

FISHES OF LOPHIIFORMES (PEDICULATI) OF TAIWAN^{1,2}

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(Accepted November 3, 1987)

Sin-Che Lee (1988) Fishes of Lophiiformes (Pediculati) of Taiwan. *Bull. Inst. Zool., Academia Sinica* 27(1): 13-26. This is a brief report of the recent revision on the lophiiform fishes of Taiwan, which includes the following 20 species, namely *Lophiomus setigerus*, *Lophius litulon*, *Antennarius striatus*, *A. commersoni*, *A. randalli*, *A. biocellatus*, *A. dorehensis*, *A. nummifer*, *Histiophryne cryptacanthus*, *Histrio histrio*, *Chaunax abei*, *Dibranchius japonicus*, *Halieutaea stellatus*, *H. fitzsimonsi*, *H. fumosa*, *Malthopsis lutea*, *M. jordani*, *M. annulifera*, *Halicometes reticulatus* and *Himantolophus groenlandicus*. Among the above list, *Malthopsis jordani* is the new record for Taiwan. Specimens of *Lophius litulon*, *Antennarius randalli* and *Halieutaea fitzsimonsi* are not available at the moment.

Key words: Faunistic study, Formosan lophiiform fishes.

Lophiiformes or anglerfishes are characterized externally by the transformation of first dorsal spine into illicium, if present, location of gill-openings at or behind pectoral base, no ribs and by having 2-4 elongated pectoral radials. They are marine and mostly living in relatively deeper waters, occasionally found in the estuaries and shallower coastal waters.

Up to date, a total of 265 species in 64 genera and 6 families are included in Order Lophiiformes world widely (Nelson, 1984). In the district of Taiwan alone, the earliest report on the species of this group was dated back in 1943 when Nakamura mentioned three, *Lophius litulon*, *Antennarius tridens* (= *Antennarius striatus*) and *Halieutaea stellatus*.

Later in 1951, Liang added *Lophiomus setigerus* and *Pterophryne histrio* (= *Histrio histrio*). In 1967, Chen *et al.* added further 6 species, namely *Phrynelox zebrinus* (= *Antennarius stri-*

atus), *P. tridens* (= *A. striatus*) *P. nox* (= *A. striatus*), *Chanuax pictus* (= *C. abei*), *Halicometes reticulatus*, *Malthopsis annulifera*, *M. lutea* and *Himantolophus groenlandicus*, the above three *Phrynelox* species are now combined as a single species, *Antennarius striatus*. In 1975, Yu and Chung firstly recorded *Antennarius altipinnis* (= *A. dorehensis*) from Shiao-liu-chiu. In 1980, Lee furtherly recorded *Histiophryne bougainvilli* (= *H. cryptacanthus*) from Lanyu. In 1984b Shen added *Lophiodes mutilus*, *Antennarius nummifer*, *Chaunax fimbriatus*, *Halieutaea fitzsimonsi*, *H. fumosa* and *Dibranchius japonicus*. However, after the examination of Shen's specimens in National Taiwan University, *Lophiodes mutilus* is considered as a misidentification of *Lophiomus setigerus* and *Chaunax fimbriatus* is identical with *C. abei*, only 4 species are actually increased. *Antennarius hispidus* appeared in Shen's synoptic book (1984a) has not been obtained, it is provisionally excluded from

1. Paper No. 299 of the Journal Series of the Institute of Zoology, Academia Sinica

2. Financially supported by National Science Council of the Republic of China (NSC 74-0201-B001a-35).

this report. The final revision by Chen and Yu in 1986 appears nothing new addition at all. In 1987 Pietsch stated a further occurrence of *Antennarins randalli* from Taiwan.

Since the external features of Lophiiformes, particularly antennarids are rather variable, it has long been confused by many workers when one may find different nomenclatures in the literatures. Therefore, it is necessary here to make a throughout revision on their taxonomic status by providing a key, species diagnostic characters as well as color photos.

MATERIALS AND METHODS

Most specimens were collected by trawlers from deeper grounds and were partly obtained from estuaries and shallower littoral zones. Method of measurements followed that of Caruso (1981).

Specimens are mostly deposited in the Museum of Institute of Zoology, Academia Sinica (ASIZP) and partly are the loans from Museum of the Department of Zoology, National Taiwan University (NTUM) and Taiwan Museum (TMF).

RESULTS

SYSTEMATIC ACCOUNTS

Key to families

- 1a. Ventral fins absent....Himantolophidae
- 1b. Ventral fins present.....2
- 2a. Skin smooth, 2 pectoral radials Lophiidae
- 2b. Skin rough; 3 pectoral radials.....3
- 3a. Mouth large, terminal; head globe-like or compressed.....4
- 3b. Mouth small, subterminal or inferior; head strongly depressed..... Ogocephalidae
- 4a. Head glob-like, one dorsal spine; gill-openings far apart from the hind edge of pectoral axil..... Chaunacidae
- 4b. Head compressed, three dorsal spines; gill-openings at lower axil of pectoral Antennariidae

FAMILY LOPHIIDAE

Key to genera

- 1a. Gill-openings extending below, behind and in front of pectoral base..... *Lophiodes*
- 1b. Gill-openings restricted below and behind the pectoral base.....2
- 2a. Interopercle with two spines; D. 8; A. 6; vertebrae 18-19..... *Lophiomus*
- 2b. Interopercle with single spine; D. 9-12; A. 8-10; vertebrae 26-31..... *Lophius*

Genus *Lophiomus* Gill, 1882

1. *Lophiomus setigerus* (Vahl, 1797)

鮨 鰈

Plate 1- fig. 1

Lophius setigerus Vahl, 1797: 214 (Type locality: China Sea).

Lophiomus setigerus, Temminck and Schlegel, 1842: 158; Liang, 1951: 34; Matsubara, 1955: 1342; Chen *et al.*, 1967: 3; Caruso, 1983: 13; Masuda *et al.*, 1984: 102; Shen, 1984a: 149; 1984b: 19; Chen and Yu, 1986: 346.

Materials: ASIZP 055363, 1 specimen, 89 mm SL, August 1979, Tashi; ASIZP 055448, 1 specimen, 117.6 mm SL, December 1979, Tungkan; NTUM uncatalogued, 1 specimen (labelled as *Lophius litulon*), 93.5 mm SL.

Diagnosis: D. VI, 8; A. 6; P. 22-23; C. 6; vertebrae 19. Head length 1.72-2.02, head width 1.71-1.85 in standard length. Body strongly depressed, head slightly wider than the length, interopercle with two spines. The first dorsal spine or illicium longer than the second one. Gill-opening below and behind pectoral base. Color when fresh generally brown, inside the mouth black or dark brown with light blotches.

Remarks: This species can be recognized easily from *Lophius litulon* by having less numerous soft dorsal (8 versus 9-12) and anal (6 versus 8-10) rays and vertebrae (19 versus 26-31).

Genus *Lophius* Linnaeus, 1758

2. *Lophius litulon* (Jordan, 1902)

黃鮨鰈

Lophiomus litulon Jordan in Jordan and Sordo, 1902:

364 (Type locality: Tokyo).

Lophius litulon, Nakamura, 1943: 99; Matsubara, 1955: 1342; Chen *et al.*, 1967: 5; Masuda *et al.*, 1984: 102; Shen 1984a: 149; 1984b: 19; Chen and Yu, 1986: 346.

Remarks: Although this species was reported to occur in Taiwan (Chen *et al.*, 1967), however, specimen has not yet been obtained in Taiwan. The specimen labelled as *Lophius litulon* in National Taiwan University is in fact *Lophiomus setigerus*. A higher vertebral counts is the most convenient way to distinguish from the latter.

FAMILY ANTENNARIIDAE

Key to genera

- 1a. Caudal peduncle absent; second to third dorsal spines hidden in the skin; illicium minute or hidden in the snout *Histiophryne*
- 1b. Caudal peduncle distinct; dorsal spines normal.....2
- 2a. Illicium rather short; ventral fin only slightly shorter than pectoral fin; body naked or with minute simple spinules..... *Histrion*
- 2b. Illicium well developed, smaller or longer than the second spine; ventral fin much smaller than the pectoral fin; body rough, covered with bifurcated spinules..... *Antennarius*

Genus *Antennarius* Cuvier, 1817

Key to species of *Antennarius*

1. Illicial pterygiophore extending anteriorly beyond the symphysis of upper jaw; body with distinct nearly paralleling stripes or blotches if present.....
.....*A. striatus*
Illicial pterygiophore never beyond the symphysis of upper jaw; markings on body if present, not in stripe-like....2
2. Membrane behind second dorsal spine...3
Second dorsal spine free.....4
3. The membrane attached head skin only; bony part of first dorsal spine much

longer, about 1.5–2 times the length of second dorsal spine..... *A. commersoni*

The membrane connecting broadly to third dorsal spine; bony part of first dorsal spine much shorter than the second..... *A. rendalli*

4. Appendages on chin; dorsal base with distinct yellow-ringed ocellus
..... *A. biocellatus*

No appendages on chin; the dark spot at dorsal base if present, without yellowish ring5

5. Bony part of first dorsal spine much shorter than the second, its fleshy tip in simple oval-shape.....*A. dorehensis*
Bony part of first dorsal spine about the length of second, its fleshy tip, bulbous with filaments.....*A. nummifer*

3. *Antennarius striatus* (Shaw, 1794)

條紋鰐魚

Plate 1-fig. 2 a-b Text-fig. 1 a-b.

Lophius striatus Shaw, 1794: Pl. 175 (Type locality: New Holland).

Phrynelox striatus, Schultz, 1957: 71.

Antennarius striatus, Gunther, 1878: 162; Smith, 1967: 431; Sainsbury, 1985: 80.

Phrynelox nox, Chen *et al.*, 1967: 9; Shen, 1984a: 150; Masuda *et al.*, 1984: 103; Chen and Yu, 1986: 347.

Phrynelox tridens, Chen *et al.*, 1967: 8; Shen, 1984a: 150; 1984b: 19; Masuda *et al.*, 1984: 103; Chen and Yu, 1986: 347.

Phrynelox zebrinus, Schultz, 1957: 75; Chen *et al.*, 1967: 7; Shen, 1984a: 150; Masuda *et al.*, 1984: 102; Chen and Yu, 1986: 347.

Materials: ASIZP 056088, 2 specimens, 57.5–58.0 mm SL, May 1963, Kaohsiung (former *A. nox*); ASIZP 055523 and 055579, 2 specimens, March and June 1980 respectively, from Kaohsiung (former *A. tridens*); ASIZP 055573, 4 specimens, 40.5–71.0 mm SL and ASIZP 055578, 1 specimen, 102 mm SL, all collected in June 1980, Kaohsiung (former *A. zebrinus*).

Diagnosis: D. III, 12 (last 2 branched); A. 7 (all branched); P. 10–11 (all simple); C. 9. Head 1.66–2.25, body depth 1.69–2.02 in



Text-fig. 1a. *Antennarius striatus* (former *A. atra*), 128 mm SL.



Text-fig. 1b. *Antennarius striatus* (former, *A. nox*) 58 mm SL.

standard length. Snout 6.0–7.0 and eye 9.57–14.0 in head. Body covered with small dermal bifurcated spinules, the area behind second dorsal spine naked. Bony part of first dorsal spine about or slightly longer than the second dorsal spine, the fleshy bait-like tentacle trifold. Caudal peduncle distinct. Ventral fin much smaller than pectoral. Color when fresh light brown to dark brown with black spots or zebra-like patches.

Remarks: According to Pietsch (1984), *Phrynelox* is synonymous with *Antennarius*, and the former *Antennarius tridens*, *A. nox* and *A. zebrinus* are considered as varieties of this species. The color pattern of *A. hispidus* resembles the present species, however, the presence of palmate-like first dorsal spine in *A. hispidus* can separate them.

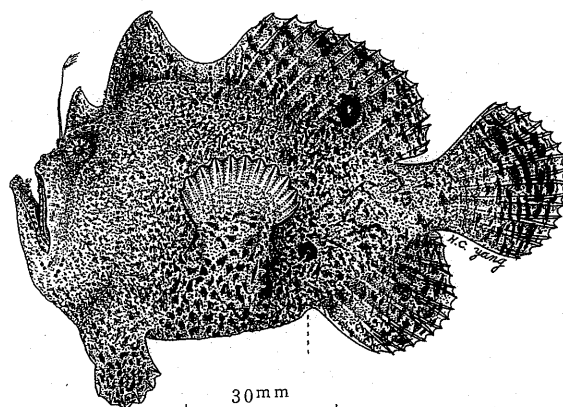
4. *Antennarius commersoni* (Lacépède, 1798)

康氏躑魚

Plate. 1– fig. 3; Text-fig. 2

Lophius commersoni Lacépède, 1798: 327 (Type locality: South Seas) (Not seen).

Chironectes commersoni, Cuvier and Valenciennes, 1837: 426.



Text-fig. 2. *Antennarius commersoni*, 164 mm SL.

Antennarius commersoni, Cantor, 1849: 1186.

Antennarius moluccensis Bleeker, 1855: 414 (Amboina); Gunther, 1878: 163; Schultz, 1957: 91; de Beaufort and Briggs, 1962: 206; Masuda *et al.*, 1984: 103.

Materials: ASIZP 056117, 1 specimen, 164 mm SL, Keelung, May 1965; TMF 00284, 1 specimen, 213 mm SL, October 1985, Santiaochiao, NE Taiwan.

Diagnosis: D. III, 13 (last 2 branched); A. 8 (all branched); P. 11 (all simple); C. 9. Head 2.09–2.41 and body depth 1.32–1.67 in standard length. Snout 4.64–4.86 and eye 10.2–11.7 in head. Body covered with minute bifurcated dermal spinules. Illicium slender, its lengthy fleshy bait consists of tuft of filaments, bony part very long, 1.6 times the length of second dorsal spine. No naked area behind second dorsal spine. Color when fresh pink scattered with tiny black specks forming two ocellates on posterior $\frac{1}{3}$ of dorsal base and one on posterior $\frac{1}{3}$ of body side. Dorsal, anal and caudal fins with dark distal margins.

Remarks: The distinctive characters described by many authors for *Antennarius moluccensis* is identical with that of *A. commersoni*. Here, the scientific name, *Antennarius commersoni* is adopted because of its seniority.

5. *Antennarius randalli* Allen, 1970

藍道氏躑魚

Antennarius randalli Allen, 1970: 518 (Type locality: Easter Island).

Remarks: According to Pietsch (1987), this species was recorded from Taiwan based on the USNM 232176 specimen collected from southernmost tip of Taiwan (Hengchun). The present author has not yet obtained the specimen.

6. *Antennarius biocellatus*
(Cuvier, 1817)

雙斑鰐魚

Plate 1-fig. 4

Chironectes biocellatus Cuvier, 1817: 427 (Type locality unknown).

Antennarius biocellatus, Pietsch, 1987: 174.

Antennarius nummifer (non Cuvier), Burgess and Axelrod, 1974: 1365.

Remarks: The orangish-red body color with white-ringed black ocellus at dorsal base is the most easily recognizable character for this species. The specimen has not yet been obtained by the author, however, the occurrence of this species in Taiwan was based on the photo taken by Mr. K. H. Choo appeared in Burgess and Axelrod, 1974 (p. 1365).

7. *Antennarius dorehensis*
Bleeker, 1859

新幾內亞鰐魚

Plate 1-fig. 5

Antennarius dorehensis Bleeker, 1859: 21 (Type locality: Doreh, New Guinea); Pietsch, 1987: 166.

Antennarius altipinnis Smith and Radcliffe, 1912 in Radcliffe, 1912: 204 (Type locality: Panay, Philippine); Schultz, 1957: 99; Yu and Chung, 1975: 3; Masuda *et al.*, 1984: 103; Shen, 1984a: 151; Chen and Yu, 1986: 347.

Materials: ASIZP 056081, 2 specimens, 26.4–31.5 mm SL, May 1975, Maopitou; ASIZP 056082, 1 specimen, 40.5 mm SL, December 1978, Wanlitung.

Diagnosis: D. III, 12 (last 3 branched); A. 7 (all branched); P. (all simple); C. 9 (all branched). Head 1.83–2.13 and body depth 1.56–2.03 in standard length. Snout 6.79–7.33 and eye 9.56–12.67 in head length. Body including dorsal spines covered with tiny

bifurcated spinules and whitish paillae, the area behind second dorsal spine not naked. Bony part of first dorsal spine shorter than the second one, its fleshy bait consists of a tuft of filaments.

Remark: It resembles the young *A. coccineus* in external appearance and color patterns, they can be easily recognizable that the latter has membraneous connection between anal fin and caudal fin. *A. coccineus* listed by Chang *et al.* (1983) is the misidentification of this species.

8. *Antennarius nummifer*
(Cuvier, 1817)

眼斑鰐魚

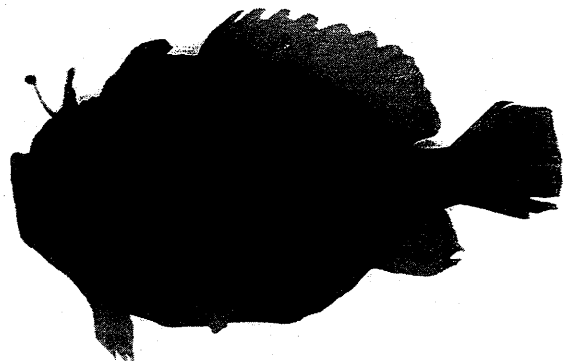
Text-fig. 3

Chironectes nummifer Cuvier, 1817: 430; Cuvier and Valenciennes, 1837: 425.

Antennarius nummifer, Gunther, 1878: 164; Schultz, 1957: 102; de Beaufort and Briggs, 1962: 217; Shen, 1984b: 19; Masuda *et al.*, 1984: 103; Chen and Yu, 1986: 347.

Materials: NTUM 04204, 1 specimen, 76.7 mm SL, October 1984, Hengchun.

Diagnosis: D. III, 12 (last 3 branched); A. 7 (all branched except the first one); P. 10 (all simple); C. 9 (all branched). Head 1.69 and body depth 1.53 in standard length. Snout 7.40 and eye 7.26 in head. Ventral fin about 64% the length of pectoral. Body covered with tiny bifurcated dermal spinules except the naked pit behind second dorsal spine. Bony part of first dorsal spine about



Text-fig. 3. *Antennarius nummifer*, 76.7 mm SL.

the length as the second one, its fleshy bait bulbous with several tentacles. Color when fresh generally dark orangish with a white-margined black ocellate at the bases of 8-9th soft dorsal rays.

Remarks: The ocellate at dorsal base is the most obvious character of this species.

Genus *Histiophryne* Gill, 1863

9. *Histiophryne cryptacanthus* (Weber, 1913)

隱棘躑魚

Plate 1-fig. 6

Antennarius cryptacanthus Weber, 1913: 564 (Type locality: Roti Island, Indonesia).

Histiophryne cryptacanthus, de Beaufort and Briggs, 1962: 220; Pietsch, 1987: 255.

Histiophryne bougainvilli, Lee, 1980: 57; Chen and Yu, 1986: 347.

Materials: ASIZP 055187 and ASIZP 055271, 2 specimens, 86.5 mm SL and 75.5 mm SL, October 1978 and April 1979, all from Lanyu; ASIZP 055476, 2, specimens, 65.0-71.5 mm SL, June 1975, Maopitou.

Diagnosis: D. III, 13-14; A. 7; P. 8-9; C. 9. Head 1.84-2.44, body depth 1.61-1.72 and pectoral 4.61-5.03 in standard length. Snout 6.73-6.88 and eye 12.5-14.64 in head length. Head very wide with dermal papillae at edges. Body naked without spinules. Illicium minute, hidden in the skin which is not seen from the surface of snout. Second and third dorsal spines well separated, all hidden within the heavy skin. The last rays of dorsal and anal soft fins united with caudal fin by membrane. Caudal peduncle absent, outermost ray simple and 7 innermost rays branched. Color when fresh pink with several dark patches.

Remarks: This genus differs from other genera in having the much degenerated illicium and the hidden second to third dorsal spines. This species is distinguished from the most closely-related *H. bougainvilli* in having the first dorsal spine completely hidden in the skin.

Genus *Histrio* Fisher, 1813

10. *Histrio histrio* (Linnaeus, 1758)

花 鰐

Plate 1-fig. 7

Lophius histrio Linnaeus, 1758: 237.

Pterophryne histrio, Liang, 1951: 34; Matsubara, 1955: 1343.

Pterophryne ranina Jordan and Sindo in Jordan, 1902: 370; Matsubara, 1955: 1343.

Histrio histrio, Schultz, 1957: 103; de Beaufort and Briggs, 1962: 197; Chen *et al.*, 1967: 11; Shen, 1984a: 150; 1984b: 19; Masuda *et al.*, 1984: 103; Chen and Yu, 1986: 347.

Materials: ASIZP 056085 2 specimens, 27.8-35.7 mm SL, May 1975, Maopitou; Uncatalogued, 1 specimen, 30 mm SL, May 1978, Nanwan.

Diagnosis: D. III, 12 (last 2 branched); A. 7 (all branched except the first one); P. 10; C. 9. Head 1.53-1.80, body depth 1.60-1.94 in standard length. Snout 7.92-8.67 and eye 6.50-7.07 in head. Body smooth without bifurcated dermal spinules but with minute granules and cutaneous appendages instead. Two appendages in front of illicium. Bony part of illicium tiny, less than $\frac{1}{2}$ the length of second dorsal spine, the fleshy bulbous bait with filaments. Ventral fin only slightly shorter than pectoral fin. Color when fresh yellowish brown, scattered with pale patches and small black spots.

Remarks: Because of the greater color variations, subsequently several different nomenclatures were found in the literatures. However, the former *Chironectes marmoratus* Temminck and Schlegel, and *Pterophryne ranina* Jordan and Sindo are now included in this species.

FAMILY CHAUNACIDAE

Genus *Chaunax* Lowe, 1846

11. *Chaunax abei* Le Danois, 1978

阿部氏單棘躑魚

Plate 2-fig. 8a-b

Chaunax abei Le Danois, 1978: 87 (Type locality:

Japan); Shen, 1984b: 20; Chen and Yu, 1986: 348.

Chaunax pictus, Chen *et al.*, 1967: 13; Chen and Yu, 1986: 13.

Chaunax fimbriatus, Shen, 1984b: 20; Sainsbury *et al.*, 1985: 80.

Materials: ASIZP 055225, 1 specimen, 104 mm SL, February 1979, Tungkang.

Diagnosis: D. I, 11; A. 6; P. 12; C. 8. Head 1.61 and pectoral 5.25 in standard length. Snout 7.87 and eye 7.87 in head length. Body covered with tiny prickles. globe-like, slightly depressed in front of the soft dorsal, like other pediculate fishes, first dorsal spine transformed into a tiny flap-like illicium which is retracted in the rostral groove. Color when fresh reddish to pink, sparsely covered with small yellowish blotches.

Remark: Norman (1939) and de Beaufort and Briggs (1962) suggested that the genus *Chaunax* has but one species of *pictus*. However, some recent authors such as Le Danois (1978) and Masuda *et al.* (1984) considered that *C. abei* is a separate species. The present author follows this. *Chaunax abei* is different from *C. fimbriatus* in having more sparsely distributed yellowish spots on back and a more deeper depression in front of soft dorsal fin. All the previous records for *C. pictus* and *C. fimbriatus* in Taiwan are in fact the misidentification of the present species.

FAMILY OGCOCEPHALIDAE

Key to genera

- 1a. Palatine toothless2
- 1b. Palatine toothed.....3
- 2a. Disk ovoid or nearly subtriangular
..... *Dibranchus*
- 2b. Disk circular, width equal to length...
..... *Halieutaea*
- 3a. Body disk triangular; snout produced into a sharp projection; second dorsal well developed; skin with large dermal ossicles *Malthopsis*
- 3b. Body disk nearly elliptical, posterior part of disk wider than length; snout

rounded; second dorsal absent or rudimentary if present; skin rough with spinules.....*Halicmetes*

Genus *Dibranchus* Gilbert, 1905

12. *Dibranchus japonicus*

Amaoka and Toyoshima, 1981

日本二鰓棘茄魚

Plate 2-fig. 9

Dibranchus japonicus Amaoka and Toyoshima, 1981: 115 (Type locality: Iwate, Japan); Shen, 1984b: 20; Masuda *et al.*, 1984: 105; Chen and Yu, 1986: 348.

Materials: NTUM uncatalogued, 1 specimen, 70.2 mm SL, March 1971, Tashi.

Diagnosis: D. I, 5; P. 19; C. 9. Head 1.70, disk width 1.51 and pectoral 3.69 in standard length. Snout 9.18 and eye 7.65 in head length. Disk ovoid, dorsal surface densely covered with spines, some with broad stellated bases, ventral surface with minute spinules. Both jaws with narrow band of villiform teeth, palatines and vomer toothless. Color when fresh dark brown on dorsal surface and whitish on ventral surface.

Remarks: This species resembles the members belonging to *Halieutaea*, however, it is characterized by the more ovoid body shape and by the lack of teeth on palatines and vomer.

Genus *Halieutaea* Valenciennes, 1837

Key to species

- 1a. Ventral surface of disk smooth without any ossicles2
- 1b. Ventral surface of disk granulated.....
..... *H. stellata*
- 2a. Dorsal surface of disk with a pair of black ring *H. fltzsmonsi*
- 2b Dorsal surface of disk without black rings *H. fumosa*

13. *Halieutaea stellata*

(Vahl, 1797)

棘茄魚

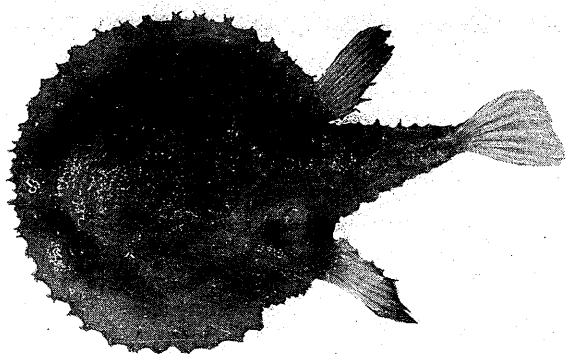
Plate 2-fig. 10; Tex-fig. 4a-b

Lophius stellata Vahl, 1797: 214 (Type locality: Japan) (not seen).

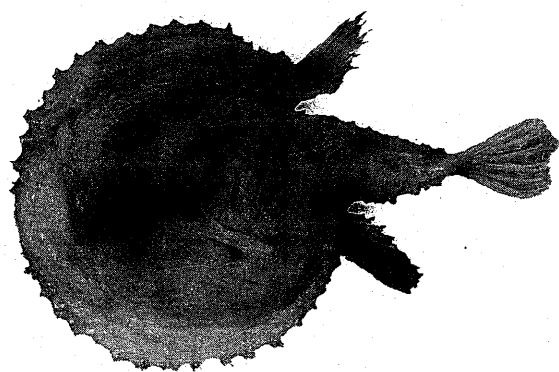
Haliutaea stellata, Temminck and Schlegel, 1842: 160; Kamohara, 1937: 12; Matsubara, 1955: 1348; de Beaufort and Briggs, 1962: 233; Chen *et al.*, 1967: 15; Shen, 1984a: 151; 1984b: 20; Masuda *et al.*, 1984: 105; Chen and Yu, 1986: 348.

Materials: ASIZP 056092, 2 specimens, 58.8–86.0 mm SL, September 1966, Makung; ASIZP 056118, 1 specimen, 117 mm SL, Tashi; ASIZP 056147, 1 specimen 93 mm SL, Dec. 1986, Kaohsiung.

Dignosis: D. I, 4–5; A. 4; P. 13; C. 9. Head length 1.58–1.69, disk width 1.31–1.52 in standard length. Snout 7.52–10.29 and eye 8.13–8.65 in head length. Ventral fin 59–66% of pectoral. Dorsal surface of disk covered with simple prickles on stellated bases; ventral surface scattered with prickles like



(a)



(b)

Text-fig. 4. *Haliutaea stellata*, 117 mm SL.
a, dorsal view;
b, ventral view.

ossicles. Generally red with an arched dark patches on anterior dorsal of disk.

14. *Haliutaea fitzsimonsi*

(Gilchrist and Thompson, 1916)

費氏棘茄魚

Plate 2-fig. 11

Haliutaea fitzsimonsi Gilchrist and Thompson, 1916: 56; Smith, 1967: 427; Shen, 1984b: 20.

Remarks: This is based on a color slide of the specimen of 138 mm SL, collected from Tungkang by Dr. Shen. Unfortunately, the specimen was lost. The most obvious character of this species is the presence of a pair of black rings on the upper surface of disk.

15. *Haliutaea fumosa*

Alcock, 1894

雲紋棘茄魚

Plate 2-fig. 12

Haliutaea fumosa Alcock, 1894: 115; Matsubara, 1955: 1348; Masuda *et al.*, 1984: 105; Shen, 1984b: 20; Chen and Yu, 1986: 348.

Materials: ASIZP 055648, 1 specimen, 66 mm SL, January 1981, Tungkang.

Diagnosis: D. I, 4; A, 4; P. 12; C. 9. Head length 1.74, disk width 1.48 in standard length. Snout 8.02 and eye 7.19 in head. Ventral fin 79% of pectoral fin. The simple small spinules on the dorsal surface of disk with pyramid-like base, the ventral surface entirely smooth. Color when fresh pink to red with irregular dark patches on upper surface of disk while generally whitish on ventral surface.

Remarks: It is easily confused with *H. stellata*, however, they can be separable by having granulated ventral surface of disk in the latter.

Genus *Malthopsis* Alcock, 1891

Key to species

- 1a. Subopercular spine with prominent antrorse spinule; dorsal and ventral surfaces sparsely scattered with bony tubercles2

- 1b. Subopercular spine without antrorse spinule; disk densely covered with bony tubercles; disk without black rings *M. lutea*
- 2a. Anal fin rays longer, extending beyond th caudal base; disk without black rings..... *M. jordani*
- 2b. Anal fin rays shorter, not reaching the caudal base: disk with black rings....
..... *M. annulifera*

16. *Malthopsis lutea*

Alcock, 1891

密星三角棘茄魚

Text-fig. 5

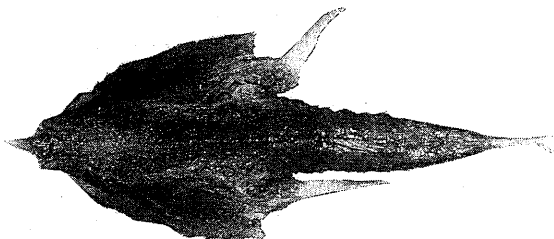
Malthopsis luteus Alcock, 1891: 26 (Type locality: Indian Sea).

Malthopsis lutea, Kamohara, 1937: 13; Matsubara, 1955: 1347; de Beaufort and Briggs, 1962: 238; Chen *et al.*, 1967: 20; Shen, 1984a: 152; 1984b: 20; Masuda *et al.*, 1984: 104; Chen and Yu, 1986: 348.

Materials: ASIZP 056024, 1 specimen, 66 mm SL, May 1964, Tungkang.

Diagnosis: D. I, 5; A. 4; P. 12; C. 9. Disk length 1.74, width 1.65, pectoral 4.25 in standard length. Snout 6.7 and eye 4.47 in disk length. Body disk triangular, with prominent rostral projecion, dorsal surface, and ventral surface around ventral fin base desely covered with bony tubercles. Subopercular spine without antrorse spinule. Tip of anal fin ray not extending to the base of caudal fin. Color in formalin uniformly brown.

Remarks: This species differs from the latter twos by having no antrorse spinules on subopercular spine and by having more densely distributed bony tubercles.



Text-fig. 5. *Malthopsis lutea*, 66 mm SL.

17. *Malthopsis jordani*

Gilbert, 1905

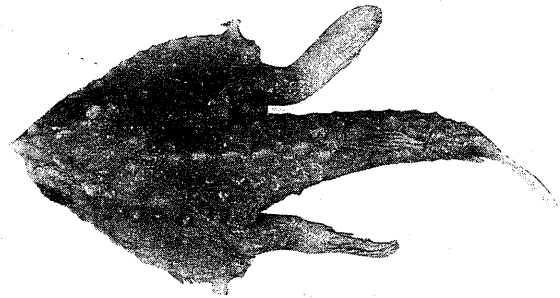
喬丹氏三角棘茄魚

Text-fig. 6a-b

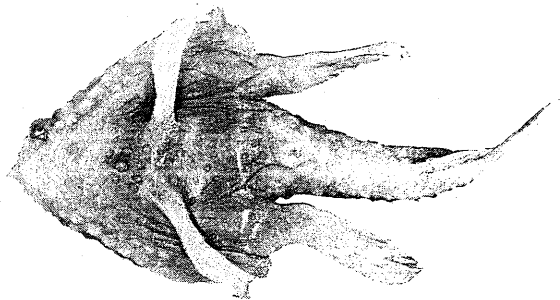
Malthopsis jordani Gilbert, 1905: 695 (Type locality: Molokai); Matsubara, 1955: 1347; Masuda *et al.*, 1984: 104.

Materials: ASIZP 056025; 1 specimen, 88 mm SL, May 1964, Tungkang.

Diagnosis: D. I, 6; A. 4; P. 13; C. 9. Disk length 1.87, width 1.91 and pectoral 4.19 in standard length. Snout 7.83 and eye 4.09 in disk length. Disk only slightly longer than width. Subopercle well protruded laterally with several spinules on it, two of them larger: one directed forwardly and the other posteriorly. Either surfaces of disk scattered with bony tubercles which are smaller on ventral surface. Anal fin rays longer, extending slightly beyond the caudal base. Color in formalin uniformly brown without black ring-like markings.



(a)



(b)

Text-fig. 6. *Malthopsis jordani*, 88 mm SL.
a, dorsal view;
b, ventral view.

Remarks: It resembles *M. annulifera* but differs from the latter by the longer anal fin rays and the lack of rings on dorsal disk surface

18. *Malthopsis annulifera*

Tanaka, 1908

環紋三角棘茄魚

Plate 2-fig. 13

Malthopsis annulifera Tanaka, 1908: 44 (Type locality: Sagami Sea); Matsubara, 1955: 1347; Chen *et al.*, 1967: 19; Shen, 1984a: 152; Masuda *et al.*, 1984: 104; Chen and Yu, 1986: 348.

Materials: ASIZP 055227, 1 specimen, 48.8 mm SL, February 1979, Tungkang.

Diagnosis: D. I, 5; A. 4; P. 12; C. 9. Disk length 1.81, width 1.53 and pectoral 5.42 in standard length. Snout 6.75 and eye 6.42 in disk length. Dorsal surface and ventral surface of disk around ventral fin base sparsely covered with bony tubercles. Subopercular spine with an antrorse spinule. Subopercular spine with an antrorse spinule. Dorsal surface of disk brownish when fresh, with 6 black rings while the ventral surface whitish. Tip of anal fin ray not extending to caudal base.

Remarks: The black rings on body disk is the most obvious character of this species, the largest being the subopercular spine. Soft dorsal very small with only 3 rays. Vomer and palatines toothed. Color when fresh brownish with light reticulated patterns.

Remarks: This genus can be separated from *Malthopsis* by the lack of rostral projection and by having tiny spinules on disk in comparison with larger bony tubercles in the latter.

Genus *Halicmetes* Alock, 1891

19. *Halicmetes reticulatus*

Smith and Radcliffe, 1912

網紋棘茄魚

Plate 2-fig. 14

Halicmetes reticulatus Smith and Radcliffe in Radcliffe, 1912: 208 (Type locality: Sombrero Is.,

Philippine); Kamohara, 1937: 13; Matsubara, 1955: 1347; Chen *et al.*, 1967: 17; Shen, 1984a: 151; Masuda *et al.*, 1984: 104; Chen and Yu, 1986: 348.

Materials: ASIZP 055226, 1 specimen, 73 mm SL, February 1979, Tungkang.

Diagnosis: D. I, 3; A. 4; P. 12; C. 9. Disk length 1.90, width 1.40, pectoral 5.84 in standard length. Snout 12.03 and eye 8.56 in disk length. Disk elliptical, rounded anteriorly. Skin of both surfaces of disk covered with minute bony spinules which are multifold along the edges of disk.

FAMILY HIMANTOLOPHIDAE

Genus *Himantolophus*

20. *Himantolophus groenlandicus*

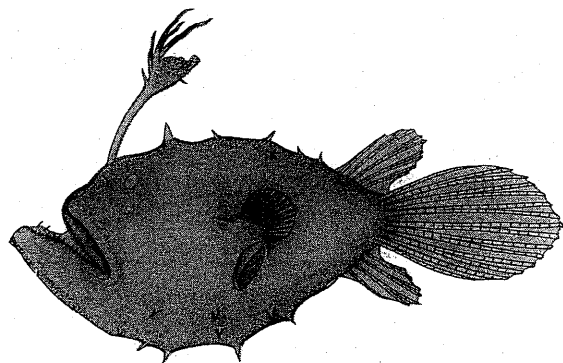
Reimhardt, 1837

疏棘鰈鰨

Text-fig. 7

Himantolophus groenlandicus Reinhardt, 1837: 74 (not seen); Matsubara, 1955: 1359; Chen *et al.*, 1967: 22; Masuda *et al.*, 1984: 105; Chen and Yu, 1986: 350.

Remarks: A young specimen of 43 mm standard length was collected in December 1966 from Tungkang, and described by Chen *et al.* (1967). Unfortunately the above specimen was lost, and no any recent collection was available since the publication of the paper.



Text-fig. 7. *Himantolophus groenlandicus*, 43 mm SL.

Acknowledgements: The author would like to express his gratitude to Dr. S. C. Shen of the Department of Zoology, National Taiwan

Plate 1

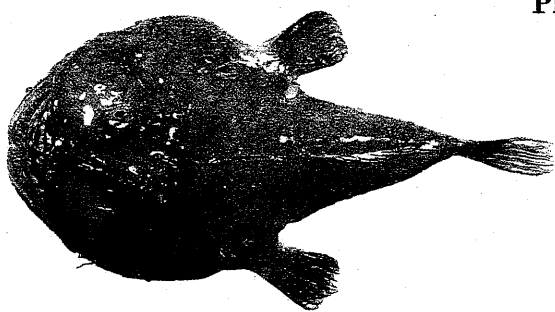
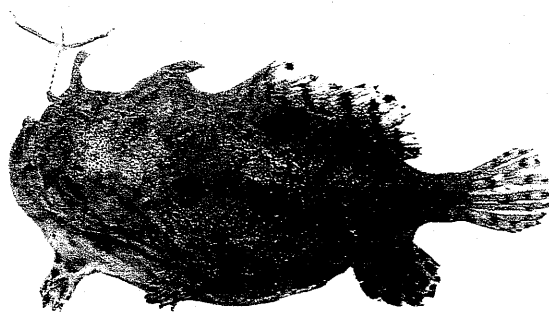
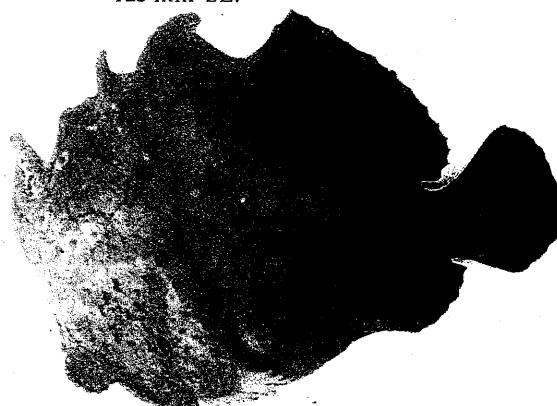
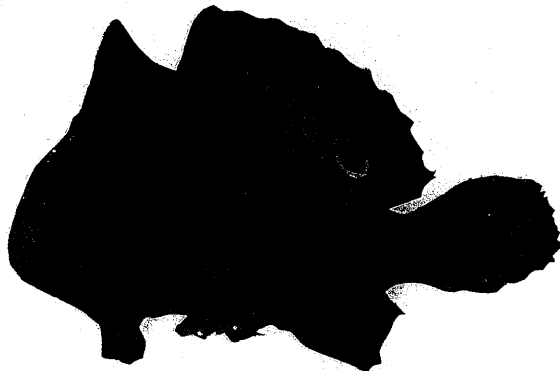
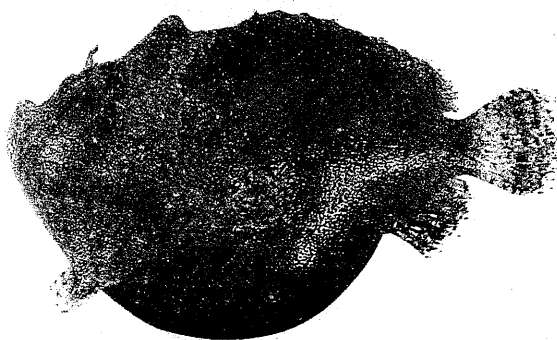
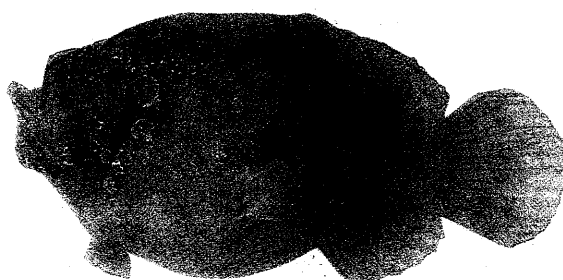
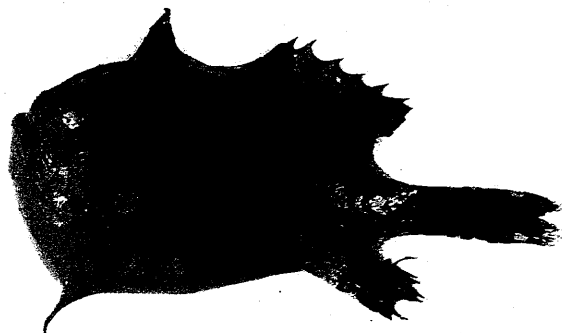
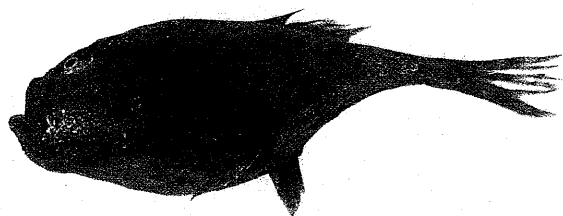
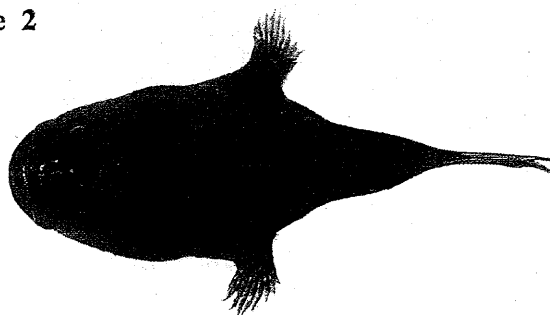
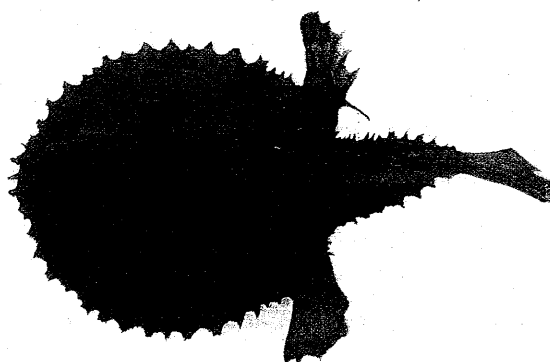
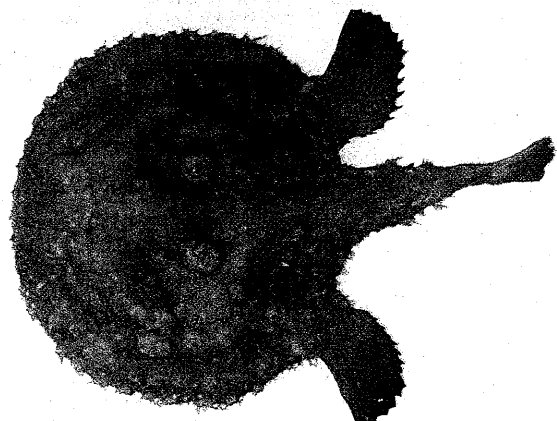
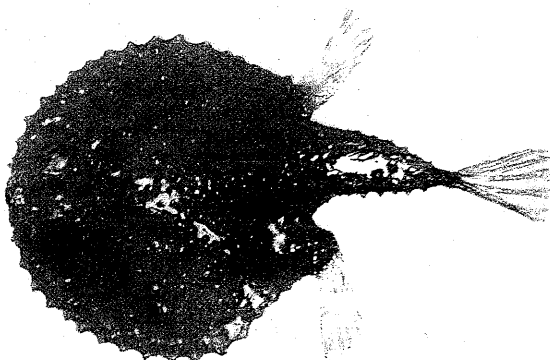
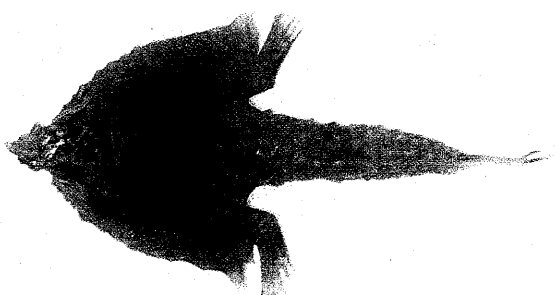
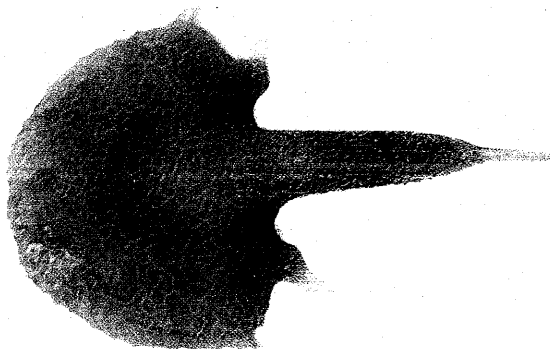
Fig. 1. *Lophiomus setigerus*, 117.6 mm SL.Fig. 2a. *Antennarius striatus* (former *A. tridens*), 123 mm SL.Fig. 2b. *Antennarius striatus* (former *A. zebrinus*), 71 mm SL.Fig. 3. *Antennarius commersoni*, 213 mm SL.Fig. 4. *Antennarius biocellatus*, body length not recorded.Fig. 5. *Antennarius dorehensis*, 40.5 mm SL.Fig. 6. *Histiophryne cryptacanthus*, 75.5 mm SL.Fig. 7. *Histrion histrio*, 30 mm SL.

Plate 2

Fig. 8a. *Chaunax abei*, lateral view, 104 mm SL.Fig. 8b. *Chaunax abei*, dorsal view, 104 mm SL.Fig. 9. *Dibranchius japonicus*, 70.2 mm SL.Fig. 10. *Halieutaea stellata*, 93 mm SL.Fig. 11. *Halieutaea fitzsimonsi*, 138 mm SL.Fig. 12. *Halieutaea fumosa*, 60 mm SL.Fig. 13. *Malthopsis annulifera*, 48.8 mm SL.Fig. 14. *Halicometes reticulatus*, 73 mm SL.

University and Mr. H. W. Kao of Taiwan Museum for the loans of some specimens. Thanks are extended to Dr. Piltsch of the University of Washington for his valuable suggestion. This work was financially supported by National Science Council (NSC 74-0201-B001a-35).

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臺灣之柄鰭目魚類

李 信 徹

本文報告如下之鰕鰕、黃鰕鰕、條紋鰕魚、康氏鰕魚、藍道氏鰕魚、雙斑鰕魚、新幾內亞鰕魚、眼斑鰕魚、隱棘鰕魚、花鰕、阿部氏單棘鰕魚、日本二鰓棘茄魚、棘茄魚、費氏棘茄魚、雲紋棘茄魚、密星三角棘茄魚、喬丹氏三角棘茄魚、環紋三角棘茄魚、網紋棘茄魚及疏棘鰕鰕等二十種，其中之喬丹氏三角棘茄魚為臺灣之新記錄種。