line scales cycloid with one opening directed downward to the exterior (Fig. 3 F). 47-53 scales of lateral line spiny, the spines more prominent anteriorly. Umbraculum with one upper lobe (Fig. 16c).

Colour : Head and body dark brown dorsally and dorsolaterally, pale ventrally. First dorsal dark, black blotch between 6-8/9 spines. Upper half of second dorsal membrane less dark. Pectorals dark with spots on rays. Pelvics black. Anal and caudal dark.

Distribution : Known from Massawa, Ethiopia, Pakistan, Gulf of Kutch; Red sea; Muscat; Gulf of Oman, off west coast of India.

Taxonomic Note : The present specimens agree with the original description of *P. suppositus* Troschel. Examination of holotype of *P. maculipinna* Regan clearly reveals (Table 19) that this species is a junior synonym of *P. suppositus* Troschel. A study of the description of *T. scaber* given by Fowler shows that the species is actually referable to *I. supposita* (Troschel).

***Inegocia crocodila* (Tilesius, 1812)**
(Fig. 4A, 17, Tables 2, 3, 4, 7, 8, 11)

1812. *Platycephalus crocodilus* Tilesius, type locality Nagasaki.

1955. *Thysanophrys crocodilus* : Munro, Coastal waters of Sri Lanka.

1982. *Suggrundus crocodilus* : Murty, Tuticorin, Madras and Visakhapatnam.

1983. *Cociella crocodila* : Knapp, W. Indian Ocean.

1878. *Platycephalus punctatus* Day, type locality Malabar

Material examined : 29 specimens (12 females, 17 males) ranging from 118 mm to 359 mm total length from Kakinada.

Additional material examined : Four specimens (females) ranging from 268 mm to 273 mm total length from Cochin; 4 specimens (3 females, 1 male) ranging from 122 mm to 420 mm total length from Malabar and Ganjam coasts (ZSI.Reg.No.F.1849, F.1850, F.1851, F.3449.).

Description : D. VIII-IX, 11; P. ii, 11-16, ii-vii; V. I, 5; A. 11-12; C. 12-14; Ll. 54-57; spine bearing scales in lateral line 2-10, vertical scale rows: above lateral line 72-81, below lateral line 51-59; L.tr. 13-18/1/30-39; GR. 1 + 1 + 3-5.

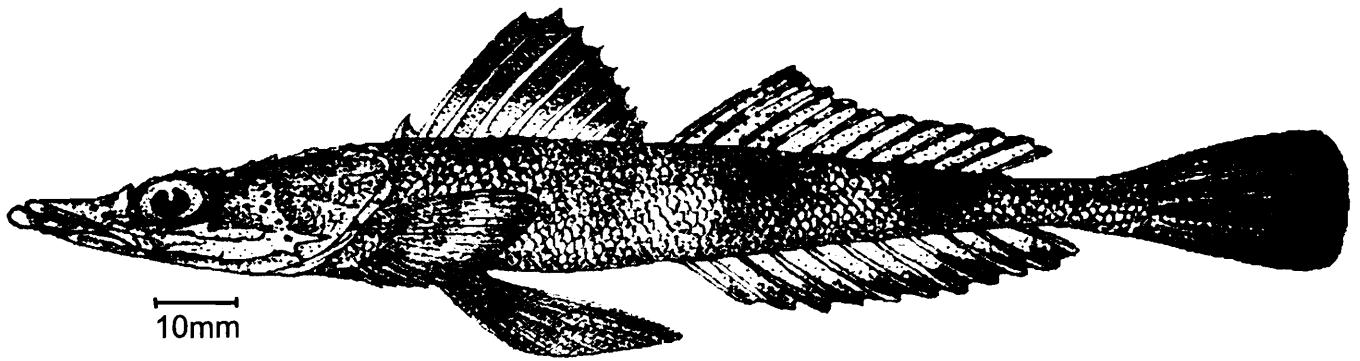
As percent of standard length : Head 31.2 - 35.0 (33.6); depth 9.8 - 14.6 (11.7); predorsal 31.7 - 35.6 (34.5); prepectoral 24.9 - 30.6 (28.0); prepelvic 34.5 - 38.4 (36.1); preanal 56.6 - 61.6 (59.8); first dorsal base 19.0 - 22.1 (20.4); first dorsal height 13.4 - 16.3 (14.5); second dorsal base 26.9 - 29.5 (28.2); second dorsal height 10.6-13.4 (12.3); anal base 29.1 - 31.2 (30.3); anal height 6.5 - 8.6 (7.6); pectoral 11.9 - 16.0 (14.0); pelvic 18.3 - 23.2 (20.7); caudal peduncle 4.4 - 5.8 (5.1).

As percent of head length : Head width 50.0 - 61.5 (55.3); eye 20.5 - 25.5 (22.3); snout 27.3 - 30.1 (28.6); interorbital 7.4 - 11.7 (9.6).

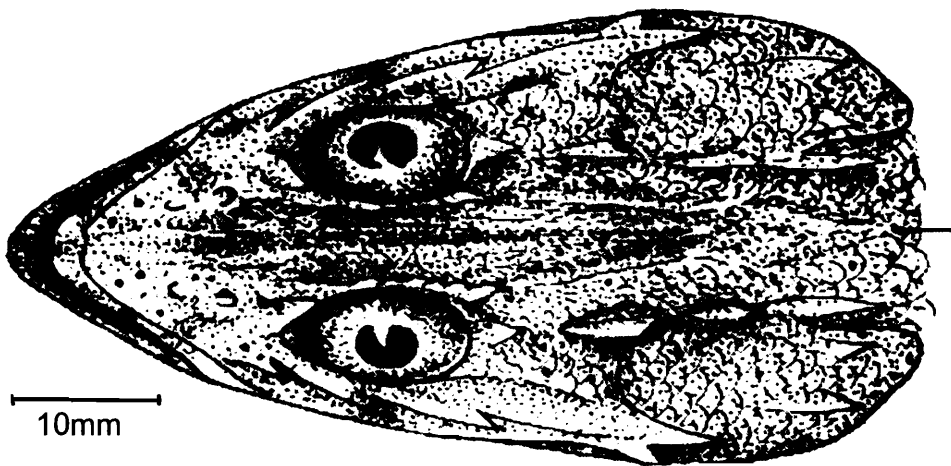
Head depressed, side of the head bicarinate. Anterior nostril with a flap. Two nasal spines between anterior pair of nostrils behind ridges. A pair of ridges extends from nasal spines to the interorbital space. Preocular with a spine. Anterior half of supraorbital ridge smooth, posterior half with 1-3 spines. Superior postorbital ridge with two spines; one at the beginning and one near the end; 1-4 small ridges between posterior pair of spines. Inferior postorbital with 4-5 spines. Suborbital ridge with 3-4 spines; one at the origin of ridge with 4 small radiating ridges around its base, two spines below the middle of eye and fourth spine when present lies below middle of eye or below the posterior border of eye. Preopercle with 3 spines of which the first one is the longest in line with suborbital ridge; supplemental spine present, Very small subopercular flap present. Two ridges on opercle end as spines; lower ridge longer. Teeth in jaws in several villiform rows, those in the innermost row pointed and directed inwards; on vomer all or some teeth pointed and are arranged in two separate patches, teeth on palatines pointed and arranged in a narrow longitudinal band. First dorsal spine shortest and third one longest. Posterior margin of pectoral slightly convex, caudal more or less truncate. Pelvics extend up to first or second anal ray. Lateral line scales ctenoid with one opening directed downward to the exterior (Fig. 4 A). Umbraculum with one upper lobe (Fig. 17c).

Colour : Body dark brown above with 4 dark bands and black dots. First dorsal black; the pigment on basal region appears as a light horizontal band. Second dorsal with 2-3 black spots on each ray. Pectorals and pelvics dark. Anal rays bear distantly placed black spots, anal margin light dark. Caudal with 4 dark bands; upper one and lower one oblique middle two horizontal.

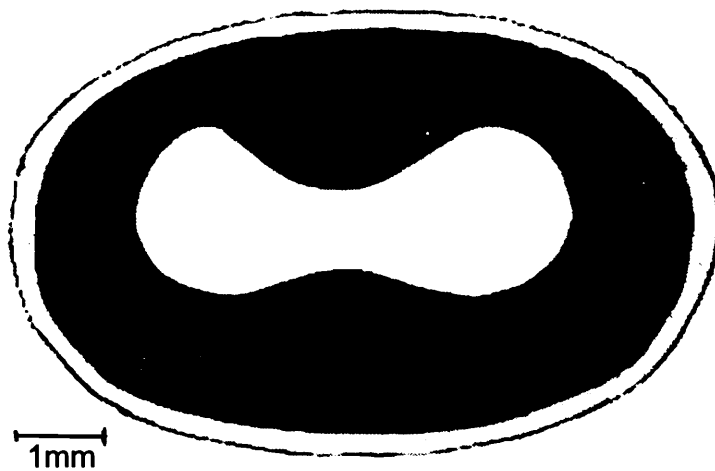
Distribution : Known from Durban, Natal, Zanzibar, Red sea, Madagascar, Pakistan, coasts of India, Andaman sea, coast of Sri Lanka, Thailand, China, Singapore, Java, Borneo,



a. Lateral view



b. Dorsal view of head



c. Umbraculum

Fig. 17. *Inegocia crocodila* (Tilesius, 1812)

Zululand, North Celebes, Philippines, Malacca, Ambon, Timor, Arafura sea, Ternate, New Guinea, Batavia, Palawan province, Negros, Luzon, Manila Bay, sea of Japan.

Inegocia malayana (Bleeker, 1853)

(Fig. 4B, 18, Plate VII, VIII, Table 2, 3, 4, 7, 9, 11, 20)

1853b. *Platycephalus malayanus* Bleeker, type locality Padang; De Beaufort and Briggs, 1962; Jones and Kumaran, 1971 : Kavaratti : Lakshadweep.

1982. *Suggrundus malayanus* : Murty, Kavaratti : Lakshadweep.

1876. *Platycephalus variolosus* Günther, type locality Samoa.

1966. *Thysanophrys papillolabium* Schultz, type locality Cherry Island, Marshall Islands.

1980. *Platycephalus crocodilus*: Jones and Kumaran, (*nec* Tilesius, 1812) : Kiltan : Lakshadweep.

1986. *Thysanophrys otaitensis* Knapp, type locality South Africa.

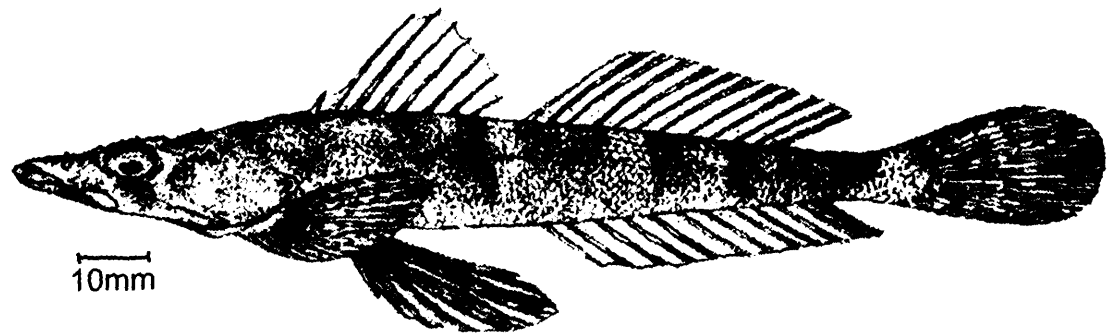
Material examined : One specimen (female) total length 165 mm from Kiltan Island, Lakshadweep; 4 specimens (2 females, 2 males) 144 mm, 155 mm, 172 mm and 207 mm total length from Agathi and Kiltan, Lakshadweep; CMFRI-LA-F.144/462 (Jones, 1969).

Description : D. IX, 11; P. ii, 13-14, vi-vii; V. I, 5; A. 12-13; C. 12; Ll.51-52; spine bearing scales in lateral line 1-3, vertical scale rows: above lateral line 51-56, below lateral line 48-56; L.tr. 7-10/1/21-27, GR. 1 + 1 + 3-4.

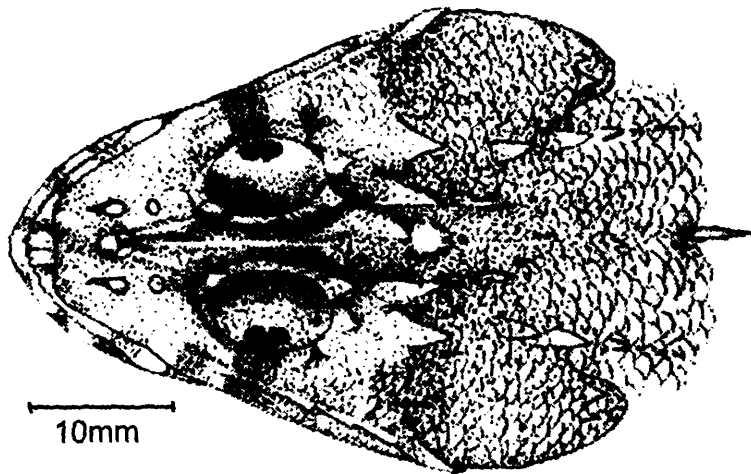
As percent of standard length : Head 30.9 - 31.9 (31.4); depth 9.8- 12.1 (10.4); predorsal 31.5 - 33.3 (32.8); prepectoral 25.2 - 26.6 (26.0); prepelvic 34.8 - 37.8 (36.8); preanal 58.4 - 61.6 (59.7); first dorsal base 20.5 - 22.0 (21.0); first dorsal height 14.6 - 16.1 (15.1); second dorsal base 27.8 - 29.7 (28.5); second dorsal height 12.9 - 15.7 (14.3); anal base 28.5 - 34.8 (31.7); anal height 8.5 - 9.4 (8.8); pectoral 15.6 - 18.9 (17.7); pelvic 24.5 - 26.3 (25.3); caudal peduncle 5.2 - 5.9 (5.5).

As percent of head length : Head width 66.3 - 74.5 (70.7); eye 19.2 - 21.7 (20.9); snout 28.3 - 30.2 (29.4); interorbital 10.0 - 12.7 (11.1).

Body subcylindrical, head much depressed, side of head bicarinate. Anterior nostril with a flap. Several papillae along edges of lips. Two nasal spines; no ridges between nostrils. Preocular with a spine. Supraorbital ridge smooth anteriorly, serrated posteriorly. Superior postorbital ridge with 3-4 spines, inferior postorbital ridge with 4-5 spines, suborbital ridge with 4 spines one below the middle of eye, one below the posterior border of eye and two spines behind. Preopercle with 3 spines of which first and 2nd are short, 3rd spine minute, no supplemental spine. Two indistinct ridges on opercle ending in spines. A broad membranous flap along opercular border. Teeth villiform in jaws vomer and palatines; several rows in jaws innermost row long and pointed inwards, on vomer they are arranged in two patches, on palatines they are arranged in a longitudinal band. Pectoral fin and caudal fin rounded.



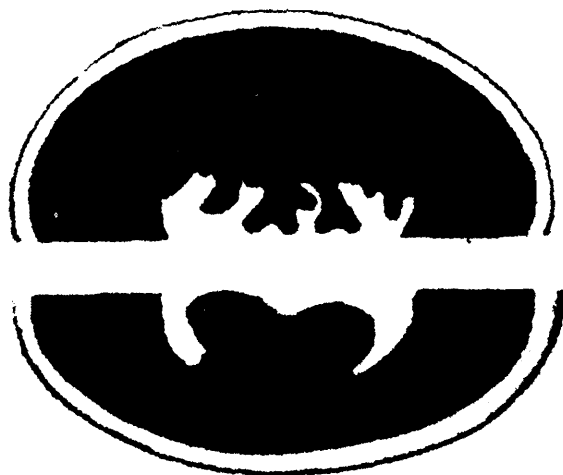
a. Lateral view



b. Dorsal view of head



c. Umbraculum : Full view



d. Umbraculum : Upper and lower halves separated to show cirri and lobes

Fig. 18. *Inegocia malayana* (Bleeker, 1853)

third dorsal spine longest and ninth are shortest. Pelvic fin reaches up to 3rd anal fin ray. Lateral line scales ctenoid with two openings to the exterior (Fig. 4 B). Umbraculum cirrose, some cirri branched (Fig. 18c).

Colour : (in formalin-preserved specimens) Dorsal and dorsolateral sides mottled or blotched with brown, white and dark. Ventral side pale, four bands on body; some of these bands are broken into spots or encircling light areas as distinct ocelli; white spot just in front of occipital region. Dorsal, pectoral and pelvic with brown spots; caudal with brown spots as indistinct vertical lines.

Distribution : Known from Natal, Seychelles Lakshadweep; Sumatra, Ambon, Queensland; Southern Indonesia, Northwestern Australia; Marianas Islands and Marshall Islands.

Taxonomic Note : Under the description of *Platycephalus fuscus*, Cuvier (1829) stated that he found a drawing named as *Cottus otaitensis* among the drawings made by Parkinson from Otaiti (Tahiti). He also stated that this name was found in the manuscript of Solander. After Cuvier (1829), the name *Cottus otaitensis* was not mentioned in any of the taxonomic works until Fowler (1928) listed "*Cottus otaitensis* (Parkinson) Cuvier", under the synonymy of *Platycephalus fuscus* Cuvier. Later he (Fowler, 1949:109) described *P. fuscus* Cuvier and stated under the description that "This may be the long obscured *Cottus otaitensis* Parkinson (in Cuvier: *Hist. Nat. Poiss.* Vol.4, 177(241), 1829, type locality Tahiti)" Knapp (1986) described "*Thysanophrys otaitensis* (Parkinson, 1829)" and treated *P. malayanus* Bleeker (1853b), *P. variolosus* Günther (1876) and *T. papillolabium* Schultz (1966) as its synonyms. He also included⁶ "*Cottus otaitensis* Fowler, 1949" as a synonym (?) of his *T. otaitensis* but did not state anything about *P. fuscus* Cuvier though it was only under the description of Ital species that Cuvier (1829) made a mention of and compared "*C. otaitensis*" with *P. fuscus*.

The name "*Cottus otaitensis*" was first published by Cuvier (1829) mentioning the unpublished name under the description of another species. In addition to satisfying the provisions of Article 11, a name published before 1931 must have been accompanied by a description, definition or indication (Article 12) and these provisions are not met with here; therefore this name cannot be considered as available. Further, since Fowler (1928) cited only the name under the synonymy of *P. fuscus* Cuvier (1829), it also does not constitute an 'indication' under Article 16 of the Code. Though Knapp (1986:485) used the name "*Thysanophrys otaitensis* (Parkinson, 1829 in Cuvier 1829)" (Parkinson was actually the artist and hence cannot be the author of the species; it is Solander who provided the manuscript description) and gave a description and figure of this species, since he used a name that is not 'available', it is not possible to treat *Cottus otaitensis* Parkinson as a name that is 'available' more so when there is an available and valid name that is under regular use by the taxonomists (*P. malayanus* Bleeker) for about one and half centuries. It is thus

⁶ Fowler (1949), did not describe *Cottus otaitensis*, he only described *P. fuscus* and opined that "This may be the long obscured *Cottus otaitensis* Parkinson [in: Cuvier: *Hist. Nat. Poiss.* Vol.4, 177(241), 1829, type locality, Tahiti]," The basis for treating a species name as a synonym when that species has not been described before is unknown.

clear, that a name that is not 'available' was brought into the literature by Cuvier (1829), Fowler (1928, 1949) and Knapp (1986). Under these circumstances and in the absence of a detailed published description of the species, it is not known how one can identify a specimen as "*Cottus otaitensis*" However, since Knapp (1986) is the first to publish *Thysanophrys otaitensis* satisfying the conditions of 'availability', this species name takes the authorship of Knapp (1986) and his specimens are the types. The oldest 'available' name for the species referred to as "*Thysanophrys otaitensis*" by Knapp (1986) is *Platycephalus malayanus* Bleeker (1853b) and therefore this name is applied to the present specimens.

As mentioned above, the present specimens are characterised by the presence of papillae on the lips (this character was also mentioned in *T. otaitensis* by Knapp, 1986), but there is no mention of this character in the original or subsequent descriptions by Bleeker (1853b, 1879). De Beaufort and Briggs examined the "specimens of Bleeker's collection in the Leiden Museum" but they also did not mention this character. The other authors who described this species (Günther, 1860; Fowler, 1928; Hardenberg, 1936; Jones and Kumaran, 1971, 1980; and Murty, 1982) also did not mention this character. The holotype of this species (No. 5968 RMNH) (Plate VII A, B) has distinct papillae on lips. Evidently this character was only overlooked by the original and some subsequent authors. Tarp and Kailola (1984) mentioned the presence of papillae on the lips of *T. malayanus* described by them.

Günther (1876) described *P. variolosus* from Samoa; the examination of the holotype of this species (Plate VIII, Table 20) shows that it agrees very well with the present specimens of *I. malayana* (Plate VII, C and Fig. 18). Therefore De Beaufort and Briggs (1962) and Knapp (1986) were right in treating *P. variolosus* as a synonym of *P. malayanus* Bleeker.

Schultz (1966) described *Thysanophrys papillolabium* from Cherry Island (Marshall Islands), which was treated as a synonym of *T. otaitensis* by Knapp (1986). The description and figure of *T. papillolabium* Schultz clearly show that this species is indeed a synonym of *P. malayanus* Bleeker (Table 20). Jones and Kumaran (1971) first reported *Platycephalus malayanus* from Indian seas on the basis of 9 specimens ranging from 52 to 137 mm total length from Kavaratti, Lakshadweep. These specimens could not be located in the Reference Collection Museum of Central Marine Fisheries Research Institute, Mandapam Camp. Jones (1969) did include this species name in the catalogue of fishes collected from Lakshadweep group of Islands. A comparison of the descriptions of *P. malayanus* given by Jones and Kumaran (1971, 1980) with the specimens examined in the present work (Table 20) shows that they agree very well in all characters except that Jones and Kumaran did not mention the presence of papillae on the lips; De Beaufort and Briggs also did not mention this character in their description.

Jones and Kumaran (1980) also described '*Platycephalus crocodilus* Tilesius' on the basis of four specimens (one specimen from Agathi and three specimens from Kiltan) from Lakshadweep Islands. These specimens (CMFRI-LA-F.144/462) in the Reference Collection Museum of CMFRI were examined. The data of these three specimens as revealed by the

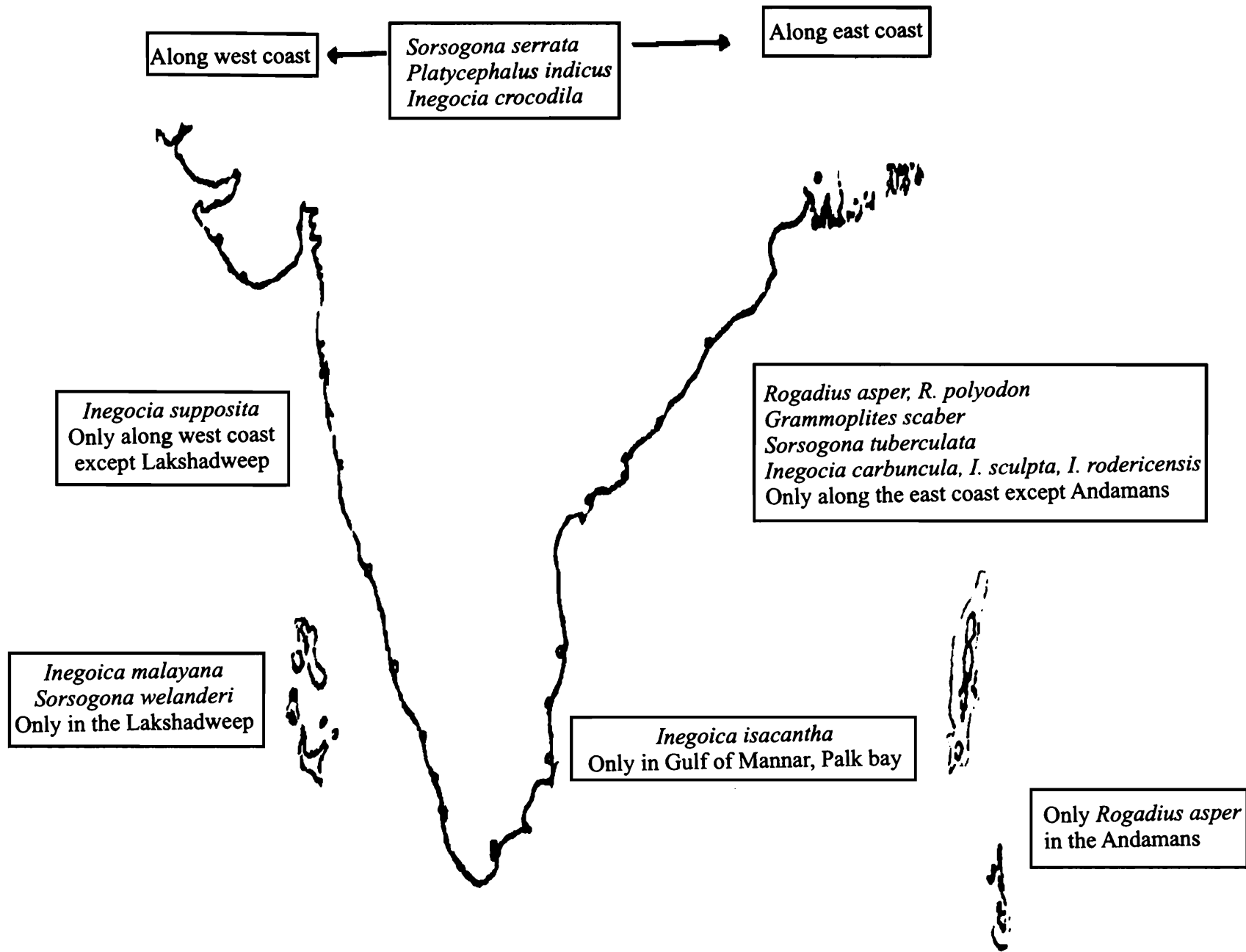


Fig 19. Distribution of flathead species along the mainland and inland coasts of India as per the available records

present examination and the details of these very specimens given by Jones and Kumaran (1980) are given in table 20. It is clear that Jones and Kumaran (1980) gave the number of lateral line scales as 88-97 whereas they are actually 51-52 in these four specimens. It may be mentioned in this connection that Jones and Kumaran (1980) described only two species, *P. malayanus* Bleeker and '*P. crocodilus* Tilesius' from Lakshadweep distinguishing them, in the key for identification of species, mainly on the basis of "series of scales"; according to them there are about 95 series of scales in '*P. crocodilus*' whereas the present examination of the specimens of '*P. crocodilus*' of Jones and Kumaran (1980) reveals that actually there are 51-56 scale rows above lateral line and 48-56 scale rows below lateral line. This clearly shows that the values given by Jones and Kumaran (1980) are erroneous. It may also be mentioned that the specimens of *P. crocodilus* examined in the present study (*vide supra*) show that there are 54-57 scales in lateral line, 72-81 scale rows above lateral line and 51-59 scale rows below lateral line. The most important diagnostic character of *P. crocodilus* is the presence of minute black dots on head and body and such spots are not there in the above four specimens. Hence the identification of the above four specimens as *P. crocodilus* by Jones and Kumaran (1980) is incorrect. The data of the four specimens, however, agree well with *P. malayanus* Bleeker (Table 20), hence they are referable to this species.

SPECIES DISTRIBUTION IN THE INDIAN SEAS

Collection of specimens of flatheads from all along the Indian coast was initiated in 1965 and continued till 1993. These collections and those in the Zoological Survey of India and the Central Marine Fisheries Research Institute reveal certain interesting features in the distribution and abundance of different species. Though a note on the geographical distribution is given under each species description, it is believed most relevant to present a brief analysis of the distribution of flatheads here, in view of the recent global recognition to the necessity of research in and protection and conservation of marine biodiversity.

Along the east coast, *Inegocia isacantha* is restricted to Gulf of Mannar and Palk Bay and *Rogadius asper*, *R. polyodon*, *Grammoplites scaber*, *Sorsogona tuberculata*, *Inegocia carbuncula*, *I. sculpta* and *I. rodericensis* are known from all along the Bay of Bengal (Fig. 19). Even among them, the records reveal that only one species: *Rogadius asper* has so far been collected from the Andaman and Nicobar islands. *R. polyodon* has been reported for the first time from the Indian seas from off Kakinada. *G. scaber*, *S. tuberculata*, *I. carbuncula*, *I. crocodila* and *P. indicus* have been collected from Gulf of Mannar and Palk Bay and *I. rodericensis* from the northern Palk Bay.

Sorsogona serrata and *I. sculpta* have been collected from northern Bay of Bengal.

Of the total of six species recorded from the Arabian Sea, *Inegocia malayana* and *Sorsogona welanderi* are restricted to the lagoons of the Lakshadweep islands, the latter species has been reported for the first time from the seas around India. *Inegocia supposita* has been recorded from all along the eastern Arabian Sea. The other three species *S. serrata*, *P. indicus* and *I. crocodila* are recorded from southwest coast.

Thus, of the fourteen species known so far and collected, eight species are recorded only from the Bay of Bengal of which, one is restricted to Gulf of Mannar and Palk Bay, three species are collected from the Arabian Sea of which two species are restricted to Lakshadweep and three species are distributed in both Bay of Bengal and Arabian sea (Fig. 19).

In regard to abundance, the flatheads are represented in the trawl landings all along the Indian coasts but in poor quantities. Hence there has not been any quantitative estimation of these fishes and there is little knowledge on the biology and spatial and temporal distribution from the Indian seas. However, the experience gained in collecting these fishes reveals that *P. indicus* is landed in fair quantities along the south east coast and in poor quantities from other parts of the coast. *I. serrata* and *I. sculpta* are abundant along the Andhra and Orissa coasts occurring in fair quantities in the trawl landings. *I. isacantha* occurs in the artisanal gear landings as well as trawl landings in the Palk Bay and Gulf of Mannar but in poor quantities. *Grammoplites scaber* is a common species along the entire east coast.

Along the west coast, *I. supposita* is common in the trawl landings all along the coastline but more abundant along the southwest coast. The landings however are poor.

The rest of the species are rather rare in the landings suggesting that their populations also are very small. This feature is likely to render them vulnerable to exploitation and therefore there is urgent need to undertake studies on the distribution pattern and biological characteristics of flatheads from along the Indian coast.

SUMMARY

The classification of the family Platycephalidae at the generic level has been in confusion resulting in erroneously referring the different species to genera. A review of the earlier work has been made and the valid genera demarcated on the basis of an examination of fresh material, study of available descriptions of the type species and in several cases re-examining the type specimens. A large number of specimens of the species known from India have been examined for this study. The major characters found to be useful are the type of caudal fin, presence or absence of a deep pit behind eye, the teeth pattern in the vomer, the nature of the suborbital ridge (smooth, serrated, armed with spines) presence or absence of antrorse preopercular spine and the scales in the lateral line being armed with spines only in the anterior portion or in the entire length. The available evidence suggests that of the total of 29 genera and 2 subgenera erected so far in the family, only eight genera (*Elates* Jordan and Seale, *Platycephalus* Bloch, *Thysanophrys* Ogilby, *Cymbacephalus* Fowler, *Rogadius* Jordan and Richardson, *Grammoplites* Fowler, *Sorsogona* Herre and *Inegocia* Jordan and Thompson) could be considered as valid. Of these, the genera *Platycephalus*, *Rogadius*, *Grammoplites*, *Sorsogona* and *Inegocia* are distributed in the seas around India. It has been recognised, as in the case of certain previous studies also, that the nature of opening in the lateral line

scales, morphology of umbraculum, the presence or absence of airbladder and such other characters are likely to offer support in the classification of genera. Though the material and information at the disposal of the present authors do not suggest such a possibility, it is believed that a concerted study using fresh material of all species and all the type specimens of all the type species and a joint effort by flathead taxonomists from different geographic regions only will offer the solution for this problem.

Of about 70 species known, only twelve were known from India. The present study recorded two additional species: *Rogadius polyodon* (Bleeker, 1853) and *Sorsogona welanderi* (Schultz, 1966) for the first time, thus raising the number of species recorded from the seas around India to fourteen. A large number of specimens from different locations along the Indian coast, of each species (except in the case of the species which are rare in the commercial catches) are examined and descriptions prepared. The synonyms under each species are also examined critically and the issues pertaining to synonymy are sorted out. Moreover, the issues pertaining to nomenclature are also addressed wherever relevant. Keys for identification of genera and species are given. The morphometric data and frequency distribution of certain meristic counts of all the species included in the present study are presented to assist comparison with material from other localities in the area of distribution of the family. A brief note on the distribution of species in the Indian seas is also given.

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*Could not consulted the original.

Table 2 : Range in the number of dorsal fin spines and rays and anal rays in different species

Sl. No.	Species	Dorsal Spines			Dorsal rays				Anal rays				
		VIII	IX	X	10	11	12	13	10	11	12	13	
1.	<i>Platycephalus indicus</i> □	VIII	IX				12	13			12	13	
2.	<i>Rogadius asper</i> □		IX	X	10	11	12		10	11			
3.	<i>Rogadius polyodon</i> □		IX			11				11			
4.	<i>Grammoplites scaber</i> □	VIII	IX				12	13		11	12	13	
5.	<i>Sorsogona tuberculata</i> □		IX	X		11	12		10	11	12		
6.	<i>Sorsogona serrata</i> □	VIII	IX			11	12	13		11	12	13	
7.	<i>Sorsogona welanderi</i> ®		IX			11				11			
8.	<i>Inegocia carbuncula</i> □	VIII	IX		10	11	12			11	12	13	
9.	<i>Inegocia isacantha</i> *		IX	X		11	12	13		11	12	13	
10.	<i>Inegocia sculpta</i> □		IX	X	10	11	12			11	12		
11.	<i>Inegocia rodericensis</i> □	VIII	IX				12			11	12	13	
12.	<i>Inegocia supposita</i> §		IX			11	12					13	14
13.	<i>Inegocia crocodila</i> □	VIII	IX			11				11	12		
14.	<i>Inegocia malayana</i> ®		IX			11					12	13	

□ From Kakinada

® From Lakshadweep

§ From Cochin

* From Gulf of Mannar and Palk Bay

Table 3 : Frequency distribution of pectoral fin rays in different species

Sl. No.	Species	17	18	19	20	21	22	23	24	N
1.	<i>Platycephalus indicus</i> [#]	1	7	36	6					50
2.	<i>Rogadius asper</i> [#]					5	17	53	5	80
3.	<i>Rogadius polyodon</i> [#]						1	2		3
4.	<i>Grammoplites scaber</i> [#]			4	50	37	5	1	1	98
5.	<i>Grammoplites scaber</i> [*]			1	5	5				11
6.	<i>Sorsogona tuberculata</i> [#]			2	18	30	9	1		60
7.	<i>Sorsogona serrata</i> [#]		1	4	64	100	26	4	1	200
8.	<i>Sorsogona welanderi</i> [§]							1		1
9.	<i>Inegocia carbuncula</i> [#]	1	15	27	7					50
10.	<i>Inegocia isacantha</i> [*]		1	45	52	2				100
11.	<i>Inegocia sculpta</i> [#]		7	85	21	2				115
12.	<i>Inegocia rodericensis</i> [#]					26	56	7	1	90
13.	<i>Inegocia rodericensis</i> [¶]					3	7			10
14.	<i>Inegocia supposita</i> [©]					2	31	15	2	50
15.	<i>Inegocia supposita</i> [¥]					1	12	3		16
16.	<i>Inegocia crocodila</i> [#]			1	3	23	2			29
17.	<i>Inegocia malayana</i> [§]					1	3	1		5

From Kakinada

\$ From Lakshadweep

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Table 4 : Frequency distribution of the number of spine-bearing scales in the anterior part of lateral line of different species

Sl. No.	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	N	
1.	<i>Platycephalus indicus</i> ®	41	6																														47	
2.	<i>Rogadius asper</i> ®						2	7	35	18	7	6	3	1	1																			80
3.	<i>Rogadius polyodon</i> ®					1	1	0	0	1																								3
4.	<i>Sorsogona tuberculata</i> ®																		1	1	7	10	16	13	4	4	3	1					60	
5.	<i>Sorsogona serrata</i> ®												2	4	5	7	10	13	23	26	41	22	15	10	7	4	4	2	2	1	1	1	200	
6.	<i>Sorsogona welanderi</i> \$						1																										1	
7.	<i>Inegocia carbuncula</i> ®							2	2	2	2	3	3	3	4	4	5	5	3	3	2	2	1	1	1	1	1						50	
8.	<i>Inegocia isacantha</i> #			2	10	15	17	16	16	15	4	2	1	1	1																		100	
9.	<i>Inegocia sculpta</i> ®			1	2	5	9	18	18	17	15	12	10	3	3	2																	115	
10.	<i>Inegocia rodericensis</i> ®															1	1	2	6	9	20	10	10	9	8	5	4	3	1	1			90	
11.	<i>Inegocia rodericensis</i> *																				1	2	3	1	1	1	1						10	
12.	<i>Inegocia crocodila</i> ®		1	2	7	10	5	2	1	1																							29	
13.	<i>Inegocia malayana</i> \$	1	3	1																													5	

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Table 5 : Frequency distribution of spine bearing scales in the anterior part of the lateral line

Sl. No.	Species	46	47	48	49	50	51	52	53	54	55	56	57	N
1.	<i>Grammoplites scaber</i> #								11	12	72	2	1	98
2.	<i>Grammoplites scaber</i> \$								1	3	6	1		11
3.	<i>Inegocia supposita</i> *		2	3	5	11	17	10	2					50
4.	<i>Inegocia supposita</i> **	1	1	2	3	3	3	3						16

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Table 6 : Frequency distribution of pored lateral line scales (Locality Kakinada)

Species	68	69	70	71	72	73	74	75	76	77	78	79	N
<i>Platycephalus indicus</i>	1	2	3	3	7	8	7	6	2	1	1	1	42

Table 7 : Frequency distribution of the number of pored lateral line scales in different species

Sl. No.	Species	50	51	52	53	54	55	56	57	58	N
1.	<i>Rogadius asper</i> #			6	8	33	30	2	1		80
2.	<i>Rogadius polyodon</i> #						1	1	1		3
3.	<i>Grammoplites scaber</i> #				11	12	72	2	1		98
4.	<i>Grammoplites scaber</i> @				1	3	6	1			11
5.	<i>Sorsogona tuberculata</i> #	2	4	5	15	32	2				60
6.	<i>Sorsogona serrata</i> #		1	6	14	48	90	34	5	2	200
7.	<i>Sorsogona welanderi</i> \$							1			1
8.	<i>Inegocia carbuncula</i> #	2	4	8	15	10	8	3			50
9.	<i>Inegocia isacantha</i> @	2	2	11	27	47	10	1			100
10.	<i>Inegocia sculpta</i> #	1	3	4	20	43	41	3			115
11.	<i>Inegocia rodericensis</i> #	1	2	7	30	35	13	2			90
12.	<i>Inegocia rodericensis</i> ¶			1	2	2	4	1			10
13.	<i>Inegocia supposita</i> ©				1	18	25	6			50
14.	<i>Inegocia supposita</i> ¥			1	4	8	3				16
15.	<i>Inegocia crocodila</i> #					12	10	4	2	1	29
16.	<i>Inegocia malayana</i> \$		3	2							5

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Table 8 : Frequency distribution of vertical scale rows above lateral line (Locality: Kakinada)

Sl. No.	Species	72	73	74	75	76	77	78	79	80	81	82	xx	xx	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	N
1.	<i>Platycephalus indicus</i>														1	1	2	2	2	3	3	5	5	5	8	3	3	3	2	48
2.	<i>Inegocia crocodila</i>	1	1	2	4	8	4	3	3	1	1	1																		29

Table 9 : Frequency distribution of vertical scale rows above lateral line in different species

Sl. No.	Species	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	N
1.	<i>Rogadius asper</i> #					10	22	24	12	8	4									80
2.	<i>Rogadius polyodon</i> #								3											3
3.	<i>Grammoplites scaber</i> #					2	9	14	23	21	16	4	4	3	1	1				98
4.	<i>Grammoplites scaber</i> @							2	5	2	1	1								11
5.	<i>Sorsogona tuberculata</i> #	1	8	9	17	21	4													60
6.	<i>Sorsogona serrata</i> #		6	11	20	38	41	56	25	2	1									200
7.	<i>Sorsogona welanderi</i> \$								1											1
8.	<i>Inegocia carbuncula</i> #		1	1	3	5	7	14	7	6	5	1								50
9.	<i>Inegocia isacantha</i> @				3	9	28	32	16	10	2									100
10.	<i>Inegocia sculpta</i> #			4	5	26	31	32	11	6										115
11.	<i>Inegocia rodericensis</i> #			2	11	24	13	12	12	8	5	3								90
12.	<i>Inegocia rodericensis</i> ¶				2	2	2	1	1	1	1									10
13.	<i>Inegocia supposita</i> ©							1	3	4	5	6	9	7	7	3	2	2	1	50
14.	<i>Inegocia supposita</i> ¥											3	4	3	2	1	1	1	1	16
15.	<i>Inegocia malayana</i> \$	1	1	1	1	0	1													5

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Table 10 : Frequency distribution of vertical scale rows below lateral line (Locality Kakinada)

Species	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	N
<i>Platycephalus indicus</i>	1	1	2	2	3	4	5	5	8	3	3	3	2	2	2	2	48

Table 11 : Frequency distribution of the number of vertical scale rows below lateral line in different species

Sl. No.	Species	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	N
1.	<i>Rogadius asper</i> [#]					1	5	8	29	21	14	2								80
2.	<i>Rogadius polyodon</i> [#]											1	1	1						3
3.	<i>Grammoplites scaber</i> [#]							1	2	5	23	32	12	8	6	4	3	1	1	98
4.	<i>Grammoplites scaber</i> [@]									1	2	7	1							11
5.	<i>Sorsogona tuberculata</i> [#]				2	4	11	15	20	6	2									60
6.	<i>Sorsogona serrata</i> [#]								12	24	58	59	33	9	4	1				200
7.	<i>Sorsogona welanderi</i> ^{\$}									1										1
8.	<i>Inegocia carbuncula</i> [#]						1	4	8	9	13	10	4	1						50
9.	<i>Inegocia isacantha</i> [@]	1	2	2	5	19	22	32	6	4	4	3								100
10.	<i>Inegocia sculpta</i> [#]					6	9	16	28	32	23	1								115
11.	<i>Inegocia rodericensis</i> [#]					6	18	22	19	16	6	2	1							90
12.	<i>Inegocia rodericensis</i> [¶]							1	5	2	1	1								10
13.	<i>Inegocia supposita</i> [@]								3	15	14	11	7							50
14.	<i>Inegocia supposita</i> [¥]									2	2	3	3	5	1					16
15.	<i>Inegocia crocodila</i> [#]								1	1	1	14	5	5	1	1				29
16.	<i>Inegocia malayana</i> ^{\$}				1	1	1	1	..	1							5

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Table 12 : Comparison of *P. asper* Cuvier (1829), *P. pristiger* Cuvier (1829), *P. asper* De Beaufort and Briggs (1962), *R. asper* Knapp (1979) and the present specimens

Species	Locality	Preocular spine	Suborbital ridge	Supraorbital ridge	Preopercular spines (Including antrorse spine)	Pored lateral line scales	Spine bearing scales in Lateral li	Opercular ridge	Colour pattern of pectoral fin
<i>P. asper</i> Cuvier (1829), original description	Japan	1	Serrated	Serrated	6	Not mentioned	anterior 1/3	serrated	spotted
<i>P. pristiger</i> Cuvier (1829), original description	New Guinea	1	Serrated	Serrated	5	Not mentioned	smooth*	serrated	
<i>P. asper</i> De Beaufort and Briggs(1962)	Japan	1	Serrated	Serrated	4	Not mentioned	not mentioned	smooth	spotted
<i>R. asper</i> Knapp (1979)	Red sea	1	Serrated	Serrated	4-5	51-54	6-11	denticulate	spotted
Present specimens	Kakinada	1	Serrated	Serrated	6-8	52-57	6-14	serrated	spotted

*First 7 scales spiny in the syntype No. 6855

Table 13 Comparison of types of *P. polyodon* Bleeker (1853a) (RMNH No. 5992) with the description of the species given by De Beaufort and Briggs (1962) and the present *R. polyodon*

Sl. No.	Character	Type specimens		De Beaufort and Briggs	Present <i>R. polyodon</i>
		1	2		
1.	D	IX, 11	IX, 11	IX, 12	IX, 11
2.	P	22	23	21	22-23
3.	A	11	11	12-Nov	11
4.	Pored Ll scales	51	57	Not given	55-57
5.	Spine bearing Ll scales	4	5	2	5-9
6.	Vertical scale rows above Ll	56	58	*	55-57
7.	Vertical scale rows below Ll	48	53	*	54-55
8.	L.tr	9/1/21	9/1/21	6-7/1/15-16	8-9/1/22-23
9.	Nasal spines	2	2	Not mentioned	
10.	Preocular spines	1	1	1	1
11.	Umbraculum	Bilobed	Bilobed	Not mentioned	Bilobed
12.	Gill Rakers	1+1+5	1+1+5	Not mentioned	1+1+5
13.	Anterior side of Supraorbital ridge	Smooth	Smooth	Serrated	Smooth
14.	Posterior side of Supraorbital ridge	Serrated	Serrated	Serrated	Serrated
15.	Superior postorbital ridge	Serrated	Serrated	Serrated	Serrated
16.	Inferior postorbital ridge	Serrated	Serrated	Serrated	Serrated
17.	Spine at origin of suborbital ridge	Absent	Absent	Absent	Absent
18.	Number of Preopercular spines including the antrorse spine	5	5-6	4	45-6

*De Beaufort and Briggs (1962) mentioned "Sq.l 70-80" in this species and similarly in several other species. In some cases they gave 'Ll' While the later expression is conventional, the former is not clear. They did not explain anywhere. The expression 'Sq.L' also cannot be taken as total number of vertical scale rows because the number of scale rows above and below lateral line is often different and therefore there cannot be one value.

Table 14 : Comparison of the present specimens with the holotype. original description of *P. serratus* Cuvier. holotype of *P. nigripinnis* Regan and holotype. Paratypes and specimens of *S. melanoptera* Knapp and Wongaratana

Sl. No.	Character	<i>P. serratus</i> Cuvier, 1829 Original Description	<i>P. serratus</i> Cuvier, 1829 Holotype	<i>P. nigripinnis</i> Regan. 1905 Holotype	<i>S. melanoptera</i> Knapp and Wongaratana	<i>S. melanoptera</i> Knapp and Wongaratana Paratypes	<i>S. melanoptera</i> specimens sent by Knapp	<i>P. serratus</i> Specimens in ZSI	Present specimens of <i>S. serrata</i>
1.	Locality	Trincomale	Trincomale	Muscat	Off Cochin	Gulf of Oman, Cochin, Vizhinjam, Madras, Andamans	Off west coast of India	Lakshadweep	Kakinada
2.	D	IX, 12	IX, 12	IX, 12	IX, 12	IX, 12-13	VIII-IX, 12-13	VIII-IX, 11	VIII-IX, 11-13
3.	A	11	11	12	12	12	12	11-12	11-13
4.	P	19	19	20	21	20-21	19-20	19-20	19-24
5.	GR		..	..	2+8	2-3+8-10	2-3+8-11	2+1+6-8	2-3+1+6-10
6.	Preopercular spines	4	..	3	3	3	3	3	3
7.	Spine bearing IJ scales	..	12	*10-12	31	13-31	17-21	14-22	12-31
8.	Pored lateral line scales	..	54	61	55	52-55	51-54	53-55	51-58
9.	Supraorbital ridge	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated
10.	Suborbital ridge	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated	Serrated
11.	Upper Umbraculum	..	..	Bilobed	Bilobed	Bilobed	Bilobed	Bilobed	Bilobed

* From original description

Table 15 : *W. welanderi* : Comparison of the original description of Schultz (1966) and the present specimen.

Sl. No.	Character	Schultz (1966)	Present specimen
1.	D	IX, 11	IX, 11
2.	P	22	23
3.	Pored lateral line scales	54	56
4.	Spine bearing scales in lateral line	6 or 7	6
5.	Nasal spines	2	2
6.	Preocular spines	2	2
7.	Small spines on the base of preocular	Present	Present
8.	Umbraculum	Single lobe	Single lobe
9.	Gill rakers	1+1+5	1+1+5
10.	Anterior part of Supraorbital ridge	Serrated	Serrated
11.	Posterior part of Supraorbital ridge	Serrated	Serrated
12.	Superior postorbital ridge	Serrated	Serrated
13.	Spine at the origin of suborbital ridge	Absent	Absent
14.	Preopercular spines	2	2
15.	Cheek	Unicarinate	Unicarinate

Table 16 : Comparison of *P. carbunculus* Valenciennes, *P. carbunculus* Cantor, *P. cantori* Bleeker, *P. cantori* De Beaufort and Briggs, *P. carbunculus* De Beaufort and Briggs, *P. bobosok* Bleeker and the present specimens of *I. carbuncula*

Sl. No.	Character	<i>P. carbunculus</i> Valenciennes Holotype No. 6875	<i>P. carbunculus</i> Cantor Original description	<i>P. cantori</i> Bleeker Types in BMNH	<i>P. cantori</i> De Beaufort and Briggs	<i>P. carbunculus</i> De Beaufort and Briggs	<i>P. bobosok</i> Bleeker Holotype RMNH 5915	<i>I. carbuncula</i> Present specimens
1.	Locality	Bombay	Penang	Penang	...	...	Singapore	Kakinada
2.	D	IX. 11	IX, 11-12	IX. 11	IX, 12	VIII-IX. 11	VIII, 11	VIII-IX, 10-12
3.	A	12	12	11	12	12	12	11-13
4.	L1	55	...	62	68	...	49	50-56
5.	Spine bearing scales in L1	5	...	9	2+few	...	5	7-26
6.	Preocular spines	*1	...	1	1	1	1	1-2
7.	Nasal spines	...	...	3 pairs	3 pairs	1+some small	1 pair	1-3 pairs
8.	Preopercular spines	...	...	4	...	2-3	3-4	3-4
9.	Supraorbital ridge	Serrated completely	Serrated completely	Serrated completely	...	Denticulated	Serrated, anterior 1/4 smooth	Serrated completely or anterior part smooth
10.	Spines on suborbital ridge	6	...	5, 10	6+ small pine	5-7	5-6	6-13
11.	Ocular cirrus	...	...	...	...	Present	Present	Present

* From original description

Table 17 : Comparison of important characters in the syntype of *P. isacanthus* Cuvier in the Paris Museum, type specimens of *P. bataviensis* Bleeker in the Leiden Museum and British Museum, the description of *I. japonica* Matsubara and Ochiai, and Knapp, and *P. bataviensis* De Beaufort and Briggs and present specimens of *I. isacantha*

Sl. No.	Character	<i>P. isacanthus</i> Cuvier.1829 Syntypes No. 5248, 6854	<i>P. bataviensis</i> Bleeker,1853 Type RMNH No.5918	<i>P. bataviensis</i> Bleeker.1853 Type BMNH,1880. 4.21.102-4	<i>I. japonica</i> Matsubara and Ochiai, 1955	<i>I. japonica</i> Knapp 1983	<i>P. bataviensis</i> De Beaufort and Briggs	<i>I. isacantha</i> Present specimens
1.	Locality	Bourou	Batavia	Batavia	Japan	Western	...	Rameswaram
2.	D	IX, 12	IX, 12-13	...	IX, 12	IX, 12	IX, 12	IX-X, 11-13
3.	A	12	11-12	...	12	12	12-13	11-13
4.	P	20	19-20	19	19-21	19-22	19	18-21
5.	L1	55	53-55	60	51-55	51-54	75-80(sq.l.)	47-56
6.	Spine bearing scales in L1	6	3-5	...	6-8	14-16	...	3-14
7.	GR	...	1+1+3-4	...	1+5	1+4-5	...	1+1+1-4
8.	Preopercular spines	*2	2	3	3	2-3	...	2-3
9.	Subopercular flap	...	Present	Present	Present	Present	Present	Present
10.	Cirri in Umbraculum	...	Rounded	...	Pointed	...	...	Rounded
11.	Supraorbital ridge posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated	Serrated	**Serrated posteriorly	Serrated posteriorly	Serrated
12.	Spines in superior postorbital ridge	...	2	4	2-4	...	2	2-3
13.	Spines in inferior postorbital ridge	...	4-6	7	6-9	...	6-7	4-7
14.	Spines in suborbital ridge	3	2	3	3	2	3-4	2-4
15.	Vertical bands on body	*5	...	6 ill-defined	*6 vague bands	4-6	...	5-6

* From original description

** From figure

Table 18 : Comparison of *P. sculptus* Günther 1880 (holotype, syntype and original description), *K. detrusus* Matsubara and Ochiai 1955, *P. bengalensis* Rao, 1966, *S. rodericensis* Tarp and Kailola, 1984, and Sainsbury *et al.*, and the present specimens of *I. sculpta*

Sl. No.	Character	<i>P. sculptus</i> Günther Holotype and Syntype	<i>P. sculptus</i> Günther Original description	<i>K. detrusus</i> Matsubara and Ochiai	<i>P. bengalensis</i> Rao	<i>I. sculpta</i> Present Specimens	<i>S. rodericensis</i> Tarp and Kailola	<i>S. rodericensis</i> Sainsbury <i>et al.</i>
1.	Locality	Arafura sea	Arafura sea	Japan	Visakhapatnam	Kakinada	N.W Australia	Northern and N.W Australia
2.	Number examined	2	2	46	20	115	1	1
3.	D	IX, 11	IX, 11	IX, 11	IX, 11	IX,X, 10-12	VIII-IX, 11	VIII-IX, 12
4.	A	12	12	12	12	11-12	12	12
5.	P	20	...	18-20	17-19	18-21	...	...
6.	L1	58, 60	70	46-55	72-78	50-56	...	67-70
7.	Spine bearing L1 scales	27, 17	Anterior half	1-2	7-8	3-15	...	...
8.	L.tr.	9/1/19	...	...	9-10/24-27	8-12/1/18-25	...	...
9.	GR	...	...	2+6-9	2+9	2+1+6-8	...	...
10.	Pyloric caecae	...	...	7	5	6-8	...	...
11.	Subopercular flap	Triangular	Tongue-shaped	Bayonet-shaped	...	Triangular	Present	Present
12.	Preocular spines	...	...	1	1	1	1	1
13.	Spines in suborbital ridge	6	Series of spines	6	...	4-6	5-6	5-6
14.	Pectoral fin shape	Falcate	Falcate	Falcate	Falcate	Falcate	Falcate	Falcate
15.	Ocellus on pectoral fin	Present	...	Present	Present	Present	Present	Present
16.	Preopercular spines	3	2	3	3	3	3	3

Table 19 : Comparison of *P. suppositus* Troschel, *P. maculipinna* Regan and the present specimens

Sl. No.	Character	<i>P. suppositus</i> Troschel 1840 original description	<i>P. maculipinna</i> Regan, 1905 original description	<i>P. maculipinna</i> Types in BMNH 5 specimens	<i>I. supposita</i> Present specimens
1.	Locality	...	Muscat	Muscat	Cochin and Mangalore
2.	D	IX, 12	IX, 12	IX, 12	IX-X, 11-12
3.	Longest spine in first dorsal	4th	3rd or 4th	4th	3rd or 4th
4.	Black blotch on dorsal between spines	...	6-8 (6-9 in Fig.)	Present	6-8/9
5.	A	13	13	12	13-14
6.	P	22	...	22-23	21-24
7.	Pored scales in lateral line	44	*100-104	55	53-56
8.	Spine bearing lateral line scales	...	Nil	51-53	47-53
9.	Preocular spines	1	1(from Fig.)	1	1
10.	Spines in supraorbital ridge	3	3-4	3	3-4
11.	Spines in superior postorbital ridge	2	...	2	2
12.	Spines in inferior postorbital ridge	4	...	5	4
13.	Suborbital spines	3	...	3	3-4
14.	Pectoral	...	With black spots	With black spots	With black spots
15.	Pelvic	...	Black	Black	Black
16.	Caudal	...	Black	Dark	Dark

*Regan described higher scale count but there are only 55 scales in the types

Table 20 : Comparison of present specimens of *I. malayana* (first two columns) with descriptions of *P. crocodilus* Jones and Kumaran, *P. malayanus* Bleeker, *P. malayanus* De Beaufort and Briggs, *P. malayanus* Jones and Kumaran, holotype of *P. variolosus* Günther and description of *T. papillolabium* Schultz.

Sl. No.	Character	From Kiltan Lakshadweep (Present examination 1 specimen) 4 specimens)	" <i>P. crocodilus</i> " Jones and Kumaran.1980 (Present examination	<i>P. crocodilus</i> Description of Jones and Kumaran 1980	<i>P. malayanus</i> * Bleeker 1853b Original description	<i>P. malayanus</i> De Beaufort and Briggs	<i>P. malayanus</i> Jones and Kumaran 1971	<i>P. variolosus</i> Günther 1876 Holotype	<i>T. papillolabium</i> Schultz 1966, original description
1.	D	IX, 11	IX, 11	IX, 11-12	IX, 11-12	IX, 11(12)	IX, 11	IX, 11	IX. 10-12
2.	P	22	21-22	21-22	21	20	21	21	21-22
3.	A	12	12-13	12	12-13	12(13)	12	12	12
4.	Pored lateral line scales	51	51-52	88-97	68(55)	...	52-56	56	54
5.	Spine bearing scales in lateral line	3	1-2	2-3	0(2-3)	...	2	3	1-2
6.	L.tr.	8/1/27	7-10/1/21-26	7-8/1/19-21	...(8/1/22)	...	7/1/20-26	8/1/24	7/1/15
7.	Nasal spines	2	2	2	2	2	2	2	...
8.	Preocular spines	1	1	...	1	1	...	1	1
9.	Supraorbital ridge posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated posteriorly	Serrated
10.	Spines in supraorbital ridge	7	7-8	...	...	7-20	7-12	3	8
11.	Spines in superior postorbital ridge	3	3-4	1-2	...	3-5	3-4	2	3-4
12.	Spines in inferior postorbital ridge	5	4-5	4-6	...	8	5	5	4-5
13.	Spines in suborbital ridge:								
	a. at origin	...	...	...	1	0-1	nil	...	...
	b. below anterior border of eye	...	...	...	...	...	...	...	...
	c. below middle of eye	1	1	...	...(1)	1-2	2-4	1	...
	d. below posterior border of eye	1	1	...	...(1)	...	1	1	...
	e. behind hind border of eye	2	2	...	...(1)	3-4	...	2	...
14.	Papillae on lips	Present	Present	...	...(Present)	...	...	Present	Present
15.	Preopercular spines	2+1Minute	2+1Minute	2	2	3	3	2	2
16.	Lower opercular ridge	Smooth	Smooth	...	Smooth	...	...	Smooth	Smooth
17.	Subopercular flap	Round	Round	Feeble	...(Absent)	Round not pronounced	Well developed	...	Present

*The data of the holotype as examined now are given in parantheses; in instances where the original description and the data of holotype as examined now agree. the data of holotype are not shown

PLATE-I

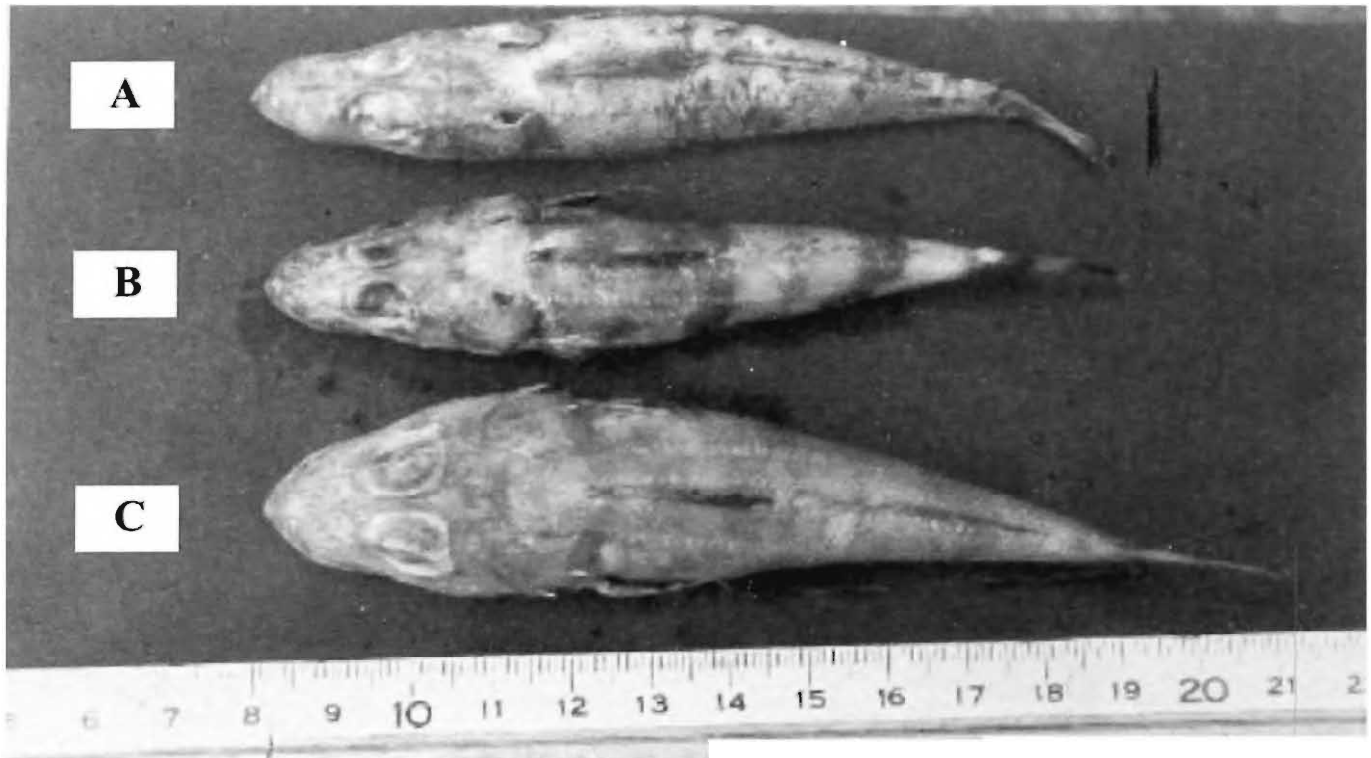


A. *Cymbacephalus nematophthalmus* (Günther 1860), Holotype in the British Museum



B. *Platycephalus rudis* Günther 1880, Holotype in the British Museum

PLATE-II

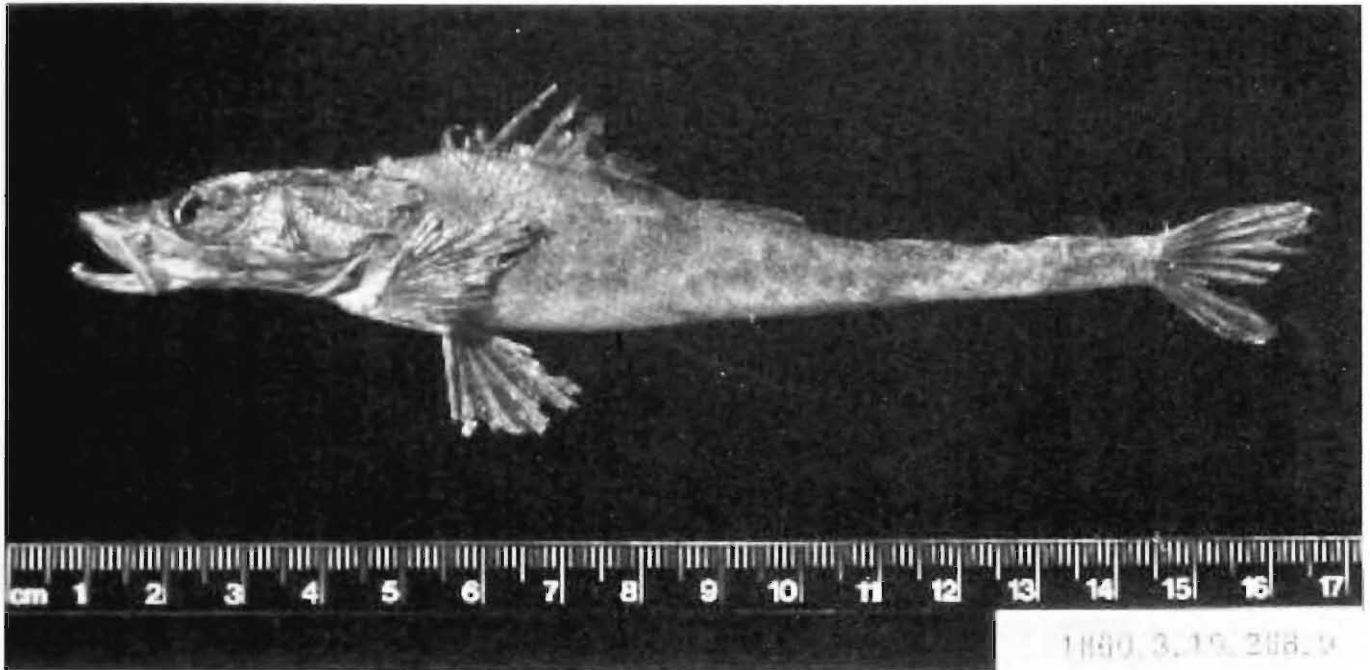


A. Holotype of *P. polyodon* Bleeker, B. Present specimen of *R. polyodon*,
C. Present specimen of *R. asper*

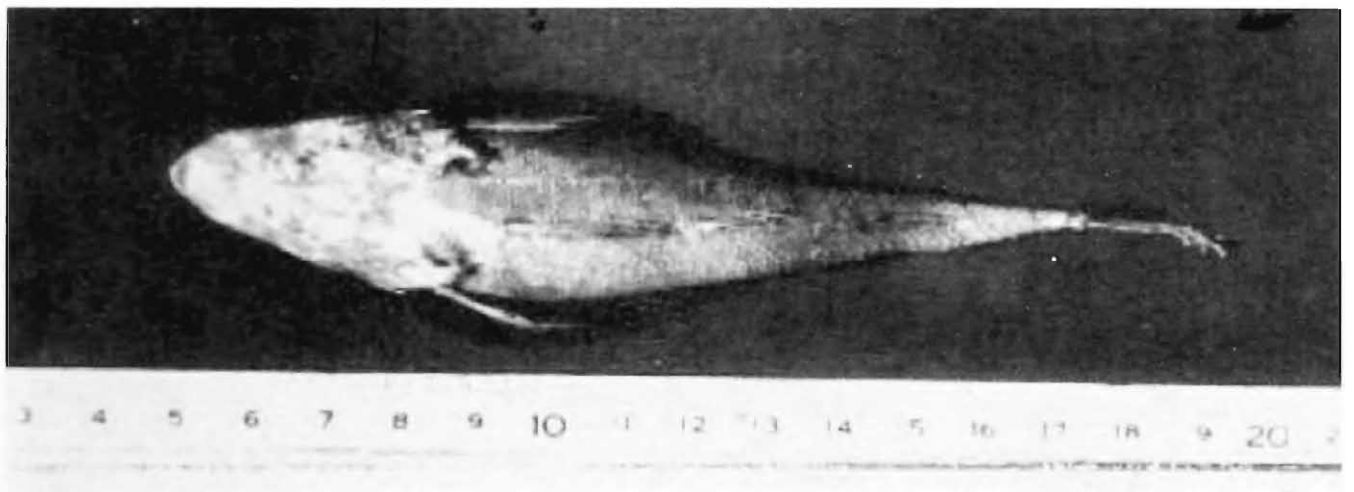


D. *P. nigripinnis* Regan, 1905 from Muscat; Type No. 1904.5.25.145 in British Museum

PLATE-III



A. *Platycephalus carbunculus* Cantor (No. 1860. 3.19.268.9 in the British Museum)



B. *Platycephalus bobosok* Bleeker, Holotype

PLATE-IV

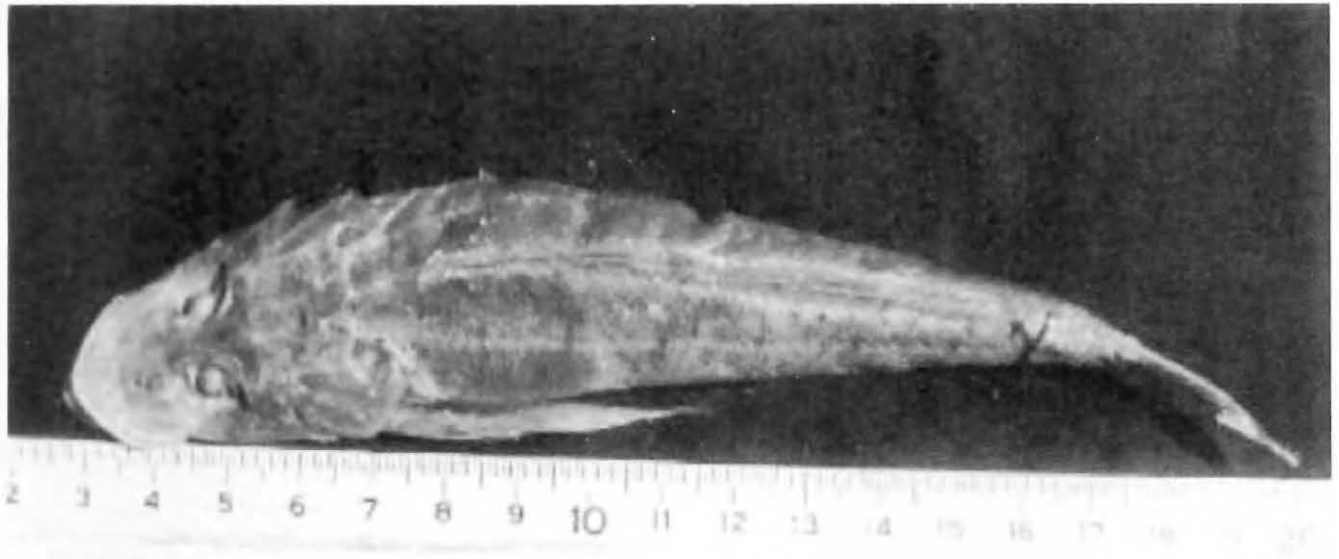


A. *Platycephalus bataviensis* Bleeker, Holotype in the BMNH

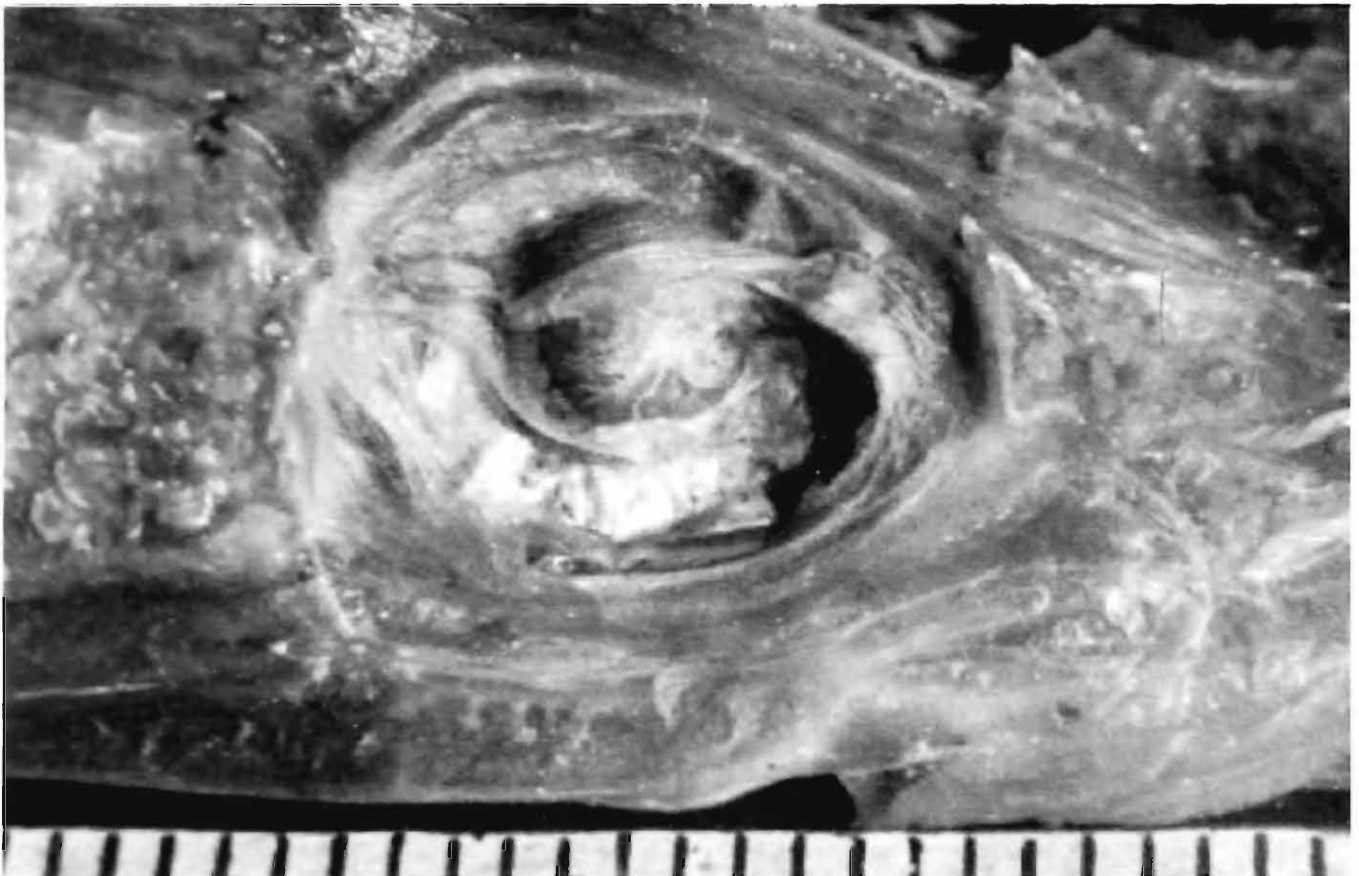


B. *Platycephalus bataviensis* Bleeker, Holotype in the BMNH

PLATE-V

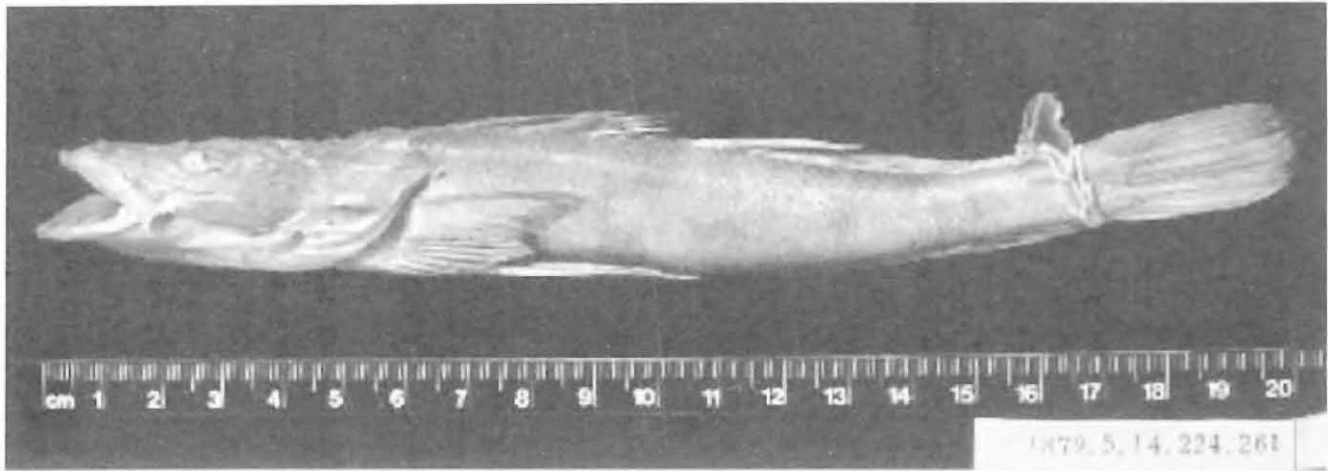


A. *Platycephalus bataviensis* Bleeker, Type in the Leiden Museum



B. *Platycephalus bataviensis* Bleeker, Type in the Leiden Museum; Note the umbraculum in the eye

PLATE-VI

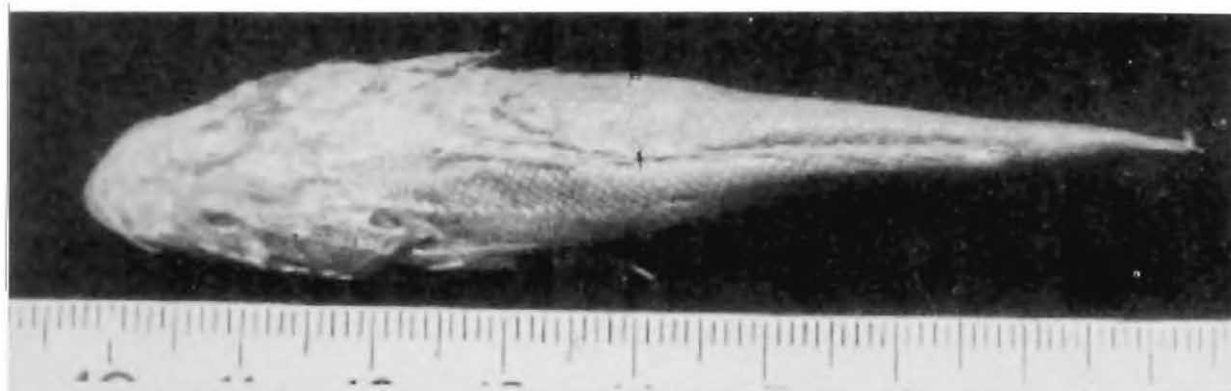


A. *Platycephalus sculptus* Günther 1880, type in the British Museum (No. 1879. 5. 14. 224. 261)



B. *Inegocia sculpta* (Günther) present specimen

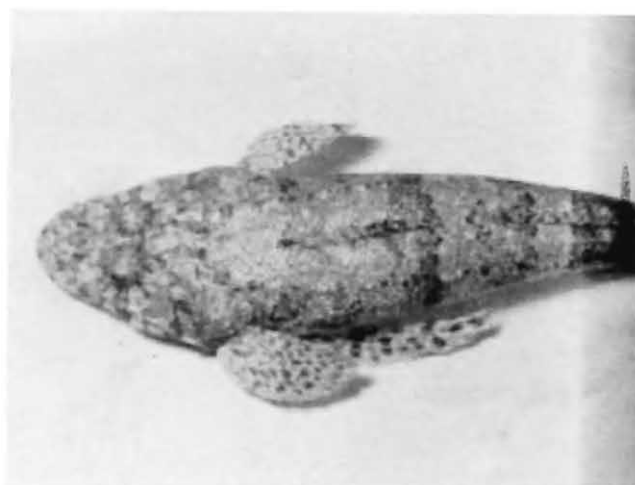
PLATE-VII



A. *Platycephalus malayanus* Bleeker, Holotype in the Leiden Museum



B. *Platycephalus malayanus* Bleeker, Holotype in the Leiden Museum

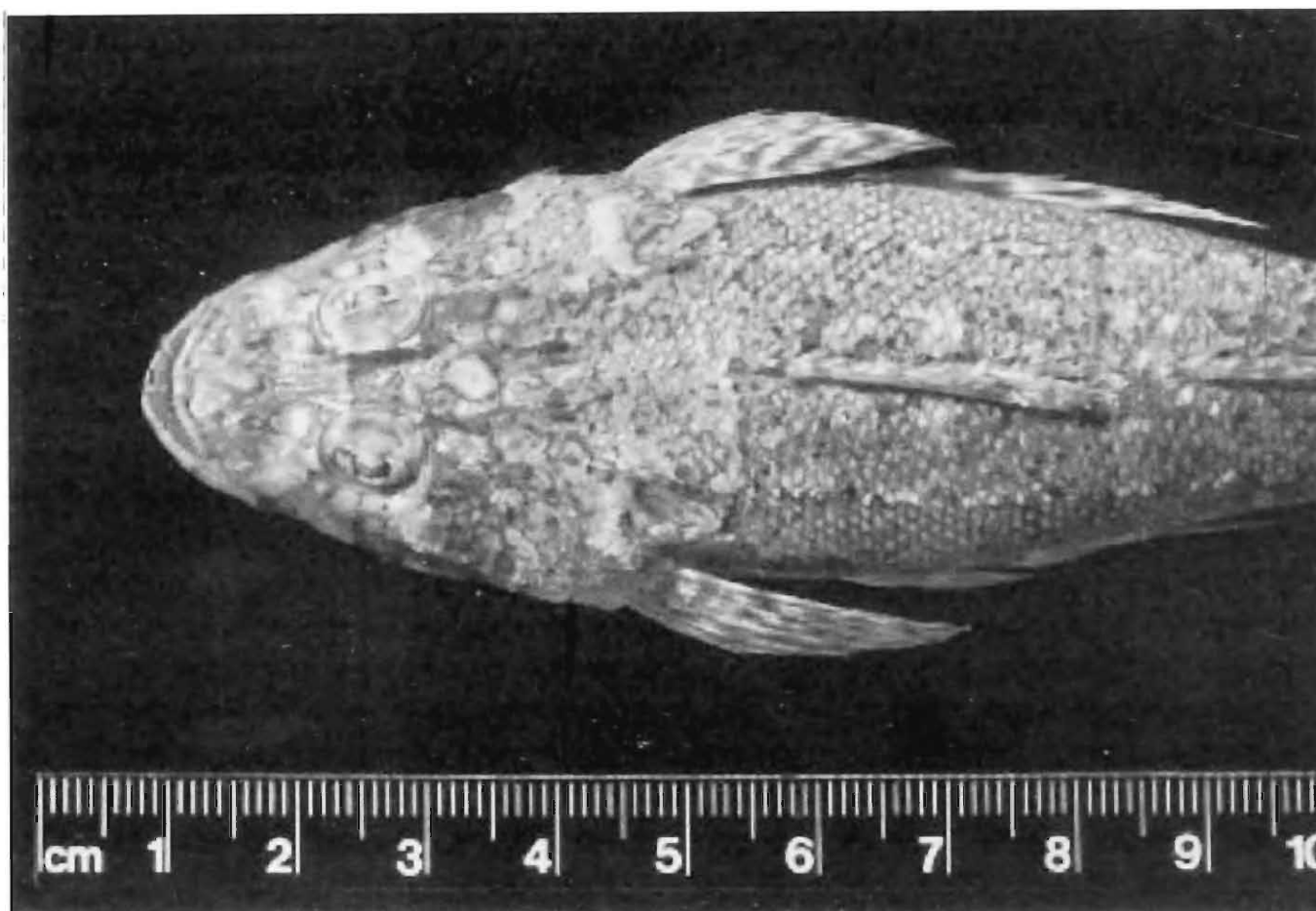


C. *Inegocia malayana* (Bleeker) from Lakshadweep

PLATE-VIII



A. *Platycephalus variolosus* Günther in the British Museum (Lateral view)



B. *Platycephalus variolosus* Günther in the British Museum (Dorsal view of anterior side)