

## A New Species of the Batfish Genus *Malthopsis* (Lophiiformes: Ogcocephalidae) from the Northwestern Indian Ocean

Hsuan-Ching Ho<sup>1,2</sup>, Artém M. Prokofiev<sup>3</sup>, and Kwang-Tsao Shao<sup>2,\*</sup>

<sup>1</sup>Institute of Marine Biology, National Taiwan Ocean University, 2 Peining Rd., Keelung 202, Taiwan. E-mail:ogcoho@gmail.com

<sup>2</sup>Biodiversity Research Center, Academia Sinica, Nankang, Taipei 115, Taiwan

<sup>3</sup>A. N. Severtsov's Institute of Ecology and Evolution, Russian Academy of Sciences, Leninsky Prospect 33, Moscow 119071, Russia  
E-mail:prokart@rambler.ru

(Accepted September 19, 2008)

**Hsuan-Ching Ho, Artém M. Prokofiev, and Kwang-Tsao Shao (2009)** A new species of the batfish genus *Malthopsis* (Lophiiformes: Ogcocephalidae) from the northwestern Indian Ocean. *Zoological Studies* 48(3): 394-401. *Malthopsis retifera* sp. nov. is described from 17 specimens collected in the northwestern Indian Ocean off Somalia at depths of 375-420 m. The new species can be distinguished from its congeners in having a reticular color pattern on its dorsal surface and 5 pairs of dark spots on the disk margin and tail; bucklers on the dorsal surface are relatively pointed, and areas between the principal bucklers lack small tubercles or bucklers; bucklers on the belly are rounded and flat; the reclined anal fin reaches the base of the caudal fin; there are no black ocelli or dots on the dorsal surface; there are 6 lateral line scales in the opercular series and 7 or 8 in the tail series; there are 11-13 (mainly 12) pectoral fin rays; and there are 4 or 5 (mainly 5) dorsal fin rays. <http://zoolstud.sinica.edu.tw/Journals/48.3/394.pdf>

**Key words:** Taxonomy, Fish, New species, *Malthopsis retifera*, Indian Ocean.

Species of *Malthopsis* (Alcock, 1891) are relatively small members of the family Ogcocephalidae, attaining a total length (TL) of < 15 cm and usually < 10 cm. All but the western Atlantic *M. gnoma* occur in the Indo-West Pacific Ocean. Species are characterized by a strongly depressed and triangular body disk, a conical rostral protuberance overhanging the illicial cavity and mouth, a relatively small mouth, the skin covered with strongly ossified cone-shaped scales (bucklers) with apical spines, small villiform teeth in the jaws and on the 5th ceratobranchial, the palatines, and vomer, gill filaments present on the 3rd and 4th gill arches (except for *M. gnoma*, which has only a few filaments on the 4th gill arch), and pectoral pedicels not well attached to the body wall.

Fourteen species have been described and attributed to *Malthopsis*. Ochiai and Mitani (1956) recognized 5 valid species in Japanese water: *M. annulifera* Tanaka, 1908, *M. jordani* Gilbert, 1905, *M. lutea* Alcock, 1891, *M. mitrigeria* Gilbert and Cramer, 1897, and *M. tiarella* Jordan, 1902. Four species, *M. erinacea*, *M. sparsa*, *M. spinosa*, and *M. spinulosa*, described by Garman (1899) presently belong to *Dibranchus*, which leaves 10 nominal species of *Malthopsis* (Bradbury 1999 2003). Bradbury (1998) described *M. gnoma* from the central western Atlantic.

A recent examination of batfish specimens in the collection of the Institute of Oceanology, Russian Academy of Sciences, Moscow and revealed 17 specimens of an undescribed species of *Malthopsis* collected by the research vessel

\*To whom correspondence and reprint requests should be addressed. E-mail:zoskt@gate.sinica.edu.tw

*Vityaz* from the northwestern Indian Ocean at depths of 375–420 m. This paper provides a description of that species.

## MATERIALS AND METHODS

The body length used throughout is the standard length (SL). The number of specimens and SL is in parentheses following the catalog number for each entry, e.g., IORAS 1790 (7, 44.0–70.8). Terminology for describing the angling apparatus follows Bradbury (1967). Methods and definitions of the characters used in this study were modified from Bradbury (1988, 1998), as defined below. Vertebral counts were made from radiographs and include the hypural plate counted as the posteriormost vertebra. Proportional measurements are rounded to the nearest 0.1 mm. Morphometric values are expressed as percentages of SL and are defined as follows: skull length (SKL), distance between center of upper lips to a groove between skull and 1st vertebra; head width (HW), width of the head measured between the opercle/pteroic joint on opposite sides; head depth (HD), distance between the 2nd neuromast of dorsolateral branch of subopercular lateral line and joint connecting the opercle and pterotic; orbital diameter (OD), greatest diameter of bony orbit; interorbital width (IO), narrowest distance between lateral frontal bones of either side; rostral length (RL) (measured on ventral side), distance between upper extent of illicial cavity and anterior tip of rostrum; mouth width (MW), measured as greatest overall width; illicial cavity width (IW), greatest width of illicial cavity opening; predorsal length (PD), distance from center of upper lips to base of 1st dorsal fin ray; postanus length (PAN), distance from the symphyseal spine of lower jaw to the genital papilla, immediately posterior to anus; preanal length (PAL), distance from symphyseal spine of lower jaw to origin of 1st anal fin ray; disk margin length (DM) (measured on ventral side), distance from posterior swelling of mandible to posterior base of subopercular buckler; pectoral fin length (PF), distance from base to distalmost tip of longest fin ray; anal fin length (AF), distance from origin of anal fin to distalmost tip of longest fin ray; dorsal fin length (DF), distance from origin of dorsal fin to distalmost tip of longest fin ray; and caudal fin length (CF), distance from base of caudal fin to distalmost tip. Institutional abbreviations are as listed in Leviton et al. (1985), with the exception of Biodiversity Research Center, Academia Sinica,

Taipei (ASIZP).

### *Malthopsis retifera* sp. nov.

(Figs. 1–8)

(new English name: reticulate triangular batfish)

*Materials examined: Holotype:* ZIN 54262 (ex. IOAN 1790) (1, 60.3), R/V *Vityaz*, cruise 17, station 2560, 12°14'–12°18'N, 53°06'–53°09'E, 375–380 m, bottom shrimp trawl, 27 Oct. 1988.

*Paratypes:* IORAS 1790 (7, 44.0–70.8); IORAS 1797 (1, 65.7), both collected with holotype. ASIZP 69358 (2, 56.3–63.0); USNM 393310 (2, 36.4–53.2) and ZMMSU 21662 (3, 37.4–62.3), all extracted from IORAS 1790. IORAS 1796 (1, 59.2), R/V *Vityaz*, cruise 17, station 2830, 12°13'–12°19'N, 53°05'–53°09'E, 395–420 m, bottom shrimp trawl, 16 Jan. 1989.

*Diagnosis:* A species of the genus *Malthopsis* differing from its congeners in having a reticulate color pattern on dorsal surface of disk and 5 pairs of dark spots on disk margin and lateral sides of tail; rostrum directed to front; bucklers on dorsal surface relatively pointed, no small tubercles or bucklers between principal bucklers; bucklers on belly rounded and flat; anal fin reaching caudal fin base when laid back; 6 lateral line scales in subopercular series and 7 or 8 in tail series; 11–13 (usually 12) pectoral fin rays and 4 or 5 (usually 5) dorsal fin rays.

*Description:* Morphometric and meristic values are respectively provided in tables 1 and 2.

Body strongly depressed, disk markedly triangular in dorsal view, cranium elevated above dorsal surface of other parts of disk; caudal peduncle slender, tapering posteriorly; rostrum small, conical, distinctly overhanging illicial cavity and mouth (Fig. 5A), directed to front rather than upward (Fig. 5B), its length longer than 1/2 eye diameter; eye large, directed dorsolaterally; no pupillary operculum; interorbital space relatively flattened, not forming a groove; illicial cavity a small triangular cave, wider than high; esca a single bulb bearing 2 small cirri on dorsal margin; mouth small, terminal; small villiform teeth on jaws forming narrow bands, those on 5th ceratobranchial (“tongue teeth” sensu Bradbury 1967, 1980) in 2 large, closely spaced, elongated patches, and quadrangular tooth patches on vomer and palatines.

Scales on body surface in form of bucklers, relatively sharp and pointed (Fig. 6), mostly associated with lateral line, skeleton, and body

edge; skin completely naked between principal bucklers, without tubercles, but sometimes with some smaller bucklers. Skin above eye with a series of a few small bucklers, naked elsewhere. Three or 4 enlarged bucklers on frontal edge; bucklers on dorsal surface of skull in 2 or 3 irregular rows, joined to median row posteriorly; numerous rounded flat bucklers on ventral surface,

each buckler usually with 8-12 facets and a few apical spines centrally (Fig. 7, best seen under magnification); ventral surface of gill cavity and thoracic regions mostly naked; buckler of subopercular divided into 2 or 3 spines, a large one directed forward, a lateral one directed upward, and sometimes a small one directed backward, additional smaller spines also sometimes present



Fig. 1. *Malthopsis retifera* sp. nov. Holotype, ZIN 54262, 60.3 mm SL, dorsal view.



Fig. 2. *Malthopsis retifera* sp. nov. Holotype, ZIN 54262, 60.3 mm SL, ventral view.

behind and below (Figs. 8A, B); caudal peduncle covered with large bucklers, those on dorsal surface forming 4 or 5 irregular rows, 1 median row sometimes behind dorsal fin, 2 rows on each side of dorsal fin; 2 lateral rows of bucklers on each side associated with lateral line, those of lower row larger than upper row; bucklers on ventral surface of caudal peduncle relatively flattened forming 2 regular rows between anus and anal fin; anus surrounded by 4-6 bucklers, of similar size to neighboring bucklers.

All fins naked, with small bucklers only on

base of caudal fin rays; membrane of pectoral fins thin, transparent; dermal cirri flap-like, distributed on disk margin, lateral sides of tail, and in association with lateral line scales.

*Color*: Background color of preserved specimens uniformly yellowish to brownish. Dorsal surface covered with a reticulate pattern, which extends onto all fins except pelvic and anal fins. Five pairs of black dots on each side of disk margin and tail: 1 at anterior margin of orbit (Fig. 5B), 2 on disk margin, and 2 on lateral sides of tail between pectoral and dorsal fins. Some smaller individuals



Fig. 3. *Malthopsis retifera* sp. nov. Holotype, ZIN 54262, 60.3 mm SL, lateral view.



Fig. 4. Small paratype of *Malthopsis retifera* sp. nov. USNM 393310, 36.4 mm SL, dorsal view.

with dark spots on dorsal surface (Fig. 4).

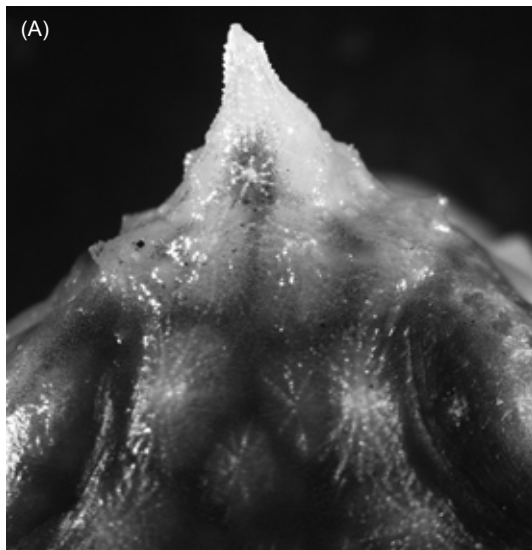
**Distribution:** Known only from type series collected from the northeastern Indian Ocean off Somalia at depths of 375-420 m.

**Etymology:** The name '*retifera*' from the Latin '*rete*' meaning '*net*', in reference to the characteristic reticulate color pattern on the dorsal surface of the disk.

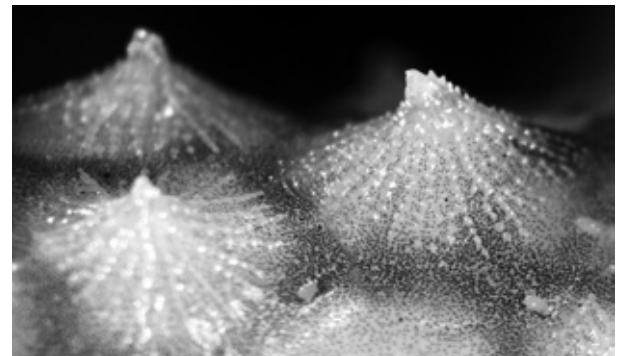
## DISCUSSION

Of the 6 valid species in the genus, *Malthopsis retifera* sp. nov. is most similar to the

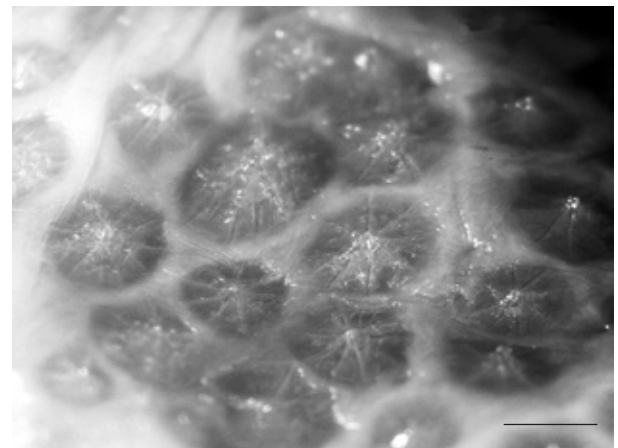
western-Pacific species, *M. annulifera*, in having 5 dorsal fin rays, 12 (11-13) pectoral fin rays, rounded and flattened bucklers on its ventral surface, and no tiny tubercles or small bucklers between the principal bucklers. The new species differs from *M. annulifera* in having a reticulate color pattern on the dorsal surface (vs. uniformly yellowish to brownish), 5 pairs of black dots laterally on its sides (vs. no black dots), relatively sharp (vs. blunt) bucklers (see fig. 8C in Ochiai and Mitani 1956); no ocelli or dots on its dorsal surface (vs. 5-20 ocelli), its rostrum slightly unturned (vs. directed forward horizontally), an extra lateral spine on its subopercular bucklers (Figs. 8A, B) (vs. no extra spine), and its anal fin reaching the caudal fin base when laid back (vs. not reaching the caudal fin base). *Malthopsis retifera* sp. nov. also seems to have a smaller body size, the largest known specimen being the 70.8 mm holotype, whereas specimens of *M. annulifera* reach more than 90 mm SL.



**Fig. 5.** Rostrum of *Malthopsis retifera* sp. nov. of holotype. (A) dorsal and (B) lateral profiles. Arrow indicates the 1st lateral black spot.



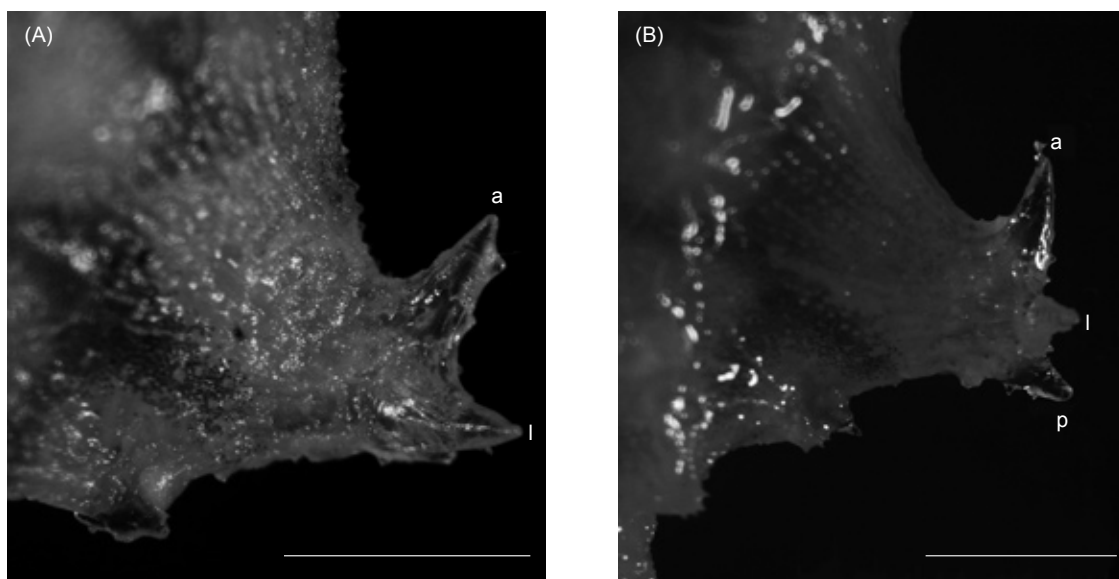
**Fig. 6.** Bucklers on the dorsal surface of the body anterior to the dorsal fin of the holotype.



**Fig. 7.** Bucklers on the ventral surface of the body of the holotype. Scale bar = 1 mm.

*Malthopsis retifera* sp. nov. is also similar to *M. jordani*, which is considered to be a Hawaiian I. endemic (Ho and Shao, in preparation), but differs in having 5 dorsal fin rays (vs. 6 usually), 5 pairs of black dots laterally on its sides (vs. none); relatively sharp (vs. blunt) bucklers; relatively large bucklers

ventrally (vs. small and somewhat embedded under skin), a relatively wide (7.0%-11.9% SL) and flattened interorbital space (vs. narrow, 4.4%-5.6% SL, and forming a groove); an anal fin that does not extend well beyond the caudal fin base (vs. extending well beyond), a sharp and pointed



**Fig. 8.** Subopercular buckler of *Malthopsis retifera* sp. nov. (A) holotype and (B) paratype, USNM 393310, 63.0 mm SL. a, anterior spine; l, lateral spine; p, posterior spine. Scale bar = 2 mm.

**Table 1.** Morphometric values for *Malthopsis retifera* sp. nov. and *M. jordani*

	<i>M. retifera</i> sp. nov.			<i>M. jordani</i>	
	Holotype	All types ( <i>n</i> = 17)		<i>n</i> = 21	
Standard length (mm)	60.3	36.8 - 70.8		37.3 - 55.7	
Measurements in % SL		Range (Average)	SD	Range (Average)	SD
Skull length	27.4	26.4 - 30.1 (28.0)	1.1	27.0 - 34.0 (29.3)	1.5
Head width	26.1	23.7 - 35.4 (25.8)	2.6	20.8 - 24.6 (23.0)	0.9
Head depth	22.2	19.3 - 34.6 (22.4)	3.5	18.7 - 22.5 (20.0)	1.1
Orbital diameter	12.3	11.3 - 20.1 (13.0)	2.0	12.5 - 14.9 (13.5)	0.7
Interorbital width	7.8	7.0 - 11.9 ( 7.8)	1.1	4.4 - 5.6 ( 5.0)	0.4
Rostral length	4.8	3.5 - 9.2 ( 6.4)	1.9	3.6 - 9.4 ( 7.2)	1.3
Mouth width	15.7	13.9 - 23.5 (15.6)	2.3	11.3 - 14.7 (13.2)	0.8
Illicial cavity width	3.8	3.0 - 7.1 ( 4.3)	0.9	3.6 - 6.3 ( 5.0)	0.8
Predorsal length	68.8	65.7 - 70.2 (67.8)	1.4	63.4 - 70.3 (66.7)	1.8
Postanus length	54.4	51.2 - 56.5 (54.6)	1.5	52.2 - 58.9 (55.1)	1.3
Preanal length	77.8	77.8 - 82.3 (80.5)	1.5	78.8 - 86.4 (81.6)	1.5
Disk margin length	41.2	41.2 - 49.3 (44.6)	2.4	41.1 - 48.1 (44.8)	1.8
Pectoral fin length	22.0	18.7 - 31.4 (22.5)	2.7	21.1 - 28.2 (24.3)	1.6
Anal fin length	18.1	15.6 - 27.7 (19.1)	2.7	17.8 - 23.1 (20.2)	1.3
Dorsal fin length	17.5	14.8 - 24.5 (17.7)	2.2	18.0 - 24.6 (21.8)	1.8
Caudal fin length	25.7	25.6 - 38.5 (27.8)	3.1	27.4 - 32.7 (29.3)	1.4

Measurements are defined in the text.

rostrum (vs. blunt), and an extra lateral spine on the subopercular bucklers (vs. no extra spine).

Bradbury (1998) gave diagnostic characters for *Malthopsis*, all but one of which are consistent with the species we examined. The character, "tiny tubercles covered on skin between bucklers" (Bradbury 1998: 208), is not present in all species. Although *M. gnoma*, *M. lutea*, and *M. tiarella* have this feature, *M. retifera* sp. nov., *M. mitrigeria*, *M. jordani*, and *M. annulifera* lack it. The character may be useful instead for defining the former 3 as a species complex.

Bradbury (1998) mentioned that about 1/4 of specimens of *M. gnoma* had a faint reticulum of thin brownish lines over the dorsal surface of the disk and tail. However, the color pattern in that species is finer and easily lost in preservative. *Malthopsis retifera* sp. nov. differs from *M. gnoma* in lacking tubercles between its bucklers (vs. numerous fine tubercles between bucklers) and having no gill filaments on the 4th gill arch (vs. a few gill filaments present). A reticulate color pattern is present on the dorsal surface of the holotype of *M. jordani*, but absent in all other specimens examined. The reticulations on the holotype are much finer than those in *M. retifera* sp. nov.

### Distribution of congeners

Of the currently recognized species of

*Malthopsis*, *M. mitrigeria* has the widest distribution, extending from the Indian Ocean to the western and central Pacific. *Malthopsis lutea* is also known from the Indian and western Pacific oceans, but has not been recorded from the central Pacific. *Malthopsis gnoma* is the only species found in the Atlantic Ocean, where it is restricted to the Gulf of Mexico and Caribbean Sea in the central western Atlantic. *Malthopsis annulifera* and *M. tiarella* were described from the northern Pacific off Japan. The former can be found from Japan, Taiwan, and the Philippines. *Malthopsis jordani* was originally described from Hawaii and subsequently recorded widely in the western Pacific, but based on the material we have examined, it appears to be restricted to the Hawaiian Is. Although *M. retifera* sp. nov. has only been found at the type localities in the western Indian Ocean, more intensive collecting in adjacent areas may show it to have a wider distribution.

*Comparative materials: M. mitrigeria:* Taiwan: ASIZP 64420 (2, 56.0-58.0); ASIZP 64529 (9, 48.0-59.5); ASIZP 64586 (1, 60.0); ASIZP 64597 (24, 39.0-58.3); ASIZP 64605 (18, 32.0-51.6); ASIZP 66869 (1, 45.0); ASIZP 67352 (1, 46.5); ASIZP 67355 (1, 53.0). Indian Ocean: IOAN uncat. (5, 47.6-56.0). *M. annulifera:* Taiwan: ASIZP 55227 (1, 42.6); ASIZP 56026 (2, 60.7-70.0); ASIZP 58053 (3, 40.0-69.2); ASIZP 60225 (1, 56.0); ASIZP 60510 (1, 52.7); ASIZP 62596 (1, 57.0); ASIZP 62946 (1, 55.4); ASIZP

**Table 2.** Meristic values for *Malthopsis retifera* sp. nov. and *M. jordani*

	<i>M. retifera</i> sp. nov.		<i>M. jordani</i>
	Holotype	All types (n = 17)	n = 21
		Range	Frequency
Pectoral fin rays <sup>a</sup>	12	11-13 (12)	11 (6), 12 (27), 13 (1)
Dorsal fin rays	5	4 or 5 (5)	4 (1), 5 (16)
Anal fin rays	4	3 or 4 (4)	3 (1), 4 (16)
Caudal fin rays	9	9	9 (17)
Lateral line scale counts			
Supraorbital series	6	6 or 7	6 (10), 7 (7)
Body series	10	8-10	8 (1), 9 (7), 10 (9)
Cheek series	8	8	8 (17)
Preopercular series	2	2	2 (17)
Subopercular series	6	6	6 (17)
Dorsolateral branch of subopercular	3	3	3 (17)
Postersubopercular series	3	3	3 (17), 4 (4)
Ventral series	0	0	0 (17)
Tail series	8	8	8 (17)

<sup>a</sup>Counted on both sides.

63084 (1, 55.0); ASIZP 63530 (1, 57.0); ASIZP 64588 (2, 64.6-82.8); ASIZP 64592 (2, 52.0-56.0); ASIZP 66018 (1, 65.5); ASIZP 66463 (1, 58.6). *M. jordani*: Hawaiian Is.: BPBM 23688 (1, 45.5); BPBM 24156 (3, 47.7-50.3); BPBM 24168 (2, 48.3-54.7); BPBM 24174 (2, 49.8-53.0); BPBM 24184 (3, 41.8-55.7); BPBM 24186 (7, 37.3-46.4); BPBM 24199 (3, 39.2-52.3).

**Acknowledgments:** We are grateful to Prof. N.V Parin (IOAN) for making type specimens available, S. Smith (USNM) for registering types, and Y.C. Liao (ASIZP) for loaning study material. This study was partially supported by grants RFBR-NSC 07-04-92000-NNS\_a to AMP and NSC96-2621-B-001-006-MY3 from the National Science Council, Taiwan to KTS. HCH especially thanks AMP's family for their kind hospitality during his visit in Moscow. We also thank T. Iwamoto for reading the manuscript and providing valuable suggestions and anonymous reviewer for reviewing and improving the manuscript.

## REFERENCES

- Alcock A. 1891. Class Pisces. Natural history notes from H.M. Indian Marine Survey Steamer Investigator. Commander R.F. Hoskyn, R.N., commanding. – Series II., No. 1. On the results of deep-sea dredging during the season 1890-91. *Ann. Mag. Nat. Hist. Ser. 6*, **8**: 19-34.
- Bradbury MG. 1967. The genera of batfishes (family Ogcocephalidae). *Copeia* **1967**: 399-422.
- Bradbury MG. 1980. A revision of the fish genus *Ogcocephalus* with descriptions of new species from the western Atlantic Ocean (Ogcocephalidae; Lophiiformes). *Proc. Calif. Acad. Sci. Ser. 4*, **42**: 229-285.
- Bradbury MG. 1988. Rare fishes of the deep-sea genus *Halieutopsis*: a review with descriptions of four new species (Lophiiformes: Ogcocephalidae). *Fieldiana Zool. (New Ser.)* **44**: 1-22.
- Bradbury MG. 1998. A new species of *Malthopsis* (Lophiiformes: Ogcocephalidae) from the western Atlantic Ocean. *Bull. Mar. Sci.* **63**: 207-211.
- Bradbury MG. 1999. A review of the fish genus *Dibranchius* with descriptions of new species and a new genus *Solocisquama* (Lophiiformes, Ogcocephalidae). *Proc. Calif. Acad. Sci.* **51**: 259-310.
- Bradbury MG. 2003. Family Ogcocephalidae Jordan 1895 – batfishes. *Calif. Acad. Sci. Annot. Checklists Fishes* **17**: 1-17.
- Garman S. 1899. Reports on an exploration off the west coasts of Mexico, Central and South America, and off the Galapagos Islands, in charge of Alexander Agassiz, by the U.S. Fish Commission steamer "Albatross," during 1891, Lieut. Commander Z. L. Tanner, U.S.N., commanding. XXVI. The fishes. *Mem. Mus. Comp. Zool.* **24**: 1-431.
- Gilbert CH. 1905. II. The deep-sea fishes of the Hawaiian Islands. *In* The aquatic resources of the Hawaiian Islands. *Bull. US Fish Comm.* **23**: 577-713.
- Gilbert CH, F Cramer. 1897. Report on the fishes dredged in deep water near the Hawaiian Islands, with descriptions and figures of twenty-three new species. *Proc. U. S. Natl. Mus.* **19**: 403-435.
- Jordan DS. 1902. A review of the pediculate fishes or anglers of Japan. *Proc. U. S. Natl. Mus.* **24**: 361-381.
- Leviton AE, RH Gibbs, E Jr Heal, CE Dawson. 1985. Standards in herpetology and ichthyology: Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia* **1985**: 802-832.
- Ochiai A, F Mitani. 1956. A revision of the Pediculate fishes of genus *Malthopsis* found in the waters of Japan (Family Ogcocephalidae). *Pac. Sci.* **10**: 271-285.
- Tanaka S. 1908. Descriptions of eight new species of fishes from Japan. *Annot. Zool. Jpn.* **7**: 27-47.