Bull. Inst. Zool., Academia Sinica **26**(1): 77-94 (1987)

FISHES OF THE FAMILY PLATYCEPHALIDAE (TELEOSTEI: PLATYCEPHALOIDEI) OF TAIWAN WITH DESCRIPTIONS OF TWO NEW SPECIES

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(Accepted October, 1, 1986)

Kwang-Tsao Shao and Jeng-Ping Chen (1987) Fishes of the family Platycephalidae (Teleostei: Platycephaloidei) of Taiwan with descriptions of two new species. *Bull. Inst. Zool., Academia Sinica* **26**(1): 77-94. This paper reports nineteen species of the newly revised family Platycephalidae, including two new species of *Suggrundus longirostris* and *S. brevirostris*, occurring in the surrounding waters of Taiwan. The other species are *Parabembras curtus*, *Bembras japonicus* of subfamily Bembradinae and *Platycephalus indicus*, *Rogadius asper*, *Onigocia tuberculatus*, *Onigocia spinosa*, *Onigocia macrolepis*, *Grammoplites scaber*, *Suggrundus rodericensis*, *Suggrundus meerdervoorti*, *Ratabulus megacephalus*, *Thysanophrys papillolabium**, *Thysanophrys chiltonae**, *Thysanophrys arenicola**, *Cociella crocodila*, *Inegocia guttata*, and *Inegocia japonica* of subfamily Platycephalinae. The above four species with asterisks and the genus *Ratabulus* are new records for the Taiwan area. Keys, diagnostic characters, synonyms and figures of all studied species are given.

Fishes of the family Platycephalidae, usually called flatheads, are confined to the Indo-Pacific region except a single species occurring off West Africa. There are about 70 species in the world, belonging to 22 genera of 2 subfamilies, Bembradinae and Platycephalinae (Nelson, 1984). Though flatheads are largely marine, a few species inhabit esturaries. Flatheads are bottom dwelling fish which can bury themselves just below the sand or mud and only expose their eyes to wait and grasp those careless small fishes. In Taiwan, flatheads are food fishes especially those species which has large body size such as *Platycephalus indicus*. They are caught mostly by bottom trawl net mixed with other miscellaneus benthic fishes. Since they are caught occasionally their economic value is not high.

The family Platycephalidae together with Hoplichthyidae form the suborder Platycephaloidei. Flatheads are elongate, sometimes almost cylindrical in cross-section and the head region is strongly depressed. Numerous ridges and spines occur on the head. The lower jaw is undershot. The two dorsals are closely spaced; the anal is spineless except *Parabembras*, and the pelvics are widely separated and located behind the large pectorals which lack loose rays.

The earliest literatures which reported the flatheads of Taiwan may dated back to 1902 when Jordan and Evermann listed two species: *Platycephalus indicus* and *P. inermis*. The latter species was a synonym of the *Cociella crocodila* mentioned by Matsubara and Ochiai in 1955. Later in 1909, Jordan and Richardson added *Thysanophrys scaber* and *T. japonicus*. Fowler and Bean (1922) added another one species *T. macracanthus* of the same genus. Okada (1938) furtherly added *T. meerdervoorti*. In

1. Paper No. 285 of the Journal Series of the Institute of Zoology, Academia Sinica.

1951, Liang listed three new records: *Parabembras curtus*, *Cociella crocodilus*, and *Onigocia macrolepis* in a checklist of Taiwan Fisheries Research Institute but treated the first one species as one independent family of Bembridae. In 1966, de Beaufort and Griggs changed the name of *P. macracanthus* into *P. rodericensis* and mentioned that the *P. tuberculatus* was distributed in Taiwan. The first synopsis work of flatheads in Taiwan was done by Chen (1969) in which a total number of 9 genera and 12 species were listed including three new records: *Bembras japonicus*, *Onigocia spinosa*, and *Inegocia guttata*. Nevertheless, the species of *Onigocia tuberculatus* previously mentioned by de Beaufort and Griggs (1966) was removed from his list and no original literature was cited for the record of *Rogadius asper*. In the two recent synopsis books of Shen (1984) and Chen and Yu (1986) the list of flatheads were basically the same without any changes except a few synonymous problems. As the results of the present work, six more species were increased, namely *Ratabulus megacephalus*, *Thysanophrys papillolabium*, *T. chiltonae*, *T. arenicola*, and the two new species of *Suggrundus longirostris* and *S. brevirostris*. Thus the total number of platycephalid species known to Taiwan is nineteen. Among the eleven genera, the genus *Ratabulus* is new to Taiwan.

MATERIALS AND METHODS

Specimens were mostly collected from the fish markets at Ta-shi, Chun-chou, and Peng-hu islands from where the fishes were landed by the fishing boats operated from the waters near shore by bottom trawling or handline. *Ratabulus megacephalus* and *Suggrundus brevirostris* were only collected by the impinged specimens at the first nuclear power plant at Gin-shan. Several species of *Thysanophrys* occurred around the coral reef area were collected by using SCUBA diving methods at southern Taiwan or Hsiao-liu-chiu. All three species of this genus are new records to Taiwan since no one has attemped to collect flatheads in the coral reef area in the past.

Specimens were photographed when fresh and preserved thereafter for further observations. Standard length was taken from the tip of upper jaw to the base of caudal fin. Scales above lateral line was counted downward and forward or backward (counts in parenthesis) following the natural scale row to lateral line, but not including the lateral-line scale; scales below lateral line was count upward and backward from the origin of the anal fin to the lateral line. Gill rakers were counted both on the upper and lower limbs of first left gill arch. All of the specimens are now deposited in the Museum of the Institute of Zoology, Academia Sinica (ASIZP).

Systematic account

Key to the subfamilies, genera and species of Platycephalidae from Taiwan

1. Head moderately depressed; pelvic below pectoral base (subfamily: Bembradinae) 2
   Head extremely depressed; pelvic behind pectoral base (subfamily: Platycephalinae) 3
2. Anal fin with 3 spines and 5 soft rays (genus: *Parabembras*) ..... *Parabembras curtus*
   Anal fin without any spines, soft rays more than 11 (genus: *Bembras*) ..... *Bembras japonicus*
3. Vomerine teeth in a crescentic band; head greatly depressed, nearly smooth (genus: *Platycephalus*) ..... *Platycephalus indicus*
   Vomerine teeth in 2 parallel longitudinal bands; head moderately depressed, usually with strong spines or granules 4
4. Suborital ridge finely serrated along its entire length; side of head unicarinate 5
   Suborbital ridge not finely serrated, with spines or entirely smooth; side of head bicarinate 8

5. Preopercle with a strong antrose spine on lower margin (genus: *Rogadius*)..... .....*Rogadius asper*
Preopercle without antrose spine (genus: *Onigocia*).....6
6. Lateral line with 16-20 spined scales ....*Onigocia tuberculatus*
Lateral line spined scales less than 11...7
7. Lateral line with 8-11 spined scales..... .....*Onigocia spinosa*
Lateral line with 2-4 spined scales..... .....*Onigocia macrolepis*
8. Scale moderate in size; all scales of lateral line with a strong spine (genus: *Grammoplites*)..... *Grammoplites scaber*
Scale moderate to small in size; only parts of lateral line scales with spine..9
9. Upper side of head well granulated and denticulated (genus: *Suggrundus*)....10
Upper side of head not granulated....13
10. The longest preopercular spine longer than eye diameter; lateral line with 19-22 spined scales....*Suggrundus rodericensis*
The longest preopercular spine shorter than eye diameter; lateral line with 3-11 spined scales 11
11. Lateral line with 8-11 spined scales; head and body with black spots..... .....*Suggrundus meerdervoorti*
Lateral line with 1-4 spined scales; head and body without any black spots...12
12. Body reddish brown; snout length longer than eye diameter..... ..... *Suggrundus longirostris*
Body grey; snout short as long as eye diameter.....*Suggrundus brevirostris*
13. Teeth highly specialized, those on upper jaw canine-like and depressible (genus: *Ratabulus*).....*Ratabulus megacephalus*
Teeth all villiform; no canine teeth...14
14. Preopercular spines 3 or more; 4 or more spines on the median longitudinal keel of the second suborbital bone; the iris lappet is bilobed (genus: *Thysanophrys*) 15
Preopercular spines 2; 1 or rarely 2 similar spines on the median longitudinal keel of the second suborbital bone; the iris lappet is simple or cirrosed.....17
15. Edge of lips with papillae..... ..... *Thysanophrys papillolabium*
Edge of lips without papillae .....·16
16. Least width of bony interorbital space 1.1 to 2.0 in eye diameter..... ..... *Thysanophrys arenicola*
Least width of bony interorbital space 5.5 to 6 in eye diameter .... *Thysanophrys chiltonae*
17. Interopercular flap absent (genus: *Cociella*) .....*Cociella crocodila*
Interopercular flap present (genus: *Inegocia*) 18
18. Interopercular flap large, anterior 1 to 3 pored-scales spined; snout larger, 2.9 to 3.1 in head length.....*Inegocia guttata*
Interopercular flap small, anterior 6 to 8 pored-scales spined; snout shorter, 3.2 to 3.6 in head length ....*Inegocia japonica*

1. *Parabembras curtus* (Temminck and Schlegel)

Fig. 1

Bembras curtus Temminck and Schlegel, 1843: 42 (type locality, Nagasaki).
Parabembras curtus, Bleeker, 1874: 370; Jordan and Richardson, 1908: 644; Liang, 1951: 30; Masuda *et al.*, 1984: 321.

Materials: Three specimens, ASIZP 056047, 71.2-151.2 mm SL., Oct. 14, 1985, Ta-shi; 5 specimens, ASIZP 056048, 65.0-113.6 mm SL., Oct. 8, 1985, Tung-kang; 2 specimens, ASIZP 056056, 112.6-132.8 mm SL., Sept. 3, 1985, Ta-shi.

Diagnosis: D. IX-X-I, 7-9; A. III, 5; P. 19-22; L1. 35; Ltr. 5(5-6)/9. Head 2.47-2.54, body depth 5.32-5.47 in standard length. Eye diameter 3.59-3.64, snout 3.98-4.21, interorbital 15.74-16.1 in head length. Head large and well depressed; lower jaw projecting; muzzle shorter than eye; opercular and subopercular spines feeble. Scales on body large and ctenoid. Second dorsal and anal fins with short base. Anal fin with 3 spines. Color

uniformly reddish.

Distribution: Distributed from the Pacific coast of Southern Japan to the Indian Ocean.

2. *Bembras japonicus* Cuvier and Valenciennes

Fig. 2, 3

Bembras japonicus Cuvier and Valenciennes, 1829: 282 (type locality, Japan); Chen, 1969: 278; Masuda *et al.*, 1984: 321.

Materials: One specimen, ASIZP 055041, 173.4 mm SL., Jul. 18, 1985, Ta-shi; 1 specimen, ASIZP 055046, 96.0 mm SL., Oct. 8, 1985, Tung-kang.

Diagnosis: D. X-XI-I, 11; A. 14; P. 17; L1. 55; Ltr. 4-5(6-7)/13. Head 2.46-2.88, body depth 6.80-7.32 in standard length. Eye diameter 3.43-3.99, snout 3.13-3.23, interorbital 14.80-15.81 all in head length. Body rather slender, flattened on ventrally. Muzzle longer than eye; jaws subequal; infraorbital ridge with several denticulations, directed backward. Anterior several scales on the lateral line with a strong spine. Body color orangish red scattered with black dots on dorsal side, and whitish on the lower abdomen.

Distribution: Distributed from Southern Japan, East China Sea to Taiwan.

3. *Platycephalus indicus* (Linnaeus)

Fig. 4, 5

Callionymnus indicus Linnaeus, 1758: 50 (type locality, Asia) (not seen).

Platycephalus insidiator Cuvier and Valenciennes, 1829: 227; Temminck and Schlegel, 1842: 39; Jordan and Seale, 1905: 794; 1907: 38.

Platycephalus indicus, Bleeker, 1877, pl. 1, fig. 3; Jordan and Evermann, 1902: 361; Jordan and Richardson, 1908: 641; 1909: 194; Fowler and Bean: 1927: 9; Matsubara and Ochiai, 1955: 100; de Beaufort and Briggs, 1962: 131; Masuda *et al.*, 1984: 322.

Materials: Seven specimens, ASIZP 054677, 72.3-112.7 mm SL., May 3, 1975, Nanliao; 1 specimen, ASIZP 056071, 260.4 mm SL., Sept. 29, 1985, Peng-hu.

Diagnosis: D. II-VII-I, 13; A. 13; P. 18-19; GR. 2—3+6—9; L1p. 62-69; Ltr. 10(15)/19-21. Head 3.22-3.47; body depth 8.76-10.53 in standard length. Eye diameter 6.74-8.42, snout 3.72-4.33, interorbital 5.43-7.32 all in head length. Head smooth, except for the low superciliary, parieto-occipital, scapular and preopercular ridge, none of them with spines or serrations. Interorbital wider than eye diameter. The iris lappet is simply overlying the pupil and neither bilobed nor cirrosed. Prevomerine teeth placed in a crescentic band. Preoperculum ending in two robust spines, subequal or the lower one longer than the upper one. Interopercular flap present. Lateral line without any spined scale.

Distribution: It is known from Red Sea, South Africa to Indo-Pacific where the north limit is Southern Japan.

4. *Rogadius asper* (Cuvier and Valenciennes)

Fig. 6, 7

Platycephalus asper Cuvier and Valenciennes, 1829: 257 (type locality, Japan).

Rogadius asper, Jordan and Richardson, 1908: 630; Matsubara and Ochial, 1955: 74; Chen, 1969: 279; Masuda *et al.*, 1984: 321.

Materials: One specimen, ASIZP 056038, 144.7 mm SL., Aug. 9, 1985, Hsin-da-kang; 2 specimens, ASIZP, 77.9-113.8 mm SL., Sept. 26, 1985, Ta-shi; 1 specimen, ASIZP 056050, 136.6 mm SL., Oct. 9, 1985, Chun-chou; 1 specimen, ASIZP 056051, 60.2 mm SL., Aug. 24, 1985, Peng-hu; 2 specimens, ASIZP 056055, 96.9-114.4 mm SL., Sept. 28, 1985, Peng-hu; 2 specimens, ASIZP 056057, 69.0-91.5 mm SL., Aug. 18, 1985, Ta-shi.

Diagnosis: D. I-VIII, 11-12; A. 11; P. 21-23; L1p. 47-55 (8-12 with spines); Ltr. 6-7(7-8)/15-16; GR. 1+6—7. Head 2.32-2.66, body depth 6.14-8.12 in standard length. Eye diameter 3.34-4.58, snout 3.08-3.62, interorbital 15.64-24.32 all in head length. Head moderately depressed usually armed with strong spines or granules. Side of head unicarinated, the median longitudinal keel of the second suborbital bone with a row of close-set sharp spines. Preoperculum with a strong antrose

spine on lower surface and 4 spines at angle. Body grayish brown, tinged with purplish; back with obscurely dark band. Spinous dorsal mottled on the membranes; soft dorsal with rows of spots on the rays. Caudal with indistinct dark cross-bands and spots. Upper pectoral rays speckled with dusky, and the lower half blackish with an outer whitish edge.

Distribution: It is known from Philippines, Taiwan to Southern Japan.

Remark: This genus can be easily recognized by having a strong antrose spine on the lower face of the preopercle.

5. *Onigocia tuberculatus* (Cuvier and Valenciennes)

Fig. 8

Platycephalus tuberculatus Cuvier and Valenciennes, 1829: 258 (type locality, Trinquemalé); Day, 1876: 275; de Beaufort and Briggs, 1962: 142.
Thysanophrys tuberculatus, Fowler and Bean, 1922: 65.
Onigocia tuberculatus, Chen, 1986: 436.

Materials: One specimen, A0117, 100.4 mm SL., date unknwon, Tung-kang.

Diagnosis: D. I-VII, 12; A. 11; Llp. 52 (19 with spines); Ltr. 4(6)/12. Head 2.83, body depth 7.44 in standard length. Eye diameter 3.76, snout 3.60, interorbital 15.40 all in head length. Suborbital ridge finely denticulated, some of them bifurcated, ending in the rather strong preopercular spine. Preopercular spines 3 or 4, the first the longest. Color of preserved specimens brownish above, with traces of darker cross bands on body and tail. Dorsals with faint transverse bands; caudal, pectorals, and ventrals more or less spotted.

Distribution: It is known from Red Sea, coast of Natal, Maldives, India, Philippines and Taiwan.

Remark: This is a very rare species in Taiwan. Although it was reported to occur in Taiwan by de Beaufort and Briggs (1962), it is the first time here, to obtain specimen of this species.

6. *Onigocia spinosa* (Temminck and Schlegel)

Fig. 9

Platycephalus spinosus Temminck and Schlegel, 1842: 40 (type locality, Nagasaki).
Thysanophrys spinosus, Jordan and Richardson, 1908: 633.
Onigocia spinosa, Jordan and Thompson, 1914: 278; Matsubara and Ochiai, 1955: 69; Chen, 1969: 279; Masuda *et al.*, 1984: 321.

Materials: One specimen, ASIZP 056044, 65.4 mm SL., Sept. 26, 1985, Ta-shi; 6 specimens, ASIZP 056049, 81.1-99.5 mm SL., Oct. 14, 1985, Ta-shi.

Diagnosis: D. I-VIII, 11-12; A. 12; P. 20-22; Llp. 35-42 (8-11 with spines); Ltr. 3(3-4)/10-11; GR. 1+3—5. Head 2.18-2.76; body depth 5.20-7.42 in standard length. Eye diameter 3.26-4.32, snout 3.34-4.38, interorbital 12.34-16.52 all in head length. Side of head unicarinated. Suborbital bone serrated. Preopercular spines 3. Interopercular flap absent. The iris lappet bilobed. Pelvic fins reaching below base of about 5th dorsal ray. Body dark grayish-brownish above, the back with about four indistinct dark bands, belly paler.

Distribution: Distributed from Southern Japan, East China Sea to Taiwan.

Remark: The genus *Onigocia* is characterized by having larger scales with about 35-42 pored lateral line scales against 50-60 in other genera of Platycephalinae.

7. *Onigocia macrolepis* (Bleeker)

Fig. 10

Platycephalus macrolepis Bleeker, 1854: 399 (type locality, Nagasaki).
Thysanophrys macrolepis, Kamohara, 1952: 70.
Onigocia macrolepis, Jordan and Thompson, 1914: 278; Liang, 1951: 30; Matsubara and Ochiai, 1955: 71; Masuda *et al.*, 1984: 321.

Materials: One specimen, ASIZP 056027, 34.3 mm SL., May 25, 1985, Wan-li-tung.

Diagnosis: D. I-VII, 12; A. 12; P. 20; Llp. 41 (3 with spines); Ltr. 3(4)/9; GR. 1+4. Head 2.64, body depth 7.46 in standard length. Eye diameter 3.72, snout 4.32, inter-

orbital 25.96 all in head length. Side of head unicarinated. The median longitudinal keel of the second suborbital bone armed with a row of close-set sharp spines and the number of spines are fewer and stronger in *Onigocia macrolepis* than those in *O. spinosa*. Preopercle with 3 spines. Body color light yellowish brown, with by 4 or 5 indistinct dusky bars; dorsally, and yellowish ventrally.

Distribution: Known from Southern Japan, the Yellow and East China Seas to Taiwan.

8. *Grammoplites scaber* (Linnaeus)

Fig. 11, 12

Cottus scaber Linnaeus, 1758: 264 (not seen).
Platycephalus scaber, Cuvier and Valenciennes, 1829: 249; Day, 1876: 275; de Beaufort and Briggs, 1962: 140.
Thysanophrys scaber, Jordan and Richardson, 1909: 217; Seale, 1910: 287.
Grammoplites scaber, Chen, 1969: 279.

Materials: One specimen, ASIZP 054782, 141.3 mm SL., January 1976, An-ping; 1 specimen ASIZP 056028, 194.6 mm SL., Aug. 9, 1985, Ker-tz-liao.

Diagnosis: D. I-VIII, 12; A. 12; P. 18-19; Llp. 54-56 (all of them spined); Ltr. 5(12)16. Head 3.18-3.32, body depth 8.56-10.65 in standard length. Eye diameter 5.14-5.71, snout 3.39-3.75, interorbital 8.89-10.18 all in head length. Preopercular spines 3. Suborbital ridge low with one or more small spines in front of eye, one below middle of eye and one behind eye; from the last spine, the ridge is somewhat deflected and ended in the preopercular spines; this part of the ridge smooth or with several spines. Color in formalin: body brownish above, lighter below, back and sides indistinctly banded. First dorsal with very small spots, forming a more or less distinct dark band. Ventral with similar spots. Second dorsal, anal, and caudal fins with rows of brown spots.

Distribution: Known from Madagascar, India, Singapore to Taiwan.

9. *Suggrundus rodericensis* Cuvier and Valenciennes

Fig. 13, 14

Platycephalus rodericensis Cuvier and Valenciennes, 1829: 253 (type locality, Bourbon); de Beaufort and Briggs, 1966: 144.
Platycephalus macracanthus, Day, 1876: 276.
Thysanophrys macracanthus, Fowler and Bean, 1922: 117.
Suggrundus rodericensis, Chen, 1986: 436.

Materials: Five specimens, ASIZP 056039, 74.8-159.7 mm SL., Oct. 14, 1985, Ta-shi.

Diagnosis: D. I-VIII, 12; A. 12; P. 19-21; Llp. 51-53 (19-21 with spines); Ltr. 5(6-7)/15. Head 2.84-3.04, body depth 8.54-8.73 in standard length. Eye diameter 4.46-4.78, snout 3.78-3.99, interorbital 10.89-11.50 all in head length. All bones of head rugose. Suborbital ridge low, with a spine at its beginning before eye, one below middle of eye, and one below the rear of eye. Behind this spine the ridge is somewhat deflected with three additional spines. Preopercular spines 3. First preopercular spine almost equal or longer than eye diameter. Color of preserved specimen brown above and lighter below. First dorsal with rows of brown spots; second dorsal, anal, and caudal fins hyaline; pectorals and ventrals with black dots.

Distribution: It is known from Indo-Pacific, Philippines, Taiwan to Queensland.

10. *Suggrundus meerdervoorti* (Bleeker)

Fig. 15, 16

Platycephalus meerdervoorti Bleeker, 1860: 80 (type locality, Nagasaki).
Insidiator rudis Jordan and Snyder, 1900: 363.
Thysanophrys meerdervoorti, Jordan and Richardson, 1908: 635.
Suggrundus meerdervoortii, Whitly, 1930: 1146; Okada and Matsubara, 1938: 334.
Suggrundus meerdervoorti, Matsubara and Ochiai, 1955: 76; Masuda *et al.*, 1984: 321.

Materials: Three specimens, ASIZP 056040, 110.1-126.6 mm SL., Sept. 28, 1985, Peng-hu; 2 specimens, ASIZP 056052, 97.3-111.1 mm SL., Aug. 24, 1985, Peng-hu; 2

specimens, ASIZP 056054, 107.5-133.7 mm SL., Sept. 29, 1985, Peng-hu; 1 specimen, ASIZP 056072, 163,9 mm SL., Sept. 27, 1985, Peng-hu.

Diagnosis: D. I-VII-VIII, 11; A. 11; P. 19-21; GR. 1+7—9; Llp. 51-55 (7-11 with spines); Ltr. 7(11-14)/16. Head 2.83-3.16, body depth 6.32-8.16 in standard length. Eye diameter 3.68-4.37, snout 3.27-3.81, interorbital 11.24-15.32 all in head length. Preopercular spines 3. Interopercular flap present. Color grayish, with black dots on the sides of head and anterior part of body. Spinous dorsal with black cloud-like; pectorals speckled with black; pelvic fin blackish except base and distal edge.

Distribution: Distributed from Southern Japan, Yellow Sea and East China Sea to Taiwan.

Remark: Different genera of Platycephalinae can be easily identified in terms of the arrangement of spines on median longitudinal keel of the second suborbital bone. It it armed with about 4 indistinct spines and fine granules in *Suggrundus*; a row of close-set sharp spines in *Onigocia* and *Rogadius*; 3-5 spines in *Thysanophrys*; 1 sharp spine and about 4 much smaller ones in *Ratabulus*; 1 sharp spine in *Inegocia*; and a blunt tubercle in *Platycephalus*; 1 or rarely 2 similar spines in *Cociella* and *Grammoplites*.

The diagnostic characters for this species defined by Shen (1984) was probably incorrect when he mentionded that there was no spined scales on the lateral line. Actually our specimens have 7-11 spined scales on lateral line, this agrees quite well with Matsubara and Ochiai (1955).

11. *Suggrundus longirostris* n. sp.

Fig. 17, 18, Text-fig. la, Table 1

Holotype: ASIZP 056070, 183.9 mm SL., Oct. 14, 1985, Ta-shi, Taiwan.

Paratype: ASIZP 056069, 185.5 mm SL., taken together with the holotype.

Diagnosis: D. I-VII, 11; A. 11-12; P. 18-20; Llp. 54-56 (3 with spines); GR. 1+5; Ltr. 7(9)/18. Head 2.76-2.78, body depth 8.16-8.44 in standard length. Eye diameter 4.53-4.76, snout 3.02-3.16, interorbital 16.71-17.42 all in head length. Snout relatively long. Preoperculum with 2 spines. Infraorbital ridge with 5 distant spines, the last one just in front of the base of the long preopercular spine. Interopercular flap present. Spinous and soft dorsals of about equal height; Length of the first dorsal spine relatively shorter than other congeneric species. The longest dorsal spine 2.6 in head. The longest anal ray is the tenth or eleventh. Body color reddish brown with traces of dark cross bands on body. The axil and lower part of pectoral reddish, upper pectoral mottled with black dots.

Description: Meristic and morphometric data of the two specimens are given in Table 1. Teeth villiform, in bands in jaw, in two small patch on vomer, and in a narrow band on palatines. Two spines between the anterior nostrils. Maxillary not reaching as far as below anterior border of eye. Cranial spines is sketches in Text-fig. la. Supraorbital ridge with a spine in front of eye; smooth above middle of eye; serrated in its posterior part which have fourteen small spines. Superior postorbital ridge with four spines. Inferior postorbital ridge with a single small spine anteriorly, two or three spines in its middle part and one small and two rather large spines behind. Suborbital ridge with a small spine in frontborder of eye, a spine below anterior half of eye, and four to five behind-border of eye, the last one just in front of the base of the upper preopercular spine. Preoperculum with three spines. A big interopercular flap present. Scale ctenoid, except those of belly which are cycloid. Preopercle and opercle with ctenoid scales. First dorsal spine half as long as eye, the third spine longest and almost four times of the first one. First dorsal ray simple, the others forked. The last second anal ray longest but shorter than the longest one of soft dorsal ray, almost thrice the length of the first dorsal spine. Twelve rays of pectoral forked.

TABLE 1

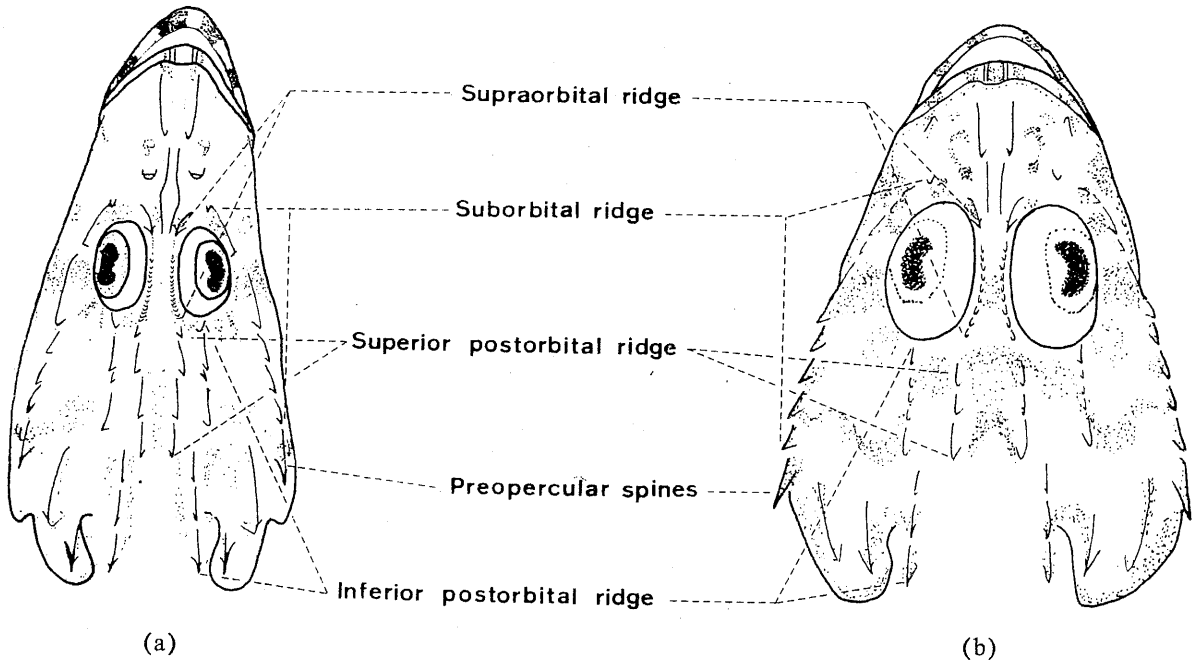
Comparison of meristic and morphometric data for the four species of *Suggrundus* from Taiwan including the two new species of *S. longirostris* and *S. brevirostris*. The holotype is denoted by an asterisk. Standard length is in mm.

Count or measurement	*S. longirostris* ASIZP 056070*	*S. longirostris* ASIZP 056069	*S. brevirostris* ASIZP 056060*	*S. brevirostris* ASIZP 056059	*S. rodericensis* ASIZP 056039	*S. meerdervoorti* ASIZP 056040
Meristic						
Dorsal fin spines	I-VII	I-VII	I-VII	I-VII	I-VIII	I-VII
Dorsal fin rays	11	11	12	12	12	11
Anal fin rays	12	11	13	13	12	11
Pectoral fin rays	19	19	19	19-20	19-21	19-21
Pores in lateral line	55	56	53	53-55	51-53	51-55
Scales bearing spines at anterior part of lateral line	3	3	3	3	19-21	6-9
Scales from soft dorsal fin origin to lateral line	7	7	4	4	7	11-14
Scales from anal origin to lateral line	18	18	17	15-17	15-16	16
Scale rows before dorsal	11	11	8	7-8	7-8	9-10
Morphometric						
Sandard length (SL.)	183.9	185.5	65.0	43.9-58.1	74.7-159.7	110.1-126.6
in standard length						
Head length	2.78	2.76	2.92	2.80-2.94	2.84-3.04	2.82-2.87
Body depth	8.44	8.16	7.51	6.92-7.51	8.54-8.73	8.22-8.27
in head length						
Eye diameter	4.73	4.62	3.79	3.72-3.98	4.46-4.78	4.36-4.42
Snout length	3.08	3.01	3.94	3.75-3.96	3.78-3.99	3.31-3.40
Least width of bony interorbit	17.56	16.87	17.39	17.39-19.18	10.89-11.50	12.14-12.39
Length of first dorsal spine	9.46	9.02	4.52	4.43-5.39	11.84-12.01	7.11-7.48
Longest dorsal spine	2.42	2.31	1.92	1.92-2.41	2.32-2.48	2.22-2.36
Longest ray of soft dorsal	2.45	2.51	2.01	2.01-2.24	2.56-2.69	2.12-2.22
Longest ray of pelvic	1.46	1.53	1.49	1.46-1.54	2.54-2.64	1.39-1.47
Longest ray of anal	3.59	3.64	3.41	3.41-3.52	4.12-4.28	3.06-3.73

Color when fresh see Fig. 17, 18. Color in formalin: body reddish brown with traces of dark cross bands; a dark brown band across interorbital space and cheeks, interrupted by eye. The second to the sixth spines of the first dorsal with black margin on it upper part; the axil and lower part of pectoral reddish, upper pectoral mottled with black dots; soft dorsal and the top of anal fin with indistinct rows of dark spots; five to six longitudinal bands on the caudal fin.

Etymology: This species is named *longirostris* in reference to its reltively long snout compare to that of many other species of flathead.

Remarks: After we carefully compare the characters of this species with that of other species available to us from the literatures, there are three species of other genera that are more similar to our specimens. *Thysanophrys chilitonae* Schultz (1966: 57). Their cranial spines of suborbital ridge, snout length, eye diameter, and the width of interorbital bone are similar; but their body coloration and scale rows are different (TC *vs.* SL: 5-6/1/14-16 *vs.* 7/1/18. The second related



Text-fig. 1. Schetch of the head of *Suggrundus longirostris* (a), and *S. brevirostris* (b).

species is *Cociella malayanus* (Bleeker) (de Beafort and Briggs, 1962: 152; Munro, 1967: 527). They are similar to each other on meristic counts, preopercular spine and the spine numbers of supraorbital and suborbital ridge. Nevertheless, they are different on the inferior postorbital ridge (PC *vs.* SL: 5 *vs.* 7-8); dorsal spine number (PC *vs.* SL: 9 *vs.* 8); width of interorbital bone (PC *vs.* SL: 1.7-3.2 *vs.* 3.71-3.65 in ED). The third similar species is *Cociella serratus* (Cuvier and Valenciennes) (Munro, 1967: 528). Their pattern of cranial spines are almost identical except the infraorbital ridge which the spines is present in *S. longirostris* but absent in *C. serratus*. Other differences are head length (CS *vs.* SL: 4 *vs.* 3.3 in SL); width of interorbital bone (CS *vs.* SL: 4 *vs.* 3.54-3.71 in ED); and the number of spinous lateral line (CS *vs.* SL: 0 *vs.* 3).

12. *Suggrundus brevirostris* n. sp.

Fig. 19, Text-fig. 1b, Table 1

Holotype: ASIZP 056060, 65.0 mm SL., Aug. 27, 1986, Taiwan, Gin-shan, the Inlet waters of the first nuclear power plant.

Paratype: ASIZP 056059, 5 specimens: 44.0-58.1 mm SL., taken with the holotype.

Diagnosis: D. I-VII, 12; A. 12; P. 19-21; Llp. 53-55 (3 with spines); GR. 1+5; Ltr. 4(6)/15-17. Head 2.80-2.92; body depth 6.92-7.51 in standard length. Eye diameter 3.79-3.95, snout 3.75-3.94, interorbital 17.39-19.18 all in head length. Snout short as long as eye diameter. Preoperculum with one larger and 3 smaller spines. Infraorbital ridge with 6 spines. Length of the first dorsal spine relatively long. Anal fin rays equally long. Body color dark brown above with 5-7 dark broader cross bands, belly white. Fins mottled with black dots.

Description: Teeth villiform, in bands in jaw, in two patches on vomer, and in a narrow band on palatines. Two spines between the anterior nostrilis. Maxillary reaching to below front border of eye. Supraorbital ridge with a spine in front of eye, entirely finely serrated which forming by ten to eleven spines. Superior postorbital ridge with four spines, the third is the biggest. Inferior postorbital ridge with one small and one large spines anteriorly, four spines in its

middle, and three rather large and more distant spines posteriorly. Suborbital ridge with a spine at its beginning, a pair of small spines before eye, one or two spines below anterior half of eye, a row of spines which consists of five spines behind posterior eye. The last one just in front of the base of the upper preopercular spine. Preoperculum with three spines. Preopercle and opercle with ctenoid scales. First dorsal spine long, about 1.1–1.2 in ED. The third spine of the first dorsal longest, almost equal to eye diameter and snout length. The second anal ray is the longest which is different as *Suggrundus longirostris* at the last second one. Color when fresh see Fig. 19. Color in formalin: body grayish-brown with several dark cross bands; a dark brown band across interorbital space and cheeks, interrupted by eyes; the second band from nape to the base of first dorsal broadest; the following one narrow and below anterior part of the second dorsal; the next band covers from the middle part of the second dorsal to the end of dorsal fin; the last band across caudal peduncle. A black margin broader than eye diameter on the upper part of first dorsal. The second dorsal fins and upper part of anal fin with black dotted lines. Caudal fin with three black bands.

Etymology: The *Suggrundus brevirostris* is named by its short snout which is shorter or equal to eye diameter.

Remark: The type of spines on the infraorbital ridge of this species is similar to that of *O. macrolepis* (Bleeker). However, they differ in their body color and the numbers of pored lateral line scales (53–55 in former *vs* 39–47 in the latter species). Other similar species to the present species is *Platycephalus cantori* Bleeker (de Beaufort and Briggs, 1962: 149). They are identical to each other on their cranial spine patterns, maxillary length, and width of interorbital bone; but the following meristic counts and morphometric measurement are differnet: number of dorsal spines (PC *vs.* SB: IX *vs.* i–VII); anal fin rays (PC *vs.* SB: 12 *vs.* 13); scales rows (PC *vs.* SB: 5/16 *vs.* 4/17); body depth (PC *vs.* SB: 6.75 *vs.* 6.92–7.51); head length (PC *vs.* SB: 3 *vs.* 2.8–2.94); and height of first dorsal spine (PC *vs.* SB: 2 *vs.* 1.19 in ED).

13. *Ratabulus megacephalus* (Tanaka)

Fig. 20

Thysanophrys megacephalus Tanaka, 1917: 9 (type locality, Tokyo) (not seen).

Ratabulus megacephalus, Jordan and Hubbs, 1925: 287; Okada and Matsubara, 1938: 334; Matsubara and Ochiai, 1955: 95; Masuda *et al.*, 1984: 322.

Materials: One impinged specimen, ASIZP 056029, 73.5 mm SL., Aug. 27, 1986, the inlet waters of the first nuclear power plant at Gin-shan.

Diagnosis: I–VIII, 11; A. 11; P. 19; GR. 1+7; Llp. 52 (2 with spines); Ltr. 7(11)/19. Head 2.59, body depth 11.44 in standard length. Eye diameter 5.06, snout 3.12, interorbital 20.79 all in head length. Head and snout relatively narrow and elongated. Teeth of upper jaw canine-like and depressible at anterior part of the band as well as the middle part of the innermost series; while those in the low jaw granular except for depressible canines on the innermost series. Vomerine teeth rather few, depressible and canine-like; palatine teeth canine-like, depressible anteriorly and villiform posteriorly. Body color dark brown above with 6–8 narrow darker cross bands; belly white. Fins mottled with black dots.

Distribution: It is known from Southern Japan, East China Sea to Taiwan.

14. *Thysanophrys papillolabium* Schultz

Fig. 21

Thysanophrys papillolabium Schultz, 1966: 55 (type locality, Marshall islands)

Materials: One specimen, ASIZP 056079, 42.6 mm SL., Mar. 19, 1986, Tan-tz-wan.

Diagnosis: D. IX, 12; A. 12; P. 20; Llp.

53 (1 with spine); Ltr. 5(6)/14; GR. 1+5. Head 2.82, body depth 8.34 in standard length. Eye diameter 4.42, snout 3.21, interorbital 12.39 all in head length. Preopercular spines 3. Cheek bicarinated. Interopercular flap present. Suborbital ridge with 3 spines. The median longitudinal keel of the second suborbital bone with 3 spines. Interorbital bone about 2.80 in eye diameter. Ground color whitish with dark marking reddish brown marking; ventral side whitish.

Distribution: It is only known from Marshall islands and Taiwan.

Remark: The color pattern and meristic counts of this species is similar to that of *T. chiltonae*. *T. paillolabium* differs from all other species of the genus *Thysanophrys* in having a row of short papillae along edge of lips. Its interorbital bone is also wider than *T. chiltonae* expressed as 2-3 in eye diameter in *T. papillolabium* against 5-6 in *T. chiltonae*.

15. *Thysanophrys arenicola* Schultz

Fig. 22

Thysanophrys arenicola Schultz, 1966: 60 (type locality, Marshall islands); Masuda *et al.*, 1984: 322.

Materials: Two specimens, ASIZP 056073, 158.0-169.9mm SL., Mar. 18, 1985, Wan-li-tung; 1 specimen, ASIZP 056074, 146.0 mm SL., Apr. 13, 1985, Wan-li-tung; 1 specimen, ASIZP 056075, 163.8 mm SL., Sept. 10, 1979, Gi-Chi; 1 specimen, ASIZP 056077, 73.3 mm SL., May 24, 1985, Wan-li-tung.

Diagnosis: D. IX, 12; A. 12; P. 19-21; Llp. 52-53 (2 with spines); Ltr. 6(6-7)/15-16; GR. 1+5. Head 2.92-3.18, body depth 7.24-7.76 in standard length. Eye diameter 4.53-5.12, snout 3.10-3.43, interorbital 7.24-8.76 all in head length. Front edge of preorbital with two forwardly directed spines. The median longitudinal keel of the second suborbital bone with 5 spines. Preopercular spines 3, the lower most one rudimentary. Interorbital space as wide, as eye diameter. Interopercular flap absent. Body generally yellowish brown, with numerous small dots.

Distribution: Known from Marshall islands, Taiwan to Japan.

16. *Thyanophrys chiltonae* Schultz

Fig. 23, 24

Thysanophrys chiltonae Schultz, 1966: 57 (type locality, Marshall islands).
Inegocia chiltonae, Masuda *et al.*, 1984: 322.

Materials: One specimen, ASIZP 056076, 100.4 mm SL., May 20, 1986, Hsiao-liu-chiu; 1 specimen, ASIZP 056078, 71.7 mm SL., (unknown); 1 specimen, ASIZP 056080, 43.4 mm SL., Jul. 25, 1986, Hsiao-liu-chiu.

Diagnosis: D. I-III, 11; A. 12; P. 20-21; Llp. 53-55 (2 with spines); Ltr. 5(6)/14-15; GR. 1+5. Head 2.59-2.71, body depth 8.42-8.76 in standard length. Eye diameter 3.95-4.23, snout 3.00-3.25, interorbital 20.42-26.75 all in head length. Suborbital ridge with 3-4 spines. Preopercular spines 3. Interopercular flap present. Body pale brown to whitish with 4 or 5 obscure, brownish, cross bars on back.

Distribution: Known from Marshall islands, Taiwan, and Japan.

Remark: The *Thysanophrys chiltonae* is characterized by its long snout, large orbits, and very narrow interorbital space.

17. *Cociella crocodila* (Tilesius)

Fig. 25, 26

Platycephalus crocodilus Tilesius, 1812: 59 (type locality, Nagasaki) (not seen); Cuvier and Valenciennes, 1829: 256; Jordan and Snyder, 1900: 368; Jordan and Richardson, 1908: 638.
Platycephalus punctatus Cuvier and Valenciennes, 1829: 243.
Platycephalus inermis Jordan and Evermann, 1903: 361.
Inegocia crocodilus, Jordan and Thompson, 1914: 279.
Cocius crocodilus, Jordan and Hubbs, 1925: 287; Liang, 1951: 30.
Cociella crocodila, Matsubara and Ochiai, 1955: 87; Masuda *et al.*, 1984: 322.

Materials: One specimen, ASIZP 056042, 162.4 mm SL., Feb. 13, 1986, Yen-liao; 1 specimen, ASIZP 056045, 177.8 mm SL., Oct. 14,

1985, Ta-shi; 1 specimen, ASIZP 056061, 119.3 mm SL., Aug. 9, 1985, Hsin-da-kang; 1 specimen, ASIZP 056064, 223.3 mm SL., Sept. 29, 1985, Peng-hu.

Diagnosis: D. I-VII-VIII, 11; A. 11; P. 19-21; GR. 1+5-7; Llp. 49-54 (2-3 with spines); 9(14)/20-22. Head 2.78-3.16, body depth 8.07-11.22 in standard length. Eye diameter 4.18-5.07, snout 3.24-3.68; interorbital 10.32-14.02 all in head length. Preopercular spines 2. Interopercular flap absent. Body greyish brown, with 5 indistinct dark broad bars. Ventral side uniformly pale. In small specimens, dorsal and ventral side with numerous small dark blotches which change remarkably in number and size with growth of fish.

Distribution: Distributed from Southern Japan to the Indian Ocean.

18. *Inegocia guttata* (Cuvier and Valenciennes)

Fig. 27

Platycephalus guttata Cuvier and Valenciennes, 1829: 244 (type locality, Japan).

Inegocia guttata, Matsubara and Ochiai, 1955: 82; Chen, 1969: 280; Masuda *et al.*, 1984: 322.

Materials: One specimen, ASIZP 056062, 298.7 mm SL., Oct. 14, 1985, Ta-shi; 1 specimen, ASIZP 056063, 384.9 mm SL., Apr. 23, 1986, Ta-shi.

Diagnosis: D. I-VII-VIII, 11; A. 11; P. 22; GR. 1+5; Llp. 51-52 (3 with spines); 8-9(13-15)/20-22. Head 2.63-2.84, body depth 7.38-8.64 in standard length. Eye diameter 5.26-5.48, snout 2.93-3.25, interorbital 11.26-12.38 all in head length. The median longitudinal keel of the second suborbital bone with one sharp spine. Preopercular with 2 spines smaller than half of eye diameter. The interopercular flap very large, rather broader than long, rounded at the tip, and tongue-like in general form. Iris lappet cirrose, the cirri well developed. Body, head and fins spotted with dark brown and usually with 8 well defined broad darker bands across back.

Distribution: It is known from Japan, China Sea to Taiwan.

19. *Inegocia japonica* (Tilesius)

Fig. 28, 29

Platycephalus japonicus Tilesius, 1812: 59 (type locality, Nagasaki) (not seen); Cuvier and Valenciennes, 1829: 256.

Thysanophrys japonicus, Jordan and Richardson, 1908: 636; 1909: 194.

Inegocia japonica, Jordan and Thompson, 1914: 278; Matsubara and Ochiai, 1955: 80; Masuda *et al.*, 1984: 321.

Materials: One specimen, ASIZP 056053, 191.8 mm SL., Sept. 28, 1985, Peng-hu; 1 specimen, ASIZP 056066, 199.4 mm SL., Aug. 27, 1985, Peng-hu; 1 specimen, ASIZP 056067, 191.9 mm SL., Aug. 9, 1985, Ker-tz-liao.

Diagnosis: D. I-VIII, 12; A. 12; P. 19-21; GR. 1+5; Llp. 52-54 (6-8 with spines); 1TR. 6-7(11-13)/14-15. Head 3.82-3.03, body depth 5.38-7.21 in standard length. Eye diameter 4.12-4.64, snout 13.16-15.42, interorbital 14.32-16.34 all in head length. Preoperculum, like *Inegocia guttata*. with two small spines. Interopercular flap longer than wide, caniniform and acutely pointed. Color in formalin: generally grayish and whitish ventrally.

Distribution: Known from Southern Japan, Yellow and East China Seas and Taiwan.

Acknowledgements: The authors wish to thank Dr. S. C. Shen of National Taiwan University, Dr. S. C. Lee of the Institute of Zoology, Academia Sinica, and Dr. M. J. Yu of the Tung-hai University for the loan of literatures. Dr. S. L. Lee who carefully corrected the manuscript and gave valuable discussion and recommendation is highly appreciated. The authors would like to extend his appreciation to Mr. Mao-Shen Su of the Taiwan Fisheries Research Institute at Tungkang for the collection of *Onigocia tuberculatus*. This study was supported by the National Science Council of the Republic of China (NSC 75-0201-B001-10).

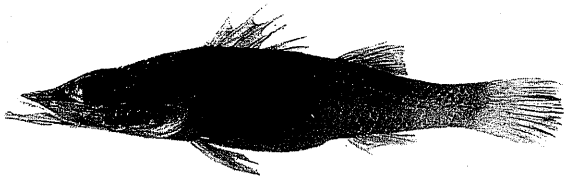


Fig. 1. *Parabembras curtus*, 201.8 mm SL.

Fig. 2. *Bembras japonica*, 173.4 mm SL.

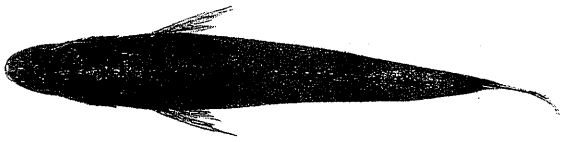


Fig. 3. *Bembras japonica*, 173.4 mm SL.

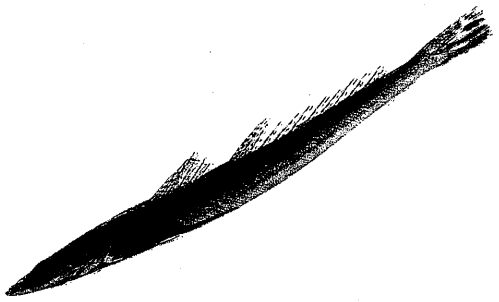


Fig. 4. *Platycephalus indicus*, 260.4 mm SL.

Fig. 5. *Platycephalus indicus*, 260.4 mm SL.

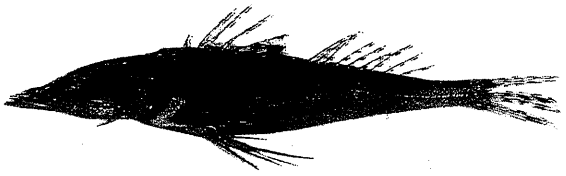


Fig. 6. *Rogadius asper*, 91.5 mm SL.

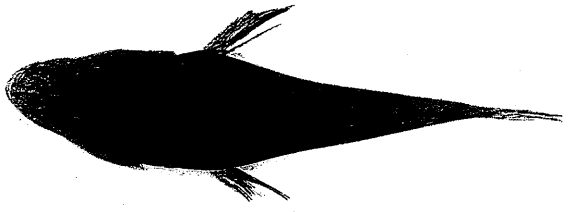


Fig. 7. *Rogadius asper*, 91.5 mm SL.

Fig. 8. *Onigocia tuberculatus*, 100.4 mm SL.

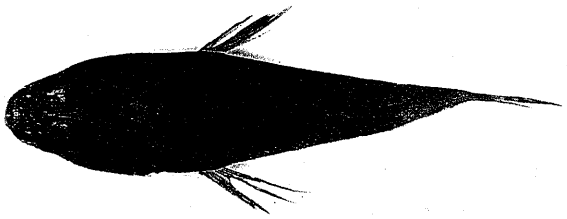


Fig. 9. *Onigocia spinosa*, 98.5 mm SL.

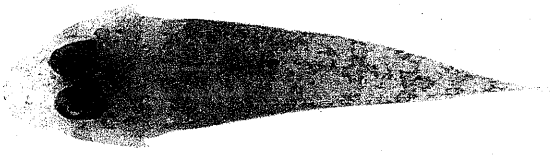


Fig. 10. *Onigocia macrolepsis*, 34.3 mm SL.

Fig. 11. *Grammoplites scaber*, 194.6 mm SL.

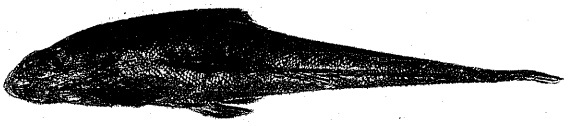


Fig. 12. *Grammoplites scaber*, 194.6 mm SL.

Fig. 13. *Suggrundus rodericensis*, 159.7 mm SL.

Fig. 14. *Suggrundus rodericensis*, 159.7 mm SL.

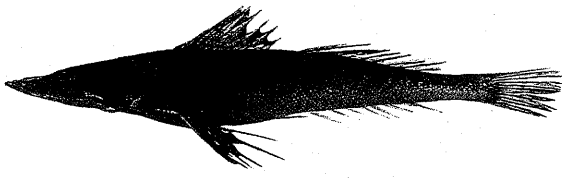


Fig. 15. *Suggrundus meerdervoorti*, 163.9 mm SL.

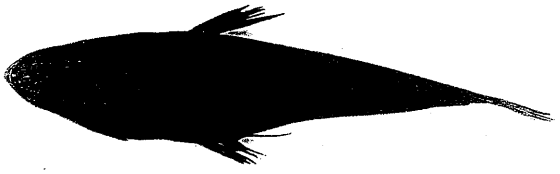


Fig. 16. *Suggrundus meerdervoorti*, 163.9 mm SL.

Fig. 17. *Suggrundus longirostris* 183.9 mm SL.

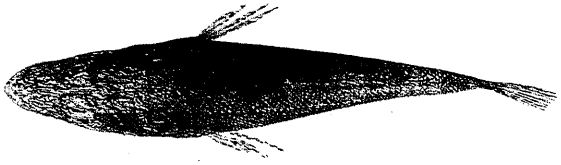


Fig. 18. *Suggrundus longirostris* 183.9 mm SL.

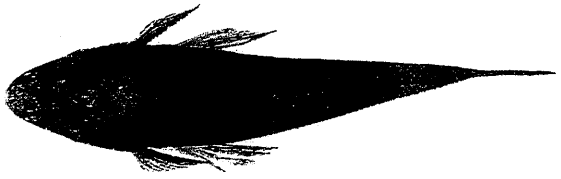


Fig. 19. *Suggrundus brevirostris* 65.0 mm SL.

Fig. 20. *Ratabulus megacephalus*, 73.5 mm SL.

Fig. 21. *Thysanophrys papillolabium*, 42.6 mm SL.

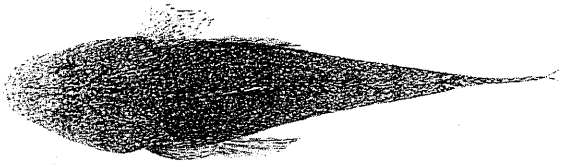


Fig. 22. *Thysanophrys arenicola*, 145.9 mm SL.

Fig. 23. *Thysanophrys chiltonae*, 100.4 mm SL.

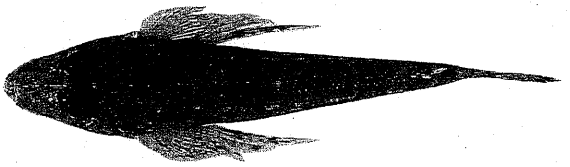


Fig. 24. *Thysanophrys chiltonae*, 100.4 mm SL

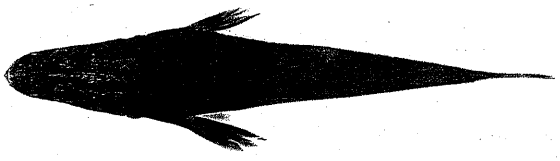


Fig. 25. *Cociella crocodila*, 119.3 mm SL.

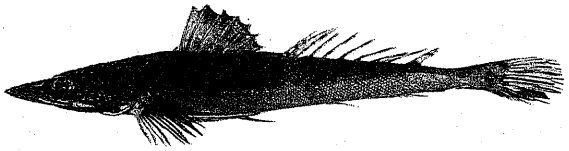


Fig. 26. *Cociella crocodila*, 119.3 mm SL.

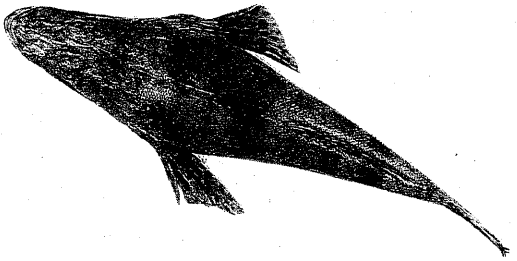


Fig. 27. *Inegocia guttata*, 384.9 mm SL.

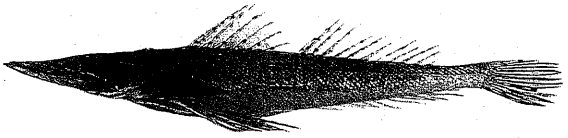


Fig. 28. *Inegocia japonica*, 199.4 mm SL.

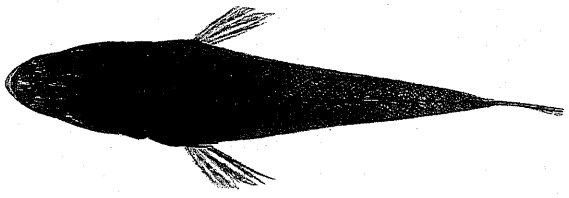


Fig. 29. *Inegocia japonica*, 199.4 mm SL.

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臺灣產之牛尾魚科魚類兼記其兩新種

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本文記載下列二亞科十一屬十九種棲息於臺灣近海及沿岸產之牛尾魚科魚類，其中包括2種 *Suggrundus* 屬的新種魚類，它們是長吻牛尾魚（*S. longirostris*）及短吻牛尾魚（*S. brevirostris*）。其它的魚種是短鯛（*Parabembras curtus*）、赤鯛（*Bembras japonicus*）屬於赤鯛亞科（*Bembradinae*）；印度牛尾魚（*Platycephalus indicus*）、松葉牛尾魚（*Rogadius asper*）、突粒牛尾魚（*Onigocia tuberculatus*）、鬼牛尾魚（*Onigocia spinosa*）、大鱗牛尾魚（*Onigocia macrolepis*）、橫帶牛尾魚（*Grammoplites scaber*）、大棘牛尾魚（*Suggrundus rodericensis*）、大眼牛尾魚（*Suggrundus meerdervoorti*）、巨頭牛尾魚（*Ratabulus megacephalus**）、乳瓣牛尾魚（*Thysanophrys papillolabium**）、窄眼眶牛尾魚（*Thysanophrys chiltonae**）、沙地牛尾魚（*Thysanophrys arenicola**）、鱷形牛尾魚（*Cociella crocodila*）、眼眶牛尾魚（*Inegocia guttata*）及日本牛尾魚（*Inegocia japonica*）等均屬於牛尾魚亞科（Platycephalinae）。以上加註星號之四種牛尾魚爲臺灣之新記錄種，而 *Ratabulus* 則爲新記錄屬。本文亦附有檢索表、各種之主要特徵、異名錄及彩色圖片等以利學者之參考。