



Review of the batfish genus *Halicometus* Alcock, 1891 from Australian waters, with descriptions of two new species (Lophiiformes: Ogcocephalidae)

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Abstract

A taxonomic review of species of the Indo–Pacific batfish genus *Halicometus* occurring in the Australian Exclusive Economic Zone is provided. Treatments of six species in the region, including diagnoses of the widespread *Halicometus niger* Ho, Endo & Sakamaki, 2008, *H. reticulatus* Smith & Radcliffe, 1912 and *H. ruber* Alcock 1891, a reclassification of the poorly known *H. marmoratus* Weber, 1913, and descriptions of two new species, *H. westraliensis* n. sp. (an Australian endemic) and *H. drypus* n. sp. (from the northern sector of the Australian Exclusive Economic Zone off Norfolk Island). The Australian species can be distinguished from each other and regional congeners by a combination of morphometrics, meristics and colouration. A key is provided for all known species of the genus.

Key words: Pisces, taxonomy, review, *Halicometus*, new species, Australia

Introduction

The batfish genus *Halicometus* was established by Alcock (1891) for his new species *Halicometus ruber* based on two specimens collected from the Andaman Sea. Since Alcock's paper, three additional species have been described. Weber (1913) described a variation of *H. ruber*, *H. ruber* var. *marmoratus*, based on 5 specimens collected from the Madura Sea, Indonesia. Smith & Radcliffe in Radcliffe (1912) described *Halicometus reticulatus* on the basis of 5 specimens collected from Luzon Island, Philippines, and Ho *et al.* (2008) described *Halicometus niger* (originally as *nigra*) based on specimens collected from the Western Pacific Ocean off Japan, Taiwan and Australia.

In 2003, ogcocephalids in Australia collections were examined in detail by the second author as part of a bioregionalisation of the Australian continental slope (Last *et al.*, 2005). Prior to this investigation, the group was poorly known in the region despite the existence of a reasonable amount of material in the Australian collection network; the Zoological Catalogue of Australia (Paxton *et al.*, 1989) checklist did not include a single species of *Halicometus* but accompanying notes suggested that at least two unidentified species of the genus are in Australian collections and that the Australian Museum housed 32 specimens of *H. ruber* from the North-west Shelf.

The Australian collections were re-examined by the first author as part of a more detailed doctoral study focused on the systematics and distribution of the family in the Indo–Pacific (Ho, unpublished thesis) and which now forms the basis of this paper. As a consequence of these studies, 5 species of *Halicometus* are now recognized from Australian seas: *H. niger* and *H. reticulatus*; *H. marmorata* Weber, 1913, now recognized as valid, taking an available name, based on material from eastern Australia and possibly Madagascar; *H. ruber* formally identified from Western Australian material; and two new regionally endemic species described from eastern and western Australia. *Halicometus westraliensis* n. sp. is described on the basis of 21 specimens (17 types and 4 non-types) collected off Western Australia, and *Halicometus drypus* n. sp. is described on the basis of the holotype collected from the Norfolk Ridge in the Tasman Sea.

The purposes of the present study are to document the species of *Halicmetus* occurring in Australian waters, investigate previous records, describe and name the two new taxa, and provide a key to all known species in Australia.

Methods and materials

Australian specimens are deposited at the Australian Museum, Sydney (AMS), the Australian National Fish Collection, Hobart (CSIRO), Queensland Museum, Brisbane (QM), Museum Victoria, Melbourne (NMV), Western Australia Museum, Perth (WAM), and the National Museum of Marine Biology & Aquarium, Taiwan (NMMB-P). Institution abbreviations follow Eschmeyer *et al.* (2018, online version).

Morphometrics are expressed as percentages of standard length (SL). Methods for taking measurements followed Ho *et al.* (2008) and are defined as follows: *skull length*, distance between the symphysis of the upper jaw and the groove between the skull and 1st vertebra; *orbital diameter*, greatest diameter of the bony orbit, measured from its inner margins; *interorbital width*, narrowest distance between the lateral frontal bones, measured from their outer margins; *mouth width*, measured as the greatest overall width; *illicial cavity width*, greatest transverse distance across the illicial cavity, measured from its inner margins; *pre-dorsal length*, distance from the symphysis of the upper jaw to the origin of the dorsal fin, if applicable (i.e. cannot be measured if the fin is absent); *pre-cloacal length* (also referred to as the post-anal length in Ho *et al.*, 2008), distance from the symphysis of the lower jaw to the genital papilla (situated immediately posterior to the anus); *pre-anal length*, distance from the symphysis of the lower jaw to the origin of the anal fin; *disk margin length*, measured on the ventral side, distance from the posterior swelling of the mandible (outer corner of the mouth) to the posteriormost edge of the base of the subopercular buckler; *pectoral-fin length*, distance between the middle of the pectoral-fin base to the tip of the longest fin ray; *caudal-fin length*, distance between the base of the caudal fin to the distalmost fin tip. Two additional measurements are included: *disk width*, the greatest width of the disk measured when the disk is expanded naturally, not including the subopercular buckler prolongation; and *disk length*, distance between the symphysis of the upper jaw to the posteriormost base of the subopercular buckler.

Halicmetus Alcock

Halicmetus Alcock, 1891:27. Type species: *Halicmetus ruber* Alcock, 1891, by monotypy.
Halicmetes: Lindberg *et al.*, 1997:232 (misspelling).

Diagnosis. Head strongly depressed; anterior margin of disk truncate to broadly rounded; rostrum extending anteriorly to or slightly beyond mouth and anterior margin of disk; mouth small; dorsal fin present or absent, if present, minute in size; entire body covered with small bucklers and small dermal tubercles; subopercular buckler moderately developed, usually bearing some short terminal spinules; gill filaments present on 2nd and 3rd gill arches, absent from fourth gill arch; gill rakers present on first to third gill arches; 3–4 gill rakers on outer side of 2nd gill arch; esca triangular and bulbous, fringed on its lower margin and usually bearing a pair of dorsal cirri; teeth on vomer and palate forming three closely adjacent quadrangular patches; tongue teeth (5th ceratobranchial) in two closely attached elongated patches.

Remarks. The taxonomic status of *Halicmetus ruber* var. *marmorata* Weber, 1913 has long been a mystery. Weber described *marmorata* as a new variation of *H. ruber*, based on 5 syntypes collected from the Madura Sea, Indonesia. The translation of Weber's (1913: 567) original description is as follows:

Alcock's H. ruber is described as "uniform light pink" in life, whereas my specimens show several irregularly shaped, brown speckles all over the surface, which often merge into even larger blotches. Moreover the eyes are rather smaller as in H. ruber. The diameter is about one-seventh of the disc and approximately about as wide as half of its anterior distance to one another. The mouth is slightly longer than the eye diameter. But in my specimens the eye diameter is almost one-eighth of the disc's length, therefore being as long as the anterior distance to one another and only about half as long as the mouth opening. Since my specimens otherwise resemble all other factors in the description of Alcock, I would like to see my specimens only as local variation of the same species, possibly confined to the Indo–Australian Archipelago.

According to Article 45.5.4 of The Code (ICZN, 2018, online version), a taxon “is subspecific if first published before 1961 and its author expressly used one of the terms “variety” or “form” (including use of the terms “var.,” “forma”, “v.” and “f.”)...”. Weber (1913) treated his specimens as a local variation of *H. ruber* and gave a distribution range of Indo–Australian Archipelago, thus qualifying *marmorata* as a valid subspecific name.

Weber and de Beaufort (1962), evidently by de Beaufort, synonymized it with *H. reticulatus* based on the colouration. Bradbury (1967) initially considered the taxon to be a synonym of *H. ruber*, but later (Bradbury, 2003) listed it as an *incertae sedis* in the Ogocephalidae (Eschmeyer *et al.*, 2018). Ho *et al.* (2008) also treated the taxon as a subspecies of *H. ruber*.

In 2006 and 2013, the first author examined the syntypes at the Zoölogisch Museum, Amsterdam (ZMA) confirming characters described by Weber, except for the types being colourless. These specimens are similar to *H. reticulatus*, based on the shared presence of a dorsal fin, simple dermal spinules on the body surface, a small eye and pale peritoneal membrane with scattered melanophores [specimens not dissected, but the colouration still detectable through the semi-transparent skin]. Other species, *H. ruber*, *H. cf. ruber* (*sensu* Ho *et al.*, 2008) and *H. niger*, with their adults lack dorsal-fin rays, have numerous forked dermal spinules on the body surface, a larger eye, and a brown peritoneal membrane (Ho *et al.*, 2008).

After examining a large collection of specimens from the Indo–West Pacific, we identified a species with a marbled colour pattern on the dorsal surface, usually with dorsal-fin rays (about one-fifth of examined specimens lacked rays), a small eye, and pale peritoneal membrane, typical of *H. ruber* var. *marmorata*. The taxon is elevated as an objective available name of species rank and redescribed below on the basis of newly collected specimens.

Valid species. *Halicmetus* is represented in the Indo–Pacific by six valid nominal taxa: *H. drypus* **n. sp.**, *H. marmoratus* Weber, 1913, *H. niger* Ho, Endo & Sakamaki, 2008, *H. reticulatus* Smith & Radcliffe, 1912, *H. ruber* Alcock, 1891, and *H. westraliensis* **n. sp.**, and one undescribed species, *H. cf. ruber* (*sensu* Ho *et al.*, 2008).

Key to batfishes of the genus *Halicmetus*

- 1A. Peritoneal membrane uniformly light brown, grayish or black 2
- 1B. Peritoneal membrane pale with scattering of darker peppery dots 5
- 2A. Body uniformly dark, blackish or gray; tubercles on body surface mainly trifid or bifurcate; rostrum extended well beyond mouth. *H. niger* (western Pacific)
- 2B. Dorsal surface uniformly pale or with a light brown marble pattern; rostrum usually not extended beyond mouth (with few exception) 3
- 3A. Dorsal surface uniformly pale; dark pigmentation on nostrils, upper roof of illicial trough, both jaws, pelvic fin, and distal portions of pectoral and anal fins *H. ruber* (eastern Indian Ocean)
- 3B. Dorsal surface with light brown marble pattern (often faded after preservation); body uniformly pale elsewhere 4
- 4A. Body mainly covered with bifurcate tubercles; peritoneal membrane light brown *H. cf. ruber* (western North Pacific)
- 4B. Body mainly covered with simple tubercles; peritoneal membrane greyish or black *H. drypus* **sp. nov.** (Tasman Sea)
- 5A. White reticulate pattern on dorsal surface (often faded after preservation) *H. reticulatus* (Indo–West Pacific)
- 5B. Marble pattern on dorsal surface (often faded after preservation) 6
- 6A. Rich brown marble pattern on dorsal surface (often faded after preservation); simple tubercles covering dorsal surface *H. marmoratus* (Indo–West Pacific)
- 6B. Dorsal surface uniformly pale or sometimes with light brown smoky pattern (often faded after preservation); dorsal surface covered with both bifurcate and simple tubercles. *H. westraliensis* **sp. nov.** (Western Australia)

Halicmetus marmoratus Weber, 1913

Vernacular name: Marbled Shortnose Seabat

Figures 1, 2A, 3; Tables 1–2

Halicmetus ruber var. *marmorata* Weber, 1913:567 (Type locality: Madura Sea; syntypes: ZMA 101.893).

Halicmetus ruber (not of Alcock): ?Brauer, 1902:327.

Halicmetus reticulatus: Weber & de Beaufort, 1962:239 (in part). ?Paxton *et al.*, 2006:653.

Specimens examined. Syntypes. ZMA 101-893 (5, 33.6–60.3), Siboga station 12, Madura Sea, 7°15’S, 115°15.6’E, 289 m, no date.

AMS 46 CSIRO

Other material. 61 specimens, 42.0–82.2 mm SL. AMS I.15984-001 (1, 46.0), 130 km S of Sydney, New South Wales, 34°43'S, 151°12'E, 357 m, 6 Jul. 1971. AMS I.17861-002 (1, 74.5), off Broken Bay, New South Wales, 33°34'S, 151° 59'E, 411 m, 31 Oct. 1972. AMS I.17862-011 (2, 74.1–76.7), off Newcastle, New South Wales, 33°10'S, 152°22'E, 366–695 m, 18 Oct. 1972. AMS I.18794-003 (2, 69.5–69.8), NE of Wollongong, New South Wales, 34°16'S, 151°26'E, 366 m, 8 Aug. 1975. AMS I.18795-009 (1, 74.6), NE of Wollongong, New South Wales, 34°21'S, 151°24'E, 410 m, 8 Aug. 1975. AMS I.19104-002 (2, 42.0–71.1), SE of Clarence River, New South Wales, 29°41'S, 153°45'E, 406–413 m, 10 Oct. 1975. AMS I.20435-008 (1, 44.3), off North Solitary Island, New South Wales, 29°47'S, 153°44'E, 438 m, 2 Aug. 1978. AMS I.20919-027 (4, 51.6–69.0), NE of Raine Island, 11°35'S, 144°04'E, 420 m, 12 Feb. 1979. AMS I.22642-001 (2, 37.1–54.4), E of Cape Hawke, New South Wales, 32°07'S, 153°05'E, 448–457 m, 27 Jul. 1981. AMS I.24019-001 (1, 70.9), Shoalhaven Bight, New South Wales, 35°02'S, 151°07'E, 480–485 m, 25 Nov. 1982. AMS I.24110-002 (1, 76.4), off North Head, New South Wales, 33°27'S, 152°05'E, 391–402 m, 21 Aug. 1979. AMS I.24457-001 (3, 76.8–82.2), off Wollongong, New South Wales, 34°19'S, 151°25'E, 443–475 m, 1 Dec. 1983. AMS I.24822-001 (2, 71.3–77.7), E of Wollongong, New South Wales, 34°38'S, 151°15'E, 348 m, 19 Jul. 1979. AMS I.28547-001 (6, 55.2–83.0), off Wattamola, New South Wales, 34°14'S, 151°29'E, 375–430 m, 28 Jul. 1987. AMS I.30414-002 (1, 57.3), E of Entrance, New South Wales, 33°23'S, 151°08'E, 3 Oct. 1979. AMS I.33436-006 (1, 77.8), 30°18'S, 153°27'E, off Coffs Harbour, New South Wales, 256 m, 7 Sep. 1992. AMS I.38464-001 (1, 76.4), 35°31'S, 150°43'E, off Brush Island, New South Wales, 322–331 m, 11 Dec. 1996. AMS I.38469-002 (1, 71.5), off Ulladulla, New South Wales, 33°40'S, 151°52'E, 380–390 m, 17 Sep. 1996. AMS I.39996-001 (3, 46.0–82.5), off Bermagui, New South Wales, 36°16'S, 150°22'E, 330–402 m, 18 Feb. 2000. AMS I.40406-001 (1, 72.4), off Bermagui, New South Wales, 36°44'S, 150°20'E, 274–375 m, 22 Jul. 2000. AMS I.40434-003 (2, 72.9–77.4), E of Bermagui, New South Wales, 36°25'S, 150°21'E, 366–402 m, 30 Aug. 1999. AMS I.40450-002 (1, 73.0), NE of Montague Island, New South Wales, 36°00'S, 150°00'E, 472 m, 1 Sep. 1999. AMS I.40477-002 (2, 71.5–75.2), off Montague Is., New South Wales, 36°09'S, 150°24'E, 329–400 m, 12 Oct. 2000. AMS I.40478-001 (2, 76.8–82.2), NE of Montague Is., New South Wales, 36°07'S, 150°24'E, 366–421 m, 2 Aug. 2000. AMS I.40814-002 (1, 72.9), NE of Montague Is., New South Wales, 36°09'S, 150°24'E, 311–329 m, 28 Feb. 2001. AMS I.41008-001 (1, 55.6), off Montague Is., New South Wales, 37°07'S, 150°24'E, 310–366 m, 16 Jul. 2001. CSIRO CA 3195 (1, 60.8), off Sydney, New South Wales, 33°43'S, 151°52'E, 410–420 m, 25 Jan. 1982. CSIRO H 715-11 (2, 45.3–59.4), S of Saumarez Reef, Queensland, 22°49'S, 154°10'E, 445–450 m, 17 Nov. 1985. CSIRO H 954-3 (1, 57.8), S of Saumarez Reef, Queensland, 23°12'S, 153°33'E, 399–405 m, 18 Nov. 1985. CSIRO H 1119-1 (1, 44.1), NW of Saumarez Reef, Queensland, 21°18'S, 153°29'E, 459–462 m, 21 Nov. 1985. CSIRO H 3937-01 (1, 54.5), SE of Hobart, Tasmania, 43°39'S, 147°53'E, 279–314 m, 20 Mar. 1994. CSIRO H 4775-06 (1, 80.2), off Sydney, New South Wales, 33°44'S, 151°51'E, 380–388 m, 23 May 1996. NMMB-P28594 (1, 49.2), removed from CSIRO H 715-11. NMV A4013 (1, 67.4), 48 km S of Point Hicks, Victoria, 38°15.5'S, 149°18.7'E, 408–446 m, 15 Oct. 1984. NMV A21622 (1, 56.1), off Greenwell Point, New South Wales, 34°55'S, 151°04'E, 450–468 m, Feb. 1999. QM I.18523 (1, 57.7), off Rockhampton, Queensland, 22°36'S, 154°14'E, 548.6 m, 4 Oct. 1980. QM I.15663 (1, 72.3), NE of Raine Island, Queensland, 11°35'S, 144°04'E, 420 m, 12 Feb. 1979. QM I.21612 (2, 48.9–77.7), Capricorn Group, Queensland, 23°07'S, 153°24'E, 400 m, 6 Sep. 1983. QM I.23624 (1, 81.1), Euston Reef, Queensland, 16°40'S, 146°16'E, 600 m, 2 Dec. 1986.

Tentative identification. AMS I.28108-012 (2, 68.3–68.7), Nosy Be, Andilana Beach, Madagascar, western Indian Ocean, 14°43.25'S, 50°56.25'E, 6 Nov. 1988.

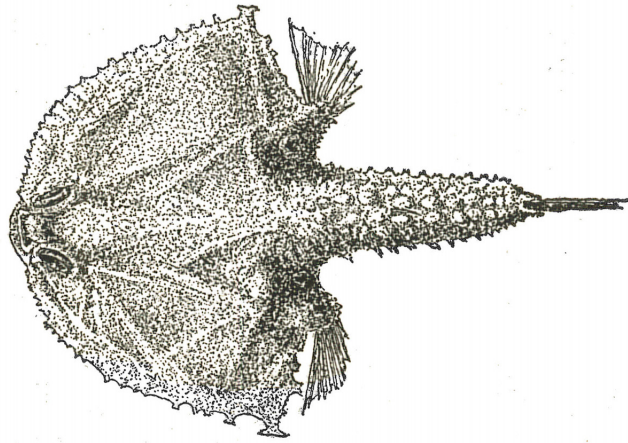
Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: disk broad, width 70–81% SL; eye small, orbit diameter 7.7–9.8% SL; interorbit narrow, 6.7–9.0% SL; illicial trough opening elevated; mid-dorsal disk covered with simple spinules and very dense coverage of well-developed, granular, dome-shaped bucklers, easily visible without magnification; belly covered with relatively widely spaced, simple spinules and low multicuspid tubercles; dorsal-fin rays usually present; pectoral-fin rays 11–14 (modally 13); dorsal surface pale greenish or white with pattern of darker dusky cross bars, pattern persistent when preserved; peritoneal membrane pale with sparse pattern of melanophores; distal parts of pectoral, pelvic and anal fins pale.

Description. Proportional measurements of specimens, expressed as percentages of SL, and meristic data are given in Table 1.

TABLE 1. Morphometric values of *Halicmetus* species studied in present work.

	<i>H. marmoratus</i>		<i>H. westraliensis</i> sp. nov.		<i>H. reticulatus</i>		<i>H. ruber</i>		<i>H. drypus</i> sp. nov.	
	Non-types (n= 57)		Holotype		All types (n=17)		Non-type (n=1)		Non-types (n=2)	
	Mean (Range)	SD	Mean (Range)	SD	Mean (Range)	SD	Non-type (n=1)	Range	Non-types (n=2)	Holotype
SL	37.1–83.0		34.0–85.8		74.7		51.7–65.9		66.7	
%SL										
Predorsal length	66.3 (63.0–68.8)	1.5	65.7 (61.2–69.4)	2.6	--	--	--	--	--	--
Skull length	27.7 (24.8–30.2)	1.2	27.2 (25.6–28.8)	1.0	26.5	26.5	26.3–28.0	26.3–28.0	25.8	25.8
Orbital diameter	8.8 (7.7–9.8)	0.5	8.2 (7.2–8.9)	0.6	7.6	7.6	9.4–10.0	9.4–10.0	9.3	9.3
Interorbital width	7.9 (6.7–9.0)	0.6	7.3 (6.3–8.3)	0.7	7.1	7.1	6.2–6.4	6.2–6.4	5.7	5.7
Head width	21.6 (19.5–25.0)	1.1	21.3 (20.2–22.7)	0.8	21.6	21.6	21.1	21.1	21.0	21.0
Head depth	27.4 (24.8–30.8)	1.7	26.2 (24.6–27.6)	1.0	25.2	25.2	21.1–21.1	21.1–21.1	24.9	24.9
Precloacal length	55.5 (52.6–58.3)	1.3	54.8 (53.1–56.9)	1.1	55.0	55.0	53.6–54.9	53.6–54.9	54.4	54.4
Prenasal length	75.5 (72.5–78.2)	1.4	75.9 (74.1–78.6)	1.5	76.3	76.3	76.8–77.0	76.8–77.0	76.3	76.3
Disk-margin length	48.7 (44.5–52.9)	2.2	48.7 (45.3–51.5)	1.8	47.4	47.4	46.2–46.4	46.2–46.4	44.2	44.2
Mouth width	16.4 (14.5–21.7)	0.9	16.3 (15.5–16.8)	0.4	15.9	15.9	14.6–14.9	14.6–14.9	14.8	14.8
Pectoral-fin length	19.1 (14.3–21.7)	1.6	18.4 (16.6–20.6)	1.3	16.9	16.9	19.1–20.7	19.1–20.7	15.4	15.4
Caudal-fin length	19.7 (17.0–23.3)	1.4	21.2 (18.9–22.7)	1.3	18.7	18.7	22.3–24.6	22.3–24.6	20.1	20.1
Illicial cavity width	6.8 (5.8–7.7)	0.7	5.9 (5.0–6.7)	0.6	6.2	6.2	7.0–7.2	7.0–7.2	4.8	4.8
Disk width	75.3 (69.9–80.8)	4.9	70.0 (65.5–73.6)	2.6	68.0	68.0	63.4–75.4	63.4–75.4	66.6	66.6
Disk length	60.2 (57.6–71.6)	5.1	55.1 (52.9–57.9)	1.6	56.0	56.0	50.7–52.2	50.7–52.2	51.3	51.3

A



B



C



FIGURE 1. *Halicmetus marmoratus* Weber, 1913. A. Original drawing as *Halicmetus reticulatus* from Weber & de Beaufort, 1962, fig. 55. B. AMS I.24822-001, 1 of 2, 77.7 mm SL, fresh, photo by K. Graham. C. CSIRO H 4775-06, 80.2 mm SL, fresh.

Body depressed; disk subtriangular, broader than long, truncated anteriorly; skull slightly elevated when viewed in lateral profile; orbit small, directed laterally rather than dorsally; rostrum a bony plate, usually not extending to mouth and anterior disk margin; illicial cavity entirely under rostrum, its opening triangular in shape, wider than high; nostrils located on each side of lateroventral margins of illicial cavity; esca a fleshy bulb with short filaments on dorsal margin, usually 2, but sometimes up to 6 cirri.

Mouth small, horizontal, slightly curved; lower jaw slightly beyond upper jaw anteriorly; teeth villiform, small, in wide band in both jaws; teeth on vomer and palatines forming quadrangular patches, close together. Fifth ceratobranchials bearing large and elongated tooth plates (tongue teeth, *sensu* Bradbury 1967, 1980); plates closely attached.

Gill filaments present only on 2nd and 3rd gill arches; 3–4 gill rakers on 2nd gill arch; gill opening small, at dorsal and inner portion of pectoral elbow. Dermal cirri present, associated with lateral line system on disk margin and tail. Pectoral fins at lateral side of disk; pelvic fins on ventral surface, closer to mouth than anus; anal fin on ventromedial surface at mid-length of tail.

Squamation agreeing well with the definition of *Ogcocephalus* by Bradbury (1980), consisting of close-set tubercles and bucklers, their bases slightly overlapping, forming heavy armour. Numerous simple tubercles covering entire body except for eyes, lips, nostrils, fins, and anus. Larger bucklers on disk margin and tail, usually associated with lateral line system and skeleton; those on dorsal surface of rostrum fused together, forming flat bony plate; small bucklers evenly covered on dorsal surface of body, easily visible without magnification; bucklers on frontal ridge relatively low and small; bucklers or multifid tubercles on ventral surface slightly larger than co-occurring tubercles; bucklers on dorsal surface of tail forming one major row and two irregular lateral rows on each side; two rows of bucklers on ventro-lateral side associated with lateral-line neuromasts, those on ventral surface of tail forming two regular rows.

Lateral line canal system well developed. Supraorbital series 4 or 5; body series 8 or 9; premaxillary series 0; cheek series 6; preopercular series 2; subopercular series 7; dorsolateral branch of subopercular series 3; ventral series 1; tail series 8–11 (mainly 10 or 11).

Colour. Freshly caught specimens with blackish green marble pattern on pinkish yellow background; all fins pale, some with irregular light brown colour; ventral surface pale to pinkish. In preserved specimens, dorsal surface pale with deep gray marble pattern; all fins and ventral surface pale (Fig. 1B). Oral cavity pale, with gray on pharynx. Peritoneum pale with pepper dots.

Distribution. Most of specimens examined were from the eastern coast of Australia; one jar with two specimens were collected from Madagascar. The bathymetric range extended from 256 to 695 m, with most specimens taken between 300 and 500 m.

Remarks. Two specimens (CSIRO CA.3195 and H.1119-1) identified in 2003 as being potentially distinct from other material of *H. marmoratus* have a much longer rostrum that extends well forward of the eyes and forward of the mouth, and have a more strongly sculptured anterior disk margin. The status of these specimens needs further elucidation.

Similarly, two other specimens (AMS I.28108-012) were tentatively identified as the present species but were collected from the Western Indian Ocean, far outside its recognized distributional range. They are nearly identical to *H. marmoratus* based on morphology. More specimens of both are needed for comparison with verified *H. marmoratus*.

***Halicmetus westraliensis* sp. nov.**

Vernacular name: West Australian Shortnose Seabat.

Figures 2B, 3, 4; Tables 1–2

Holotype. CSIRO CA 3647 (68.4), SW of Imperieuse Reef, Rowley Shoals, Western Australia, 18°07'S, 118°09'E, 400–404 m, 5 Feb. 1983.

Paratypes. Sixteen specimens, 34.0–85.8 mm SL. AMS I.22808-011 (1, 64.8), 220 km N of Port Hedland, Western Australia, 17°59'S, 118°17' E, 404–420 m, 3 Apr. 1982. AMS I.22821-026 (1, 64.6), 190 km NW of Port Hedland, Western Australia, 18°16'S, 118°12'E, 298–320 m, 10 Apr. 1982. AMS I.22825-025 (1, 39.2), 200 km NW of Port Hedland, Western Australia, 18°59'S, 117°10'E, 300–326 m, 13 Apr. 1982. AMS I.22826-021(1,

38.4), 210 km NW of Port Hedland, Western Australia, 18°44'S, 117°02'E, 396–406 m, 13 Apr. 1982. CSIRO B 3121 (1, 64.4), SW of Rowley Shoals, Western Australia, 17°56'S, 118°21'E, 418–420 m, 5 Feb. 1983. CSIRO B 3293 (5, 66.6–85.8), collected together with holotype. NMV A29670-019 (2, 34.0–47.5), North West Shelf, Western Australia, 18°34.2'S, 117°27.7'E, 401–405 m, 14 Jun. 2007. NMV A29731-028 (1, 64.0), North West Shelf, Western Australia, 12°31.8'S, 123°25.6'E, 401–404 m, 7–8 Jul. 2007. WAM P.28080.005 (1, 62.5), Rowley Shoals, Western Australia, 16°50'S, 120°03'E, 433–434 m, 20 Aug. 1983. WAM P.28341.002 (1, 55.5), Imperieuse Reef, Rowley Shoals, Western Australia, 17°58'S, 118°22'E, 406 m, 28 Feb. 1984. WAM P.30586.004 (1, 93.4), North West Shelf, Western Australia, 19°20'S, 115°40'E, 348–352, 29 Jan. 1984.

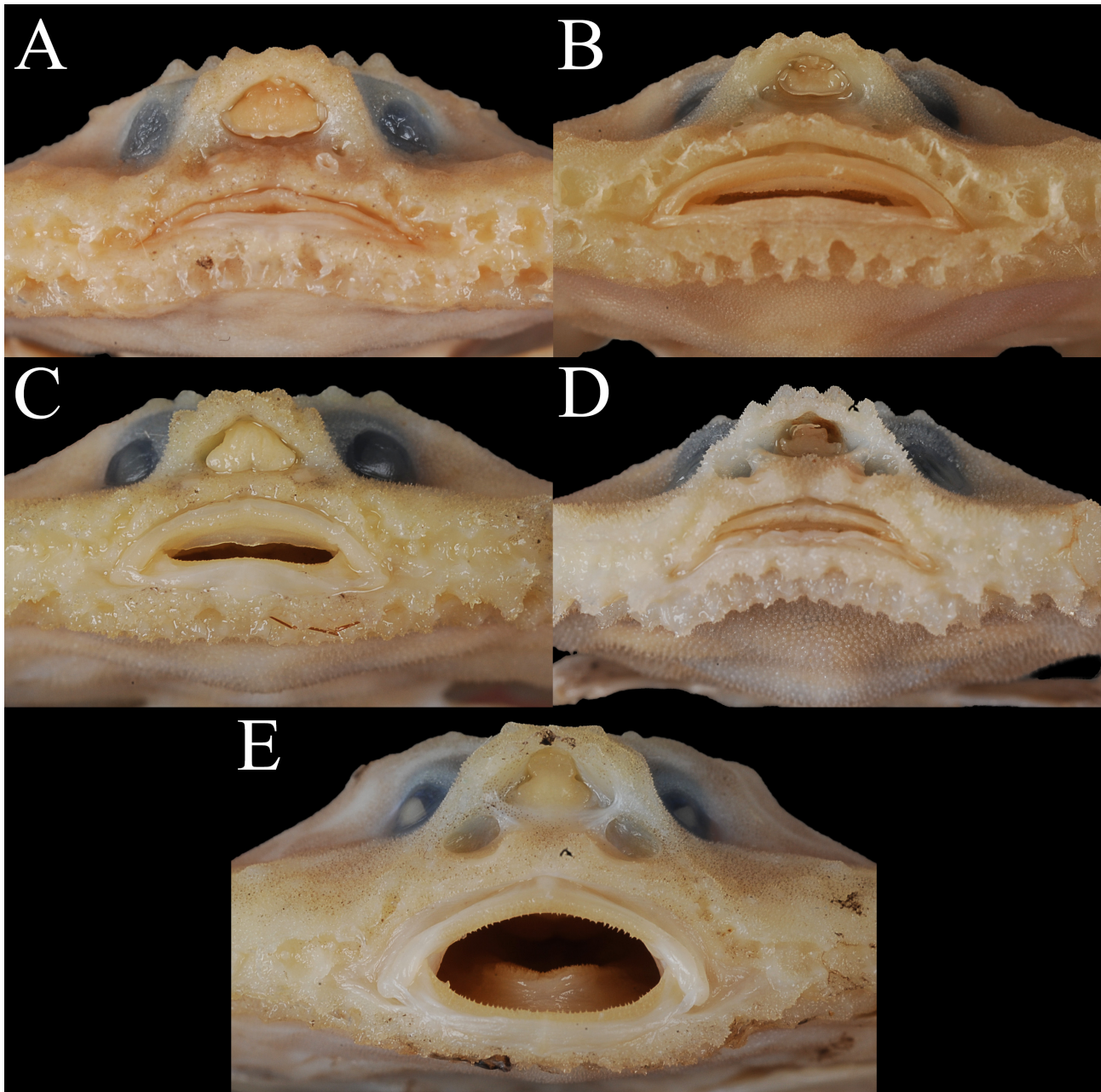


FIGURE 2. Front view of five *Halicmetus* species. A. *H. marmoratus*, CSIRO H 954-03, 57.8 mm SL. B. *Halicmetus westraliensis* sp. nov., CSIRO CA3647, holotype. C. *H. drypus* sp. nov., holotype. D. *H. ruber*, WAM P.31798-003, 65.9 mm SL. E. *H. reticulatus*, CSIRO H 4070-48, 74.7 mm. All preserved specimens, not to scale.

Non-types. AMS I.22822-018 (1, 39.2), 200 km NW of Port Hedland, North West Shelf, Western Australia, 18°23'S, 117°41'E, 396–418 m, 11 Apr. 1982. NMV A29670-024 (1, 14.6), collected together with NMV A29670-019. NMV A29676-006 (1, 15.3), North West Shelf, Western Australia, 17°31'S, 118°51.2'E, 405–406 m, 16 Jun.

2007. NMV A29731-028 (1 of 2, 26.0), North West Shelf, Western Australia, 19°43.8'S, 115°21.2'E, 389–423 m, 12 Jun. 2007. NTM S.14368-014 (1, 34.9), S of Cartier Reef, Timor Sea, 12°43.1'S, 123°33.2'E, 13 Jun. 1996, 280 m.

Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: disk moderately broad, 66–74% SL; orbit small, 7.2–8.9% SL; interorbit narrow, 6.3–8.3% SL; illicial trough opening low; mid-dorsal disk covered with mixed simple and bifurcated spinules; tiny bucklers evenly distributed on dorsal surface, imperceptible without magnification; belly covered with closely spaced, simple spinules and slightly larger, scattered multicuspid tubercles; dorsal-fin rays usually present; pectoral-fin rays 11–12 (modally 12); dorsal surface pale pink, covered with a dense pattern of faint dusky blotches when fresh, uniformly creamy white when preserved; peritoneal membrane pale with sparse melanophores; distal parts of pectoral, pelvic and anal fins pale.

Description. Proportional measurements of type specimens, expressed as percentages of SL, and meristic data are given in Tables 1 & 2 respectively.

Dorsal-fin rays 0–3; anal-fin rays 4; pectoral-fin rays 12–13. Body depressed; disk subtriangular, margin rounded, broader than long, weakly truncated anteriorly; skull slightly elevated anteriorly when viewed in lateral profile; orbit small, directed dorsolaterally; rostrum bony, almost flat, plate-like, not overhanging mouth; illicial cavity situated entirely under rostrum, opening broad, much wider than high; nostrils located on each side of ventrolateral margins of illicial cavity; esca a fleshy bulb, usually with 2 short filaments on its dorsal margin.

Mouth small, horizontal, slightly curved dorsally; lower jaw projecting slightly; teeth villiform, small, in wide band in both jaws; quadrangular tooth patches on vomer and palatines. Fifth ceratobranchials bearing large and elongated tooth plates (tongue teeth, *sensu* Bradbury 1967, 1980), situated adjacent each other.

TABLE 2. Distribution of dorsal-fin and pectoral-fin ray counts for five Australian species of *Halicmetus*. Note that *H. ruber* with 3–4 dorsal-fin rays are juveniles.

	Dorsal fin rays						Pectoral fin rays				
	n	0	1	2	3	4	n	11	12	13	14
<i>H. ruber</i>	8	2	-	-	5	1	8		12	4	
<i>H. reticulatus</i>	1	1					1		2		
<i>H. marmoratus</i>	57	12	15	14	14	2	57	4	12	86	12
<i>H. westraliensis</i> sp. nov.	17	2	4	6*	5		17	2	32*		
<i>H. drypus</i> sp. nov.	1	1*					1		2*		

*denotes values of holotypes.

Gill filaments present, only on 2nd and 3rd gill arches; 3–4 gill rakers on 2nd gill arch; gill opening small, slit-like, beside dorsal, inner portion of pectoral elbow. Dermal cirri present, associated with lateral-line system on disk margin and tail. Pectoral fins well developed, extending from posterior margin of disk; pelvic fins centrally on ventral surface of disk, their origin slightly closer to mouth than to anus; dorsal fin usually present as a single short ray (often obscure), well forward of anal fin when present; anal fin short-based, situated on ventromedial surface near mid-length of tail.

Squamation on dorsal disk consisting of close-set spinules and numerous, very small bucklers (mostly imperceptible without magnification); spinules minute, mainly simple on central disk, becoming more frequently bifurcate on head and near disk margin; bucklers much smaller than 1 mm wide, elevated slightly above spinules, usually spiny; bucklers on frontal ridge relatively low and small, first 2 fused to form flat bony plate-like rostrum; supraorbital membrane (eyelid) covered with spinules. Ventral surface of disk predominantly covered with simple spinules; very small spiny bucklers dispersed loosely over surface. Disk margin with 3 obvious rows of large bucklers, less distinct along its posterior margin; uppermost bucklers in semi-regular row, low, broad based, lacking well defined spinelets; median and lowermost rows of bucklers taller, associated with lateral line, apices elevated and spiny, directed laterally, lowermost row inferior to median row, neuromasts well defined. Subopercular buckler enlarged, extended laterally beyond disk margin; with enlarged anterior spine (usually present and possibly damaged in some specimens), overlaid with smaller spinelets (variable in size and coverage). Pectoral-fin base covered dorsally with small but well developed spiny bucklers; bucklers in single row over anterior fin ray. Tail armoured, entirely covered in strong bucklers; dorsal surface with two parallel median rows and two irregular

dorsolateral rows of large, low, long-based bucklers; rows coalescing posteriorly, eventually forming single, enlarged, keel-like buckler at caudal-fin base (surface comprised of smaller, somewhat obscure bucklers); lateral margin with two rows of bucklers associated with lateral line, similar in appearance to those of disc margin, their apices directed posterolaterally; ventral surface with 2 regular rows of low bucklers, coalescing to single, enlarged, keel-like buckler at caudal-fin base. Caudal-fin bucklers well developed, with variable coverage; bucklers thick, spiny, often persistent for about 3/4 of ray length; median rays usually with best developed bucklers.

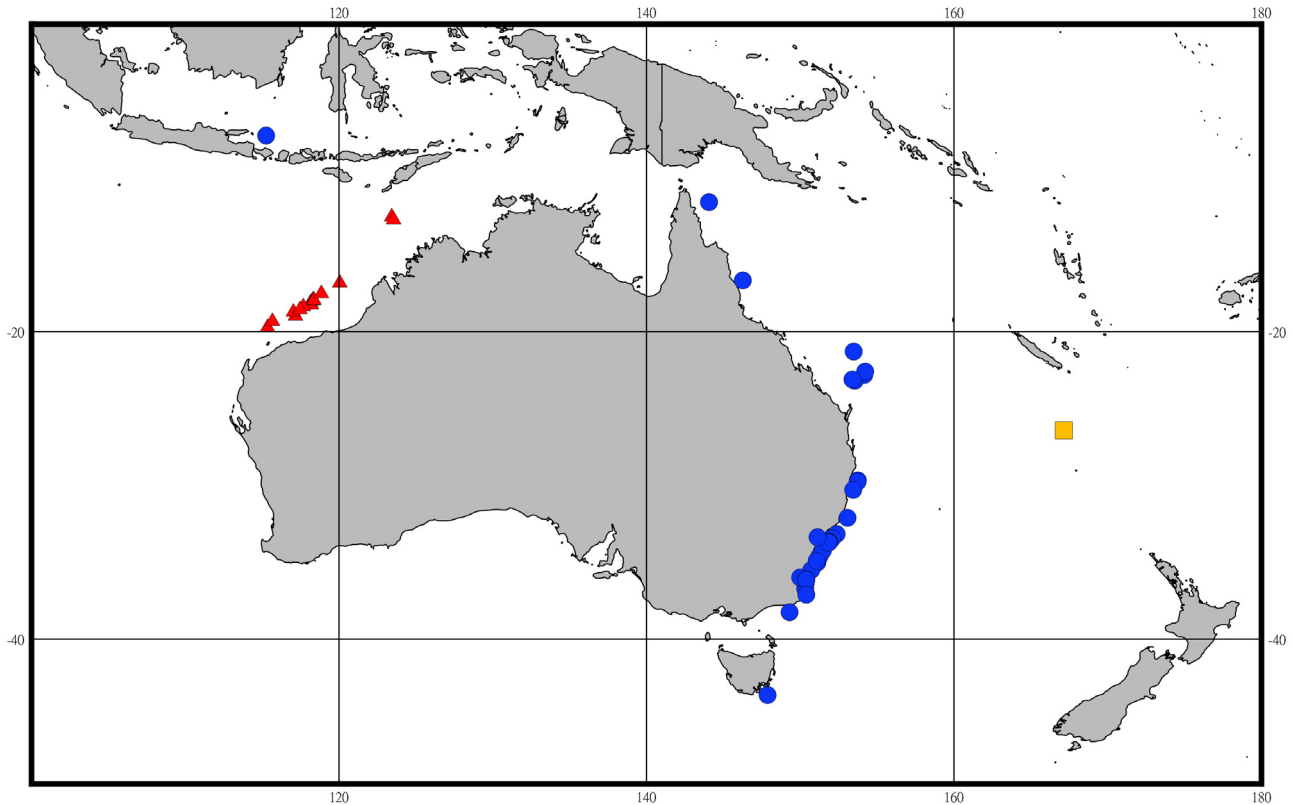


FIGURE 3. Specimen collection sides of *Halicmetus marmoratus* (blue circles), *Halicmetus westraliensis* sp. nov. (red triangles) and *Halicmetus drypus* sp. nov. (yellow square).

Lateral line canal system well developed. Supraorbital series 4 or 5; body series 8 or 9; premaxillary series 1; cheek series 8; preopercular series 2; subopercular series 7; dorsolateral branch of subopercular series 3; ventral series 1; tail series 9–10.

Colour. Fresh specimens pale pinkish or yellowish brown on median disc and tail, suffused with fainter darker brown irregular blotches; margin of disk pale; all fins pale; ventral surface probably paler than dorsal surface. In preserved specimens, dorsal surface usually uniformly creamy white, occasionally with less distinct irregular marble patterns; all fins and ventral surface pale. Buccal cavity pale, pharynx gray. Peritoneum pale with scattered melanophores.

Distribution. Known from specimens collected from off the west coast of Australia, between 12°S and 20°S, the bathymetric range 389–423 m.

Etymology. The name *westraliensis* is a reference to the type locality, Western Australia.

***Halicmetus drypus* sp. nov.**

Vernacular name: Pink Shortnose Seabat

Figures 2C, 3, 5; Tables 1–2

Holotype. CSIRO H 6019-01 (66.7), Norfolk Ridge, Tasman Sea, 26°26'S, 167°09'E, 750–774 m, 18 May 2003.

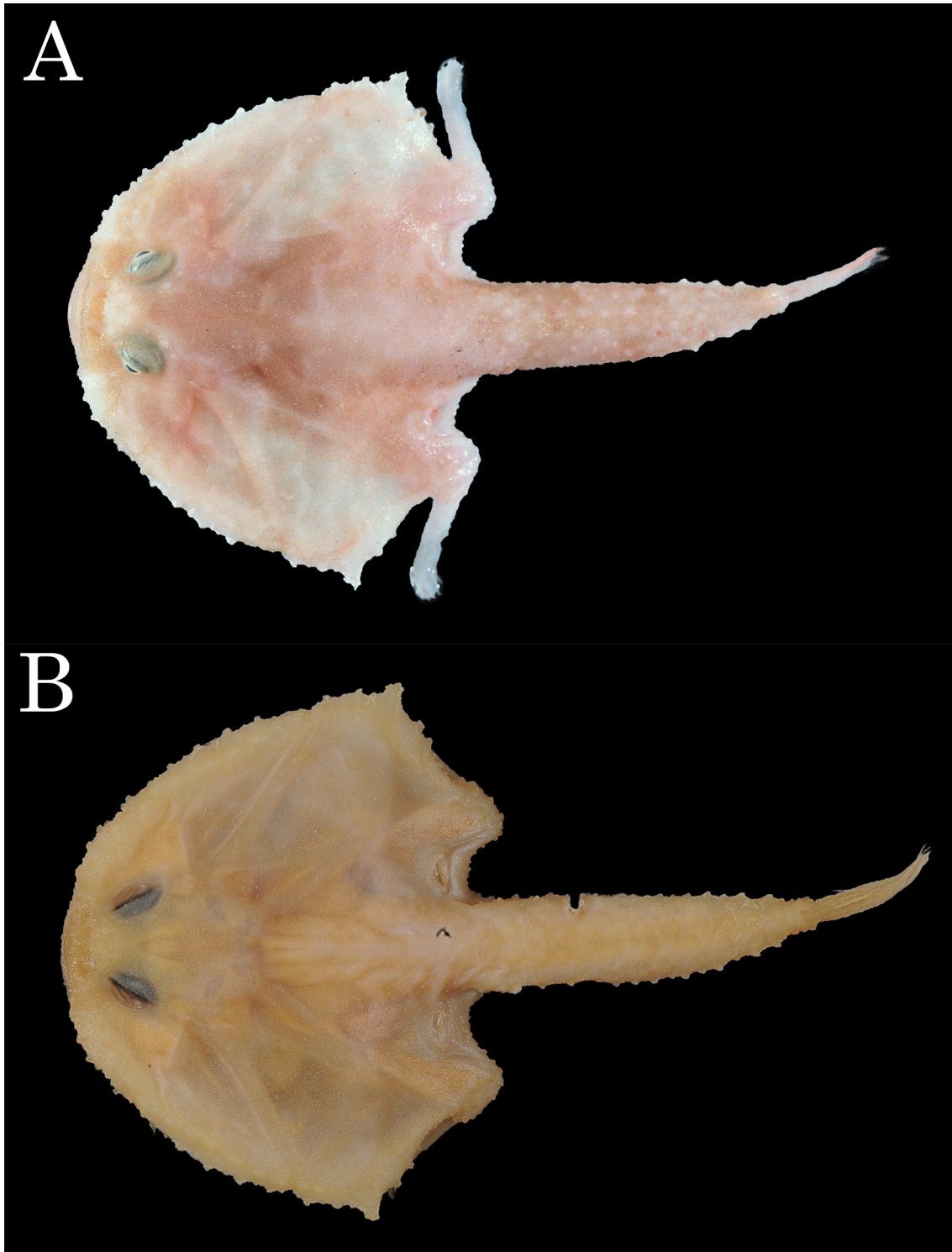


FIGURE 4. *Halicmetus westraliensis* sp. nov., CSIRO CA3647, holotype, 68.4 mm SL. A. fresh. B. preserved.

Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: body disk moderately broad, ~67% SL; orbit relatively large, ~9.3% SL; interorbital very narrow, ~5.7% SL; illicial trough opening moderately high; mid-dorsal disk with mainly relatively widely spaced, simple spinules and weak coverage of very tiny tubercles, imperceptible without magnification; belly covered with relatively widely spaced, simple and bifurcate spinules, larger tubercles and bucklers absent; dorsal-fin rays absent; pectoral-fin rays 13; dorsal surface pale pink with diffuse darker reddish pattern when fresh, uniformly creamy white when preserved; peritoneal membrane pale with many scattered melanophores (not visible from ventral surface); distal parts of pectoral, pelvic and anal fins pale.

Description. Proportional measurements of specimens, expressed as percentages of SL, and meristic data are given in Table 1.

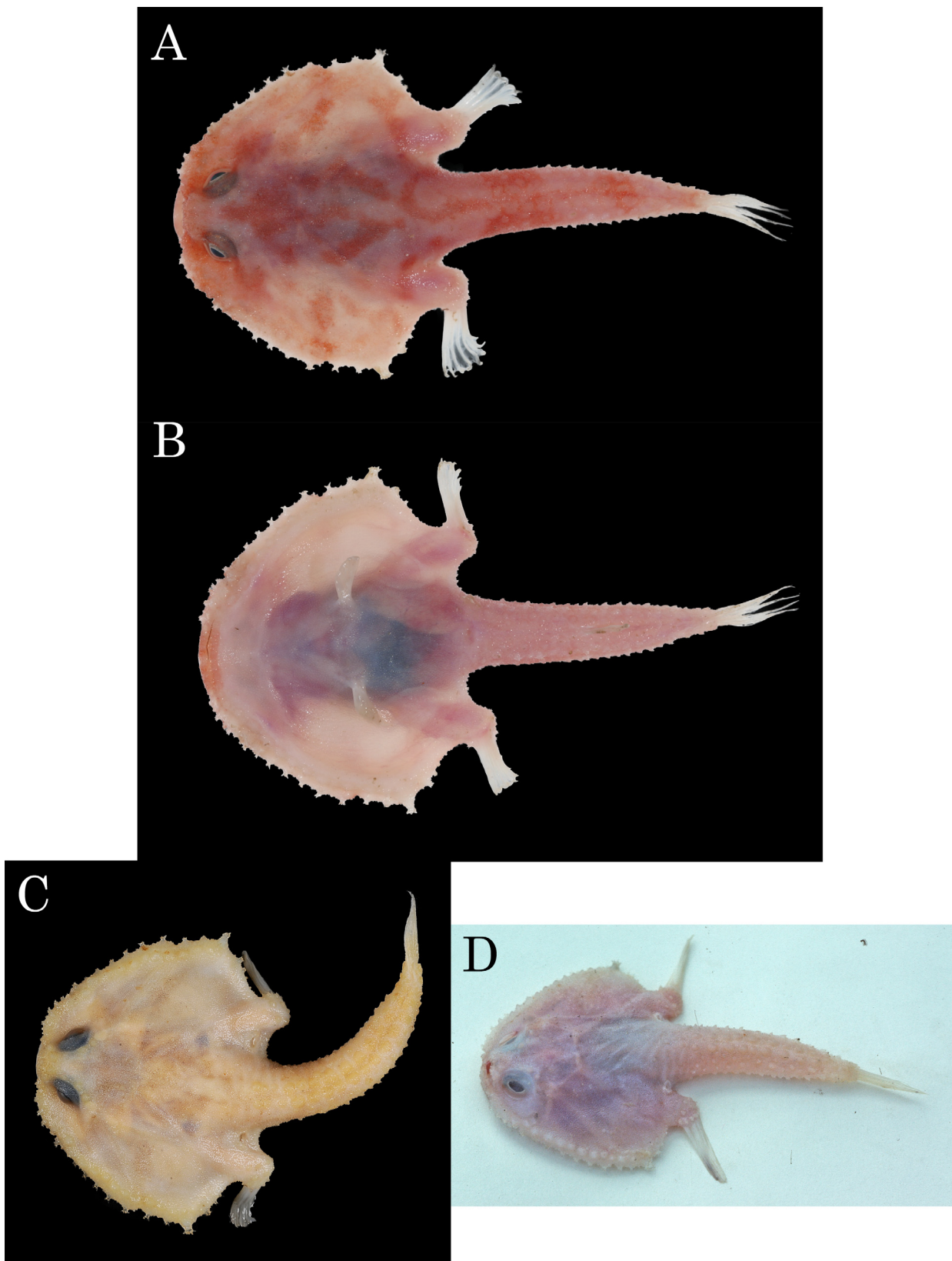


FIGURE 5. *Halicmetus drypus* sp. nov., holotype, CSIRO H.6019-01, 66.7 mm SL, fresh. A. dorsal view. B. ventral view. C. preserved, dorsal view. D. Fresh caught specimen, specimen not retained, photo by K. Graham.

Dorsal-fin rays 0; anal-fin rays 4; pectoral-fin rays 13. Body depressed; disk subtriangular, slightly broader than long, truncated anteriorly; skull barely elevated anteriorly when viewed in lateral profile; orbit large, directed dorsolaterally; rostrum a bony plate, short to mouth; illicial cavity situated entirely under rostrum, opening broad, wider than high; nostrils located on each side of lateroventral margins of illicial cavity; esca a fleshy bulb with 2 short filaments on dorsal margin.

Mouth small, horizontal, slightly curved; lower jaw slightly beyond upper jaw anteriorly; teeth villiform, small, in wide band in both jaws; quadrangular tooth patches on vomer and palatines. Fifth ceratobranchials bearing large and elongated tooth plates (tongue teeth, *sensu* Bradbury 1967, 1980).

Gill filaments present only on 2nd and 3rd gill arches; 3–4 gill rakers on 2nd gill arch; gill opening small, at dorsal and inner portion of pectoral elbow. Dermal cirri present, associated with lateral line system on disk margin and tail. Pectoral fins at outer portion of posterior margin of disk; pelvic fins on ventral surface, closer to mouth than anus; anal fin on ventromedial surface at mid-length of tail.

Squamation agreeing well with definition of *Ogcocephalus* by Bradbury (1980), consisting of close-set tubercles and bucklers, their bases slightly overlapping, forming heavy armor. Numerous simple tubercles covering entire body except for eyes, lips, fins, and anus. Large bucklers present and usually associated with lateral line system and skeleton; those on dorsal surface of rostrum fused together, forming flat bony plate; bucklers along disk margin multifid, each with 5 sharp spinules; small bucklers evenly covered on dorsal surface of body, subequal to neighboring tubercles and imperceptible without magnification; bucklers on frontal ridge of moderate size; bucklers on ventral surface subequal to adjacent tubercles; bucklers on dorsal surface of tail forming two major rows and some scattered one on each side; two rows of bucklers on ventro-lateral side associated with lateral-line neuromasts, those on ventral surface of tail relatively small and forming two regular rows.

Lateral line canal system well developed. Supraorbital series 4; body series 9; premaxillary series 1; cheek series 8; preopercular series 2; subopercular series 7; dorsolateral branch of subopercular series 3; ventral series 1; tail series 10.

Colour. Pale red smoky pattern on pinkish yellow background when fresh; all fins pale; ventral surface paler than dorsal surface. In preserved specimens, dorsal surface uniformly creamy white; all fins and ventral surface pale. Oral cavity and gill chamber pale. Peritoneum membrane dark gray.

Distribution. Known only from the holotype collected from the Norfolk Ridge, Tasman Sea at a depth of 774 m.

Etymology. From the Greek *drypus*, referring to the pink plant genus *Drypis* of the Tribe Drypideae, family Caryophyllaceae.

Remarks. An additional freshly caught specimen from eastern Australia similar to *H. drypus* was photographed by fisheries scientist, Ken Graham (Fig. 4D) and thought to be deposited in the Australian Museum. However, a recent search for this specimen was unsuccessful. *Halicmetus drypus* might be a rare or range restricted species because we examined many specimens collected from Australian waters but discovered only one specimen in collections.

***Halicmetus ruber* Alcock, 1891**

Vernacular name: Red Shortnose Seabat

Figures 2D, 6, 7; Tables 1–2

Halicmetus ruber Alcock, 1891:27, pl. 8, figs. 1, 1a–b. (type locality: Andaman Sea, 344–402 m). Alcock, 1898:pl. 19, fig. 5 (figure). Bradbury, 1967:415 (in part). Bradbury, 2003:5 (in part). Ho *et al.*, 2008:767.

Material examined. 8 specimens, 14.4–65.9 mm SL. NMV A29679-007 (2, 18.4–19.1 mm SL), North West Shelf, Western Australia, 16°44.3'S, 119°15.0'E, 693–698 m, 17 Jun. 2007. NMV A29720-004 (1, 51.7), North West Shelf, 14°33'S, 121°15.4'E, 1021–1023 m, Western Australia, 4 Jul. 2007. NMV A29719-011 (2, 17.2–18.0), North West Shelf, Western Australia, 14°36.9'S, 121°19.7'E, 698–705 m, 3 Jul. 2007. NMV A29684-005 (2, 14.4–14.8), 17°01'S, 119°35.5'E, North West Shelf, Western Australia, 440–451 m, 18 Jun. 2007. WAM P.31798.003 (1, 65.9), N of West Cape, Western Australia, 21°30.4'S, 113°56'E, 650 m, 11 Mar. 2001.

Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: body disk relatively narrow, 63–75% SL; orbit large, 8.8–10.5% SL; interorbital very narrow, 5.1–6.4% SL; illicial trough

opening moderately high; mid-dorsal disk with small scattered bucklers, robust and multicuspid spinules and scattered tiny tubercles, the later imperceptible without magnification; belly covered with relatively widely spaced, robust, simple and bifurcate spinules, larger tubercles and bucklers absent; dorsal-fin rays absent in adult; pectoral-fin rays 12–13; fresh colour unknown, uniformly creamy white when preserved; peritoneal membrane with dense coverage of melanophores (visible from ventral surface); distal parts of pectoral, pelvic and anal fins blackish.



FIGURE 6. *Halicmetus ruber* Alcock, 1891, WAM P.31798-003, 65.9 mm SL.

Remarks. Australian material and the diagnosis given above is consistent with the description of this species provided by Ho *et al.* (2008).

Alcock (1891) mentioned that his specimens of *Halicmetus ruber* (2 syntypes) have 11 pectoral-fin rays, whereas the majority of specimens examined in the genus had 12–14 (except *H. reticulatus* which sometimes had 11). We may assume that Alcock had overlooked 1 or 2 small rays which are usually hard to detect, especially in cases where the pectoral fin is shrunk through partial desiccation. Although Alcock (1891) mentioned that the species is “uniformly light pink”, all specimens we examined have various black pigmentation on body and fins (Ho *et al.*, 2008; present study).

Brauer (1902) recorded 0–3 dorsal-fin rays and 10–11 pectoral-fin rays in specimens collected off the western coast of Sumatra, Indonesia, and off eastern coast of Africa. However, his specimens are most likely misidentifications of *H. marmoratus*. The number of pectoral-fin rays is a still slightly lower than that of *H. marmoratus* so a detailed re-examination on Brauer’s specimens is needed.

It is notable that all six juveniles (14.4–19.1 mm SL) have 3–4 very short dorsal-fin rays, whereas all adults (>30 mm SL, n=14, Ho, per. data) have no dorsal-fin rays. It is very possible that all or some *Halicmetus* species have dorsal-fin rays initially and these are gradually reduced or lost with growth. We have not examined juveniles of *H. niger*, *H. cf. ruber* or *H. drypus* which all lack dorsal-fin rays in adults so this hypothesis needs further investigation.

***Halicmetus reticulatus* Smith & Radcliffe, 1912**

Vernacular name: Reticulated Shortnose Seabst

Figures 2E, 7, 8; Tables 1–2

Halicmetus reticulatus Smith & Radcliffe in Radcliffe, 1912:208, pls. 20, fig. 2, 21 fig. (type locality: off Sombrero Island, southern Luzon Island, Philippines, 291 m). Bradbury, 1967:415. Bradbury, 2003:5. Ho *et al.*, 2008:772.

Material examined. CSIRO H 4070-48 (1, 74.7), 18°12'S, 118°14'E, NW of Port Hedland, 266–269 m, 8 Sep. 1995.

Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: disk moderately broad, width ~68% SL; eye small, orbit diameter 7.5–8.3% SL; interorbit broad, 6.0–8.1% SL; illicial trough opening high; mid-dorsal disk covered with very short, simple and multicuspid spinules and dense coverage of minute, spiny tubercles (barely visible without magnification); belly covered with very short, widely spaced, simple and multifid spinules and very short multicuspid tubercles; dorsal-fin rays usually present; pectoral-fin rays 12–14 (modally 12); dorsal surface pale yellowish pink, overlain with dense greenish grey reticulations, pattern persistent when preserved; peritoneal membrane pale with sparse melanophores; distal parts of pectoral, pelvic and anal fins pale.

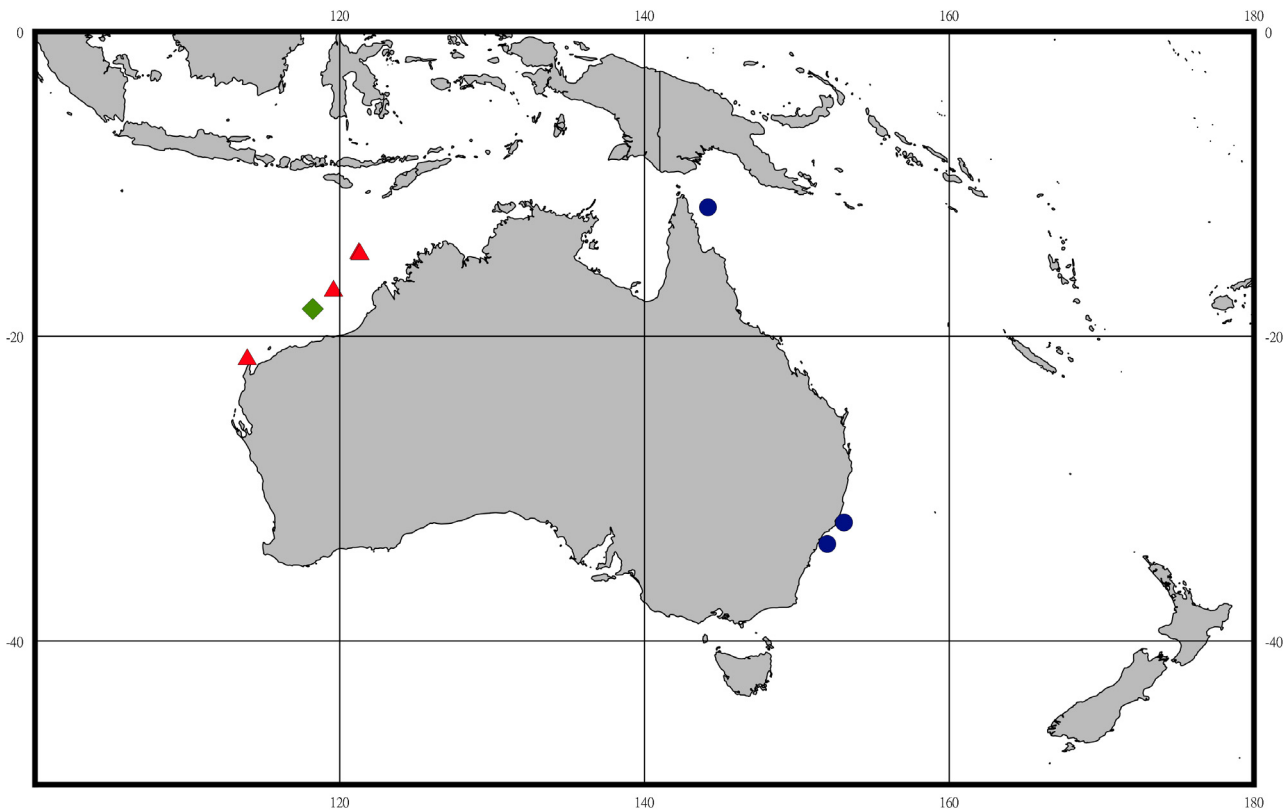


FIGURE 7. Specimen collection sites of *Halicmetus ruber* (red triangles), *Halicmetus reticulatus* (green diamond), and *Halicmetus niger* (blue circles). Specimens from Australia only.

Remarks. Australian material and the diagnosis given above is consistent with the description of this species provided by Ho *et al.* (2008). The CSIRO specimen is the only individual known from the Australian region. When fresh it had a white reticulate colour pattern, small eye and pale peritoneal membrane with scattered pepper dots, typical of populations of *Halicmetus reticulatus* from other parts of the Pacific. However, it is notable that this specimen has many more bifurcated tubercles on the dorsal surface and these are slightly different in shape to those of western North Pacific populations, which have only simple tubercles.

Paxton *et al.* (2006) recorded this species from off southern Queensland to southern New South Wales. These records are most likely misidentifications of *H. marmoratus* based on the distribution range provided.

***Halicmetus niger* Ho, Endo & Sakamaki, 2008**

Vernacular name: Black Shortnose Seabst

Figure 7

Halicmetus nigra Ho, Endo & Sakamaki, 2008:768, figs. 1, 4A, 5A (type locality: Central Tosa Bay, off Kochi, Shikoku Island, Japan, depth ~500 m).

Halicmetus niger: Ho & Shao, 2011:37 (name emmendation).

Material examined. 10 specimens, 46.7–87.2 mm SL. AMS I.29756007 (1, 87.2, paratype), FRV Kapala sta. K 89-15-04, eastern Broken Bay, bottom trawl, 33°38'S, 152°0'E, 677–750 m, 4 Aug. 1989; AMS I.30304003 (2, 53.9–60.6, paratypes), FRV Kapala sta. K 89-17-09, eastern Cape Hawke, 32°13'S, 153°6'E, 820–857 m, 17 Aug. 1989. AMS I.20920019 (6, 46.7–58.9, paratypes), 6–17.6 km NE of Raine I., 11°32'S, 144°10'E, 1 prawn trawl, 1000 m, 12 Feb. 1979. CSIRO H.4070-48 (1, 74.7), NNW of Port Hedland, 18°12'S, 118°14'E, 269 m, 8 Sep. 1995.

Diagnosis. A species of *Halicmetus* distinguished by the following combination of characters: disk moderately broad, 62–71% SL; orbit very large, 78.9–11.6% SL; interorbit broad, 6.1–8.1% SL; illicial trough opening low; mid-dorsal disk covered with mixed simple and multicuspid spinules; tiny bucklers evenly distributed on dorsal surface, imperceptible without magnification; belly covered with closely spaced, simple spinules and slightly larger, scattered multicuspid tubercles; dorsal-fin rays absent; pectoral-fin rays 12–15 (modally 13–14); uniformly black dorsally, paler grayish ventrally; peritoneal membrane with dense coverage of melanophores; fins dark banded or black.

Remarks. The diagnosis given above is consistent with the description of this species provided by Ho *et al.* (2008). The name is apparently an adjective and should be spelled *niger* when in *Halicmetus*.

Discussion

The genus *Halicmetus* comprises seven nominal species and can be further subdivided into two subgroups: the *H. ruber* species group, including *H. ruber*, *H. niger*, *H. cf. ruber* and *H. drypus*, which can be separated from the *H. reticulatus* species group by having a light brown peritoneum, usually bifurcate to multifid tubercles on the body surface, relatively large eye and relatively narrow body disk. Members of the *Halicmetus reticulatus* species group, which includes *H. reticulatus*, *H. marmoratus* and *H. westraliensis*, have a pale peritoneal membrane with darker melanophores, usually simple tubercles on the body surface, relatively small eye and relatively wide body disk. *Halicmetus marmoratus* and *H. westraliensis* are also similar to *H. reticulatus* in usually having dorsal-fin rays.

Halicmetus marmoratus differs from *H. reticulatus* in having a marbled colour pattern on the dorsal surface (*vs.* reticulate pattern) and a relatively wider illicial cavity (5.5–7.7% SL *vs.* 4.6–6.4% SL). It differs from *H. westraliensis* in having simple tubercles on the body surface (*vs.* many bifurcated tubercles on the body surface), a marbling on the dorsal surface (*vs.* uniformly pale or with a light brown or smoky pattern), and body disk that is relatively broad (69.9–80.8% SL *vs.* 65.5–73.6% SL) and long (57.6–71.6% SL *vs.* 52.9–57.9% SL). It is also similar to *H. cf. ruber* (*sensu* Ho *et al.*, 2009) in having a marbled colour pattern on the dorsal surface, but *H. marmoratus* usually has a pattern that is usually greenish black (*vs.* pinkish brown in *H. cf. ruber*), dorsal-fin rays usually present (*vs.* all examined specimens lacked dorsal-fin rays), and pale peritoneum with many peppery dots (*vs.* uniformly light brown).

Halicmetus westraliensis differs from *H. reticulatus* in having mainly bifurcated tubercles on the body surface (*vs.* simple tubercles), and lacking a colour pattern on the dorsal surface (*vs.* reticulate pattern present).

Halicmetus drypus is most similar to *H. cf. ruber* but differs in having mainly simple tubercles covering the body surface (*vs.* tubercles mainly bifurcate), body uniformly creamy white in preservation (*vs.* marbled light gray on dorsal surface), a relatively large mouth (width 15.9% SL *vs.* 13.0–14.6% SL), and peritoneal membrane greyish black (*vs.* light brown).



FIGURE 8. *Halicmetus reticulatus* Smith and Radcliffe, 1912. CSIRO H 4070-48, 74.7 mm SL.

The bathymetric ranges for *Halicmetus* species differ somewhat, varying from 269 m to as deep as 1023 m. Members of the *H. ruber* species group seem to have deeper ranges: 280–1000 m for *H. niger* (Ho *et al.*, 2008) and the single known specimen of *H. drypus* was collected at 774 m. The two syntypes of *H. ruber* were taken from 344–402 m, and other specimens were taken from ~400 m. However, it is notable that a specimen (NMV A28720-004) of *H. ruber* was taken from off northwestern Australia at 1021–1023 m deep which represents a depth record for the genus. The depth range for *H. cf. ruber* needs further investigation. Members of *H. reticulatus* species group were taken from shallower depths: 291–500 m for *H. reticulatus* (Kulbicki *et al.*, 1994), 256–695 m for *H. marmoratus*, and 298–420 m for *H. westraliensis*.

Although Ho *et al.* (2008) reported *H. cf. ruber* from Australia and possibly New Caledonia, their Australian specimens are now recognized as the new species (*H. drypus*) described above. The confirmed range of *H. cf. ruber* is now the western North Pacific, off Japan and Taiwan. Based on an examination of specimens collected near the type locality of *H. ruber*, the western North Pacific *H. cf. ruber* is clearly undescribed. Naming of this species must follow a more detailed comparison with the syntypes of *H. ruber*.

Comparative materials

Listed in Ho *et al.* (2008) with the following additional specimens. *Halicmetus reticulatus*: CAS 88742 (1, 81.0), CAS 88789 (1, 74.0), 14°41'04"N, 123°24'07"E, Luzon Island, the Philippines, 435–451 m, 27 Sep. 1995. *Halicmetus ruber*: CAS 42748 (3, 42.9–51.1), 7°40'N, 97°09'E, off Phuket Island, Thailand, 21 Mar. 1963.

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