

A REVIEW OF THE PEDICULATE FISHES OF TAIWAN

JOHNSON T. F. CHEN, MO-CHAO LIU* and SIN-CHE LEE**

ABSTRACT

This systematic review of the angler fishes found in the waters of Taiwan and its adjacent islands is based on specimens collected from October 1960 to December 1966. It brings the angler fishes known in Taiwan up to 12 species. Among them only *Lophius litulon* (JORDAN) was lacking. 2 families (Chaunacidae and Himantolophiidae) and 6 species (*Phrynelox zebrius* (SCHULTZ), *Chaunax pictus* LOWE, *Halicometus reticulatus* SMITH & RADCLIFFE, *Malthopsis annulifera* TANAKA, *Malthopsis lutea* ALCOCK and *Himantolophus groenlandicus* REINHARDT) are newly added to the ichthyofauna of Taiwan.

INTRODUCTION

The present paper deals with the fishes of the Order Pediculatida found in the waters of Taiwan. Materials studied mostly collected by Mr. H. C. YANG, Mr. HERMAN T. C. WENG, and the junior author during October 1960 to December 1966, from the coastal area and tide pool of rocky shores around Taiwan. Few were obtained from estuary of rivers. All the specimens, except the species *Lophius litulon* (JORDAN), now preserved in the Biology Department of Taiwan Normal University, and the Taiwan Fisheries Research Institute. One species is referred to the specimen preserved in Ichthyological Laboratory of Tunghai University. As a result of the present study, *Pterophryne ranina* (TILESIIUS) is to be considered as a synonym of *Histrio histrio* (LINNAEUS), 2 families and 6 species (marked with asterisks) named below should represent as new records from Taiwan.

Lophiidae

Lophiomus setigerus (VAHL)

Lophius litulon (JORDAN)

* Associate professor, Department of Biology, National Taiwan Normal University, Taipei, Taiwan.

** Assistant, Department of Biology, National Taiwan Normal University, Taipei, Taiwan.

Antennariidae

- Phrynelox tridens* (TEMMINCK & SCHLEGEL)
 * * *Phrynelox zebrinus* (SCHULTZ)
Phrynelox nox (JORDAN)
Histrio histrio (LINNAEUS)

Chaunacidae

- * * *Chaunax pictus* LOWE

Ogcocephalidae

- Halieutaea stellata* (VAHL)
 * * *Halicmetus reticulatus* SMITH & RADCLIFFE
 * * *Malthopsis annulifera* TANAKA
 * * *Malthopsis lutea* ALCOCK

Himantolophiidae

- * * *Himantolophus groenlandicus* REINHARDT

MEASUREMENTS

Measurements appeared in this paper are taken as: body length (standard length), from tip of lower jaw to caudal base; head length, from tip of lower jaw to hind margin of gill-opening; disk length, from tip of lower jaw to vent. The greatest width of the disk is measured as a distance between the outermost point of the most prominent subopercular spines.

ACKNOWLEDGEMENT

The authors wish to express their sincere thanks to the following persons for their kind assistances: To Dr. L. P. SCHULTZ, Smithsonian Institute, Washington D. C., for his personal communication and confirming identification of one species; to Mr. H. C. YANG, Taiwan Fisheries Research Institute, for helping in collecting specimens and making figures; to Mr. HERMAN T. C. WENG, Tunghai University, for helping in every respects, during the course of this study.

Order PEDICULATIDA**Key to Families of Pediculatida of Taiwan**

- 1a. Ventral fin present.
 - 2a. Body depressed, skin smooth. 2 pectoral radials. Pseudobranchiae present. (Suborder LOPHIINA)
Mouth wide. Gill-opening comparatively large, at lower axil of pectoral.....LOPHIIDAE
 - 2b. Body depressed or compressed, skin rough. 3 pectoral radials. Pseudobranchiae vestigial or absent. (Suborder ANTENNARIINA)
 - 3a. Head globe-like or compressed. Mouth large, terminal.
 - 4a. Head compressed. Three spinous dorsal rays. Gill-opening at lower axil of pectoral.....
..... ANTENNARIIDAE
 - 4b. Head globe-like. Spinous dorsal represented by illicium only. Gill-opening distinctly behind upper axil of pectoral..... CHAUNACIDAE
 - 3b. Head strongly depressed. Mouth not large, usually inferior or subterminal. Spinous dorsal only represented by an illicium which is receivable into a tentacular cave. Gill-opening small, just at or slightly anterior to upper axil of pectoral.....OGCOEPHALIDAE
- 1b. Ventral fin absent. No pseudobranchiae. Body globe-like, more or less compressed. (Suborder CERATIINA).
Body sparsely distributed with bony scutes or spines. Nostrils located on antero-lateral side of head. Eyes small, laterally..... HIMANTOLOPHIIDAE

Suborder LOPHIINA

Family LOPHIIDAE

Key to Genera of Lophiidae of Taiwan

- 1a. Teeth in lower jaw in 3~5 series. Vertebrae 18~20. Anal rays 6~7; ventra rays 6~7.....
..... *Lophiomus*
- 1b. Teeth in lower jaw in 2 series or less. Vertebrae 30. Anal rays 8~11; ventral rays 5.....
..... *Lophius*

Genus LOPHIOMUS GILL, 1882

Lophiomus GILL, Proc. U. S. Nat. Mus., Vol. 5,1882, p.552 (type species, *Lophius setigerus* VAHL).

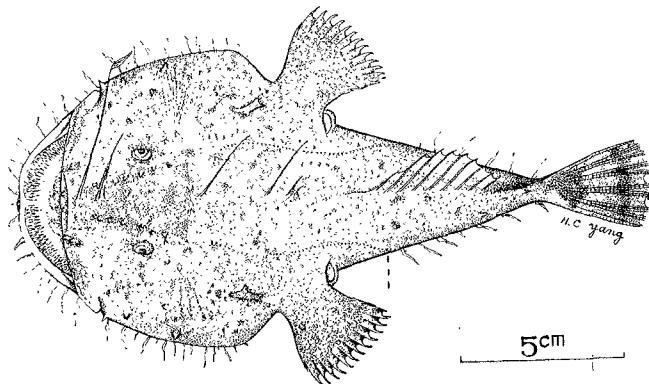


Fig. 1 *Lophiomus setigerus* (VAHL)

LOPHIOMUS SETIGERUS (VAHL)

fig. 1

Lophius setigerus VAHL, Skrivt. Naturh. Selsk. Kiøbenhavn, Vol. 4, 1797, p. 214, pl. 3, figs. 5 and 6 (type locality, China Sea).

Lophiomus setigerus TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., 1842, p. 158, pl. 80 (Nagasaki).—GÜNTHER, Cat. Brit. Mus. Fish., Vol. 3, 1861, p. 180 (coast of China and Japan).—JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 363.—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 423.—FOWLER & BEAN, Proc. U. S. Nat. Mus., Vol. 62, 1922, p. 73 (Takao).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 456.—OKADA, Cat. Vert. Japan, 1938, p. 274.—AGCO, Philippine Journ. Sci., Vol. 69, no. 2, 1939, p. 162, pl. 1, fig. 1 (Philippines).—BOESEMAN, Zool. Med., Rijksmuseum, Leiden, 1947, p. 135.—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu, Japan, 1950, p. 283.—LIANG, Rep. Taiwan Fish. Res. Inst., no. 3, 1951, p. 34.—KAMOHARA, Rep. Kochi Univ., Nat. Sci., no. 3, 1952, p. 101.—HERRE, Check List Philippine Fish., 1953, p. 852.—SMITH, Sea Fish. S. Africa, 1953, p. 426, fig. 1224 (Cape to Natal).—CHEN, Quart. Journ. Taiwan Mus., Vol. 6, no. 2, 1953, p. 127.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1342.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 262 and fig.—OKADA, Fish. Japan, 1955, p. 432 and fig.—CHEN, Synop. Vert. Taiwan, 1956, p. 95 (Kaohsiung).—CHU, Rep. Inst. Fish. Biol. Nat. Taiwan Univ., Vol. 1, no. 2, 1957, p. 15 (Pescadores).—YANG & LEE, Study Fish. Tainan Hsien, pt. 2, 1965, p. 13 (Tainan).

Lophiomus laticephalus TANAKA, Zool. Mag., Vol. 30, 1918, p. 227 (Kii).

Length of head 1.75~1.92; width of head 1.52~1.67; distance from origin of soft dorsal to snout tip 1.51~1.54, to caudal base 1.92~2.38; origin of anal to snout tip 1.26~1.32, to caudal base 3.41~3.48; origin of pectoral to snout tip 2.06~2.12, to caudal base 1.83~2.04; origin of ventral to snout tip 3.57~3.78, to caudal base 1.13~1.36; all in standard length. Width of head 0.78~0.91, length of snout 3.27~3.95, eye 6.33~6.8, all in length of head. Eye 2.11~2.32 in length of snout.

Body elongate and depressed, covered sparsely with ossicles; skin soft, lateral sides of head, around mouth and dorsum of body with flaps. Head broad, supraorbital ridge elevated, each with 3 spinules; interorbital space concave. Mouth wide and directed upward, lower jaw strongly protruded, with 3 or more series of canine-like teeth, upper jaw with only 2 alternate series, smaller than which on lower jaw, and bands of same teeth on vomer, palatines and tongue. Stout humeral spine armed with 4 or 5 pointed antrose spinules. Gill-opening at lower axil of pectoral, comparatively large.

Dorsal VI, 9, first spine much slender than second, with long fleshy tentacle or flap at its tip, bony part of first spine 1.87~2.11, second 2.71~2.78, both in length of head; last two spines small but connected by membrane; soft dorsal beginning above vent and near to caudal base than to snout tip, base of soft dorsal 2.53~2.56, longer than that of anal, longest ray 3.54~4.18. Anal 7,

beginning a little behind vent, fin membrane extending more posteriorly than that of soft dorsal, anal base 3.07~3.65, longest ray 3.38~3.54. Pectoral 22, longest ray 2.55~2.96. Ventral 7, apart from each other, far before and much smaller than pectoral, not reaching to posterior end of pectoral base, longest ray 3.54~4.13. Caudal 6, subtruncate, longest ray 2.42~2.79.

Color when fresh dark brown on dorsal surface, and along with light dots, ventral surface pale. Peritoneum dark colored. Fleishy tentacle of first dorsal spine black. Inside of mouth blackish anteriorly but white blotched. Dorsal brown; pectoral and caudal darker distally and lighter basally; ventral and anal uniformly light gray.

This species is closely related to *L. miacanthus* GILBERT from Hawaii, but differs by having more spinous and soft rays, first dorsal spine much longer than second. Size may be over 1 meter in total length.

Specimens studied:

- TNUT (Biology Department of Taiwan Normal University) 130101, standard length 87.5mm, May 1964, collected from Tungkang.
 TNUT 130102, standard length 167mm, April 1966, collected from Nan-fan-ao.
 TNUT 130103, standard length 163mm, Oct. 1960, collected from Keelung.
 TNUT 130104, standard length 157mm, Sept. 1966, collected from Makung.

Genus *LOPHIUS* LINNAEUS, 1756

Lophius LINNAEUS, Syst. Nat. ed. 10, Vol. 1, 1756, p. 236 (type species, *Lophius vespertilio* LINNAEUS).

LOPHIUS LITULON (JORDAN)

Lophiomus litulon JORDAN, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 364, fig. 1 (type locality, Matsushima bay, Tokyo, Wakanoura to Totomi bay).—JORDAN, TANAKA & SNYDER. Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 422, fig. 391.

Lophius litulon REGAN, Ann. Mag. Nat. Hist. (7), Vol. 11, 1903, p. 284.—WANG, Biol. Lab. Sci. Soc. China, Vol. 11, no. 6, 1935, p. 234, fig. 52 (Shangtung).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 455.—OKADA, Cat. Vert. Japan, 1938, p. 274 (Hokkaido, Taiwan).—NAKAMURA, Illust. Taiwan Fish. etc., 1943, p. 99, fig. 198 (Taiwan).—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu, Japan, 1950, p. 28.—TANAKA, Fig. Desc. Fish. Japan, 1951 (rev.), p. 429, pl. 118, figs. 344, 345.—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no. 3, 1952, p. 101.—CHEN, Quart. Journ. Taiwan Mus., Vol. 6, no. 2, 1953, p. 127.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 262 and fig. (Japan).—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1342.—CHEN, Synop. Vert. Taiwan, 1956, p. 95 (Taiwan).—KAMOHARA, Color. Illust. Fish. Japan, pt. 1, 1961, p. 63, pl. 63, fig. 5.

Lophiomus longicephalus TANAKA, Zool. Mag., Vol. 30, 1918, p. 227.

Length of head 2.16, width of head 2.6; both in standard length. Eye 10.28, snout 8.13; both in length of head.

Body elongate and depressed, covered sparsely with bony ossicles; skin soft, with flaps on lateral side of head and around mouth, shorter ones sparsely distributed on upper surface of body, on fins and even on lower surface, all these flaps less developed than in *Lophiomus setigerus*. Head broader when compared with *Lophiomus setigerus*, back much more elevated, its spine prominent, width rather narrow. Mouth large, terminal, directed upward, lower jaw projecting; teeth slender and pointed, mostly canine-like, those at upper jaw in two rows, inner row large, outer row very small; lower jaw with two rows of large teeth arranged alternately, inner row still larger; vomer and palatines toothed. Humeral spine rather small, simple. Gill-opening at lower axil of pectoral.

Dorsal VI, 9, first spine little shorter than second, with simple flattened long flap, third small, separated from second by a rather wide space, next three spines also small, detached from each other; soft dorsal originating well before anal. Anal 9, its fin membrane is extended more posteriorly than that of soft dorsal. Pectoral 22, large, scarcely reaching to anal. Ventral 5, inserted well before pectoral, not reaching to posterior end of pectoral base. Caudal 7, subtruncate.

Color in formalin dark gray, rather closely scattered with small dark rings, areas within such dark rings paler than ground color; under surface white; mouth whitish, except a narrower skinny fold just behind lower jaw, which is adorned with brown reticulations; dorsal and anal as well as caudal blackish brown, free margins much paler; pectoral colored and marked similiary as body, becoming darker distally, margin abruptly much darker, but tip of rays projecting from connecting membrane whitish; ventral whitish, inner surface dark. (After TANAKA.)

Suborder ANTENNARIINA

Family ANTENNARIIDAE

Key to Genera of Antennariidae of Taiwan

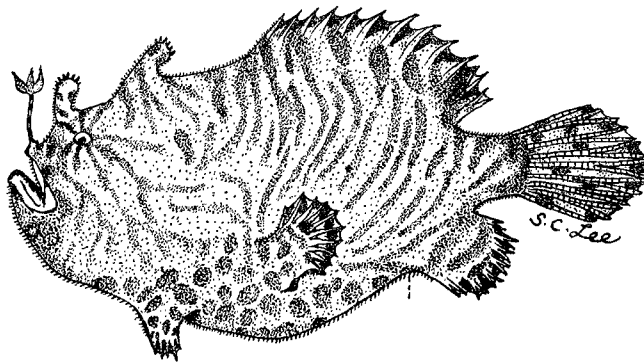
- 1a. Skin rough, covered with dermal prickles. First dorsal spine with bifid or trifid tentacles, its front base without dermal cirrus. Ventral fin much smaller than pectoral fin.....*Phrynelox*
 1b. Skin with fine granules but without dermal prickles. First dorsal spine with bulbous tentacles, its front base with dermal cirrus. Ventral fin long, subequal to pectoral fin.....*Histrio*

Genus *PHRYNELOX* WHITLEY, 1931

Phrynelox WHITLEY, 1931, Austr. Zool., Vol. 6, pt. 4, p. 328 (genotype, *Lophius striatus* SHAW).

Key to Species of *Phrynelox* of Taiwan

- 1a. First dorsal spine with trifold tentacles at its tip; soft dorsal rays usually 12.
- 2a. Bony part of first dorsal spine subequal to second spine; behind second dorsal spine forming a distinctly naked area.
- 3a. Pectoral rays usually 10. Ground color light brown, with regularly zebra-like patterns of dark brown as well as vertical fins, about 8~10 on each side; belly thickly blotched.....
..... *P. zebrinus*
- 3b. Pectoral rays usually 11.
- 4a. Ground color light brown, mottled or striped with dark brown, fins and belly more or less dark spotted; pectoral rays not white tipped.....*P. tridens*
- 4b. Ground color black or dark brown, with round blotches on body side and vertical fins; pectoral rays white tipped..... *P. nox*



_____ 2CM

Fig. 2 *Phrynelox zebrinus* SCHULTZ

**** PHRYNELOX ZEBRINUS SCHULTZ**

Fig. 2

Phrynelox zebrinus SCHULTZ, Proc. U. S. Nat. Mus., Vol. 107, 1957, p. 75, fig. 3 (type locality, Port Jackson, New South Wales, Australia).

Length of head 1.76~1.95; width of head 3.31~4.14; distance from origin of soft dorsal to snout tip 2.3~2.57, to caudal base 1.86~2; origin of anal to snout tip 1.31~1.35, to caudal base 3.72~4.35; origin of pectoral to snout tip 2.3~2.4, to caudal base 1.62~1.9; origin of ventral to snout tip 4.24~4.65, to caudal base 1.28~1.35; all in standard length. Snout 4.9~6.72; eye 12~15.2; interorbital 3.73~4.95; all in length of head. Eye 1.83~2.09 in length of snout.

Body oval, more or less compressed, covered with minute granules and bifid or trifold spinules. A naked area behind base of second dorsal spine. Snout short. Eye small, separated by broad interorbital space. Mouth rather large, subvertical, lower jaw slightly protruded, symphysis of mandibles with prominent tubercle; jaws, vomer, palatines and tongue with bands of canine-like

teeth. Throat with fleshy tentacles. Gill-opening in small pore-like, adjacent to lower axil of pectoral. Caudal peduncle distinct.

Dorsal III, 12; first spine subequal to second as well as third, its tip with trifid fleshy tentacles, bony part of first spine 4.23~6.12; soft dorsal begins a little before gill-opening, near to snout than to caudal base, last 2 or 3 rays branched, base of soft dorsal 1.19~1.46, much longer than that of anal, longest ray 2.28~2.37. Anal 7, all branched, begins a little behind vent, anal base 3.55~4.41, longest ray 2.92~3.31. Pectoral 10, all simple, longest ray 2.85~3.32. Ventral 5, far before and much smaller than pectoral, not reaching to posterior end of pectoral base, longest ray 5.12~5.75, inner ray branched. caudal 9, branched, except few outer ones, longest ray 1.73~1.95, hind margin more or less rounded.

Color when fresh light brown, with narrower zebra-like streaks of blackish, about 8~10 on each side; belly scattered with large blackish blotches. Fins yellowish, with blackish spots.

Counts and color patterns of this specimen quite agree with description and figure given by SCHULTZ except zebra-like patterns narrower and interspace broader. It in some respects is also somewhat related to *P. tridens*, but differs by having more zebra-like patterns.

Specimens studied:

TNUT 130209~130215, standard length 74.5~96mm, Sept. 1966, collected from Makung.

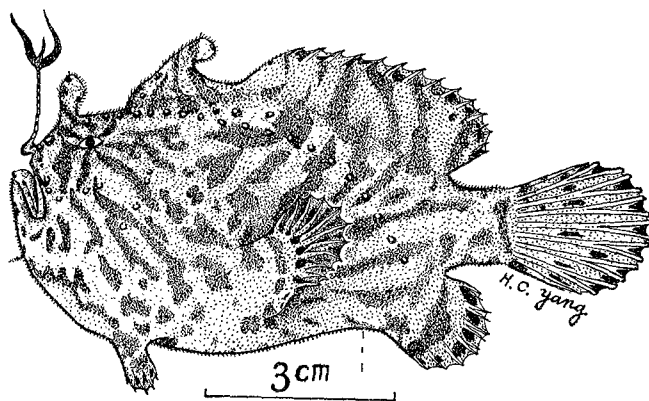


Fig. 3 *Phrynelox tridens* (TEMMINCK & SCHLEGEL)

PHRYNELOX TRIDENS (TEMMINCK & SCHLEGEL)

Fig. 3

Chironectes tridens TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., 1842, p. 159, pl. 81, figs. 2~5 (type locality, Nagasaki, Japan).

Antennarius tridens JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 372 (Japan).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo., Vol. 33, Art. 1, 1913, p. 423.—W Sci. Soc. China, Zool. ser., Vol. 7, no. 1, 1931, p. 60 (Foochow).—

OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 456 (Japan, China Sea).—OKADA, Cat. Vert. Japan, 1938, p. 247.—NAKAMURA, Illust. Taiwan Fish. etc., 1943, p. 100, fig. 199 (Taiwan).—HERRE, Lingn. Sci. Journ., Vol. 21, nos. 1~4, 1945, p. 122 (Tinghai, Chekiang).—BOESEMAN, Zool. Med., Rijksmuseum, Leiden, 1947, p. 136.—KAMOHARA, Desc. Fish. Tosa. Kishu, Japan, 1950, p. 284, fig. 218.—KAMOHARA, Rep. Kochi Univ., Nat. Sci., no.3, 1952, p. 102.—CHEN, Quart. Journ. Taiwan Mus., Vol. 6, no. 2, 1953, p. 128.—OKADA, Fish. Japan, 1955, p. 430 and fig.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1344.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 263 and fig.—CHEN, Synop. Vert. Taiwan. 1956, p. 95.—KAMOHARA, Color. Illust. Fish. Japan, pt. 1, 1961, p. 64, pl. 64, fig. 1.—YANG & LEE, Study Fish. Tainan Hsien, pt. 2, 1965, p. 4 (Tainan).

Phrynelox tridens SCHULTZ, Proc. U. S. Nat. Mus., Vol. 107, 1957, p. 79 (Japan).

Length of head 1.67; width of head 3; distance from origin of soft dorsal to snout tip 2.07, to caudal base 1.76; origin of anal to snout tip 1.28, to caudal base 4.61; origin of pectoral to snout tip 2.14, to caudal base 1.81; origin of ventral to snout tip 6, to caudal base 1.25; all in standard length. Snout 6; eye 12; interorbital 3.87; all in length of head. Eye 2, in length of snout.

Body oval, more or less compressed, densely covered with minute granules and bifid spinules. A naked area behind base of second dorsal spine. Snout short. Eye small, separated by broad interorbital space. Mouth rather large, subvertical, lower jaw slightly protruded; symphysis of mandibles with prominent tubercle. Both jaws with narrow bands of canine-like teeth, vomer, palatines and tongue with broader bands of same teeth. Gill-opening in small pore-like, adjacent to lower axil of pectoral. Caudal peduncle distinct.

Dorsal III, 12; tip of first spine with trifid fleshy tentacles, bony part of first spine 4.38, subequal to second; soft dorsal begins a little before gill-opening, near to snout tip than to caudal base, last three rays branched; base of soft dorsal 1.2, much longer than that of anal, longest ray 2.25. Anal 7, begins a little behind vent, anal base 3.6, longest ray 2.25, all rays branched. Pectoral 11, all simple, longest ray 2.57. Ventral 5, far before and much smaller than pectoral, not reaching to posterior end of pectoral base, longest ray 4.5, inner ray branched. Caudal 9, mostly branched, except outer ones, longest ray 2.11, hind margin nearly rounded.

Color when fresh uniformly brownish pink, marked with some black elongate blotches and irregular stripes. Tongue darkly blotched. Eye radiated with same colored stripes.

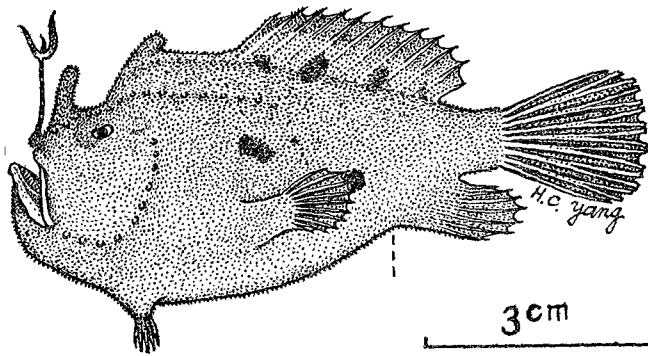
DE BEAUFORT & BRIGGS (1962, p. 211) placed *P. zebrinus*, *P. tridens* and *P. nox* as synonym of *Antennarius pinniceps* COMMERSON. But *A. pinniceps* described is with only two tentacles at tip of first dorsal spine. I agree with opinion of SCHULTZ (1957) to keep *P. zebrinus*, *P. tridens* and *P. nox* as separate species.

Specimen studied:

TNUT 130207, standard length 60mm, July 1963, collected from estuary of Chiang-chun River.

PHRYNELOX NOX (JORDAN)

Fig. 4

Fig. 4 *Phrynelox nox* (JORDAN)

Antennarius nox JORDAN, in JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 375, fig. 6 (type locality, Wakanoura and Nagasaki).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 424, fig. 392.—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 457 (S. China).—OKADA, Cat. Vert. Japan, 1938, p. 274 (Taiwan).—CHEN, Quart. Journ. Taiwan Mus., Vol. 6, no. 2, 1953, p. 128.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1344.—CHEN, Synop. Vert. Taiwan, 1956, p. 95.

Phrynelox nox SCHULTZ, Proc. U. S. Nat. Mus., Vol. 107, 1957, p. 78, fig. 5 (Japan).

Length of head 1.68~2.35; width of head 3.9~4.36; distance from origin of soft dorsal to snout tip 2.29~2.4, to caudal base 1.94~1.97; origin of anal to snout tip 1.24~1.33, to caudal base 4.76~5; origin of pectoral to snout tip 2.03~2.38, to caudal base 1.94~2.09; origin of ventral to snout tip 4.44~5, to caudal base 1.38~1.67; all in standard length. Snout 5.06~5.71, eye 6.75~8, interorbital 3.1~3.87, all in length of head. Eye 1.52~1.83 in length of snout.

Body oval, more or less compressed, closely covered with minute granules and bifid or trifid spinules. A naked area behind base of second dorsal spine. Snout short. Eye small, separated by broad interorbital space. Mouth rather large, subvertical; premaxillary protractile, lower jaw protruded; jaws, vomer, palatines and tongue with bands of canine-like teeth. Gill-opening in small pore-like, just adjacent to lower axil of pectoral. Caudal peduncle distinct.

Dorsal III, 11~12; tip of first spine with trifid fleshy tentacles, bony part of first spine 2.94~3.38, second dorsal spine 3.6~3.63, both in length of head; soft dorsal begins a little before gill-opening, and near to snout tip than to caudal base, last two rays branched; base of soft dorsal 1.26~1.40, much longer than that of anal, longest ray 2.61~2.92. Anal 7, begins a little behind vent, anal base 4.86~5.85, longest ray 3.09~3.45, all rays branched. Pectoral 11, simple, longest ray 3.27~3.62. Ventral 5, inner ray branched, far before and much smaller than pectoral, not reaching to posterior end of pectoral base, longest ray 6.18~6.33. Caudal 9, branched, except outer ones, longest ray 1.78~2, hind margin rounded.

Color in formalin uniformly dark brown, with blackish round blotches slightly larger than eye. All fins black, but white tipped.

Very closed to *P. tridens*, but differs mainly by having dark ground color.

Specimens studied:

TFRI (Taiwan Fisheries Research Institute) 4527~4530, standard length 39~62mm, May 1963, collected from Kaohsiung.

Genus *HISTRIO* FISCHER, 1813

Histrio FISCHER, Zoognosia, ed. 3, Vol. 1, 1813, pp. 70,78 (type species, *Lophius histrio* LINNAEUS).

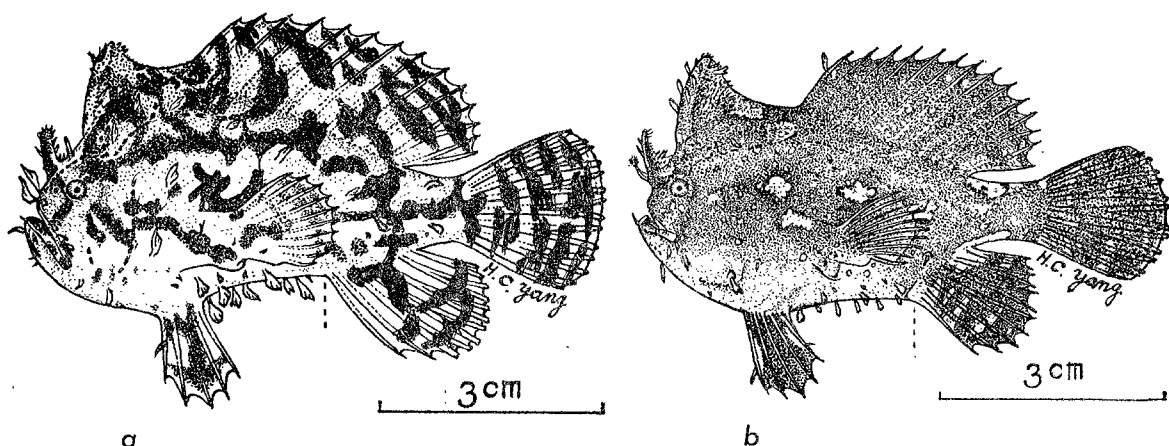


Fig. 5 a and b *Histrio histrio* (LINNAEUS)

HISTRIO HISTRIO (LINNAEUS)

Fig. 5 a and b

Chironectes marmoratus TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., 1842, p. 159, pl. 81, fig. 1 (type locality, Nagasaki, Japan).

Antennarius histrio GÜNTHER, Cat. Brit. Mus. Fish., Vol. 3, 1861, p. 188 (Caribbean Sea).

Antennarius marmoratus GÜNTHER, Cat. Brit. Mus. Fish., Vol. 3, 1861, p. 185 (E. coasts of Africa through E. Indies to Polynesia).

Pterophryne histrio GOODE & BEAN, Ocean. Ichth., 1895, p. 486 (west Indies).—JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 368, fig. 2 (China, coast of Japan).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 425, fig. 394 (China, Misaki, Sagami, Enoshima).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 456, pl. 112, fig. 1 (S. Japan).—OKADA, Cat. Vert. Japan, 1938, p. 274 (Honsyu, Taiwan).—BOESEMAN, Zool. Med., Rijksmuseum, Leiden, 1947, p. 135.—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu, Japan, 1950, p. 285 (Japan, E. India, Africa, Atlantic Ocean).—LIANG, Rep. Taiwan Fish. Res. Inst. no. 3, 1951, p. 34.—HERRE, Check List Philippine Fish., 1953, p. 855.—CHEN, Quart. Journ. Taiwan

Mus., Vol. 6, no. 2, 1953, p. 127.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 263 and fig.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1343.—CHEN, Synop. Vert. Taiwan, 1956, p. 95 (Taiwan).—YANG & LEE, Study Fish. Tainan Hsien, pt. 2, 1965, p. 13 (Tainan).

Pterophryne ranina JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 370, fig. 3 (coast of Japan). — JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 426, fig. 395 (Wakanoura).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 456.—OKADA, Fish. Japan, 1955, p. 431 and fig.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1343.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 263 and fig.—CHEN, Synop. Vert. Taiwan, 1956, p. 95.

Histrio histrio SMITH, Sea Fish. S. Africa, 1953, p. 431, pl. 98, fig. 1243 (S. Africa).—MUNRO, Fishes of Ceylon, 1955, p. 288.—SCHULTZ, Proc. U. S. Nat. Mus., Vol. 107 (China, Japan, Philippines etc.)—DE BEAUFORT & BRIGGS, Fish. Indo-Austr. Archip., Vol. 11, 1962, p. 197, fig. 47 (Banka, Celebes etc.).

Length of head 2.04~2.15; width of head 2.85~3; distance from origin of soft dorsal to snout tip 2.65~2.8, to caudal base 1.6~1.83; origin of anal to snout tip 1.39~1.48, to caudal base 3.11~3.53; origin of pectoral to snout tip 2.2~2.66, to caudal base 1.6~1.89; origin of ventral to snout tip 3.5~3.53, to caudal base 1.39~1.47; all in standard length. Snout 5.4~6.5, eye 8.67~8.72, interorbital 3.47~4.32, all in length of head. Eye 1.26~1.76 in length of snout.

Body oval, compressed. Skin densely covered with minute granules and scattered sparsely with flaps, but not prinkled. Behind second dorsal spine also granulated, but not forming a naked area. Snout short. Eye small, separated by a broad interorbital space. Mouth large, subvertical; premaxillary slightly protractile; lower jaw protruded; jaws, vomer, palatines and tongue with bands of canine-like teeth. Gill-opening in small pore-like, situated at lower axil of pectoral.

Dorsal III, 12; bony part of first spine 8.86 (TNUT 130205) much shorter than second, with a bulbous tentacle which bearing some cirri; soft dorsal begins a little before gill-opening and near to snout tip than to caudal base, last two soft rays branched; base of soft dorsal 0.93~1.08, much longer than that of anal, longest ray 1.73~1.85. Anal 7, begins at hind margin of vent, last 4 or 5, or 3rd and last two rays branched; anal base 2.36~2.6, longest ray 1.73~1.78. Pectoral 10, all simple, longest ray 2.17~2.38. Ventral 5, long, subequal to pectoral, exceeding to posterior end of pectoral base, longest ray 2.18-2.31. Caudal 9, all branched, except outer ones, longest ray 1.53~1.57, hind margin more or less rounded.

Coloration of this species variable:

TNUT 130201: Our specimen with back ground yellowish, scattered with many blackish wavy patterns, similar wavy patterns on fins; under surface pale, with lot of blackish dots.

TNUT 130205 & 130206: Our specimens with back ground dark brown, scattered with many yellowish dots and few irregular blotches of same color; belly dots smaller than that of TNUT 130201.

SCHULTZ (1957, p. 103), based on his study to a lot of specimens, pointed out that this genus represented by only one species all over the world, for they have no any significant differences appeared through the entire range in tropical marine waters. Three specimens collected by the junior authors are very similar, but some variations then recorded as follows:

	TNUT 130201	TNUT 130205	TNUT 130206
Total length (mm)	75	69	51.3
First dorsal spine	missing	present	missing
Belly flaps	larger	smaller	smaller
Anal rays	last 5 branched	last 4 branched	3rd and last 2 branched
Dots size	larger than pupil	smaller than pupil	smaller than pupil
Ground color	yellowish	dark brown	dark brown
Numbers of black dots from hind margin of pectoral base to origin of anal	15	20	40

Specimens studied:

TNUT 130201, standard length 56mm, June 1963, collected from Tainan (Hsiahsang).

TNUT 130205 & 130206, standard length 38 & 53mm respectively, June 1966, collected from Keelung (Pa-to-ze).

** Genus CHAUNAX LOWE, 1846

Chaunax LOWE, Proc. Zool. Soc. London, pt. 14, no. CLXIII, 1846, p. 81 (type species, *Chaunax pictus* LOWE).

** CHAUNAX PICTUS LOWE

Fig. 6

Chaunax pictus LOWE, Proc. Zool. Soc. London, pt. 14, no. CLXIII, 1846, p. 81 (type locality, Maderensi).—GÜNTHER, Cat. Brit. Mus., Fish., Vol. 3, 1861, p. 200 (Camera to Lobos, Madeira).—GÜNTHER, Rep. Deep-Sea Fish. Challenger, Exp. Zool., Vol. 22, 1887, p. 53, pl. 10, fig. A (Watuku, Fiji Islands).—GOODE & BEAN, Ocean. Ichth., 1895, p. 487, fig. 398 (Barbodos etc.).—SMITH, Sea Fish. S. Africa, 1953, p. 430, pl. 95, fig. 1233 (Krynsna to Natal).—MUNRO, Fishes of Ceylon, 1955, p. 287—DE BEAUFORT & BRIGGS, Fish. Indo-Austr. Archip., Vol. 11, 1962, p. 223, fig. 51 (Flores Sea, Arafura Sea, deeper part of Atlantic, Indic and Pacific).

Chaunax fimbriatus JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 377 (coast of Japan).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33,

Art. 1, 1913. p. 427 (Sagami bay, Suruga bay, Tokyo).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 457.—OKADA, Cat. Vert. Japan, 1938. p. 274.—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu. Japan, 1950, p. 285, fig. 219.—TANAKA, Fig. Desc. Fish. Japan, 1951 (rev.), p. 399, pl. 108, figs. 329, 330.—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no. 3, 1952, p. 102, fig. 99.—OKADA, Fish. Japan, 1955, p. 433 and fig.—MATSUBARA, Fish Morph. Hierar., 1955, p. 1345.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 264 and fig.—KAMOHARA, Color. Illust. Fish. Japan, 1961, p. 64 and fig.

Chaunax umbrinus GILBERT, Fish. Comm., (II), Vol. 23, 1903 (1905), p. 693, fig. 274 (Hawaiian Islands).

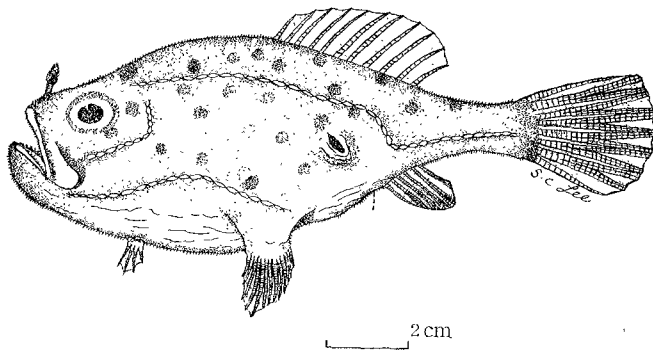


Fig.6 *Chaunax pictus* LOWE

Length of head 1.73; width of head 2.75; distance from origin of soft dorsal 1.89, to caudal base 1.92; origin of anal to snout tip 1.3, to caudal base 4.65; origin of pectoral to snout tip 2.2, to caudal base 1.91; origin of ventral to snout tip 4.48; to caudal base 1.37; all in standard length. Width of head 1.59, depth of body 3.34, length of snout 6.25, eye 7.36, interorbital 7, all in length of head. Eye 1.18 in length of snout.

Body elongate, globe-like, but slightly depressed anteriorly; thickly covered with prickles. Skinny barbules present on edge of flank and jugular. Head rather large, more or less rectangular. Snout moderate, subequal to eye diameter. Interorbital broad and slightly convex. Mouth cleft subvertical, lower jaw protruded; jaws, vomer and palatines with bands of canine-like teeth. Lateral line chain-like, and extending slightly beyond caudal base. A series of pores originated from lower angle of maxillary to where dorsally to base of pectoral. Another short series of pores running from upper angle of maxillary, backward below hind edge of eye and thence upward. Gill-opening in small pore-like, situated dorsally and beyond upper axil of pectoral.

D. I, 11, bony part of dorsal spine 10.3, with enlarged flap at its tip, this spine fitted into rostral groove and that groove entirely occupied by it; soft dorsal simple, inserted anterior to gill-opening, and at midway between snout tip and caudal base; base of soft dorsal 1.63, much longer than that of anal, longest ray 3.88. Anal 6, begins a little behind vent, rays branched except first one, anal base 7.78, longest ray 4.67. Pectoral 13, longest ray 3.05. Ventrals apart from

each other, far before and much smaller than pectoral, with 4 simple rays; not reaching to posterior end of pectoral base; longest ray 5.38. Caudal 8, branched, except outer ones, longest ray 2.5, hind margin subtruncate.

Color in formalin light pink, ventral surface pale, dorsal surface scattered with round blotches of blackish brown. Fins uniformly light brown.

NORMAN (Sci. Rep. John Murray Exp. Brit. Mus., VII, no. 1, 1939, p. 112) suggested that forms described as *fimbriatus* and *umbrinus* were simple variations of *pictus*. Several other authors accept this opinion that but a single species included in *Chaunax*. Our specimen with 13 pectoral rays and 6 anal rays may be also a individual variety.

Specimen studied:

TNUT 130301, standard length 121mm, May 1964, collected from Tungking.

Family OGCOCEPHALIDAE

Key to Genera of Ogcocephalidae of Taiwan

- 1a. Body disk near circular. Anterior margin rounded or substraight, not protruded.
 2a. Disk width subequal to length. Anterior margin rounded. Palatine toothless.....*Halieutaea*
 2b. Width of disk broader than length. Anterior margin substraight. Palatine toothed.....
 *Halicmetus*
 1b. Body disk somewhat triangular. Anterior margin pointed and protruded. Vomer and palatine toothed*Malthopsis*

Genus HALIEUTAEA CUVIER & VALENCIENNES, 1837

Halieutaea CUVIER & VALENCIENNES, Hist. Nat. Poiss., Vol. 12, 1837, p. 455 (type species, *Lophius stellatus* VAHL).

HALIEUTAEA STELLATA (VAHL)

Fig. 7

Halieutaea stellatus VAHL, Skrivt. Naturh. Selsk. Kiobenhavn, Vol. 4, 1797, p. 214, pl. 3, figs. 3 and 4 (type locality, Japan).

Halieutaea stellata TEMMINCK & SCHLEGEL, Fauna Japonica, Poiss., 1842, p. 160, pl. 82 (Nagasaki).—GÜNTHER, Cat. Brit. Mus. Fish., Vol. 3, 1861, p. 203 (Seas of China and Japan).—JORDAN & SINDO, Proc. U. S. Nat. Mus., Vol. 24, 1902, p. 380 (coast of Japan).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 428 (Tokyo to Nagasaki).—FOWLER & BEAN, Proc. U. S. Nat. Mus., Vol. 62, 1922, p. 73 (Takao).—KAMOYARA, Annot. Zool. Jap., Vol. 16, no. 1, 1937, p. 12, fig. 1 (E. Indies, China, S. Korea, Tosa).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 459.—OKADA, Cat. Vert. Japan, 1938, p. 275.—NAKAMURA, Illust. Taiwan Fish. etc., 1943, p. 100, fig. 200 (Taiwan).—HERRE, Lingnan Sci. Journ., Vol. 21, nos. 1~4, 1945,

p. 122 (Tinghai of Chekiang).—BOESEMAN, Zool. Med., Rijksmuseum, Leiden, 1947, p. 136.—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu. Japan, 1950, p. 286.—LIANG, Rep. Taiwan Fish. Res. Inst., no. 3, 1951, p. 34.—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no. 3, 1952, p. 103.—HERRE, Check List Philippine Fish., 1953, p. 857.—CHEN, Quart. Journ. Taiwan Mus., Vol. 6, no. 2, 1953, p. 128.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 265 and fig.—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1348.—OKADA, Fish. Japan, 1955, p. 434 and fig.—MUNRO, Fishes of Ceylon, 1955, p. 287.—CHEN, Synop. Vert. Taiwan, 1956, p. 95 (Kaohsiung).—DE BEAUFORT & BRIGGS, Fish. Indo-Austr. Archip., Vol. 11, 1962, p. 223, fig. 53 (Bali Sea etc.).—KAMOHARA, Color. Illust. Fish. Japan, pt. 1, 1961, p. 64 and fig.).—YANG & LEE, Study Fish. Tainan Hsien, pt. 2, 1965, p. 14 (Tainan).

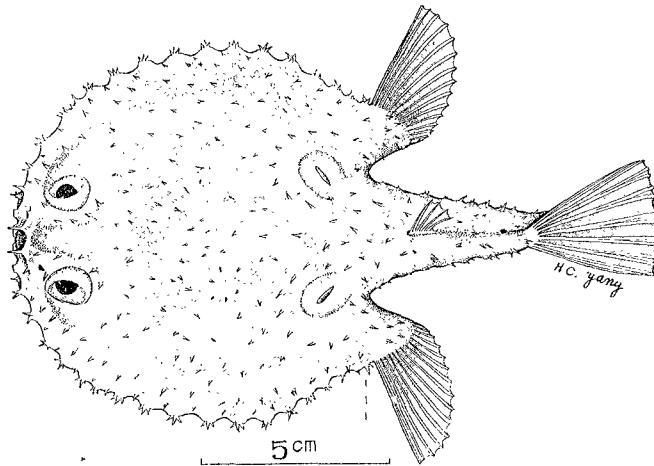


Fig. 7 *Halieutaca stellata* (VAHL)

Length of body disk 1.24~1.58; width of body disk 1.23~1.37; distance from origin of soft dorsal to snout tip 1.32~1.33, to caudal base 3.68~4.2; origin of anal to snout tip 1.25~1.55, to caudal base 4~4.66; origin of pectoral to snout tip 1.21~1.4, to caudal base 2.7~2.91; origin of ventral to snout tip 2.5~2.8, to caudal base 1.48~1.52; all in standard length. Width of body disk 0.8~0.95, length of snout 6.17~7.07, eye 5.78~7.33, interorbital 5.75~7.25, width of mouth 2.02~2.68, all in length of body disk. Eye 0.95~1.09 in length of snout.

Body disk near circular and greatly depressed, covered with sharp simple spines on dorsum of disk and tail portion, but on margin of disk with asterolike spines. Ventral surface of body disk granulated. Anterior margin of snout rounded. Interorbital strongly concave. Mouth rather large; jaws with narrower bands of small cardiform teeth, but broader on vomer and tongue; palatine toothless. Gill-opening in small pore-like, slightly anterior to upper axil of pectoral.

Dorsal with one modified spine and 4 to 5 rays, spine much short, its tip with trilobed tentacle, which receivable into tentacular cave; soft dorsal inserted behind gill-opening and very near to caudal base than to snout tip, base of soft dorsal 10.22~13.83, longest ray 5.65~7.25. Anal 4,

begins a little behind hind margin of soft dorsal, anal base 10.31~14.5, longest ray 5.31~7.35. Pectoral 12~14, longest ray 2.55~2.62. Ventral 5, slightly shorter than pectoral, longest ray 3.29~3.31, not reaching to posterior end of pectoral base. Caudal 9, longest ray 2.42~2.9, hind margin subtruncate.

Color when fresh, dorsal surface of disk grayish brown, with dark reticulate patterns, forming a clearly "∩"shaped on central of dorsal disk, ventral surface red; soft dorsal dark brown; ventrals and pectorals red; anal pink, grayish distally; caudal grayish with pink cross bars on middle way and blackish distally.

This species is very similar to *H. fumosa* ALCOCK, but differs by having granules at ventral surface of body disk in adult.

Specimens studied:

TNUT 130401 & 130402, standard length 76 & 79mm respectively, June 1964, collected from Tainan (Mashakou).

TNUT 130403, standard length 84mm, May 1964, collected from Tungking.

TNUT 130409~130411, standard length 58.5~70mm, April 1966, collected from Nan-fan-ao.

TNUT 130414, standard length 86mm, Sept. 1966, collected from Makung.

Genus *HALICMETUS* ALCOCK, 1891

Halicmetus ALCOCK, Ann. Mag. Nat. Hist., (6), Vol. 8, 1891, p. 27 (type species, *Halicmetus ruber* ALCOCK).

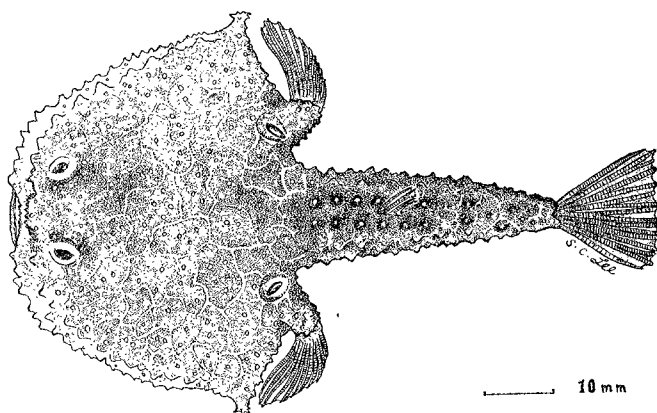


Fig. 8 *Halicmetus reticulatus* SMITH & RADCLIFFE

** *HALICMETUS RETICULATUS* SMITH & RADCLIFFE

Fig. 8

fig. 2 and pl. 21, fig. 2 (type locality, Sombrero Islands, Northwest end of Maricaban Islands, Verde Islands passage, S. Luzon).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 459, pl. 113, fig. 2 (Japan, Sombrero Islands).—OKADA, Cat. Vert. Japan, 1938, p. 275.—KAMOHARA, Bull. Biogr. Soc. Japan, Vol. 12, no. 7, 1942, p. 113. (Tosa).—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu. Japan, 1950, p. 286.—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no. 3, 1952, p. 103 (Mimase).—HERRE, Check List Philippine Fish., 1953, p. 856—DE BEAUFORT & BRIGGS, Fish. Indo-Austr. Archip., Vol. 11, 1962, p. 239, fig. 55 (near W. coast of Sumatra, Madura Sea, Philippines, Japan).

Length of body disk 1.86; width of body disk 1.41; distance from origin of soft dorsal to snout tip 1.55, to caudal base 2.82; origin of anal to snout tip 1.34, to caudal base 4.35; origin of pectoral to snout tip 1.79, to caudal base 2.26; origin of ventral to snout tip 4.34, to caudal base 1.36; all in standard length. Width of body 0.76, length of snout 8.5, eye 9.15, interorbital 5.02, width of tentacular cave 8.5, width of mouth 4.72; all in disk length.

Body disk semicircular, depressed, width broader than length; both dorsal and ventral surface of disk covered with small tubercles, those on tail and disk margin larger, each radiated with striations from its tip, each striation in continuation with many granules. Anterior margin of body disk near straight. Rostral spine obsolete, slightly curved upward; tentacular cave subequal to eye diameter. Interorbital slightly concave. Mouth small, terminal; jaws, vomer, palatines and tongue with bands of cardiform teeth. Gill-opening in small pore-like, situated at upper axil of pectoral. Subopercular spine armed with few spinules.

Dorsal with one spine, its tip nearly trilobed, and along with 2 small soft rays (a distinct space between them probable having a missing ray); origin of soft dorsal much near to caudal base than to snout tip. Anal 3, originated about halfway between vent and caudal base. Pectoral 11, longest ray 3.11. Ventral 4, far before and slightly smaller than pectoral, longest ray 3.75, not reaching to posterior end of pectoral base. Caudal 9, longest ray 2.81, hind margin subtruncate.

Color in formalin, dorsal surface grayish brown, crossed by narrow light color, forming fine reticulating bands. Ventral surface light gray.

This species is closely related to *H. ruber* of ALCOCK, but differs by having light reticulating bands and broader disk.

Specimen studied:

THUP (Biology Department of Tunghai University) 03032, standard length 79mm, Oct. 1965, collected from Tungkang.

** Genus *MALTHOPSIS* ALCOCK, 1891

Malthopsis ALCOCK, Ann. Mag. Nat. Hist., (6), Vol. 8, no. XLIII, 1891, p. 26 (type species, *Malthopsis luteus* ALCOCK).

Key to Species of Genus *Malthopsis*

- 1a. Subopercular spine with prominent antrose spinule. Two rows of bony tubercles on forehead. Ventral surface from anterior portion of ventral base to vent sparsely scattered with only few bony tubercles. Soft dorsal 4~5.....*M. annulifera*
- 1b. Subopercular spine without prominent antrose spinule. Three or more rows of bony tubercles on forehead. Ventral surface from anterior portion of ventral base to vent thickly covered with minute bony prickles. Soft dorsal 5~6.....*M. lutea*

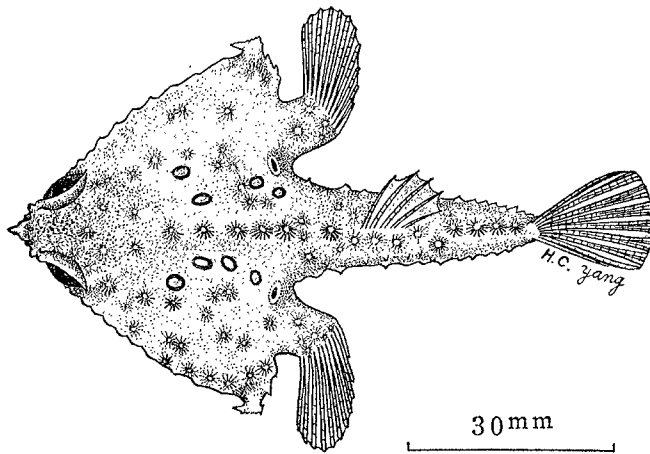


Fig. 9 *Malthopsis annulifera* TANAKA

** *MALTHOPSIS ANNULIFERA* TANAKA

Fig. 9

Malthopsis annulifera TANAKA, Annot. Zool. Jap., Vol. 7, no. 1, 1908, p. 44 (type locality, Sagami Sea).—JORDAN, TANAKA & SNYDER, Journ. Coll. Sci., Imp. Univ. Tokyo, Vol. 33, Art. 1, 1913, p. 428.—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu. Japan, 1950, p. 287, fig. 220.—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no. 3, 1952, p. 103, fig. 100.—MATSUBARA, Fish. Morph. Hierar., pt. 2, 1955, p. 1347 (Japan, E. China Sea, Philippines).—OCHIAI & MITANI, Pacf. Sci., Vol. 10, no. 5, 1956, p. 278, fig. 7 (Owasi).—KAMOHARA, Color. Illust. Fish. Japan, pt. 1, 1961, p. 64 and fig.

Length of body disk 1.95~1.99; width of body disk 1.31~1.43; distance from origin of soft dorsal to snout tip 1.4~1.47, to caudal base 2.52~2.77; origin of anal to snout tip 1.13~1.15, to caudal base 4.2~4.8; origin of pectoral to snout tip 1.75~1.78, to caudal base 1.89~1.91; origin of ventral to snout tip 3~3.27, to caudal base 1.36~1.37; all in standard length. Width of body disk 0.67~0.74, length of snout 10.83~11.56, rostral spine 16.25~18.5, eye 4.45~5.4, interorbital 6.17~6.5, width of mouth 4.62~4.64, all in disk length. Eye 0.65~0.83 in length of snout.

Body disk broad triangular, depressed; dorsal surface, except opercular and shoulder regions, covered with bony tubercles, each of them radiated with striations from its tip, each striation in

continuation with many granules. Two rows of bony tubercles on forehead. Ventral surface flat and smooth, scattered with few bony tubercles, except where between vent and anterior portion of ventral base. Tail surrounded sparsely with large bony tubercles. Snout protruded; rostral spine slightly directed upward, tentacular cave small, its width not more than one half of eye diameter. Eye large, interorbital slightly concave. Mouth small; jaws, vomer, palatines and tongue with bands of small cardiform teeth. Gill-opening in small pore-like, situated at upper axil of pectoral. Subopercular spine coarse, protruded laterally with some minute serrations at base, and with prominent antrose spinule directed forward.

Dorsal with one modified spine, its tip with bulbous tentacle; soft dorsal 5, base 6.17~6.6, short, longest ray 3~3.7, its origin near to caudal base than to snout tip. Anal 4, begins a little behind posterior end of soft dorsal, base 9.25~11.28, longest ray 3.36~3.44. Pectoral 13, longest ray 2.18~2.46. Ventral 5, far before and subequal to pectoral, but not reaching to posterior end of pectoral base, longest ray 2.67~2.85. Caudal 9, longest ray 2.06~2.19, hind margin subtruncate.

Color in formalin, dorsal surface of disk dark brown, with 8 black ring-like patterns and with minute dark dots scattered sparsely. Ventral surface light gray.

This species in some respects very resembles *M. jordani* of Hawaii, but differs by having two rows of bony tubercles instead of three on forehead. In addition, the portion between vent and pectoral base scattered with continuous bony tubercles.

Specimens studied:

TNUT 130405 & 130406, standard length 63 & 72mm respectively, May 1964, collected from Tungkang.

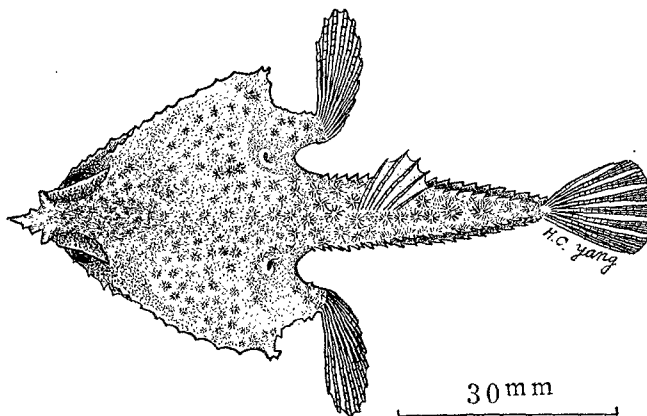


Fig. 10 *Malthopsis lutea* ALCOCK

** *MALTHOPSIS LUTEA* ALCOCK

Fig. 10

Malthopsis luteus ALCOCK, Ann. Mag. Nat. Hist., (6), Vol. 8, 1891, p. 26, pl. 8, figs. 2 and 2a (type locality, Indian Sea).—OKADA & MATSUBARA, Keys Fish. Japan, 1938, p. 458, pl. 113, fig.1 (Japan, Andamans).—OKADA, Cat. Vert. Japan, 1938, p. 275.

Malthopsis lutea KAMOHARA, Annot. Zool. Jap., Vol. 16, no.1,1937, p. 13 (Tosa).—KAMOHARA, Desc. Fish. Prov. Tosa. Kishu. Japan, 1950, p. 287 (Ise bay, Tosa, India).—KAMOHARA, Rep. Kochi Univ. Nat. Sci., no.3, 1952, p. 103 (Tosa).—HERRE, Check List Philippine Fish., 1953, p. 857.—TANAKA & ABE, Fig. Desc. Thous. Fish., pt. 1, 1955, p. 265 and fig. (S. Japan, India).—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1347.—OCHIAI & MITANI, Pacif. Sci., Vol. 10, no. 5, 1956, p. 280, fig. 9 (Heta and Owasi).—DE BEAUFORT & BRIGGS, Fish. Indo-Austr. Archip., Vol. 11,1962, p. 238, fig. 54 (deeper part of Indic and W. Pacific, westward to coast of E. Africa, eastward to Hawaii).
Malthopsis kobayashii TANAKA, Zool. Mag., Vol. 28,1916, p. 348 (Ise bay).

Length of body disk 1.74; width of body disk 1.65; distance from origin of soft dorsal to snout tip 1.37, to caudal base 2.64; origin of anal to snout tip 1.12, to caudal base 4.4; origin of pectoral to snout tip 1.65, to caudal base 2; origin of ventral to snout tip 2.64, to caudal base 1.37; all in standard length. Width of body disk 0.97, length of snout 0.71, length of rostral spine 9.5, eye 4.47, interorbital 8.84, width of mouth 5.43; all in disk length. Eye 0.82 in length of snout.

Body disk broadly triangular, depressed. Dorsal surface, except opercular and shoulder regions, covered with bony tubercles shaped as preceding species, but with three rows on forehead. Ventral surface from anterior portion of ventral base to vent thickly covered with minute dermal prickles, some of them enlarged. Tail completely surrounded with bony tubercles. Snout protruded, rostral spine sharp, slightly directed upward. Tentacular cave subequal to 1.5 eye diameter. Eye large, interorbital slightly concave. Jaws, vomer, palatines and tongue with bands of cardiform teeth. Gill-opening in small pore-like, situated at upper axil of pectoral. Subopercular spine triangular, protruded laterally and backward with few minute serrations on its tip.

Dorsal with one modified spine which with bilobed tentacle; soft rays 5, base 7.6, short, longest ray 3.45, its origin near to caudal base than to snout tip. Anal 4, inserted behind posterior end of soft dorsal, base 15.2, longest ray 3.62. Pectoral 12, longest ray 2.38. Ventral far before and subequal to pectoral, but not reaching to posterior end of pectoral base, longest ray 2.71. Caudal 9, longest ray 2.37, hind margin rounded.

Color in formalin uniform brown. Dorsal surface of body disk without distinct ring-like patterns, but with some irregular markings of black.

Specimen studied:

TNUT 130407, standard length 66mm, May 1964, collected from Tungkang.

Suborder CERATIINA
Family HIMANTOLOPHIIDAE

** Genus *HIMANTOLOPHUS* REINHARDT, 1837

Himantolophus REINHARDT, K. Danske Vidensk. Selsk., Nat. og. Math. Afh., 4, raekke, V, VII, 1837, p. 74 (type species, *Himantolophus groenlandicus* REINHARDT).

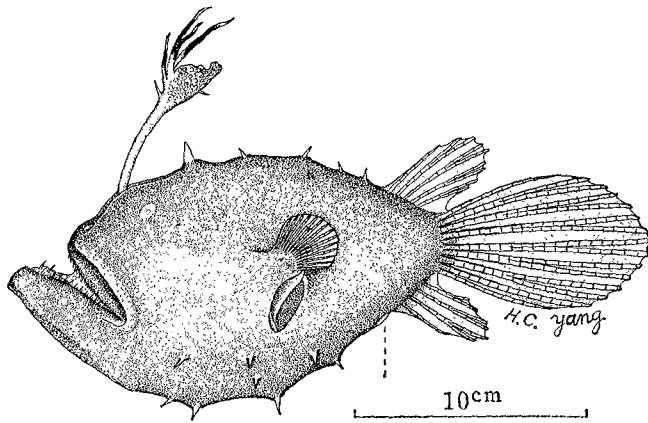


Fig. 11 *Himantolophus groenlandicus* REINHARDT

** *HIMANTOLOPHUS GROENLANDICUS* REINHARDT

Fig. 11

Himantolophus groenlandicus REINHARDT, K. Danske Vidensk. Selsk., Nat. og. Math. Afh., 4, raekke, V, VII, 1837, p. 74.—GOODE & BEAN, Ocean Ichth., 1895, p. 493, fig. 405 (coast of Greenland).—REGAN & TREWAVAS, Oceanogr. Exp. world 1928~30, no. 2, 1932, p. 59, pl. 1, fig. 1 (Atlantic, northward to Greenland and Iceland, Japan).—SMITH, Fish. S. Africa, 1953, p.429 (S. Africa).—MATSUBARA, Fish Morph. Hierar., pt. 2, 1955, p. 1359, fig. 534 (Pacific and Atlantic Oceans, Sagami bay).

Corynolophus reinhardtii GOODE & BEAN, Ocean. Ichth., 1895, p.494 (coast of Greenland).

Himantolophus danae REGAN & TREWAVAS, Oceanogr. Exp. world 1928~30, no. 2, 1932, p. 60, pl. 1, fig. 2 (China Sea).

Corynolophus sagamius TANAKA, Fig. Desc. Fish. Japan, 1951 (rev.), p.491, pl.134, fig.377 (Sagami Sea).

Corynolophus globosus TANAKA, Fig. Desc. Fish. Japan, 1951 (rev.), p.529, pl.139, fig.388 (Misaki, Sagami).

Length of head 1.59; width of head 3.58; distance from origin of soft dorsal to snout tip 1.23, to caudal base 7.16; origin of anal to snout tip 1.34, to caudal base 6.61; origin of pectoral to

snout tip 1.65, to caudal base 2.68; all in standard length. Width of head 2.25, length of snout 3.85, eye 13.5, interorbital 3.01; all in length of head. Eye 2.34 in length of snout.

Body short, oval, somewhat compressed. Skin soft, armed sparsely with slender and pointed spines. Pair of prominent sphenotic spines located rather posterior to base of spinous dorsal. Head rather large. Snout moderate. Eye very small, lateral, high up; interorbital much broad and distinctly concaved. Nostrils of each side separated by a round papilla of black color, slightly near to anterior margin of eye than to tip of snout. Mouth wide, subvertical; lower jaw protruded; jaws each with about 3 rows of slender, pointed and depressable teeth, forming a semilunar band, outermost row smaller and unequal, but innermost row large; 2 pairs of teeth on roof of mouth; no teeth on vomer and palatines. Gill-opening rather large, subvertical, situated at lower axil of pectoral. Caudal peduncle indistinct.

Spinous dorsal represented by a single long spine over eye, with terminal large granulated bulb, its anterior margin with 3 bifurcated and 2 simple tentacles, its hind margin bears an elongate rectangular projection which also granulated and tipped with a bifurcated tentacle, median tip of bulb with 2 short simple tentacles, bony part of first dorsal spine 2.07 in length of head; soft dorsal 5, only first one simple, longest ray 3.37. Anal 4, only first one simple, longest ray 3.86. Bases of soft dorsal and anal short, both ending opposite near to caudal base. Pectoral 15, all simple, longest ray 4.9. Ventral wanting. Caudal 9, outer rays simple, longest ray 1.29, hind margin rounded or slightly pointed.

Color in formalin uniform black, fins light.

Specimen studied:

TFRI 4796, standard length 43mm, Dec. 1966, collected from Tungkang.

臺灣柄鰭目魚類報告

陳兼善 劉慕昭 李信徽

臺灣產柄鰭目魚類見於前人報告者僅三科七種（其中黑花紅與花紅係同屬一種），本文就筆者等在 1960 年 10 月至 1966 年 4 月間所採集之標本加以鑑定整理，共得五科十二種，每種均加以敘述並附加插圖（其中黃鮫鯪因未獲得標本，其敘述係錄自田中氏（TANAKA 1951））。