

Two new deep-water batfish of the genus *Malthopsis* from the Pacific Ocean (Lophiiformes: Ogcocephalidae)

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Abstract. Two new deep-water batfishes from the Pacific are described. *Malthopsis arrietty*, new species, from the Philippines, is diagnosed by its extremely short rostrum (2.0–5.7% SL) directed upward rather than forward; large eye (13.7–17.4% SL); narrow interorbital space; few scattered bucklers on body with interspaces largely naked on dorsal surface; ventral surface with few flat bucklers, mostly restricted to around pelvic-fin base, almost naked elsewhere. *Malthopsis velutina*, new species, from the Marquesas Islands, French Polynesia, is diagnosed by its body covered with small indistinct bucklers, with numerous prickles on interspaces forming a velvet-like skin; short blunt and upward-directed rostral spine (3.2–5.5% SL); subopercular buckler small, with distinct spines on its tip; large eye (12.9–15.3% SL); narrow interorbital space (4.8–6.1% SL); and black patches on dorsal surface.

Key words. Ichthyology, taxonomy, Actinopterygii, Teleostei, deep-sea

INTRODUCTION

Species of *Malthopsis* are characterised by their markedly triangular body disk with each subopercle bearing an enlarged, flat buckler with or without terminal spines, and gill filaments present on the second and third gill arches (except for *Malthopsis gnoma* Bradbury, 1998, which has a few additional filaments on the first arch). The majority of species are found throughout the Indo-west Pacific region, except for *M. gnoma* which occurs in the western Atlantic Ocean. Most species inhabit the lower continental shelf (~100 m) and upper continental slope (~700 m), usually between 200–500 m, although some occur shallower or deeper (Ho et al., 2009, 2013; Ho, 2013; Ho & Last, in press).

Ochiai & Mitani (1956) revised the genus *Malthopsis* and recognised only five species from Japan. These species have been recognised in the Indo-west Pacific for more than 40 years until Bradbury (1998) added a sixth species (*M. gnoma*) from the western Atlantic Ocean.

In the past decade, the understanding of the *Malthopsis* has greatly increased. Descriptions of new species and redescriptions of previous species since 2009 (Ho et al., 2009, 2013; Ho & Shao, 2010a, b; Ho, 2013; Ho & Koeda, 2019; Ho & Last, in press) has brought the total number of

species to 20. However, more species remain to be described (Ho, pers. data).

In this study, two new deep-water species are described and named formally. The first is based on 87 type and one non-type specimens collected in the Philippines, western Pacific Ocean, at depths of 234–543.2 m (with one exception at 777 m). The majority of the type series were collected by the U.S. vessel ALBATROSS during the “Philippines Expedition 1907–1910”. The second new species is based on 93 type and five non-type specimens collected from the Marquesas Islands, French Polynesia, South Pacific Ocean at depths of 280–448 m, which represents the easternmost extreme record among congeners in the Pacific Ocean. All specimens were collected by the French vessel ALIS during the “Campagnes Musorstom 9” expedition. Both species are likely endemic to the regions in which they were collected.

MATERIAL AND METHODS

Methods for taking measurements and counts follow Ho & Shao (2010a) and Ho & Last (in press). Terminology follows Ho & Last (in press). Standard length (SL) is used throughout. Abbreviations used include orbital diameter (OD), rostral length (RL), and interorbital width (IO), and the ratios OD/RL and OD/IO.

Specimens are deposited at the National Museum of Natural History, Smithsonian Institution, Washington D.C. (USNM), California Academy of Sciences, San Francisco (CAS), Muséum National d'Histoire naturelle, Paris (MNHN), and Pisces Collection, National Museum of Marine Biology and Aquarium, Taiwan (NMMP-P). Data used for comparison were taken from Ho & Shao (2010a) and Ho et al. (2013).

Accepted by: Zeehan Jaafar

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ISSN 2345-7600 (electronic) | ISSN 0217-2445 (print)

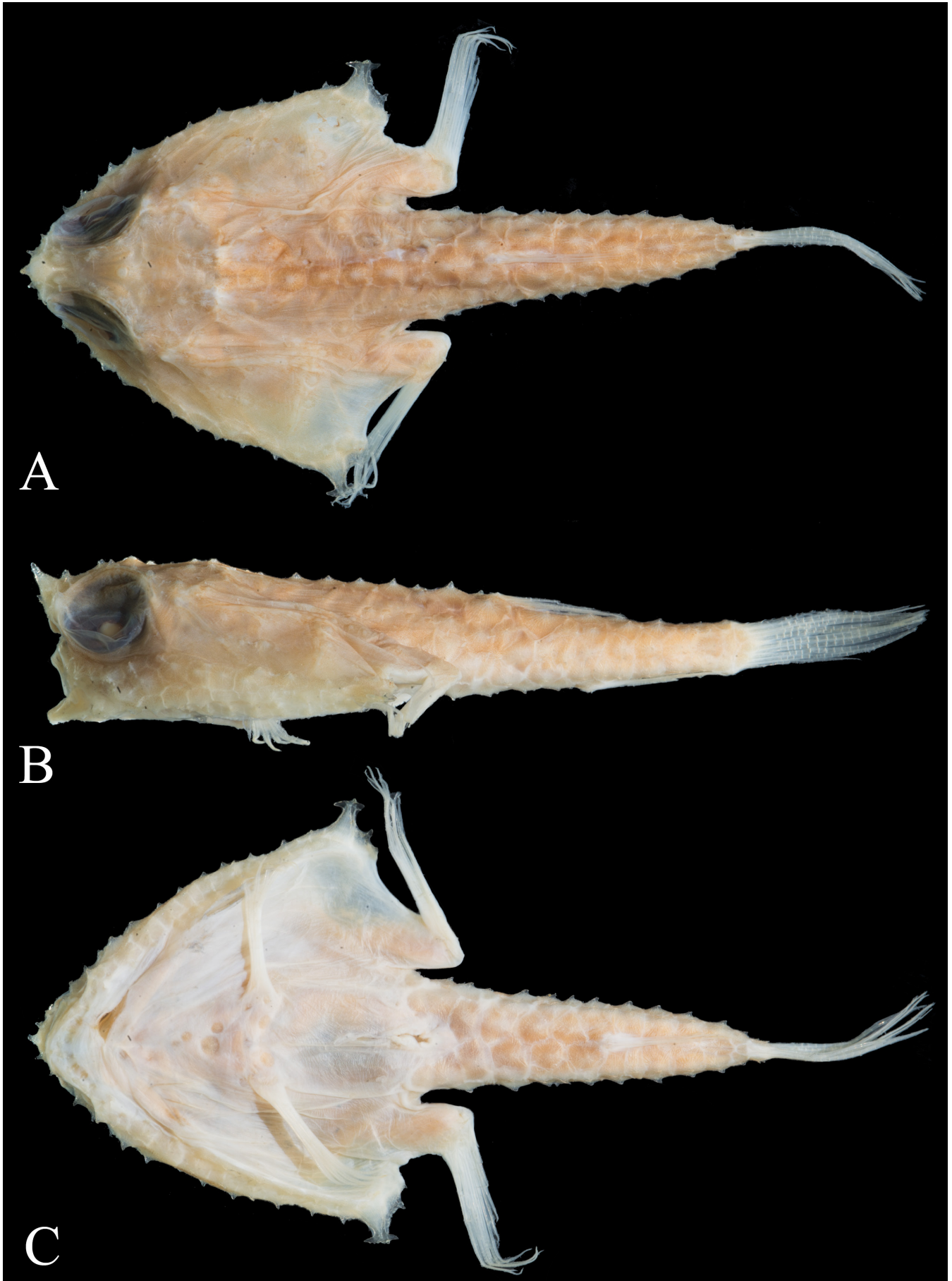


Fig. 1. *Malthopsis arrietty*, new species, holotype, USNM 169204, 45.4 mm SL. A, dorsal view; B, lateral view; C, ventral view.

Data provided in descriptions are given for the holotype first, followed in parentheses by range and mean value of all types measured, except where otherwise indicated.

TAXONOMY

Family Ogcocephalidae

Malthopsis arrietty, new species

Short-horn triangular batfish

(Figs. 1–3; Table 1)

Holotype. USNM 169204 (45.4 mm SL), ALBATROSS Philippines Expedition, 1907–1910, ALBATROSS sta. D 5113, 13°51'29.9"N, 120°50'31.2"E, Balayan Bay, off Batangas, southern Luzon, Philippines, 12-foot Tanner beam trawl and mud bag, 291 m, 17 January 1908.

Paratypes. Eighty-six specimens, 25.9–48.5 mm SL, all collected from the Philippines. CAS 34261 (1, 41.0), 13°39'04.3"N, 122°47'57.8"E, Bantuin Point, Ragay Gulf, southern Luzon, 534–543.2 m, 12 November 1966, coll. J.E. Norton. CAS 227265 (1, 44.2), 13°22'54.8"N, 121°49'31.4"E, Tayabas Bay, Marinduque Island, 234–256 m, 2 October 1966, coll. JE Norton. MNHN 2005-0666 (10, 31.6–48.5 mm SL), 11°57'07.2"N, 121°28'04.8"E, Sibuyan Sea, among Semirara Island, Caluya Island and Sibay Island, 388–404 m, 4 June 1985. NSMT-P96969 (2, 44.7–45.8), R/V HAKUHO-MARU, 10°36'32.4"N, 121°31'37.2"E–10°35'42.0"N, 121°31'12.0"E, off Panay Island, Sulu Sea, 362–372 m, 8 December 2002. USNM 122371 (15, 34.4–45.1), ALBATROSS, sta. D 5505, 8°37'14.9"N, 124°36'00.0"E, Macajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 402 m, 5 August 1909. USNM 122372 (12, 25.9–44.6), ALBATROSS, sta. D 5501, 8°37'36.8"N 124°34'48.0"E, Macajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 391 m, 4 August 1909. USNM 150855 (10, 27.3–38.3), ALBATROSS, sta. D 5506, 8°40'12.0"N, 124°31'44.4"E, Macajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 479 m, 5 August 1909. USNM 168864 (17, 26.1–44.9) and NMMB-P34201 (4, 34.1–43.0), ALBATROSS, sta. D 5502, 8°37'36.8"N, 124°34'48.0"E, Macajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 391 m, 4 August 1909. USNM 169203 (1, 46.2), ALBATROSS, sta. D 5112, 13°48'22.0"N, 120°47'24.0"E, Balayan Bay, southern Luzon, 12-foot Tanner beam trawl and mud bag, 324–326 m, 17 January 1908. USNM 169207 (1, 39.3), ALBATROSS, sta. D 5371, 13°49'40.1"N, 121°40'15.6"E, Tayabas Bay, southern Luzon, 12-foot Agassiz beam trawl and mud bag, 152 m, 24 February 1909. USNM 169209 (1, 41.8), ALBATROSS, sta. D 5402, 11°11'44.9"N, 124°15'46.8"E, Camotes Sea, between Leyte and Cebu, 12-foot Agassiz beam trawl and mud bag, 0–344 m, 16 March 1909. USNM 169210 (8, 29.1–43.5), ALBATROSS, sta. D 5409, 10°37'48.0"N, 124°13'08.4"E, Camotes Sea, between Cebu and Leyte, 12-foot Agassiz beam trawl and mud bag, 0–346 m, 18 March 1909. USNM 169212 (1, 30.5), ALBATROSS, sta. D 5507, 8°21'11.9"N, 124°12'07.2"E, Iligan Bay, Bohol Sea,

northern Mindanao, 12-foot Tanner beam trawl, 777 m, 5 August 1909. USNM 169213 (1, 54.0), ALBATROSS, sta. D 5518, 8°48'00.0"N, 123°31'12.0"E, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 366 m, 9 August 1909. USNM 169214 (1, 48.2), ALBATROSS, sta. D 5542, 8°48'29.9"N, 123°35'31.2"E, Bohol Sea, northern Mindanao, 12-foot Tanner beam trawl, 366 m, 20 August 1909. USNM 169215 (2, 39.8–44.2), ALBATROSS, sta. D 5503, 8°36'25.9"N, 124°36'07.2"E, Makajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner Beam Trawl, 413 m, 4 August 1909.

Non-type. USNM 150999 (1, 15.0), ALBATROSS, sta. D 5503, 8°36'25.9"N 124°36'07.2"E, Makajalar Bay, Bohol Sea, northern Mindanao, 12-foot Tanner Beam Trawl, 413 m, 4 August 1909.

Diagnosis. A species of *Malthopsis* belonging to the species group lacking prickles on interspaces of bucklers and distinguished from all other congeners by having an extremely short rostrum (\bar{x} = 4.1% SL) directed upward rather than forward; a large eye (\bar{x} = 15.4% SL); a narrow interorbital space (\bar{x} = 5.5% SL); OD/RL = 2.4–5.3 and OD/IO = 2.4–3.2; few scattered bucklers on body with interspaces largely naked on dorsal surface; and ventral surface with few flat bucklers, mostly restricted to around pelvic-fin base, almost naked elsewhere.

Description. Dorsal-fin rays five (mainly five, some with four or six); pectoral-fin rays 12 (mainly 12, rarely 11 or 13); anal-fin rays four (mainly four, rarely three). Body depressed, markedly triangular in dorsal view, posterior portion of skull well elevated above rest of disk; tail base narrow; caudal peduncle slender, semi-cylindrical, flattened ventrally and tapering posteriorly; rostrum very small and short, pointed (some with blunt or strongly reduced rostral spine), with small base, directed upward rather than forward (Figs. 1B, 3B), barely overhanging illicial cavity and mouth; rostral length 5.7% SL (2.0–5.7, \bar{x} = 4.1), much less than half of orbital diameter; OD/RL 2.4 (2.4–5.3, \bar{x} = 3.8); orbit larger than most congeners, its width 13.9% SL (13.7–17.4, \bar{x} = 15.4), directed dorsolaterally; no pupillary operculum; interorbital space narrow, 5.5% SL (4.7–6.3, \bar{x} = 5.5); OD/IO 2.5 (2.4–3.2, \bar{x} = 2.8).

Illicial cavity small, oval, as high as wide; esca a single bulb, bearing one small cirrus (mostly two cirri in paratypes) on dorsal margin; mouth small, terminal; small villiform teeth on jaws forming narrow bands, those on fifth ceratobranchial forming two large, elongated, adjacent patches; teeth on vomer and palatines in quadrangular patch.

Squamation on dorsal surface consisting mainly of pointed, conical, variable-sized bucklers, few in number and scattered in arrangement (Figs. 1A, 2A, 3B), interspaces between bucklers largely naked; bucklers on frontal ridge small and pointed, two enlarged preorbital bucklers which overlap anterior border of orbit, upper buckler larger and fused to the base of rostrum, with rostral spine in form of trident (Fig. 3A); usually three (three or four) smaller, subequal-

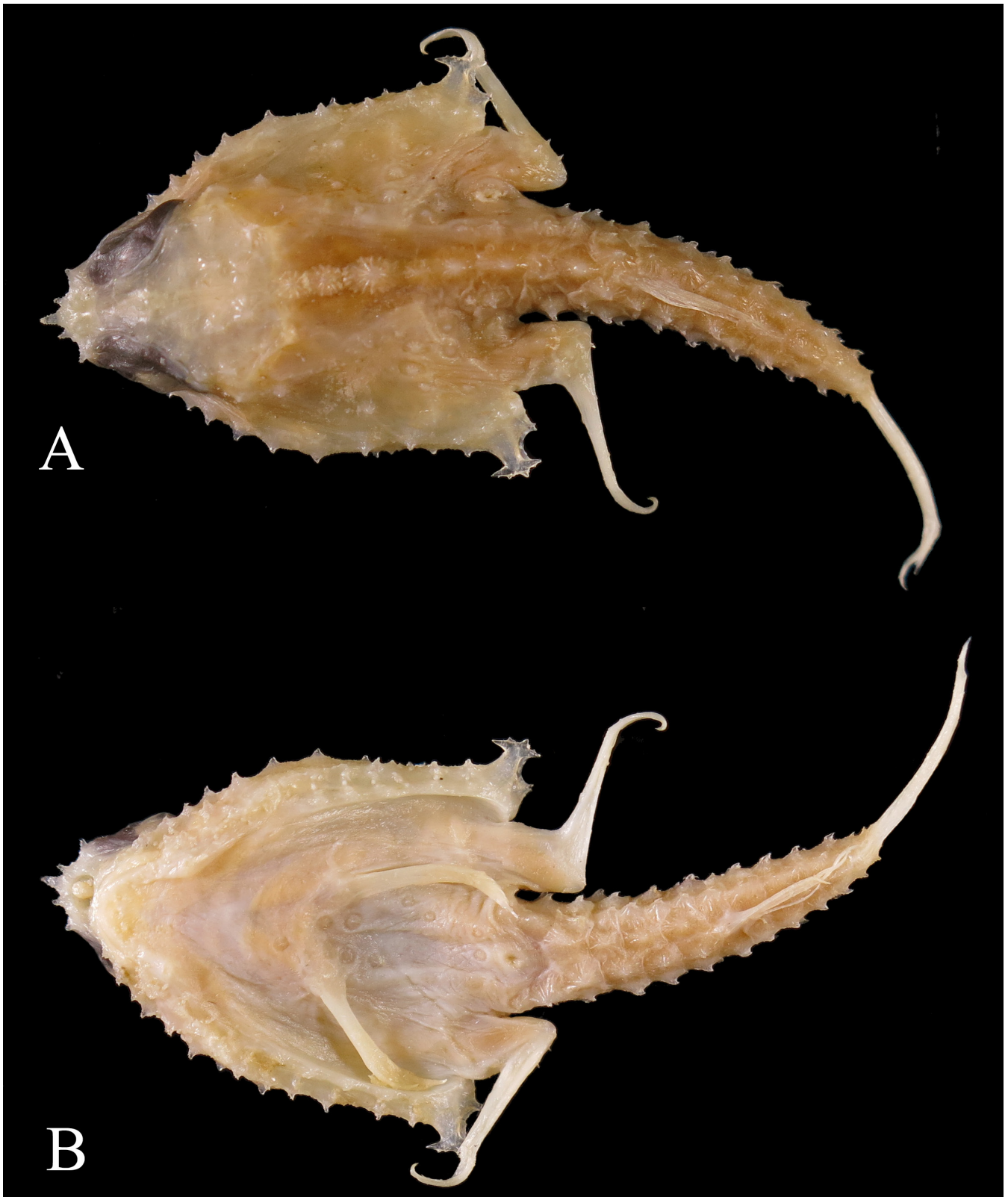


Fig. 2. *Malthopsis arrietty*, new species, paratype, NMMB-P34201, 1 of 3, 41.0 mm SL. A, dorsal view; B, ventral view.

Table 1. Morphometric and meristic data for types of *Malthopsis arrietty*, new species, and *M. parva* (after Ho et al., 2013). Frequency of pectoral-fin rays were counted on both sides.

	<i>Malthopsis arrietty</i> , new species			<i>M. parva</i>
	Holotype	Selected types	SD	Types
Standard length	45.4	40.2–54.0 (n = 22)		28.3–46.4 (n=23)
Morphometrics (% SL)		Mean (range)		Mean (range)
Head length	28.0	29.3 (27.8–31.2)	0.9	30.0 (28.2–32.9)
Head depth	22.0	21.1 (19.0–23.4)	1.2	23.6 (21.5–25.5)
Head width	24.2	24.6 (22.6–26.3)	1.2	21.9 (18.1–23.9)
Orbital diameter (OD)	13.9	15.4 (13.7–17.4)	1.0	15.8 (14.3–17.5)
Interorbital width (IO)	5.5	5.5 (4.7–6.3)	0.4	5.4 (4.3–7.0)
Rostral length (RL)	5.7	4.1 (2.0–5.7)	0.9	4.2 (2.4–5.5)
Predorsal length	64.5	66.2 (63.5–69.2)	1.8	63.0 (58.8–66.4)
Post-anus length	51.8	52.9 (50.2–55.7)	1.6	53.5 (52.8–66.4)
Preal-fin length	76.9	78.8 (75.3–81.5)	1.6	79.4 (75.9–82.5)
Disk margin	42.3	42.5 (39.9–45.9)	1.8	42.4 (38.2–47.9)
Mouth width	12.3	14.2 (12.3–16.2)	0.9	13.4 (11.6–15.7)
Dorsal-fin length	19.2	19.0 (16.1–21.9)	1.4	22.1 (18.6–25.4)
Anal-fin length	21.4	20.2 (17.9–22.9)	1.4	21.0 (18.2–23.6)
Pectoral-fin length	28.2	26.8 (23.5–30.0)	1.8	26.0 (22.8–32.0)
Caudal-fin length	31.9	29.8 (25.8–32.4)	1.6	28.6 (25.5–32.6)
OD/IO	2.5	2.8 (2.4–3.2)	0.3	2.9 (2.2–3.7)
OD/RL	2.4	3.8 (2.4–5.3)	0.8	3.8 (2.9–4.8)
Meristics		Frequency	n	Frequency
Dorsal-fin rays	5	4(6), 5(54), 6(6)	66	5(8), 6(31)
Pectoral-fin rays	12;12	11(1), 12 (128), 13 (3)	66	12(6), 13(72)

sized bucklers on frontal ridge (Fig. 3B); interorbital space naked; membranes above eyes completely naked (Fig. 3A, B).

Posterior portion of dorsal surface of skull covered by six large bucklers, one laterally on each side, four arranged in two rows medially, naked elsewhere (Fig. 3A) (smaller bucklers in some types); shoulder with large naked areas, extending to gill openings and base of pectoral elbows; a median row of large bucklers predorsally, ending before dorsal-fin origin as a triangular cluster of three large bucklers (Figs. 1A, 2A). Disk margin with a cluster of suborbital bucklers anteriorly, forming three well-defined rows posteriorly; uppermost row of bucklers elevated, slightly pointed, broad based; middle and lower rows of bucklers depressed and associated with lateral line, apices elevated; those in median row directed laterally, those in lower row directed ventrally; neuromasts well defined along lateral-line channel between median and lower rows of bucklers.

Subopercular buckler moderate in size, extending well beyond disk margin laterally; terminating on uppermost and middle rows of disk-margin bucklers; small spines on buckler tip, one directed forward and one directed backward, two smaller spines directed outward (some extra spines present in some smaller specimens); two post-subopercular bucklers, outer buckler large and bifurcate, inner small and indistinct, mostly covered by skin (Figs. 1, 2, 3C, D).

Pectoral-fin base on rear part of disk, covered dorsally with few well-developed conical bucklers, four (three to five) fine bucklers over anterior fin ray, naked elsewhere (Fig. 3C, D). Dorsal surface of tail strongly armoured, entirely covered with large, elevated, apically pointed bucklers; a row of four (four or five) large dorsolateral bucklers extending from last pair of predorsal bucklers below dorsal fin; a longer, highly irregular, semi-oblique row of slightly smaller bucklers along lateral margin of tail to caudal-fin base; an irregular row of flattened bucklers on dorsal midline before caudal fin; dorsal tail rows uniting to form a single, slightly elevated buckler at its base. Lateral margin of tail with two rows of small, low bucklers associated with lateral-line channel, similar to those on disk margin.

Ventral surface of disk covered with low bucklers, short apical spines on each buckler; belly nearly naked (one small buckler on belly of holotype, few in some paratypes but most paratypes totally naked); thoracic region with four bucklers (mostly naked in paratypes), few small bucklers on interspaces of pelvic-fin base (Figs. 1B, 2B, 3E); posterior portion of anus surrounded by six (four to six) flat bucklers; ventral surface of tail with a regular row of five conical bucklers on each side before anal-fin base; three (two or three) flat bucklers behind anal fin.

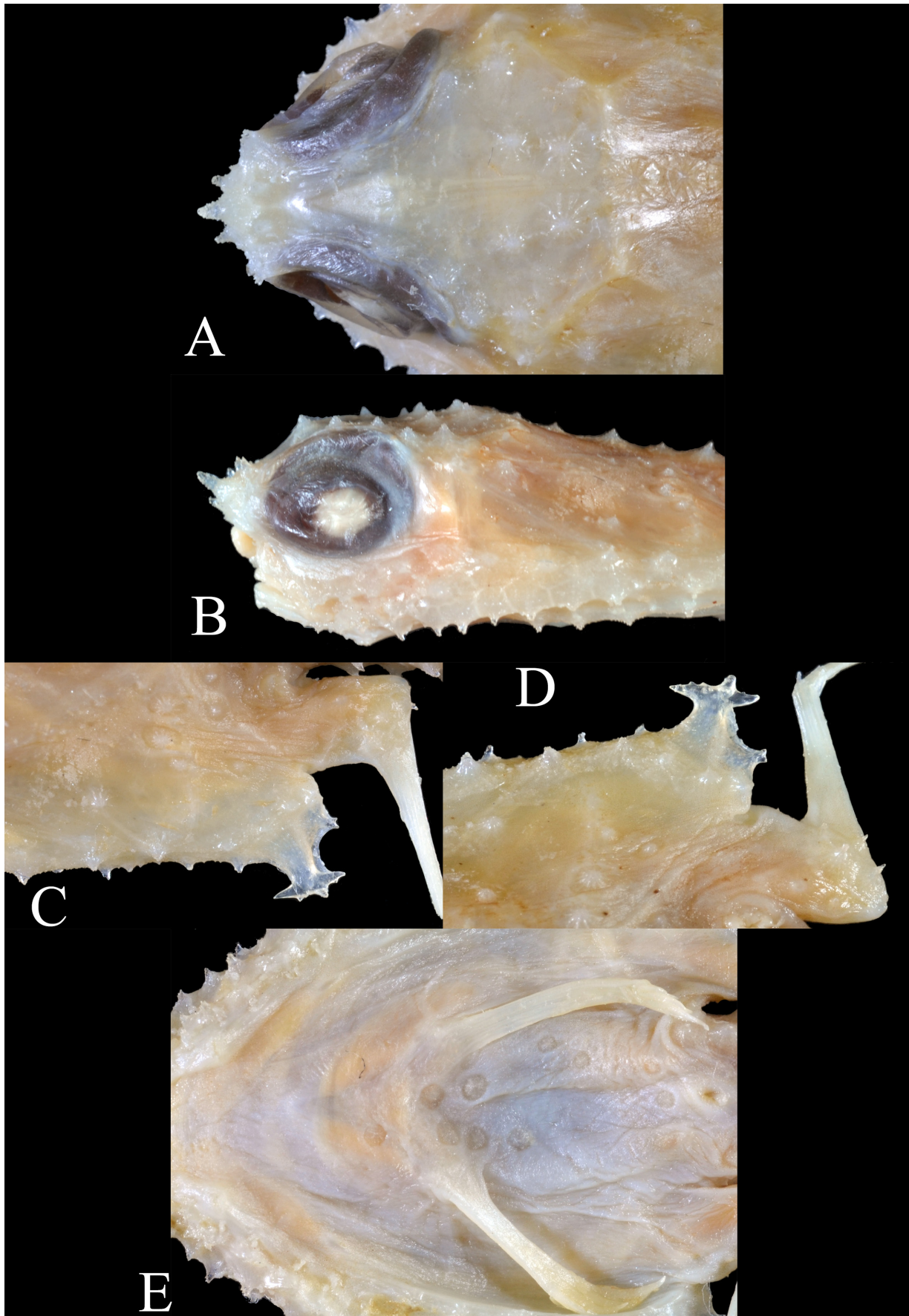


Fig. 3. *Malthopsis arrietty*, new species, paratype, NMMB-P34201, 1 of 3, 41.0 mm SL. A, dorsal view of head; B, lateral view of head; C, dorsal view of left subopercle; D, dorsal view of right subopercle; E, ventral view of disk.

Fins generally naked, without bucklers; interradials of pectoral fins thin, transparent; dermal cirri short, thin, flap-like, present on disk margin and lateral sides of tail associated with lateral-line neuromasts.

Colouration. Fresh colour unknown but likely uniformly yellow or perhaps with yellow marks as in many congeners. Preserved specimens uniformly pale brown to brown, paler on ventral surface and fins. Peritoneum pale with scattered black pepper dots.

Distribution. Known from the type series and non-type specimens collected in the Philippines and likely endemic to the region. Bathymetric range 234–543.2 m, except for one specimen (USNM 169212) collected in 777 m.

Size. A small-sized species, the largest adult measuring 54.0 mm SL, just a few millimetres larger than that of *Malthopsis parva* (51.1 mm SL), one of the smallest known species of the genus.

Etymology. The specific name, *arrietty*, used as noun in apposition, is after the miniature character of the Japanese animated fantasy film “Arrietty the Borrower” (Japan) or “The Secret World of Arrietty” (North America), in reference to the miniature size of the species.

Comparisons. *Malthopsis arrietty* is most similar to *M. parva* from New Zealand and Australia in having a small adult size (54.0 mm SL, cf. 51.1 mm SL in *M. parva*) and only a few bucklers on the ventral surface with the belly almost completely naked. *Malthopsis arrietty* differs from *M. parva* in having all bucklers on the body relatively tall and pointed (vs. low and blunt, or moderately tall with a blunt tip in *M. parva*); large naked areas on dorsal surface of body (vs. mostly covered by various-sized small bucklers); two pairs of principal bucklers on posterior portion but naked elsewhere on skull (vs. densely covered by small bucklers on those areas); tip of subopercular buckler with well-developed spinules directed forward, laterally and posteriorly (vs. margin blunt with indistinct spinules); head relatively wide, 22.6–26.3% SL, \bar{x} = 24.6% SL (vs. 18.1–23.9, \bar{x} = 21.9% SL); usually 12 pectoral-fin rays (vs. usually 13).

Malthopsis arrietty is also similar to *Malthopsis annulifera* Tanaka, 1908, from the northwestern Pacific; both species co-occur in the Philippines. *Malthopsis arrietty* differs from *M. annulifera* in lacking colour marks on the dorsal surface (vs. four to 12 ocelli on dorsal surface in *M. annulifera*) and in having all bucklers on the body relatively tall and pointed (vs. all low and blunt or flat), a larger eye with OD 13.7–17.4% SL (vs. 10.1–13.2% SL), a narrower interorbital space of 4.7–6.3% SL (vs. 6.6–9.2% SL). Moreover, *M. arrietty* has a much smaller maximum body size, reaching only 54.0 mm SL, whereas *M. annulifera* reaches 96.2 mm SL (data of *M. annulifera* from Ho & Shao, 2010a).

***Malthopsis velutina*, new species**
Polynesian triangular batfish
 (Figs. 4, 5; Table 2)

Holotype. MNHN 2008-1227 (1, 56.9), Campagnes Musorstom 9, ALIS, sta. cp1268, 7°55'59"S, 140°43'1"W, Eiao Island, Marquesas Islands, Polynesia, South Pacific Ocean, perch trawl, 420–430 m, 4 September 1997.

Paratypes. Ninety-two specimens, 37.8–55.2 mm SL, all collected by ALIS (Campagnes Musorstom 9), from Marquesas Islands, Polynesia, South Pacific Ocean, using perch trawl. MNHN 2001-0028 (1, 43.4), sta. cp1229, 9°43'59"S, 138°51'0"W, Hiva Oa Island, 310–320 m, 30 August 1997. MNHN 2003-0996 (6, 45.7–55.2), sta. cp1306, 8°55'1"S, 140°14'6"W, Nuku Hiva Island, 283–448 m, 10 September 1997. MNHN 2005-1150 (55, 37.8–50.9), collected with holotype. MNHN 2006-1461 (2, 46.9–50.9), sta. cp1269, 7°55'59"S, 140°43'1"W, Eiao Island, 420–430 m, 4 September 1997. MNHN 2008-1228 (4, 44.2–52.8) and MNHN 2008-1231 (23, 37.8–48.6), collected with holotype.

Non-types. MNHN 2000-5509 (5 juveniles, 16.7–19.6), sta. cp1238, 9°40'59"S, 139°3'0"W, Hiva Oa Island, 280–370 m, 31 August 1997.

Diagnosis. A species of *Malthopsis* with body covered with fine bucklers and prickles forming a velvet-like integument, and black patches on body surface, including upper portion of eye. It can be further distinguished from congeners by following combination of characters: rostral spine short (\bar{x} = 4.0% SL) and blunt, directed upward rather than forward; subopercular buckler small, with several spinules at its tip; a large eye (\bar{x} = 13.7% SL); narrow interorbital space (\bar{x} = 5.3% SL); anal fin reaching base of caudal fin when fully laid back; and usually six dorsal-fin rays and 12 or 13 pectoral-fin rays.

Description. Dorsal-fin rays six (usually six, rarely five or seven); pectoral-fin rays 13 (usually 12 or 13, rarely 11); anal-fin rays four. Body depressed, markedly triangular in dorsal view, its width slightly greater than length; posterior portion of skull elevated above rest of disk; tail base narrow; caudal peduncle narrow and slender, semi-cylindrical, flattened ventrally and tapering posteriorly. Orbit large, 13.5% SL (12.9–15.3, \bar{x} = 13.7), directed dorsolaterally; no pupillary operculum. Rostrum blunt, stout, with a narrow base, directed upward rather than forward (Fig. 5A, B), slightly overhanging illicial cavity and mouth; rostrum very short, 3.2% SL (3.2–5.5, \bar{x} = 4.0), much shorter than orbital diameter; OD/RL 4.3 (2.6–4.4, \bar{x} = 3.5); interorbital space narrow, 5.2% SL (4.8–6.1, \bar{x} = 5.3), forming a deep groove (Fig. 5A); OD/IO 2.6 (2.1–3.0, \bar{x} = 2.6); frontal ridge slightly convex.

Illicial cavity small, oval to rounded, its opening as high as wide; esca a single oval bulb, bearing two (one or two, mostly two) small cirri on dorsal margin; mouth small, terminal; small villiform teeth on jaws forming narrow bands, those on fifth ceratobranchial forming two large, elongated, adjacent



Fig. 4. *Malthopsis velutina*, new species, holotype, MNHN 2008-1227, 56.9 mm SL. A, dorsal view; B, ventral view.

patches; teeth forming a wide quadrangular patch on vomer and a smaller oval patch on each palatine.

Squamation on dorsal surface of disk well developed, consisting mainly of small, low variable-sized bucklers (Figs. 4, 5), interspaces between bucklers densely covered with tiny prickles, forming velvet-like integument; bucklers on frontal ridge small and blunt, two small preorbital bucklers which overlap anterior border of orbit; five (four or five) small, subequal-sized bucklers on frontal ridge; interorbital space densely covered by small bucklers (Fig. 5A); membranes above eye densely covered by small bucklers and prickles. Posterior portion of skull covered with small bucklers, except for two (two or three) slightly larger bucklers on each side (Fig. 5A); no naked area on body disk; one irregular median row of slightly larger bucklers predorsally, ending before dorsal-fin origin as two large side-by-side bucklers (Fig. 5D).

Disk margin with a cluster of suborbital bucklers anteriorly, forming three poorly-defined rows posteriorly, all bucklers small and low, with a narrow base; lower two rows of

bucklers associated with lateral-line channel, apices blunt, not well elevated; those of median row directed laterally, those of lower row directed ventrally; neuromasts along lateral-line channel well-defined. Subopercular buckler small, extending slightly beyond disk margin laterally; terminating on uppermost and middle rows of disk-margin bucklers; with a small, well-defined, forward-directed spine, a backward-directed spine and several smaller spinelets (variable in size and coverage) at its tip (Fig. 5C); two small post-subopercular bucklers, each bearing few small spinelets distally. Pectoral-fin base on posterior part of disk, covered completely with small bucklers dorsally except for small naked areas surrounding gill openings.

Dorsal surface of tail weakly armoured, entirely covered with small, low, apically pointed bucklers (Fig. 5D); a loose row of four (three to five) large dorsolateral bucklers extending from last pair of predorsal bucklers below dorsal fin on each side; a longer, highly irregular, semi-oblique row of small bucklers along lateral margin of tail to caudal-fin base; an irregular row of flattened bucklers on dorsal midline between

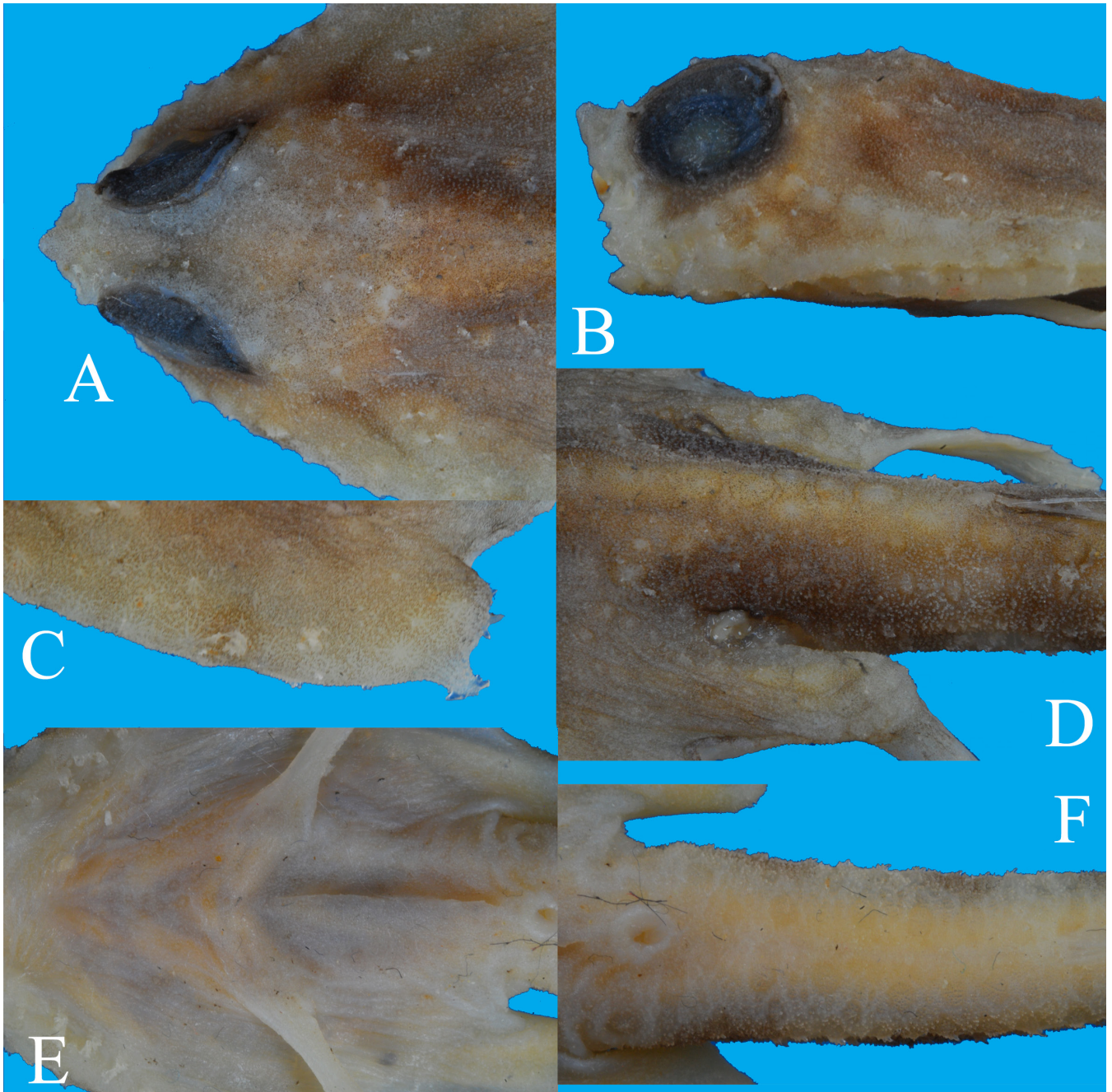


Fig. 5. *Malthopsis velutina*, new species, holotype, MNHN 2008-1227, 56.9 mm SL. A, dorsal view of head; B, lateral view of head; C, dorsal view of left subopercle; D, dorsolateral view of anterior tail region; E, ventral surface of disk; F, ventral view of anterior tail region.

dorsal and caudal fins; dorsal tail rows uniting to form a single, slightly elevated buckler at its base. Lateral margin of tail with two rows of small, low bucklers associated with lateral line, similar to those of disk margin.

Ventral surface of disk predominantly covered with small, low, flat bucklers; very stout and small apical spines present on each buckler; belly densely covered with small variable-sized bucklers, some slightly larger on breast than on belly and numerous prickles on interspaces (Fig. 5E); rear margin of anus surrounded by slightly enlarged, indistinct bucklers; ventral surface of tail with two regular rows of small bucklers (Fig. 5F), coalescing to a bulbous buckler at caudal-fin base.

Fins generally naked, without bucklers, sometimes with small bucklers on rays near caudal-fin base; inter-radials of pectoral fins thin, transparent; dermal cirri short, thin, flap-like, present on disk margin and lateral sides of tail associated with lateral-line neuromasts.

Anal fin usually short, reaching only to base of caudal fin when fully depressed, except for some larger specimens, including the holotype, with anal fin reaching base of caudal fin.

Colouration. Fresh colour unknown. The preserved holotype (Fig. 4A, B) has dorsal surface yellowish-brown with a black supraorbital membrane; large, deep brown smoky patches on dorsal surface of disk and base of tail; two saddle-like

Table 2. Morphometric and meristic data for types of *Malthopsis velutina*, new species. Frequency of pectoral-fin rays were counted on both sides.

	<i>Malthopsis velutina</i> , new species		
	Holotype	Selected types	SD
Standard length	56.9	37.8–56.9 (n = 29)	
Morphometrics (% SL)		Mean (range)	
Head length	27.1	27.7 (24.8–30.2)	1.2
Head depth	20.6	19.4 (17.3–21.6)	1.2
Head width	20.4	21.5 (19.4–23.0)	0.9
Orbital diameter (OD)	13.5	13.7 (12.9–15.3)	0.6
Interorbital width (IO)	5.3	5.3 (4.8–6.1)	0.4
Rostral length (RL)	3.2	4.0 (3.2–5.5)	0.6
Predorsal length	67.1	65.3 (62.6–68.2)	1.4
Post-anus length	51.3	51.9 (49.1–55.0)	1.4
Preanal-fin length	79.6	80.5 (77.3–83.6)	1.6
Disk margin	41.8	41.0 (38.2–43.7)	1.5
Mouth width	12.3	11.8 (9.7–13.5)	0.9
Dorsal-fin length	20.4	20.8 (17.9–23.2)	1.5
Anal-fin length	18.6	18.4 (16.3–20.5)	1.1
Pectoral-fin length	22.0	21.9 (19.9–24.0)	1.1
Caudal-fin length	27.4	27.2 (24.1–30.3)	1.7
OD/IO	2.6	2.6 (2.1–3.0)	0.2
OD/RL	4.3	3.5 (2.6–4.4)	0.5
Meristics		Value (Frequency)	n
Dorsal-fin rays	6	5(1), 6(59), 7(2)	62
Pectoral-fin rays	13;13	11(1), 12(97), 13(25)	62

blotches on tail, one at dorsal fin base and one between dorsal and caudal fins; dorsal surface of pectoral fin light brown; origin and posterior half of caudal fin deep brown; ventral surface pale uniformly; peritoneum pale with many black dots. Some paratypes have more or less consistent colouration as described for the holotype, but some have black colour surrounding the orbital, and the smoky patches on dorsal surface of disk vary in size, sometimes a paler patch centrally on dorsal surface and each side of base of tail, and some with smaller irregular patches on both sides of body disk.

Distribution. Known from the type series and non-type specimens collected in the Marquesas Islands, French Polynesia, and likely endemic to the region. Bathymetric range 280–448 m.

Size. The largest examined specimen is 56.9 mm SL, which suggests this is a small-sized species.

Etymology. The specific name *velutina*, meaning velvety, is in reference to its body covered with fine bucklers and prickles forming a velvet-like integument. Used as adjective in apposition.

Comparisons. *Malthopsis velutina* has a unique squamation that easily distinguishes it from all other congeners. It is similar to a species group that has the body surface of

disk densely covered by bucklers and tiny prickles (e.g., *Malthopsis austrafrika* Ho, 2013, *M. asperata* Ho, Roberts & Shao, 2013, *M. formosa* Ho & Koeda, 2019, *M. gnoma* Bradbury, 1998, *M. kobyashii* Tanaka, 1916, *M. provocator* Whitley, 1961, *M. tiarella* Jordan, 1902), but differs from these species in having the dorsal surface densely covered by tiny spinules forming a velvet-like integument. Other congeners with prickles on the ventral surface of the disk all have large, either sharp or blunt bucklers on the dorsal surface of the disk. Moreover, *M. velutina* has distinct spines directed forward and backward on the tip of the subopercular buckler, whereas all other species with prickles on the body surface have a dull subopercular buckler and lack distinct forward-directed spine(s).

Remarks. The squamation of *M. velutina* is somewhat similar to that of *Ogcocephalus darwini* Hubbs, 1958 and *Ogcocephalus porrectus* Garman, 1899, which may indicate that these species have adapted to a similar environment, like a fine-sandy bottom. However, *O. darwini* and *O. porrectus* are found in relatively shallow waters, 3.5–73.5 m and ca. 120 m, respectively (Bradbury, 1980), whereas *M. velutina* was collected from much deeper water, 280–448 m.

At present, *M. velutina* and *Malthopsis gigas* Ho & Shao, 2010 are the only two *Malthopsis* species known from French Polynesia, the easternmost range of the genus in the Pacific Ocean. *Malthopsis gigas* has a much larger body

size (up to 135 mm SL) and very different squamation. The two species likely use different habitats and have different ecological niches.

Comparative material. *Malthopsis annulifera*: listed in Ho & Shao (2010a); *M. asperata*: listed in Ho et al. (2013); *M. australifrica*: listed in Ho (2013); *M. formosa*: listed in Ho & Koeda (2019); *M. gigas*: listed in Ho & Shao (2010a); *M. kobyashii*: listed in Ho & Shao (2010b); *M. provocator*: listed in Ho & Last (in press); and *M. tiarella*: listed in Ho & Koeda (2019).

ACKNOWLEDGEMENTS

I thank David G. Smith and Sandra Raredon (USNM), Zora Gabsi and Romain Causse (MNHN), Gento Shinohara and Masanori Nakae (NSMT) for curatorial assistance, and Barry Russell (NTM) for suggesting improvements to the manuscript and English. The study was supported by the Ministry of Science and Technology, Taiwan and the National Museum of Marine Biology & Aquarium, Taiwan.

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