



Records of deep-sea anglerfishes (Lophiiformes: Ceratioidei) from Indonesia, with descriptions of three new species

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Abstract

An examination of the ceratioid anglerfishes collected on the Indian Ocean side of Indonesia during surveys in 2004–2005 have revealed 18 species in 9 genera and 6 families, including three new species: *Cryptopsaras couesii* (Ceratiidae); *Melanocetus johnsonii* (Melanocetidae); *Diceratias trilobus*, *Bufoceratias microcephalus* **sp. nov.**, *B. thele*, *B. shaoi*, *B. cf. wedli* (Diceratiidae); *Himantolophus danae*, *H. sagamius*, *H. nigricornis*, *H. macroceratoides* (Himantolophidae); *Oneirodes quadrinema* **sp. nov.**, *O. amaokai* **sp. nov.**, *O. carlsbergi*, *O. cristatus*, *Dermatias platynogaster*, *Chaenophryne cf. melanorhabdus* (Oneirodidae); and *Linophryne parini* (Linophrynidae). Of these, specimens of *B. shaoi*, *H. macroceratoides*, *O. cristatus* and *L. parini* represent the second records since the species were described. A specimen of *H. nigricornis* represents the third record and a specimen of *Dermatias platynogaster* represents the fourth record. Descriptive data and notes on the geographical distribution and morphological variation are provided for each species.

Key words. taxonomy, Pisces, *Bufoceratias microcephalus* **sp. nov.**, *Oneirodes quadrinema* **sp. nov.**, *Oneirodes amaokai* **sp. nov.**

Introduction

The deep-sea anglerfishes are a suborder of Lophiiformes characterized by the first dorsal-fin spines modified into illicium and terminal symbiotic light organ (except for caulophrynids, neoceratiid and some gigantactinids), the lack of a pelvic fin and extreme sexual dimorphism with dwarf males that parasitize the females permanently or temporarily. The suborder currently comprises 11 families with 35 genera and about 162 species (Pietsch, 2009; Prokofiev, 2014).

During 2004 and 2005, the Overseas Fishery Cooperation Foundation, Japan and the Agency for Marine and Fisheries Research, Republic of Indonesia conducted the Japan and Indonesia Deep Sea Fishery Resources Joint Exploration Project in deep waters off Sumatra and Java, Indonesia, in the eastern Indian Ocean. The aim of this joint exploration was to survey and develop unused deep-sea fishery resources in this area (Fig. 1). To accomplish this purpose, 138 haul operations were made during 2 cruises between 1 September and 30 October, 2004 and 3 cruises between 2 May and 14 August, 2005 aboard the Indonesian research vessel, Baruna Jaya IV. This joint exploration collected more than 400 fish species (Overseas Fishery Cooperation Foundation of Japan & Agency for Marine and Fisheries Research, Ministry of Marine Affairs and Fisheries, Indonesia, 2006).

The Indonesian collection includes 28 specimens belonging to the suborder Ceratioidei, representing 6 families, 9 genera and 18 species, including three new species. This paper summarizes information about these taxa, documents new material and geographical distributions, and provides descriptions and photos of species supported by voucher specimens.

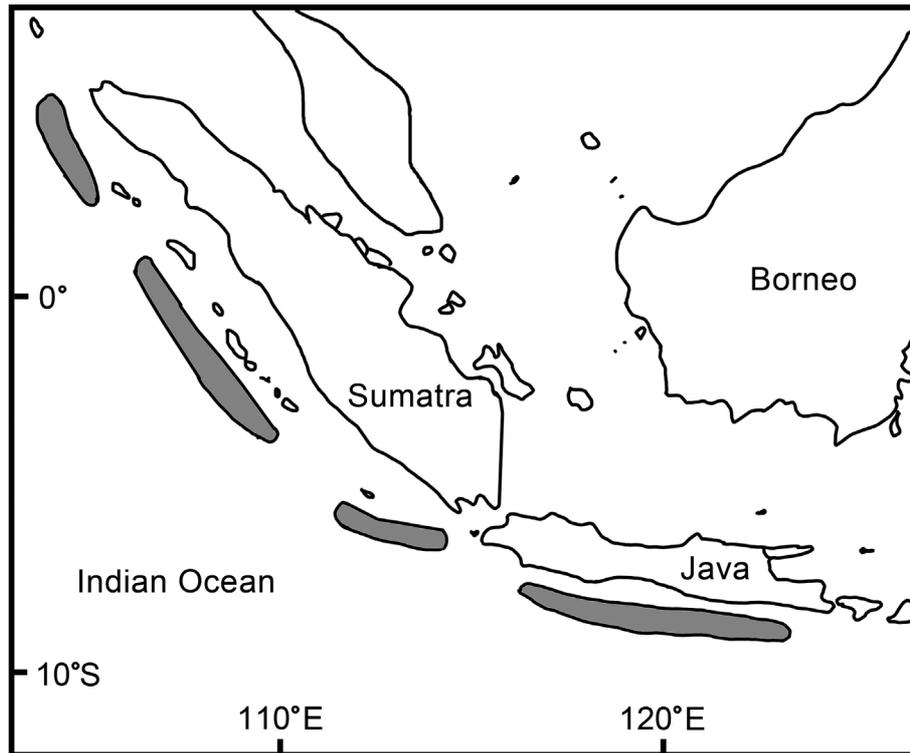


FIGURE 1. Sample locality of the survey (shaded by gray color)

Methods and materials

Terminology follows Bertelsen (1951) and Pietsch (2009). Methods for taking measurements follow Pietsch (1974). Morphometric measurements are direct distances measured by digital caliper to the nearest 0.1 mm. Head length, measured from symphysis of upper jaw to posterior margin of preopercle; head depth measured from base of sphenotic spine to that of articular spine; head width is the distance of the two sphenotic spines; frontal width is the narrowest distance between outer margin of the two frontals; illicial length measured from the base of the esca to the articulation of the illicial bone with its pterygiophore; upper jaw length, measured from the symphysis of upper jaw to the base of articular spine; lower jaw length, measured from the symphysis of lower jaw to the base of articular spine; esca bulb length is the height of the esca bulb excluding its appendages; lengths of esca appendages are total lengths measured from the base to the tip; caudal peduncle depth is the vertical distance between both margins of the caudal peduncle; caudal-fin length is measured from the posterior margin of the hypural plate to the tip of the fin.

In lists of material examined, numbers in parentheses report the number of specimens and range of standard length (SL) of specimens in the lot. Institutional abbreviations follow Fricke & Eschmeyer (2015).

Results

Family Ceratiidae

Comprising 2 genera with 4 species (Pietsch, 1986). One genus with a single species was found in the present study. Members of another genus, *Ceratias*, have been reported from this region.

***Cryptopsaras couesii* Gill, 1883**

Fig. 2

Cryptopsaras couesii Gill, 1883:284 (type locality: off New York, U.S.A., western North Atlantic, 1686 fathoms [3083 m]).
Pietsch, 2009:329.

Material. HUMZ 194454 (1, 115 mm SL, female), st. 91, 3°37.5'N, 94°53.4'E, 3°37.3'N, 94°54.9'E, 760–769 m, off Sumatra, 29 Jun. 2005.

Description. Dorsal-fin rays 4; pectoral-fin rays 15; anal-fin rays 4; caudal-fin rays 8. Teeth on vomer 7 (4 on right side, 3 on left side). Head length 31.4% SL; head depth 34.8; head width 13.3; illicial length 2.7; upper jaw length 20.1; lower jaw length 22.3.

Body slightly elongate, compressed, oval in lateral view. Mouth nearly vertical when closed. Sphenotic spines absent. Illicium very short, mostly hidden by esca. Three club-shaped caruncles just anterior to origin of dorsal-fin. Skin covered by tiny close-set dermal spines. Uniformly dark brown, inter-radial membranes of all fins transparent.

Distribution. Widespread in all three major oceans. Our specimen represents the first record from Indonesia.



FIGURE 2. *Cryptopsaras couesii* Gill, 1883, HUMZ 194454, 115.4 mm SL, fresh. A male attaches on the anal-fin base which was lost after preservation.

Family Melanocetidae

Comprising a single genus and 6 species (Pietsch & van Duzer, 1980). One species was found in this study.

***Melanocetus johnsonii* Günther, 1864**

Fig. 3

Melanocetus johnsonii Günther, 1864:302, pl. 25 (type locality: Sea of Madeira, eastern Atlantic). Pietsch, 2009:361.

Material. HUMZ 190769 (1, 29.3), st. 26, 5°29.11'N, 94°1.47'E, 5°27.49'N, 94°1.52'E, 347–361 m, off Sumatra, 13 Oct. 2004.

Description. Dorsal-fin rays 14; pectoral-fin rays 19 or 20; anal-fin rays 4; caudal-fin rays 9. Vomerine teeth 1 (1, 0). Head length 44.4% SL; head depth 87; head width 39.2; illicial length 37.9; upper jaw length 60.4; lower jaw length 65.5.

Body short, globular, rounded in lateral view. Head very deep. Mouth gape large, upturned. Sphenotic spines

well developed. Eye small. Illicium moderately long. Esca simple bulb, with a small crest. Fang-like teeth on both jaws, arranged in about 3 or 4 rows, gradually becoming 1 row posteriorly. Body uniformly black; all fins with transparent distal margin and inter-radial membranes.

Distribution. Widespread in all three major oceans.

Remarks. Pietsch (2009) mentioned that the majority of his specimens were collected shallower than 1000 meters. The Indonesian specimen was collected from a relatively shallow range of only 347–361 m.



FIGURE 3. *Melanocetus johnsonii* Günther, 1864, HUMZ 190769, 29.3 mm SL, preserved.

Family Diceratiidae

Comprising 2 genera and 6 species (Pietsch *et al.*, 2004). Paxton & Lavenberg (1973) reported *Diceratias bispinosus* (Günther, 1887) and Uwate (1979) described *Phrynichthys thele* (= *Bufoceratias thele*) from Indonesian waters. In this study, 1 species of *Diceratias* and 2 species of *Bufoceratias* are recognized from this area. In addition, a specimen tentatively identified as *B. wedli*, a species previously only known from the Atlantic Ocean, and a new species are described.

Diceratias trilobus Balushkin & Fedorov, 1986

Fig. 4

Diceratias trilobus Balushkin & Fedorov, 1986:855, fig. (type locality: off Honshu, Japan, 1211–1216 m). Pietsch *et al.*, 2006:S97. Pietsch, 2009:356.

Material. HUMZ 194412 (1, 53.1), st. 34, 8°37.7'S, 111°21.5'E–8°37.8'S, 111°19.8'E, off Java, 595–600 m, 15 May 2005.

Description. Dorsal-fin rays 6; pectoral-fin rays 15; anal-fin rays 4; caudal-fin rays 9. Teeth on vomer 2 (1 on each side); upper jaw teeth 72; lower jaw teeth 43. Head length 46.2% SL; head depth 56.0; head width 35.5; frontal width 17.4; illicial length 23.2; distance between upper jaw symphysis and origin of illicium 9.4; upper jaw length 42.8; lower jaw length 50.6; width of esca 8.9; length of esca 10.8; longest teeth on upper jaw 5.7; longest teeth on lower jaw 7.0.

Body short and globular. Illicium short. Jaw large, oblique. Esca with single anterior and posterior appendages; anterior appendage longer than posterior appendage; each appendage bearing a terminal cirrus; 2 cirri on posterior margin of posterior appendage.

Distribution. Eastern Indian Ocean, western Pacific Ocean and South China Sea. Our specimen represents first record from Indonesia.

Remarks. The Indonesian specimen is smaller than most specimens examined in Pietsch *et al.* (2006), but agrees well with the data and description provided by them. However, a few differences were observed in the specimen: only two teeth on vomer (vs. 6–10 in Pietsch *et al.*, 2006); relatively short illicium (23.2% SL, vs. 27.9–33.7% SL); relatively narrow and long esca, its width 8.9% SL (vs. 9.6–10.5% SL) and length 10.8% SL (vs. 5.8–7.9% SL); and relatively few jaw teeth, 72 (cf. 67–111) on upper jaw and 43 (vs. 51–68) on lower jaw.



FIGURE 4. *Diceratias trilobus* Balushkin & Fedorov, 1986, HUMZ 194412, 53.1 mmSL, fresh.

***Bufoceratias microcephalus* Ho, Kawai & Amaoka, sp. nov.**

New English name: Small-head toady seadevil

Figs. 5A–B, 6A; Table 1

Holotype. HUMZ 193747 (151.0), st. 29, 8°31.3'S, 110°25.0'E– 8°30.8'S, 110°23.6'E off Java, Indonesia, eastern Indian Ocean, 755–770 m, 13 May 2005.

Diagnosis. A species of *Bufoceratias* characterized by a small and narrow head; small mouth, reflected by shorter jaws; relatively small and more numerous teeth on both jaws; moderately long illicium; large esca bearing large bulb-like terminal papilla, about equal to size of esca, simple filament-like posterior appendage and pair of short simple filament-like lateral appendages; and lack of anterior appendage.

Description. Dorsal-fin rays 6; pectoral-fin rays 14; anal-fin rays 4; caudal-fin rays 9. Teeth on vomer 11 (6, 5); upper jaw teeth 97 (45, 52); lower jaw teeth 67 (33, 34). Head length 36.6% SL; head depth 39.4; head width 26.3; frontal width 12.2; illicial length 70.0; distance between upper jaw symphysis and origin of illicium 40.4; upper jaw length 29.5; lower jaw length 35.6; total length of esca 21.3.

Body slightly elongated compared to three congeners, its depth about 1.2 in length, somewhat compressed, oval profile when viewed from lateral side. Mouth relatively small, cleft not reaching eye, oblique. Oral valve well developed, lining inside of both jaws. Single tube-like nostril about midway between eye and mouth. Teeth short on both jaws and vomer, length of longest teeth on upper jaw 2.5% SL, on lower jaw 3.0% SL. Teeth present on pharyngobranchial II and III.

Illicium moderately long, emerging from dorsal surface of head behind sphenotic spines. Entire pterygiophore of illicium concealed beneath skin. Second cephalic spine beneath skin just behind base of illicium; a small pore behind base of illicium.

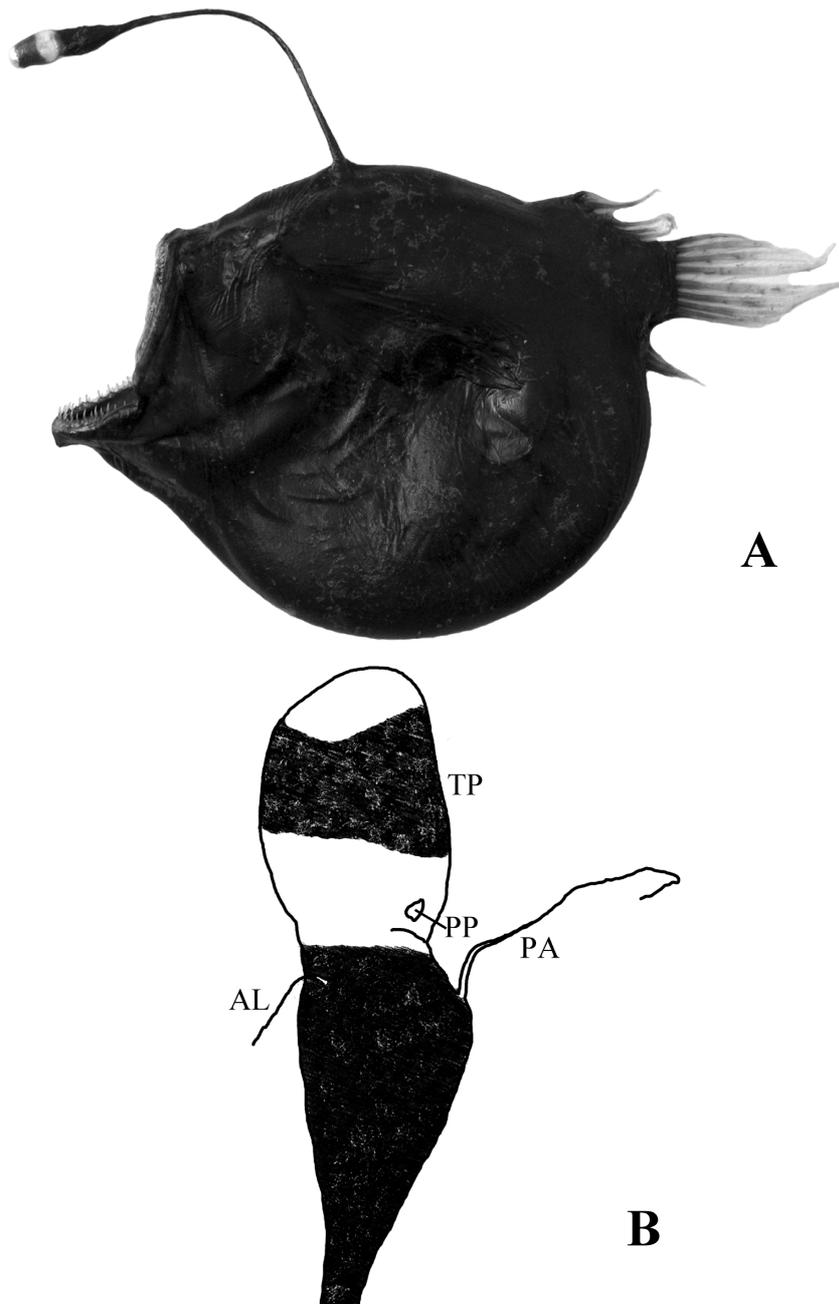


FIGURE 5. Holotype of *Bufoceratias microcephalus* Ho, Kawai & Amaoka, **sp. nov.** A. HUMZ 193747, 151.0 mm SL, preserved. B. Esca of the holotype. AL, anterolateral escal appendage. PA, posterior escal appendage. PP, posterior pore. TP, terminal papilla.

Esca large, its length 10.5% SL and width 6.8% SL, bearing very large bulb-like terminal papilla, about size of esca bulb, its length 10.8% SL and width 6.8% SL; single filament-like posterior appendage, length 15.2% SL, simple and colorless; pair of short filament-like lateral appendages, length 4.2% SL (one side much shorter than other possibly due to damage); large posterior pore at base of terminal papilla.

Body, including the illicium, esca and esca terminal papilla, covered by feeble and tiny dermal spines.

Coloration. Uniformly blackish, except for grayish rays of dorsal, anal and caudal fins and transparent inter-radial membranes. Middle portion of esca terminal papilla pigmented, base and tip semi-transparent; esca appendages transparent.

Etymology. Named for the relatively small head of this species compared to that of all other congeners.

Distribution. Known only from the holotype collected off Java, Indonesia at a depth on 755–770 m.

Remarks. A comparison on selected morphometric and meristic data for recognized species in the genus are shown in Table 1.

TABLE 1. Selected morphometric and meristic data for *B. microcephalus* Ho, Kawai & Amaoka, **sp. nov.** compared to other congeners. Proportional data are expressed as percentage of standard length (SL). Tooth counts are sum of both sides. Data in the brackets are those provided in Pietsch (2009).

| | <i>B. microcephalus</i> sp. nov. | <i>B. thele</i> | <i>B. wedli</i> | <i>B. cf. wedli</i> | <i>B. shaoi</i> |
|----------------------------|-------------------------------------|---------------------------|-------------------------|---------------------|----------------------|
| Standard length (mm) | 151.0 | 39.5–127.4 (n=3) | 51.0–127.0 (n=7) | 131.2 (n=1) | 33.5–52.5 (n=5) |
| Illicial length | 70.0 | 111.1–174.4 [112– 143] | 99.7–138.2 [83– 225] | 47.5 | 24.8–36.7 [25–40] |
| Head length | 36.6 | 41.0–48.1 | 39.0–38.8 | 44.3 | 41.8–53.4 |
| Head depth | 39.4 | 50.2–66.6 | 46.5–54.8 | 52.9 | 48.7–60.3 |
| Head width | 26.4 | 30.5–33.2 | 32.1–43.1 | 36.3 | 30.1–41.7 |
| Frontal width | 12.2 | 13.9–15.1 | 13.3–16.9 | 17.0 | 14.0–17.0 |
| Upper jaw | 29.5 | 38.4–45.6 | 36.2–45.0 | 39.8 | 38.0–49.9 |
| Lower jaw | 35.6 | 40.8–57.7 | 37.7–48.1 | 42.1 | 41.5–50.5 |
| Escal width | 6.8 | 2.0–5.8 | 3.7–5.5 | 5.6 | 4.0–5.3 |
| Longest tooth on upper jaw | 2.5 | 5.1–6.6 | 3.0–5.1 | 3.8 | 5.3–7.8 |
| Longest tooth on lower jaw | 3.0 | 6.2–9.4 | 5.0–6.9 | 5.3 | 6.2–9.2 |
| Teeth on upper jaw | 97 | 40–52 [12–49] | 33–53 [21–65] | 40 | 25–45 [34–42] |
| Teeth on lower jaw | 67 | 33–44 [15–48] | 27–40 [16–44] | 34 | 23–35 [25–30] |

Bufoceratias microcephalus **sp. nov.** can be easily separated from all three congeners by its relatively small head, the length 36.6% SL (vs. 39.0–53.4% SL in congeners) and depth 39.4% SL (vs. 46.5–66.6% SL); narrow head, the width 26.4% SL (vs. 30.1–43.1% SL) and frontal width, 12.2% SL (vs. 13.3–17.0% SL); small mouth reflected by short jaws, upper jaw length 29.5% SL (vs. 36.2–49.9% SL) and lower jaw length 35.6% SL (vs. 37.7–57.5% SL); moderately long illicium, its length 70.0% SL, which is shorter than that of *B. wedli* (99.7–147.4% SL, n=12) and *B. thele* (111.1–174.4% SL, n=3), but longer than that of *B. shaoi* (24.8–40.0% SL, n=9); more numerous jaw teeth (97 vs. 25–53 on upper jaw, 67 vs. 23–44 on lower jaw); relatively small jaw teeth, the length of longest teeth on upper jaw 2.5% SL (vs. 3.0–7.8% SL) and on lower jaw 3.0% SL (vs. 5.0–9.4% SL); and a different escal morphology with a relatively large esca bulb, a very large bulb-like terminal papilla, a slender simple filament-like posterior appendage and a pair of short, simple filament-like lateral appendages. Although represented by only a single specimen, the above-mentioned characters readily distinguish it from all other congeners.

Bufoceratias thele (Uwate, 1979)

Figs. 6B, 7A–B

Phrynichthys thele Uwate, 1979:142, fig. 19 (type locality: Halmahera Sea, western Pacific, 680–850 m).

Bufoceratias thele (Uwate, 1979): Pietsch *et al.*, 2004:104. Pietsch, 2009:358.

Materials. HUMZ 190902 (1, 48.5), st. 24, 3°44.57'S, 94°52.18'E, 3°46.22'S, 94°51.39'E, 712–768 m, off Sumatra, 21 Oct. 2004. HUMZ 191147 (1, 127.4), st. 19, 1°18.42'S, 98°45.5'E, 1°49.43'S, 98°47.10'E, 547–567 m, off Sumatra, 29 Sep. 2004. HUMZ 194413 (1, 39.5), st. 34, 8°37.7'S, 111°21.5'E–8°37.8'S, 111°19.8'E, off Java, 595–600 m, 15 May 2005.

Description. Dorsal-fin rays 6; pectoral-fin rays 13–15; anal-fin rays 4; caudal-fin rays 9. Teeth on vomer

6–11 (3–6 on each side); upper jaw teeth 40–52; lower jaw teeth 33–44. Head length 41.0–43.7% SL; head depth 50.2–55.7; head width 30.5–30.9; frontal width 13.9–15.1; illicial length 153.8–174.4; distance between upper jaw symphysis and origin of illicium 44.1–50.2; upper jaw length 38.4–41.4; lower jaw length 40.6–40.8.

Body short, globular, rounded profile in lateral view. Illicium emerging from dorsal surface of head, behind sphenotic spines. Illicium very long. Mouth large, oblique. Esca simple bulb, its width 2.0–5.8% SL, its total length 9.9–11.1% SL, with short terminal papilla, its length 3.9–6.5% SL, from about half to slightly more esca length; no other appendage present.

Slender fang-like teeth on both jaws, longest teeth on upper jaw 5.1–6.6% SL, longest teeth on lower jaw 6.2–9.4% SL.

Distribution. Previously only known from western Pacific Ocean. Our specimens represent the first record for the eastern Indian Ocean.

Remarks. Three Indonesian specimens agree well with the data and description provided by Pietsch *et al.* (2004), except for the following: longer illicium (153.8–174.4% SL, vs. 112–143% SL in Pietsch *et al.*, 2004); the 48.5 mm specimen has 52 teeth on upper jaw (vs. 15–48); the 127.4 mm specimen has 11 vomerine teeth (vs. 4–10) and 15 rays on one pectoral-fin (vs. 13–14). The 127.4 mm specimen also has a relatively long esca terminal papilla, its length 6.5% SL, compared with other specimens examined.



FIGURE 6. A. *Bufoceratias microcephalus*, HUMZ 193747, 151.0 mm SL, holotype. B. *Bufoceratias thele*, HUMZ 191147, 127.4 mm SL. C. *Bufoceratias shaoi*, HUMZ 193746, 68.2 mm SL. D. *Bufoceratias wedli*, HUMZ 31934, 124.0 mm SL.

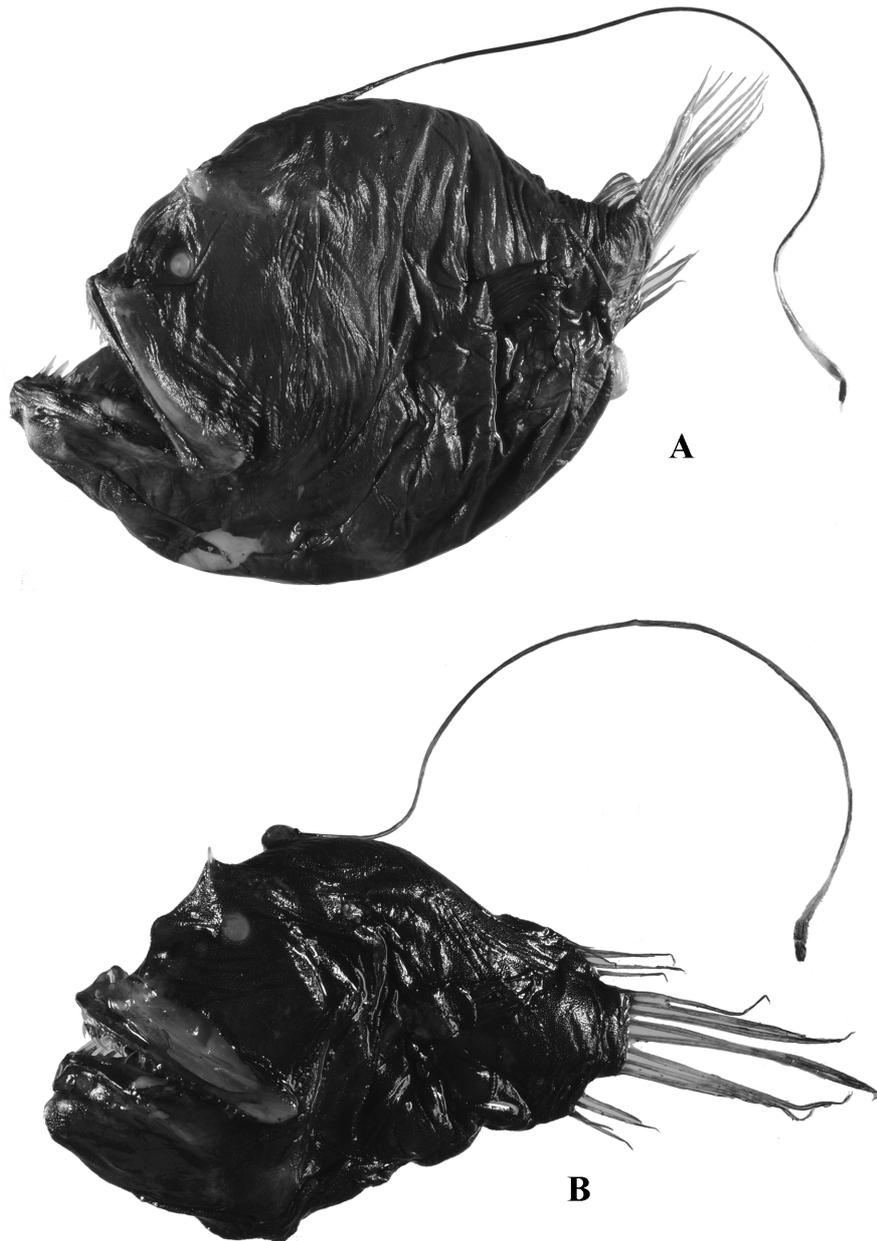


FIGURE 7. *Bufoceratias thele* (Uwate, 1979). A. HUMZ 191147, 127.4 mm SL, preserved. B. HUMZ 190902, 48.5 mm SL, fresh.

***Bufoceratias shaoi* Pietsch, Ho & Chen, 2004**

Figs. 6C, 8

Bufoceratias shaoi Pietsch, Ho & Chen, 2004:100, figs. 1, 3A (type locality: northeastern Taiwan). Pietsch, 2009:358.

Materials. HUMZ 193746 (1, 68.2), st. 29., 8°31.3'S, 110°25.0'E–8°30.8'S, 110°23.6'E, off Java, 755–770 m, 13 May 2005. HUMZ 193895 (1, 44.8), HUMZ 193896 (1, 52.5), HUMZ 193897 (1, 46.1), HUMZ 193898 (1, 33.5), st. 22, 8°18.8'S, 110°13.1'E–8°18.2'S, 109°11.3'E, off Java, 530–582 m, 11 May 2005.

Description. Dorsal-fin rays 6–7; pectoral-fin rays 13–14 (mode 14); anal-fin rays 4; caudal-fin rays 9. Teeth on vomer 6–10 (3–5 on each side); upper jaw teeth 25–45; lower jaw teeth 23–35. Head length 41.8–53.4% SL; head depth 48.7–60.3; head width 30.1–41.7; frontal width 14.0–17.0; illicial length 24.8–36.7; distance between upper jaw symphysis and origin of illicium 33.1–50.6; upper jaw length 38.0–49.9; lower jaw length 41.5–50.5.



FIGURE 8. *Bufoferatias shaoi* Pietsch, Ho & Chen, 2004, HUMZ 193746, 68.2 mm SL, preserved.

Body short, globular, rounded to oval profile in lateral view. Mouth large, oblique. Illicium emerging from dorsal surface of head behind sphenotic spines. illicium relatively short. Esca small, its total length 33.9–54.8% SL and its width 4.0–5.3% SL; extremely elongate, unpigmented terminal papilla, its length 29.2–39.7% SL and width 2.0–4.5% SL, cylindrical and gradually tapering to a terminal cirrus; esca pore situated at postero-basal margin of terminal papilla; anterior esca appendage, 18.8–28.4% SL, single main branch or divided into two branches, each subdivided into several secondary branches and bearing numerous slender filaments; a pair of lateral esca appendages, 27.2–36.7% SL, each divided into four or five branches, each branch bearing numerous long, slender filaments; posterior appendage absent. Slender fang-like teeth on both jaws, longest teeth on upper jaw 5.3–7.8% SL; longest teeth on lower jaw 6.2–9.2% SL.

Body brownish to blackish; fin rays pale grayish to black; esca appendages variously pigmented, from colorless to slightly pigmented or uniformly transparent.

Remarks. All five Indonesian specimens have nearly identical morphological characters, except for the terminal papillae that are much longer than those of type series and more dorsal-fin rays (6 or 7 vs. all with 5 rays, except for one paratype with 6). The esca morphology varies slightly: the 44.8 mm specimen has a main branch and one additional small branch on each side; the 33.5 mm specimen has a single main branch.

The lack of an esca posterior appendage in all specimens also distinguishes it from all congeners but *B. thele*, which lacks all esca appendages.

***Bufoferatias* cf. *wedli* [sensu Pietschmann, 1926]**

Figs. 6D, 9A–B

Material. HUMZ 194334 (1, 131.2), st. 66, 4°33.7'S, 109°13.4'E–4°32.8'S, 109°11.8'E, off Sumatra, 530–582 m, 11 May 2005.

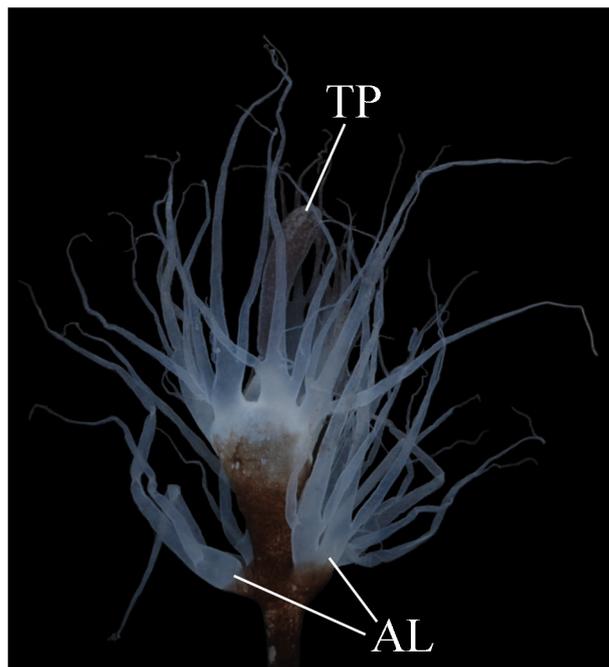
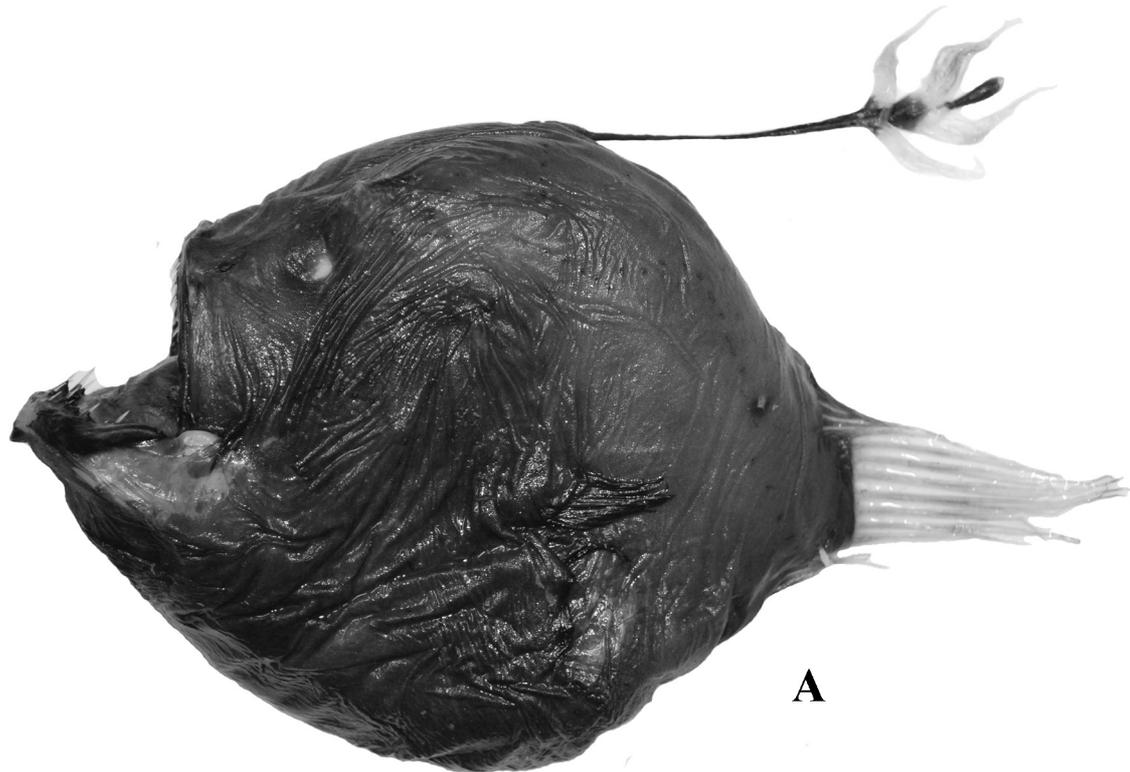


FIGURE 9. *Bufoceratias* cf. *wedli*. A. HUMZ 194334, 131.2 mm SL, preserved. B. Closed view of esca, same specimen. TP, terminal papilla; AL anterolateral esca appendage.

Description. Dorsal-fin rays 6; pectoral-fin rays 14; anal-fin rays 4; caudal-fin rays 9. Teeth on vomer 9 (4, 5); upper jaw teeth 40; lower jaw teeth 33. Head length 44.3% SL; head depth 52.9; head width 36.6; frontal width 17.0; illicial length 47.5; distance between upper jaw symphysis and origin of illicium 55.0; upper jaw length 39.8; lower jaw length 42.1.

Body short and globular, rounded in lateral view. Mouth large, oblique. Illicium emerging from dorsal surface of head behind sphenotic spines. Illicium relatively short. Esca moderate in size, its total length 25.7% SL and width 5.6% SL, appendages less complex than in *B. shaoi*; a broad-based anterior appendage, total length 21.6% SL, with four main branches, each with few secondary branches; a pair of lateral appendages, total length 26.1% SL, one with three main branches and one with four, each main branch with few secondary branches and filaments; a pair of posterior appendages, 16.2% SL, each with many short to moderately long filaments; terminal papilla stout, slightly shorter than esca, 2.7% SL, rounded and slightly expended distally, uniformly pigmented.

Slender fang-like teeth on both jaws, longest teeth on upper jaw 3.8% SL, longest teeth on lower jaw 5.3% SL.

Remarks. The presence of a pair of branched posterior appendages (total length 16.2% SL) and rounded terminal papilla that is expanded distally and fully pigmented suggest this specimen is most similar to *B. wedli*. However, the specimen has a very short illicium (47.5% SL), compared to that of *B. wedli* (99.7–147.4% SL, n=12, 19.4–127.0 mm SL), but relatively long compared to that of *B. shaoi* (24.8–40.0%, n=9, 33.5–101.0 mm SL).

Uwate (1979) described the development of the esca of *B. wedli* which displays elongation of the esca terminal papilla by 60 mm (SL) and other appendages usually developing by 40 mm with increased branching and filament elongation by 50 mm (SL). In contrast, all specimens of *B. shaoi* (33.5–101.0 mm SL) lack the posterior appendage. Thus, the presence of posterior appendage(s) is herein recognized as a diagnostic character for *B. wedli* in specimens larger than 50 mm SL.

Previously *B. wedli* was only known from the Atlantic Ocean. The Indonesian specimen, if confirmed to be *B. wedli*, will represent the first and only record in the Indian Ocean.

Family Himantolophidae

Comprising a single genus and 19 species (Bertelsen & Krefft, 1988; Pietsch & Kenaley, 2011). Four species are recognized in the present study.

Himantolophus danae Regan & Trewavas, 1932

Fig. 10

Himantolophus danae Regan & Trewavas, 1932:60, pl. 1, figs. 2, 87–88B (type locality: South China Sea, ca. 350 m). Bertelsen & Krefft, 1988:42. Pietsch, 2009:337.

Material. HUMZ 194700 (1, 45.4), st. 61, 5°53.8'S, 102°41.7'E–5°54.2'S, 102°43.2'E, 844–856 m, off Sumatra, 1 Jun. 2005.

Description. Dorsal-fin rays 5; pectoral-fin rays 17; anal-fin rays 4; caudal-fin rays 9. Head length 44.1% SL; head depth 55.7; head width 22.7; illicial length 34.3; esca width 7.0; upper jaw length 34.4.

Body short, globular anteriorly, compressed posteriorly, somewhat triangular in lateral view. Sphenotic spines well developed, directed upward. Some dark papillae on snout and chin. Twenty-five dermal spines on body, 2 or 3 on each pectoral-fin base. Teeth numerous, in about 4–5 rows, those on lower jaws larger than those on upper jaws. Vomerine teeth not detectable. Low and small dermal spines on distal half of illicial stem, esca and all appendages, including distal lobes and distal papillae.

Esca with single anterior appendage, length 24.9% SL, bifurcated distally, one branch longer than other, no short side branches; distal appendage very short, length 2.9% SL, each with two bud-like side branches; single simple posterior appendage, length 22.5% SL; two pairs of appendages posteriorly at base of esca, those on upper pairs bifurcated asymmetrically, its total length 29.5% SL, one branch longer than other, those on lower pair slightly shorter and thinner, length 21.1% SL, both simple. Distal papillae paired, short and simple. Anterior pair of esca lobes with broad bases, prolonged into filaments distally, length 4.4% SL.



FIGURE 10. *Himantolophus danae* Regan & Trewavas, 1932, HUMZ 194700, 45.4 mm SL, fresh.

Body uniformly brownish gray; all fins lightly pigmented; upper portion of illicial stem and esca paler, all appendages darker.

Distribution. Previously only known from the central South China Sea at a depth ca. 350 m. Our specimen collected from off Sumatra at a depth of 844–856 m represents the second overall record, as well as first record in the eastern Indian Ocean.

Remarks. The species was previously only known from the 39 mm SL holotype. The specimen is slightly larger than the holotype and has the following differences: a shorter illicium, its length 34.3% SL (vs. 48% SL in holotype); no side branches on the anterior esca appendage; and only two pairs of appendages at the esca base (vs. 3 pairs).

***Himantolophus sagamius* (Tanaka, 1918)**

Fig. 11

Corynolophus sagamius Tanaka, 1918:491, pl. 134, fig. 377 (type locality: Sagami Sea, Japan).

Himantolophus sagamius (Tanaka, 1918): Bertelsen & Krefft, 1988:39. Pietsch, 2009:336.

Material. HUMZ 194261 (1, 42.6), st. 31, 8°35.6'S, 110°43.3'E–8°35.5'S, 110°41.8'E, off Java, 605–607 m, 14 May 2005. HUMZ 194599 (1, 51.9), st. 103, 8°17.5'S, 109°44.1'E–8°18.0'S, 109°41.6'E, off Java, 612–632 m, 16 Jul. 2005.

Description. Dorsal-fin rays 5; pectoral-fin rays 17; anal-fin rays 4; caudal-fin rays 9. Head length 41.2–46.7% SL; head depth 49.1–58.7; head width 25.6–29.1; illicial length 33.6–36.0; esca width 6.8–7.5; upper jaw length 30.8–34.0.

Body short, globular anteriorly, compressed posteriorly. Sphenotic spines well developed, directed upward. Papillae less developed on snout and chin. Twenty-nine dermal spines on body in 42.6 mm specimen and 44 in 51.9 mm specimen, 2 or 3 on each pectoral-fin base. Teeth numerous, in about 4–5 rows, those on lower jaw larger than those on upper jaw. Vomerine teeth not detectable. Papillae not developed on snout and chin. Dermal spines loosely covering upper half of illicial stem and densely covering esca, including all appendages, in 42.6 mm specimen; densely covering illicial stem (except for base) and esca, including all appendages, in 51.9 mm specimen.

Esca of 42.6 mm specimen: a single anterior appendage, length 17.8% SL, bifurcated distally, branches subequal; single posterior appendage, length 18.1% SL, bifurcated distally, one branch longer than other; a pair of

short distal appendages, length 3.5% SL, each with 2 bud-like side branches; four esca lobes, all very low, pigmented internally; two pairs of appendages at base of esca, those on upper pair longer, length 27.0% SL, bifurcated distally, those on lower pair simple, length 17.1% SL.



FIGURE 11 *Himantolophus sagamius* (Tanaka, 1918), HUMZ 194261, 42.6 mm SL, fresh.

Esca of 51.9 mm specimen: single simple anterior appendage, length 9.2% SL; single simple posterior appendage, 8.5% SL; one pair of short distal appendages, length 1.3% SL, lower than esca lobes; four flat esca lobes; two pairs of appendages at base of esca, all simple, those on upper pair length 15.6% SL and on lower pair length 14.6% SL.

Body pale gray to brownish gray, both jaws darker. All fins transparent, except for lightly pigmented rays of caudal-fin.

Distribution. Previously only known from Pacific Ocean, this is the first record of the species from the eastern Indian Ocean. Some specimens examined in Bertelsen & Krefft (1988) were collected from 613–ca.1300 m, whereas the Indonesian specimens were collected at 605–632 m.

***Himantolophus nigricornis* Bertelsen & Krefft, 1988**

Fig. 12

Himantolophus nigricornis Bertelsen & Krefft, 1988:50, fig. 17 (type locality: San Clemente basin, off southern California). Pietsch, 2009:341.

Material. HUMZ 194476 (1, 116.0), st. 9, 8°19.1'S, 109°1.9'E–8°18.9'S, 109°0.3'E, off Java, 814 m, 6 May 2005.

Description. Dorsal-fin ray 5; pectoral-fin rays 16 (right side)/17 (left side); anal-fin rays 4; caudal-fin rays 9. Head length 35.8% SL; head depth 42.7; head width 18.5; illicial length 65.5.

Body short, compressed, profile oval in lateral view. Head very high, becoming gradually narrower posteriorly to caudal peduncle. Sphenotic spines less developed, directed upward. Papillae well developed on snout and chin. One hundred dermal spines on body, 3 on pectoral-fin base (left side missing). Teeth less numerous compared to other congeners examined in this study, about 3 rows on upper jaw and 4 rows on lower jaw, those on lower jaw larger than those on upper jaw. Vomerine teeth not detectable. Dermal spines covering on illicial stem (except for the base), more scattered on esca, with posterior and distal appendages naked.

Esca with only single distal appendage, length 6.1% SL, and single posterior appendage, length 7.8% SL; both appendages undivided proximally and bifurcated distally, those branches simple. Pair of short simple appendages on illicial stem.

Body dark brown, papillae on median portions of snout and chin pale or less pigmented. Distal and posterior appendages darkly pigmented except for semi-transparent tips.

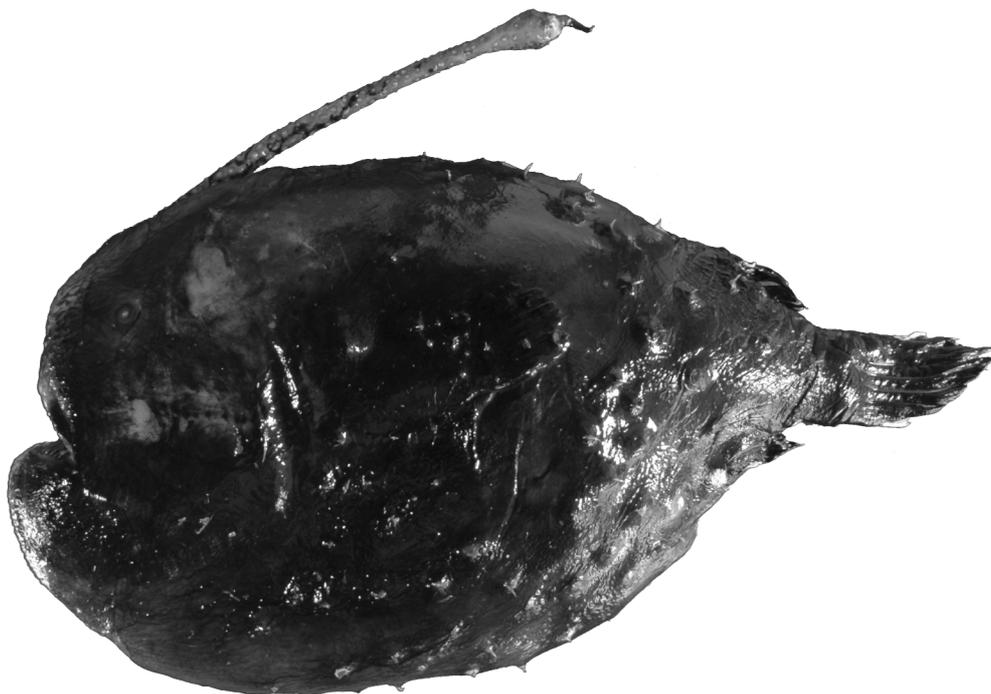


FIGURE 12 *Himantolophus nigricornis* Bertelsen & Krefft, 1988, HUMZ 194476, 116.0 mm SL, fresh.

Distribution. Previously known from eastern Pacific Ocean off California and central north Pacific Ocean off Hawaii. New record from eastern Indian Ocean off Indonesia. Bathymetric range not available previously, whereas the Indonesian specimen was taken at a depth of 814 m.

Remarks. The original description was based on two specimens, a third specimen was recorded by Pietsch (2009). The Indian Ocean specimen is smaller than the previous three specimens and the following differences were observed: illicium relatively short, length 65.5% SL (vs. 70–87% SL in Pietsch, 2009) and the proximal portion of the posterior appendage is undivided (vs. bifurcated near the base).

***Himantolophus macroceratoides* Bertelsen & Krefft, 1988**

Fig. 13

Himantolophus macroceratoides Bertelsen & Krefft, 1988:70, figs. 31–32 (type locality: Equatorial Atlantic, 246–256 m).
Pietsch, 2009:348.

Material. HUMZ 194477 (1, 95.5), st. 9, 8°19.1'S, 109°1.9'E–8°18.9'S, 109°0.3'E, off Java, 814 m, 6 May 2005.

Description. Dorsal-fin ray 5; pectoral-fin rays 15; anal-fin rays 4; caudal-fin rays 9. Head length 34% SL; head depth 44.2; head width 23.5; illicium 32.

Body short, compressed, profile oval in lateral view. Head very high, becoming gradually narrower posteriorly to caudal peduncle. Sphenotic spines less developed, directed upward. Papillae well developed on snout and chin. Seventy-four dermal spines on body and 3 on pectoral-fin base (left side missing). Numerous teeth on both jaws, in about 5 rows on each jaw, those in inner row longest, those on lower jaw longer than those on upper jaw. Vomerine teeth not detectable. Dermal spines covering distal three-fourths of illicial stem, entire esca and about one-eighth of distal esca appendage.



FIGURE 13 *Himantolophus macroceratoides* Bertelsen & Krefft, 1988, HUMZ 194477, 95.5 mm SL, fresh.

Esca with pair of extremely long distal appendages, length of distal appendage 148.2% SL (right side) and 150.9% SL (left side), respectively; length of posterior side branch on each distal esca appendage 7.6% and 6.9% SL, respectively; each side branch emerging at 45.1% and 43.1% of the appendage length, respectively, above base of each distal esca appendage; both side branches fusiform, lengths about 5 times its greatest diameter; diameter of esca bulb 10.3% SL.

Body mainly black, papillated areas of snout and chin paler; dorsal surface of head pale coinciding with illicium when fully laid back. Basal and distal portions of distal appendages and distal portion of side branches pale or transparent.

Distribution. Previously only known from two specimens collected in the eastern Atlantic and western Indian oceans. The specimen examined here represents the first record for the eastern Indian Ocean. The holotype was collected at a depth of 246–256 m, whereas the paratype was taken between 800–900 m; the Indonesia specimen was collected at a depth of 814 m.

Remarks. The Indian Ocean specimen is about intermediate in body size between the two types. Differences between the current specimens and the original description include: the distal appendages are considerably longer 148.2–150.9% SL (vs. 92–100% in Bertelsen & Krefft, 1988) and side branches on the distal appendages are somewhat shorter, 6.9–7.6% SL (vs. 9–10% SL).

Family Oneriodidae

The largest family of the suborder Ceratioidei currently comprising 16 genera and roughly 62 species (Pietsch, 2009). Six species in 3 genera were identified in present study, including 2 new species described below. Although two specimens are tentatively identified as *Chaenophryne* cf. *melanorhabdus*, they may prove to be an undescribed species when more specimens are available.

***Oneiroides quadrinema* Ho, Kawai & Amaoka, sp. nov.**

New English name: Indonesian Dreamer

Figs. 14A–B, 15A–B; Table 2

Holotype. HUMZ 194478 (169.0), st. 9, 8°19.1'S, 109°1.9'E–8°18.9'S, 109°0.3'E, off Java, 814 m, 6 May 2005.

Paratypes. HUMZ 193748 (1, 130.2), st. 29, 8°31.3'S, 110°25.0'E–8°30.8'S, 110°23.6'E, off Java, Indonesia, eastern Indian Ocean, 755–770 m, 13 May 2005. HUMZ 193893 (1, 104.6) and HUMZ 193894 (1, 69.5), st. 22, 8°18.8'S, 110°13.1'E–8°18.2'S, 110°11.3'E, off Java, Indonesia, eastern Indian Ocean, 755–770 m, 13 May 2005.

Diagnosis. A species of *Oneirodes* differing from all described species in having relatively few teeth in jaws, 17–22 total teeth (8–11 on each jaw) and the following combination of esca morphology: long, internally pigmented anterior appendage, with 2–4 black-tipped branches, its total length 15.6–19.1% SL; pair of filamentous anterolateral appendages arising from either side at base of anterior esca appendage, subequal or slightly longer than anterior esca appendage; single broad-based medial appendage with four main branches, each branch with many secondary branches and filaments; short and cylindrical posterior appendage; and blunt terminal papilla with a distal spot.

Description. Morphometric and meristic data of the type series are provided in Table 2. The following data are for the holotype, followed by those of all types where differences exist, except as indicated.

Dorsal-fin rays 6 (104.6 mm paratype with 7); anal-fin rays 4; pectoral-fin rays 16/16 (16–18); caudal-fin rays 9.

Body slightly elongate, laterally compressed, profile oblong in lateral view; body depth about 1.5 in body length excluding caudal-fin; caudal peduncle narrow, 14.0% (8.5–15.0%) SL.

Head moderately large, its length 37.3% (37.3–44.0%) SL, depth 34.8% (34.8–43.7%) SL, and width 27.6% (27.6–32.4%) SL; dorsal margins of frontals convex, frontal space narrow, narrowest distance between outer margins of frontals 10.2% (10.2–17.6%) SL. Sphenotic spines well developed.

Illicium relatively short, 15.6% (14.7–18.7%) SL; posterior end of pterygiophore protruding from dorsal midline of trunk. Esca bulb small, its width 3.6% (3.6–4.9%) SL, length excluding appendages 4.7% (4.7–6.2%) SL. Eye very small. Mouth large, its cleft extending well past eye posteriorly, upper jaw length 30.7% (30.7–34.4%) SL and lower jaw length 36.2% (36.2–45.5%) SL. Lower jaw with well developed symphysis. Quadrate spine well developed, distinctly larger than articular spine. Pectoral-fin lobe short and broad, shorter than longest ray of fin. Pectoral-fin relatively long, 19.0–22.0% SL.

Teeth slender, recurved and depressible; relatively scattered and few in number, in 1 or 2 irregular rows; teeth on upper jaw 22 (19–22; 9–11 on each side), longest teeth 3.0% (3.0–5.2%) SL; teeth on lower jaw 20 (17–22; 8–11 on each side), longest teeth 3.7% (3.7–5.9%) SL; 3 vomerine teeth (4 in all three paratypes), 2 teeth on each side (one side of holotype with 1), outer tooth about twice size of inner one, 3.2% (3.2–6.3%) SL. Epibranchial teeth absent; second and third pharyngobranchials well toothed.

Morphology of esca almost identical in all four types, except for minor variations. Esca appendage pattern B of Pietsch (1974, fig. 60B). Esca bulb pigmented internally with black butterfly-shaped pattern on top.

Anterior appendage elongate, cylindrical and internally pigmented, its length including all branches 15.6% (15.6–19.1%) SL; terminus of holotype with 4 slender branches, arranged in one row on distal and posterior margins, branch lengths 14.1–21.7% of the total length of anterior appendage, all pigmented distally, uppermost 2 slightly stronger than other 2, lowermost branch thinnest; 3 short lateral filaments slightly below branches; terminus of 69.5 mm paratype a pair of slender distally pigmented branches and three slender filaments; those of other two paratypes comprising three similar branches, branch lengths 12.8–20.3% of the total length of anterior appendage, without filaments.

Single broad-based, highly branched medial esca appendage, its base connected to that of anterior appendage and covered on most surface of esca, with four main branches arranged in two symmetrical pairs, those inner pair slightly stronger than those in outer pair; each branch bearing as many as 6 secondary branches and filaments. Conical posterodorsally directed terminal papilla (directed dorsally in 69.5 mm paratype), with a distal pigmented spot.

Anterolaterally branched appendage arising from either side at base of anterior appendage, total length 20.8% (17.4–20.8%) SL (partly damaged in 105 mm paratype); divided into 3 branches proximally and 2–3 short filaments at undivided base in holotype; appendage of paratypes divided into two main branches slightly above base, each simple or with 1–2 secondary branches and filaments.

Short, simple, cylindrical posterior appendage (compressed in holotype which might be artificial), its length 2.4% (2.2–3.5%) SL, slightly more than half of esca length excluding appendage. Lateral appendage absent.

TABLE 2. Morphometric and meristic data for *Oneirodes quadrinema* Ho, Kawai & Amaoka, **sp. nov.** and *Oneirodes amaokai* Ho & Kawai, **sp. nov.** Proportional data are expressed as percentage of SL. Pectoral-fin rays and teeth are counted on both sides.

| | <i>Oneirodes quadrinema</i> sp. nov. | | | | <i>Oneirodes amaokai</i> sp. nov. |
|--|--------------------------------------|----------|-------|-------|-----------------------------------|
| | Holotype | Paratype | | | Holotype |
| Standard length (mm) | 169.0 | 130.2 | 104.6 | 69.5 | 61.8 |
| Illicial length | 15.6 | 18.7 | 14.7 | 15.5 | 56.3 |
| Head length | 37.3 | 41.1 | 41.0 | 44.0 | 42.6 |
| Head depth | 34.8 | 40.7 | 42.2 | 43.7 | 41.6 |
| Head width | 27.6 | 27.2 | 35.3 | 32.4 | 28.2 |
| Interfrontal width | 10.2 | 17.6 | 11.9 | 10.2 | 10.4 |
| Upper jaw length | 30.7 | 34.4 | 33.6 | 34.2 | 34.0 |
| Lower jaw length | 36.2 | 39.9 | 42.3 | 45.5 | 41.9 |
| Pectoral-fin length | 20.2 | 22.0 | 20.4 | 19.0 | Broken |
| Caudal peduncle depth | 14.0 | 8.5 | 15.0 | 13.1 | 12.6 |
| Escal length | 4.7 | 5.0 | 6.1 | 6.2 | 3.7 |
| Escal width | 3.6 | 3.8 | 3.8 | 4.9 | 2.9 |
| Longest tooth on upper jaw | 3.0 | 4.1 | 4.1 | 5.2 | 3.9 |
| Longest tooth on lower jaw | 3.7 | 4.3 | 5.3 | 5.9 | 4.5 |
| Longest vomerine tooth | 3.2 | 4.3 | 5.6 | 6.3 | 2.9 |
| Upper fork of opercle | 11.7 | 12.1 | 13.6 | 12.5 | 10.7 |
| Lower fork of opercle | 25.3 | 27.0 | 26.4 | 26.9 | 26.7 |
| Subopercle | 13.5 | 16.0 | 13.8 | 14.7 | 9.5 |
| Ratio of lengths of upper and lower forks of opercle | 0.46 | 0.45 | 0.52 | 0.47 | 0.40 |
| Dorsal-fin rays | 6 | 6 | 7 | 6 | 6 |
| Anal-fin rays | 4 | 4 | 4 | 4 | 4 |
| Pectoral-fin rays (left / right) | 16/16 | 16/16 | 18/18 | 17/16 | 12/13 |
| Caudal-fin rays | 9 | 9 | 9 | 9 | 9 |
| Vomerine teeth | 2+1 | 2+2 | 2+2 | 2+2 | 3+3 |
| Upper jaw teeth | 10+12 | 10+9 | 9+10 | 10+10 | 20+20 |
| Lower jaw teeth | 10+10 | 9+8 | 10+8 | 11+11 | 22+22 |

Large posterior pore between terminal papilla and posterior appendage.

Opercle bifurcated, upper fork in holotype bilobed, simple in paratypes; length of upper fork of opercle 11.7% (11.7–13.6%) SL; length of lower fork 25.3% (25.3–27.0%) SL; ratio of lengths of dorsal and ventral forks 0.47% (0.45–0.52%) SL.

Subopercle elongate, 13.5% (13.5–16.0%) SL, its ventral end broad and rounded, dorsal end narrow and bluntly pointed, posterodorsal margin convex, not indented.

Coloration. Uniformly deep brownish to blackish; inter-radial membranes of all fins transparent except for the bases. Distal portion and appendage of esca pale or transparent, except as indicated above.

Etymology. From the Latin *quadro* meaning four and the Greek *nema* meaning tread or appendage, the name refers to the four main branches on medial escal appendage, a diagnostic character of the species.

Distribution. Known from the type series collected in the eastern Indian Ocean off Java, Indonesia, at depths of 755–814 m.

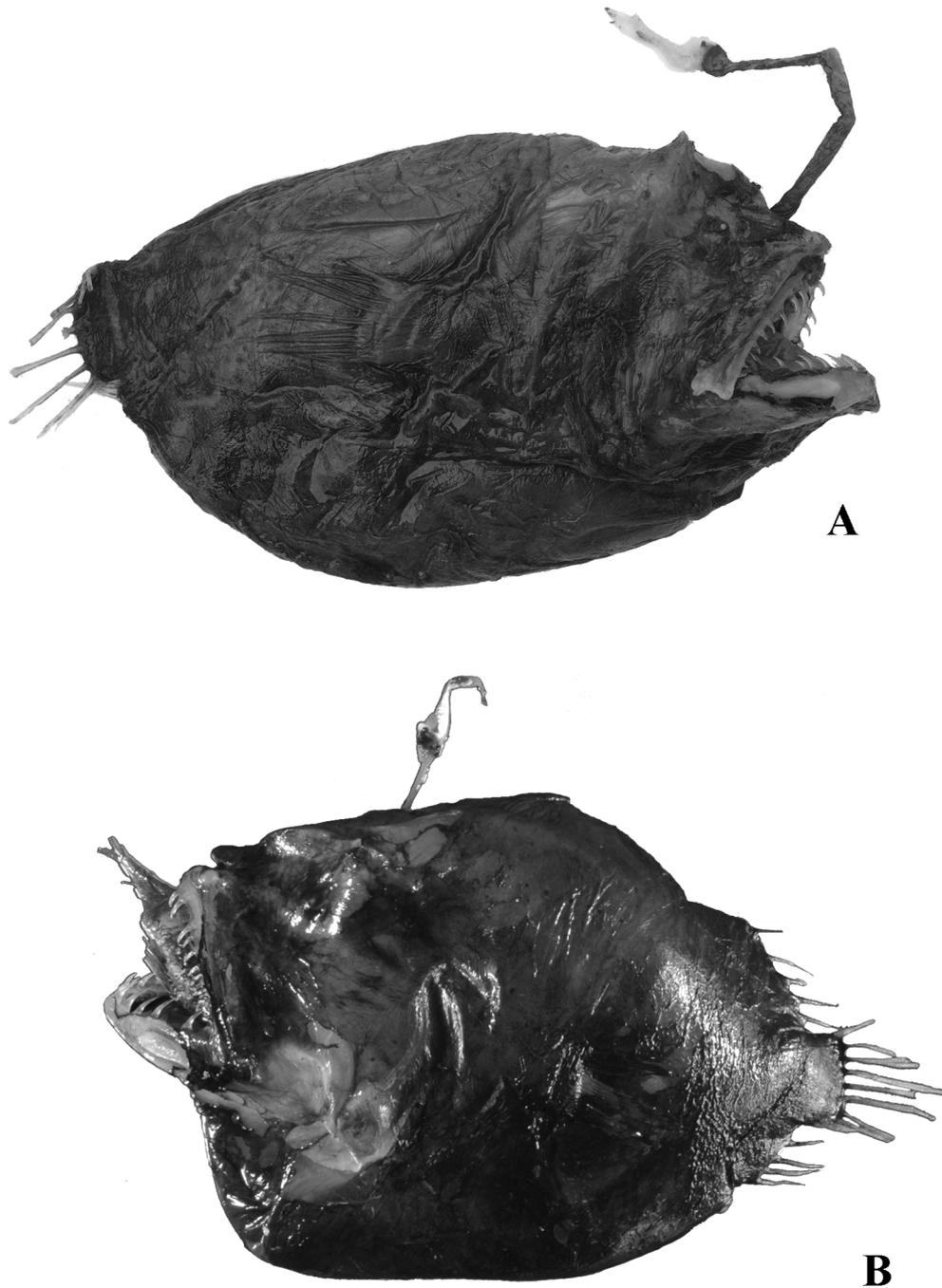


FIGURE 14. *Oneirodes quattranema* Ho, Kawai & Amaoka, **sp. nov.** A. Holotype. HUMZ 194478, holotype, 169 mm SL, right side view, preserved.. B. Paratype, HUMZ 193893, 104.6 mm SL, note that a fish is in the mouth, fresh.

Discussion. Although the medial esca appendage of *O. quadrinema* **sp. nov.** can be divided into four main branches, that are somewhat arranged in two symmetrical pairs, their bases are fused and not clearly divided into two independent appendages as in most congeners. Four species were previously recognized as sharing the possession of a single unpaired medial appendage: *O. macronema* (Regan & Trewavas, 1932), *O. clarkei* Swinney & Pietsch, 1988, *O. pithales* Orr, 1991 and *O. haplonema* Stewart & Pietsch, 1998. Of these, *O. quadrinema* **sp. nov.** is most similar to *O. haplonema* in having a relatively long anterior appendage and a pair of anterolateral esca appendages.

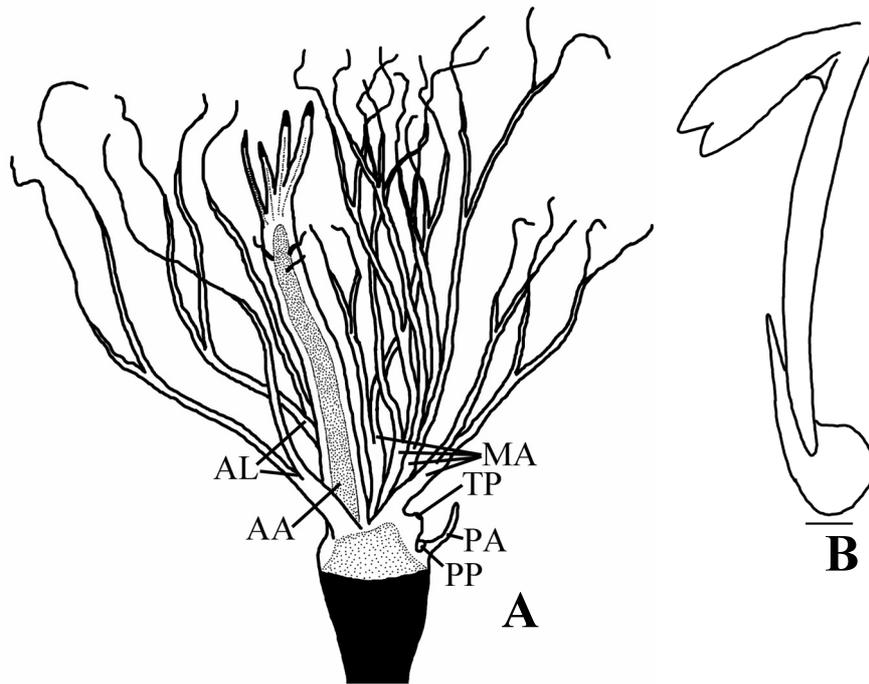


FIGURE 15. *Oneriodes quadranema* Ho, Kawai & Amaoka, sp. nov. A. drawing of esca. AA, anterior escal appendage. AL, anterior escal appendage. MA, medial appendage. PA, posterior escal appendage. PP, posterior pore. TP, terminal papilla. B. drawing of opercle (O) and subopercle (SO), scale bar =2 mm.

The new species can be distinguished from *O. haplonema* in having fewer jaw teeth, 19–22 on the upper jaw (vs. 34) and 17–22 on the lower jaw (vs. 42); 6 or 7 dorsal-fin rays (vs. 5); and a different escal appendage pattern: a broad-based branched medial appendage (vs. narrow-based and unbranched); anterolateral appendage relatively long, subequal to or longer than the anterior appendage (vs. about one-third length of anterior appendage); branches on anterior appendage all black distally (vs. colorless); and a conical terminal papilla (vs. an elongate terminal papilla).

It can be distinguished from *O. macronema* and *O. clarkei* in having a much longer anterior escal appendage, considerably longer than the illicium (vs. much shorter than the esca bulb). It differs from *O. macronema* and *O. epithales* in having a pair of anterolateral appendages (vs. absent); and from *O. clarkei* and *O. epithales* in having a simple, unbranched posterior escal appendage (vs. appendage branched distally).

Oneriodes quadrinema **sp. nov.** is also similar to *O. heteronema* (Regan & Trewavas, 1932), *O. macrosteus* Pietsch, 1974 and *O. eschrichtii* Lütken, 1871 in having similar esca morphological pattern. It differs from *O. heteronema* in having a simple posterior escal appendage (vs. appendage branched distally) and a very long anterior escal appendage (vs. appendage shorter than the esca); from *O. macrosteus* in having a simple posterior escal appendage (vs. appendage branched distally), a relatively long medial and anterolateral appendages (vs. appendages short); and from *O. eschrichtii* in having a remarkably long anterior escal appendage (vs. appendage shorter than the esca) and presence of anterolateral appendages (vs. appendages absent).

It may be also similar to a recent described species, *Oneriodes sipharum* Prokofiev, 2014, in the form of the esca pattern. The new species differs from *O. sipharum* mainly in having anterolateral appendages (vs. absent) and a less-branched and internal-pigmented anterior appendage (vs. highly branched appendage without pigmentation). Although *O. sipharum* also has few jaw teeth (20 on the upper jaw and 13 on the lower jaw), the sole holotype is a very small juvenile (14 mm SL) whereas the types of *Oneriodes quadrinema* **sp. nov.** are well-developed adults. Thus, this character is not comparable between these two species. It is notable that *Oneriodes* species exhibit strong ontogenetic changes and/or intraspecific variation in esca morphology (Pietsch, 1974). Hence, describing new species based on juvenile specimens may be inadequate and is not recommended.

All types of *Oneriodes quadrinema* **sp. nov.** have nearly identical esca appendage morphology and similar numbers of jaw teeth. However, some proportional measurements, such as head length, head depth, lower jaw

length, size of esca bulb and length of jaw teeth have clear negative trend with growth, whereas other proportions do not seem to change with growth (Table 2).

***Oneirodes amaokai* Ho & Kawai, sp. nov.**

New English name: Amaoka's dreamer

Figs. 16, 17A–B; Table 2

Holotype. HUMZ 191135 (1, 61.8), st. 32, 3°42.15'N, 94°44.55'E–3°43.31'N, 94°44.33'E, off Sumatra, Indonesia, 833–896 m, 21 Oct. 2004.

Diagnosis. A species of *Oneirodes* with relatively long illicium (56.5% SL), 12–13 pectoral-fin rays and unique esca morphology: anterior appendage complete absent; pair of filamentous anterolateral appendages; single medial appendages with 3 main filamentous branches; slender filamentous posterior appendage, branched distally; no lateral appendage.



FIGURE 16. *Oneirodes amaokai* Ho & Kawai, sp. nov., HUMZ 191135, holotype, 61.8 mm SL, fresh.

Description. Morphometric and meristic data are provided in Table 2. Dorsal-fin rays 6; pectoral-fin rays 12 (right side)/13 (left side); anal-fin rays 4; caudal-fin rays 9.

Body slightly elongate, laterally compressed, body depth about half of body length, excluding caudal-fin; caudal peduncle narrow, its depth 12.6% SL. Head moderately large, its length 42.6% SL, depth 41.6% SL and width 28.2% SL; dorsal margins of frontals convex, frontal space narrow, narrowest distance between outer margins of frontals 10.4% SL. Sphenotic spines well developed.

Illicium relatively long compared to most congeners, 56.3% SL. Esca bulb small, its width 2.9% SL, its length excluding appendages 3.7% SL. Eye very small. Mouth large, its cleft extending well pass eye, upper jaw length 34.0% SL and lower jaw length 41.9% SL. Lower jaw with well developed symphysis. Quadrate and articular spines well developed, former twice as long as latter. Pectoral-fin lobe short and broad, shorter than longest ray of fin.

Teeth slender, recurved and depressible; teeth on upper jaw 40 (20 on each side), longest teeth 3.9% SL; teeth on lower jaw 44 (22 on each side), longest teeth 4.5% SL; vomerine teeth 6 (3 on each side), outermost tooth largest, 2.1% SL. Epibranchial teeth absent; second and third pharyngobranchials well toothed.

Esca appendage pattern uncertain, but likely pattern B of Pietsch (1974:34, fig. 60B): anterior appendage absent; pair of filamentous anterolateral appendages, each bifurcated distally; single medial appendages with 3 filamentous branches, its medial branch slightly stronger than other two, with 4 secondary branches and its side branches bifurcated; terminal papilla conical, with distal black spot; large posterior pore posteriorly at base of terminal papilla; and single slender filamentous posterior appendage, with 2 secondary filaments distally.

Opercle bifurcated, axes of forks forming narrow angle, about 15°; upper fork of opercle simple and relatively short, 10.7% SL; lower fork 26.7% SL; ratio of lengths of dorsal to ventral forks 0.40. Subopercle relatively short 9.5% SL, its ventral end rounded, dorsal end narrow and bluntly pointed, posterodorsal margin convex, not indented.

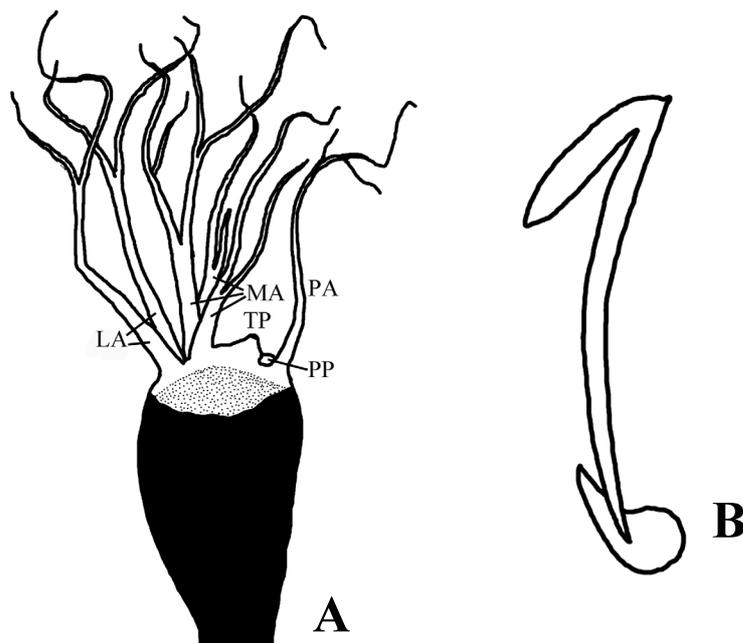


FIGURE 17. *Oneirodes amaokai* Ho & Kawai, **sp. nov.** A. drawing of esca. B. opercle and subopercle. Both from the holotype. See Fig. 15 for abbreviations.

Coloration. Uniformly blackish; inter-radial membranes transparent; appendages on esca colorless.

Etymology. Named in honor of Dr. Kunio Amaoka, Professor Emeritus of Hokkaido University, for his numerous contributions to ichthyology.

Distribution. Known only from the holotype collected in eastern Indian Ocean off Sumatra, Indonesia, at depths of 833–896 m.

Discussion. Ho & Shao (2004) described *Oneirodes pietschi*, the first species lacking an anterior escal appendage. Later, Ho *et al.* (2008) recorded the species from Indian Ocean. Prokofiev (2014) described a second species with this characteristic, *Oneirodes parapietschi* based on a single specimen collected in the eastern Pacific Ocean.

Oneirodes amaokai **sp. nov.** is the third species among the congeners that lacks anterior appendage on the esca. It differs from *O. pietschi* in having 12–13 pectoral-fin rays (vs. 14–16 in *O. pietschi*); a slightly longer illicium, 56.3% SL (vs. 37–49% SL); a pair of filamentous anterolateral esca appendages with distal branches (vs. appendages simple, never branched); a single filamentous medial appendage with three main branches that are considerably longer than the esca bulb length (vs. a pair of branched medial appendages, both shorter than the esca bulb length); a slender filamentous posterior appendage that is considerable longer than esca bulb length (vs. a compressed, terminally expanded posterior appendage, about equal to the esca); and a smaller ratio of length of upper and lower forks of opercle (0.40 vs. 0.45–0.57), reflected by the relatively short upper fork of opercle.

The new species differs from *O. parapietschi* in having a longer illicium, 56.3% SL (vs. 44.4% SL); anterolateral appendages branched distally (vs. simple); a single filamentous medial appendage with three main branches, all considerably longer than the esca bulb length (vs. a pair of branched medial appendages, both shorter than the esca bulb length); and a slender filamentous posterior appendage, considerable longer than the esca (vs. a compressed, terminally expanded posterior appendage, about equal to the esca).

Although only described on the basis of the sole holotype, the species can be clearly distinguished from its two closely similar congeners and requires a new name.

***Oneirodes carlsbergi* (Regan & Trewavas, 1932)**

Fig. 18

Dolopichthys carlsbergi Regan & Trewavas, 1932:76, fig. 115 (Type locality: Gulf of Panama, ca. 600 m).

Oneirodes carlsbergi (Regan & Trewavas, 1932): Pietsch, 1974:39. Pietsch, 2009:398.

Material. HUMZ 194130 (1, 132.1), st. 63, 4°43.4'S, 101°17.9'E–4°44.5'S, 101°18.6'E, off Sumatra, 930–940 m, 9 Jun. 2005.

Description. Dorsal-fin rays 6; pectoral-fin rays 16; anal-fin rays 4 caudal-fin rays 9. Head length 41.1% SL; head depth 44.6; head width 28.6; illicium 27.9; width of esca 3.9; upper jaw 35.5; lower jaw 38.0. Upper jaw teeth 62; lower jaw teeth 67; vomerine teeth 5 (3, 2); epibranchial teeth 3 (right side examined only).

Body short, globular, profile rounded in lateral view. Mouth large, slightly oblique. Illicium relatively short, its pterygiophore very long. Sphenotic, quadrate and articular spines well developed.

Escal appendage pattern B of Pietsch (1974:34, fig. 60B): simple anterior appendage, length 11.7% SL, internally pigmented and black distally; broad compressed posterior appendage, length 3.9% SL, anterior portion thicker than posterior, black distally; two pairs of lateral appendages, both bifurcated and with several secondary branches; pair of short medial appendages, each with several secondary branches; terminal papilla flat, not elevated; trace of anterolateral appendages on one side of escal base (possibly damaged prior to catch). Lateral and medial appendages slightly pigmented. Body uniformly black.

Distribution. Previously known from Atlantic and Pacific oceans. The Indonesian specimen represents the first record in the eastern Indian Ocean.



FIGURE 18 *Oneirodes carlsbergi* (Regan & Trewavas, 1932), HUMZ 194130, 132.1 mm SL, preserved.

***Oneirodes cristatus* (Regan & Trewavas, 1932)**

Fig. 19

Dolopichthys cristatus Regan & Trewavas, 1932:67, fig. 93 (Banda Sea, ca. 2000 m).

Oneirodes cristatus (Regan & Trewavas 1932): Pietsch, 1974:62. Pietsch, 2009:409.

Material. HUMZ 191422 (1, 52.7), st. 6, 8°37.3'S, 110°34.1'E–8°37.4'S, 110°34.2'E, off Java, 810–830 m, 11 Sep. 2004.

Description. Dorsal-fin rays 6; pectoral-fin rays 15; anal-fin rays 4; caudal-fin rays 9. Vomerine teeth 4 (2, 2); upper jaw teeth 31; lower jaw teeth 31. Head length 36.6% SL; head depth 36.1; head width 16.9; illicial length 19.7; upper jaw length 26.4; lower jaw length 37.2.

Body short, fusiform, profile oval in lateral view. Mouth large, cleft slightly oblique. Illicium relatively short, its pterygiophore very long. Sphenotic and quadrate spines well developed.

Esca appendage pattern B of Pietsch (1974:34, fig. 60B): broad, laterally compressed, internally pigmented anterior appendage, with two compressed black-tipped papillae at distal margin, its total length shorter than esca; pair of small filamentous medial appendages, their total length about equal to esca; conical terminal papilla; and short compressed posterior appendage, pigmented distally.

Opercle bifurcated, length of upper fork 12.7% SL, lower fork 25.6% SL; ratio of lengths of upper and lower forks of opercle 0.49. Subopercle oval, length 5.3% SL, dorsal end short and broadly rounded, ventral end rounded.

Distribution. Previously only known from the type series collected in the Banda and Celebes seas. The Indonesian specimen represents the first record in the eastern Indian Ocean.

Remarks. Although the eastern Indian Ocean specimen is identified as *O. cristatus*, it has several differences: 2 black-tipped papillae are on the distal margin of the anterior esca appendage (vs. a scalloped distal margin); the medial appendages are considerable longer than the esca (vs. appendages shorter than esca); the posterior appendage simple (vs. appendage branched); and the species has 15 pectoral-fin rays (vs. 13–14). Because the species is only represented by a few specimens, it is difficult to judge whether these are intraspecific or interspecific differences.

The esca morphology is also similar to that of *O. notius*, a Southern Ocean species, but the species differs from the latter in having smaller ratio of lengths of upper and lower forks of opercle (0.49 vs. 0.52–0.59) and having fewer pectoral-fin rays (15 vs. 17–19).



FIGURE 19. *Oneirodes cristatus* (Regan & Trewavas 1932), HUMZ 191422, 52.7 mm SL, fresh.

***Dermatias platynogaster* Smith & Radcliffe 1912**

Fig. 20

Dermatias platynogaster Smith & Radcliffe, in Radcliffe, 1912:206, pl. 17, fig. 3 (type locality: eastern coast of Luzon Island, 549 m). Pietsch & Kharin, 2004:123. Kharin & Pietsch, 2007:806. Pietsch, 2009:423.

Material. HUMZ 191357 (1, 122.1), st.23, 3°17.43'N, 94°55.54'E–3°18.07'N, 94°56.16'E, off Sumatra, Indonesia, eastern Indian Ocean, 760–960 m, 7 Oct. 2004.

Description. Dorsal-fin rays 6; pectoral-fin rays 15; anal-fin rays 4; caudal-fin rays 9. Vomerine teeth 4 (2, 2); upper jaw teeth 24 (12, 12); lower jaw teeth 34 (17, 17). Head length 33.7% SL; head depth 40.1; head width 29.2; illicial length 11.5; width of esca 3.7; frontal width 9.0; upper jaw length 28.5; lower jaw length 34.6.

Body slightly elongate, oblong, compressed; caudal peduncle very deep, 21.2% SL. Mouth large, slightly oblique. Sphenotic and quadrate spines well developed. Illicium relatively short. Gill opening very large. Subopercle slender, pointed dorsally and rounded ventrally.

Esca with stout, cylindrical anterior appendage, slightly pigmented internally at its base, bearing pair of stout cirri at its tip; simple, slender posterior appendage, its length about 4 times of length of esca; pair of median appendages, each with many secondary branches, total length about 3 times that of esca; and small rounded terminal papilla.

Body uniformly dark brown; appendages and filaments on esca semi-transparent.

Distribution. Previously known from three specimens collected in the Philippines and off northeastern Australia in the western Pacific Ocean and above the Magellan Seamounts in the central North Pacific Ocean. Bathymetric range 549–1342 m.

Remarks. Pietsch & Kharin (2004) confirmed the validity of this species. A third specimen collected off northeastern Australia was reported by Kharin & Pietsch (2007). Our specimen represents the fourth known specimen of this species.

Differences observed on our specimen include: slightly larger head, its length 33.7% SL (vs. 29.7–30.5% SL, in Pietsch, 2009) and depth 40.1% SL (vs. 33.7–36.6% SL); shorter illicium, 11.5% SL (vs. 15.3–17.5% SL); 34 teeth on the lower jaw (vs. 20–31); pair of stout small appendages at the tip of the anterior esca appendage (vs. absent); and all filaments on median esca appendage colorless (vs. black distally).



FIGURE 20. *Dermatias platynogaster* Smith & Radcliffe, 1912, HUMZ 191357, 122.1 mm SL, fresh.

***Chaenophryne cf. melanorhabdus* [sensu Regan & Trewavas, 1932]**

Fig. 21

Material. HUMZ 194463 (1, 91.9), st. 36, 8°40.0'S, 112°29.2'E–8°40.3'S, 112°27.9'E, off Java, 975–977 m, 20 May 2005. Provisionally identified specimen: HUMZ 194528 (1, 24.2, esca damaged), st. 69, 2°49.4'S, 95°7.0'E–2°48.6'S, 95°7.4'E, off Sumatra, 400–418 m, 14 Jun. 2005.

Description. Dorsal-fin rays 6; pectoral-fin rays 17; anal-fin rays 5; caudal-fin rays 9. Vomerine teeth 6 (3, 3), upper jaw teeth 34, lower jaw teeth 30. Head length 48.7% SL; head depth 43.9; head width 29.5; illicial length 16.4; upper jaw length 34.3; lower jaw length 46.2.

Body short, globular, slightly compressed, profile rounded in lateral view. No spines on head or on other parts of body associated with cephalic skeleton. Sphenotic with rounded dorsally directed projection. Broad deep groove in inter-frontal space. Mouth large, cleft slightly oblique.

Esca with single simple elongate anterior appendage, pigmented internally except for distal tip, for about one-third of the esca length; pair of blunt anterolateral appendages closely attached to anterior appendage; compressed, posterior appendage, each side connected to lateral appendages to form a concave surface between appendages,

with a flap-like crest. Subcutaneous internally pigmented appendage emerging from base of esca and descending along anterior margin of illicial bone.

Body uniformly deep brown to black; illicium pale, covered by semi-transparent skin, internal structure visible externally.

Remarks. The esca morphology of our specimen does not match that of any currently recognized species. The elongate anterior appendage resembles that of *C. melanorhabdus* Regan & Trewavas, 1932, but the illicium is shorter than all congeners (16.4% vs. 20.1–47.4% SL in Pietsch, 2009). According to Pietsch (1975), species of *Chaenophryne* usually have well developed esca appendages and filaments, but these are poorly developed in our specimens, the anterolateral appendages are especially strongly reduced and lack of filaments in all appendages. More specimens may prove the species to be undescribed.

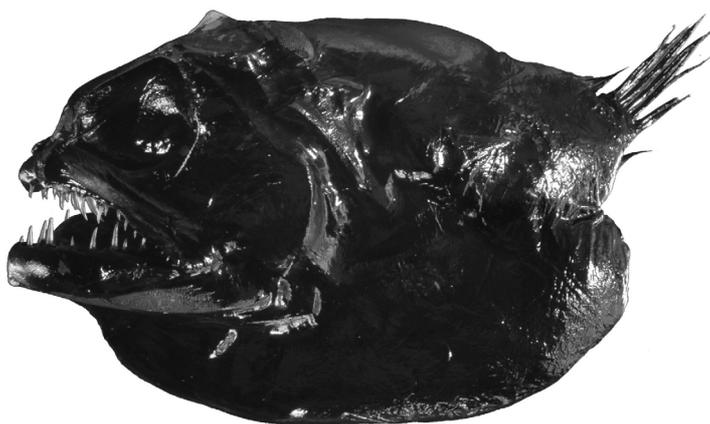


FIGURE 21. *Chaenophryne* cf. *melanorhabdus*, HUMZ 194463, 91.9 mm SL, fresh. Illicium is not shown.

Family Linophryinidae

Comprising 5 genera and 27 species. One species in *Linophryne* is recorded among our materials.

***Linophryne parini* Bertelsen, 1980**

Fig. 22

Linophryne parini Bertelsen, 1980:234, fig. 1 (type locality: East coast of South Africa, 33°41'06"S, 27°26'E, 0 to 1200–1220 meters, bottom trawl).

Material. HUMZ 194262 (1 female 66.4, 1 attached male 12.5), st. 31, 8°35.6'S, 110°43.3'E–8°35.5'S, 110°41.8'E, off Java, 605–607 m, 14 May 2005.

Description. Dorsal-fin ray 3; pectoral-fin rays 15; anal-fin rays 3; caudal-fin rays 8. Vomerine teeth 2 (1, 1); upper jaw teeth 36 (18, 18); lower jaw teeth 29 (14, 15). Head length 46.7% SL; head depth 37.8; head width 29.5; total length of hyoid barbel 43.5; upper jaw length 37.8; lower jaw length 39.0; caudal-fin length 53.6.

Body slightly elongate, profile oval in lateral view, with narrow caudal peduncle. Sphenotic spine well-developed and directed upward and forward. Preopercular spine well developed. Symphyisial spine reduced. Frontals with rounded, dorsally directed projection. Mouth large, gape slightly oblique.

Esca damaged. Hyoid barbel moderately long, with short undivided proximal stem, its length 12.1% of total hyoid barbel length or 5.3% SL; distal portion divided into median and two lateral main branches; median branch somewhat shorter, with 5 secondary branches; lateral branches bifurcated, divided into several smaller branches; each branch with varying number of filaments, each filament with distal photophore; single, short filamentous anterior branch at anterior bases of main branch.

Body uniformly blackish; hyoid barbel unpigmented except for base.

Attached male. Male individual attached posteriorly on right side of the female body. It is 12.5 mm SL (18.8% SL of host female) and 20 mm TL (9.9% of total length host female). Eyes and all head spines totally reduced. Rays of pectoral and caudal fins complete; those of dorsal and anal fins not detectable and possibly embedded.

Distribution. Previously only known from the western Indian Ocean off South Africa at depths of 1200–1220 m. New record in eastern Indian Ocean off Indonesia, at depths of 605–607 m.

Remarks. Although the esca of our specimen has been damaged, the morphology of hyoid barbel is nearly identical with the original description and the accompanying drawing. However, several differences were observed in our specimen: short undivided proximal portion of barbel (vs. nearly branched to the base); shorter head length 46.7% SL (vs. 55% SL); broader head, its width (inter-sphenotic distance) 29.5% SL (vs. 20% SL); shorter jaws, upper jaw length 37.8% SL (vs. 48% SL) and lower jaw length 39.0% SL (vs. 50% SL); and the anterior branch of hyoid barbel clearly longer than that of holotype.

It is also notable that both male and female specimens have a relatively long caudal fin (53.6% SL in female and 37.5% SL in male).

Comparative materials. *Bufoceratias wedli*: HUMZ 148605 (1, 100.0), HUMZ 148606 (1, 51.0), 18°50.7'S, 11°19.2'E, off Namibia, 598–600 m, 3 Mar. 1995.

CAS 234701 (1, 127.0), CAS 222470 (1, 91.2), CAS 222471 (1, 118.4), CAS 222472 (1, 78.2), CAS uncat. (6, 19.4–86.9); all from Angola, SW Atlantic. *Bufoceratias shaoi*: type series listed in Pietsch *et al.* (2004). *Oneirodes pietschi*: type series listed in Ho & Shao (2004).

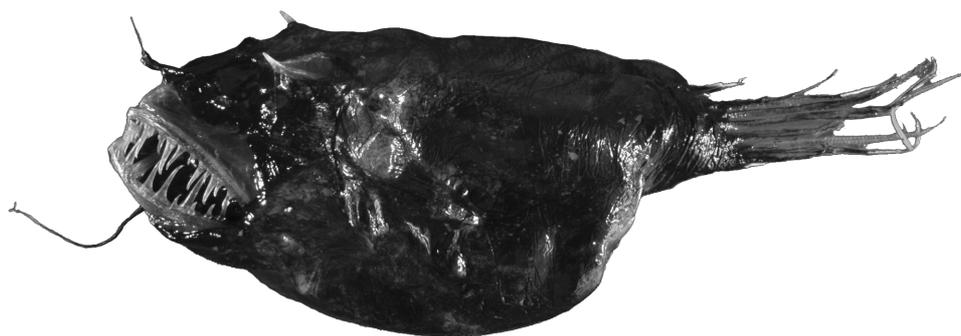


FIGURE 22 *Linophryne parini* Bertelsen, 1980, HUMZ 194262, 66.4 mm SL, fresh.

Acknowledgements

We thank M. Yabe and H. Imamura (Faculty of Fisheries Sciences, Hokkaido University) for making the materials available and M. F. Gomon (NMV) for reading and improving the manuscript. HCH especially thanks the lab mates of the Systematic Ichthyology Lab, Graduate School of Fisheries Sciences, Hokkaido University and TK and KA for their hospitalities during the visit in Hakodate; thanks also go to T. W. Pietsch for his guidance. The visit is supported by Hokkaido University Museum and by National Science Council (NSC) to HCH. We also thank Japan Deep Sea Trawlers Association, Overseas Fishery Cooperation Foundation, Japan, and Agency for Marine and Fisheries Research, Indonesia for providing an opportunity to sample in Indonesia.

References

- Balushkin, A.V. & Fedorov, V.V. (1986) A new species of diceratiid deepsea anglerfish. *Diceratias trilobus* sp. n. (Fam. Diceratiidae, Ceratioidei) from the coast of Japan. *Journal of Ichthyology*, 27 (1), 136–138. [1987]
- Bertelsen, E. (1951) The ceratioid fishes. Ontogeny, taxonomy, distribution and biology. *Dana Report*, 39, 1–276.
- Bertelsen, E. (1980) Notes on Linophrynidae VI: A new species of deepsea anglerfish of the genus *Linophryne* with notes on other *Linophryne* species with multi-stemmed barbels (Pisces, Ceratioidei). *Steenstrupia*, 6 (15), 233–249.
- Bertelsen, E. & Krefft, G. (1988) The ceratioid family Himantolophidae (Pisces, Lophiiformes). *Steenstrupia*, 14 (2), 9–89.
- Fricke, R. & Eschmeyer, W.N. (2015) Guide to fish collections. Available from: <http://researcharchive.calacademy.org> (accessed 1 August 2015)
- Gill, T.N. (1883) Deep-sea fishing fishes. *The American Sportman's Journal*, 21, 284.
- Günther, A. (1864) On a new genus of pediculate fish from the Sea of Madeira. *Proceedings of the Zoological Society of London*, 1864 (2), 301–303, pl. 25.
- Günther, A. (1887) Report on the deep-sea fishes collected by H. M. S. Challenger during the years 1873-76. *Report on the Scientific Results of the Voyage of H. M. S. Challenger*, 22 (57), 1–268, pls. 1–66.
- Kharin, V.E. & Pietsch, T.W. (2007) New finding of a rare deep-sea ceratioid Anglerfish, *Dermatias platynogaster* Smith et Radcliffe (Lophiiformes: Oneirodidae). *Journal of Ichthyology*, 47 (9), 806–808.

<http://dx.doi.org/10.1134/S0032945207090147>

- Lütken, C.F. (1871) *Oneirodes eschrichtii* Ltk., en ny grønlandsk Tudsefisk. *Oversigt over det Kongelige Danske Videnskabernes Selskabs Forhandlinger og dets Medlemmers Arbejder* (Kjøbenhavn), 1871 (2), 56–74 + 9–17, pl. 2
- Orr, J.W. (1991) A new species of the ceratioid anglerfish genus *Oneirodes* (Oneirodidae) from the western North Atlantic, with a revised key to the genus. *Copeia*, 1991 (4), 1024–1031.
<http://dx.doi.org/10.2307/1446097>
- Overseas Fishery Cooperation Foundation of Japan & Agency for Marine and Fisheries Research, Ministry of Marine Affairs and Fisheries, Indonesia (2006) *The Japan-Indonesia Deep Sea Fishery Resources Joint Exploration Project (Final Report)*. Overseas Fishery Cooperation Foundation of Japan, Tokyo, 154 + 58 pp.
- Paxton, J.R. & Lavenberg, R.J. (1973) Feeding mortality in a deep sea angler fish (*Diceratias bispinosus*) due to a macrourid fish (*Ventrifossa* sp.). *Australian Zoology*, 18, 47–51.
- Pietsch, T.W. (1974) Osteology and relationships of ceratioid anglerfishes of the family Oneirodidae, with a review of the genus *Oneirodes* Lütken. *Science Bulletin, Natural History Museum of Los Angeles County*, 18, 1–113.
- Pietsch, T.W. (1986) Systematics and distribution of bathypelagic anglerfishes of the family Ceratiidae (order: Lophiiformes). *Copeia*, 1986 (2), 479–493.
<http://dx.doi.org/10.2307/1445006>
- Pietsch, T.W. (2009) *Oceanic anglerfishes. Extraordinary diversity in the Deep Sea*. University of California Press, Oakland, 557 pp.
- Pietsch, T.W. & Kenaley, C.P. (2011) A new species of deep-sea ceratioid anglerfish, genus *Himantolophus* (Lophiiformes: Himantolophidae), from southern waters of all three major oceans of the world. *Copeia*, 2011 (4), 490–496.
<http://dx.doi.org/10.1643/CI-11-045>
- Pietsch, T.W. & Kharin, V.E. (2004) *Pietschichthys horridus* Kharin, 1989: a junior synonym of *Dermatias platynogaster* Smith and Radcliffe, in Radcliffe, 1912 (Lophiiformes: Oneirodidae), with a revised key to oneirodid genera. *Copeia*, 2004 (1), 122–127.
<http://dx.doi.org/10.1643/CI-03-080R>
- Pietsch, T.W. & van Duzer, J.P. (1980) Systematics and distribution of ceratioid anglerfishes of the family Melanocetidae with the description of a new species from the eastern North Pacific Ocean. *United States National Marine Fisheries Service Fishery Bulletin*, 78 (1), 59–87.
- Pietsch, T.W., Balushkin, A.V. & Fedorov, V.V. (2006) New records of the rare deep-sea anglerfish *Diceratias trilobus* Balushkin and Fedorov (Lophiiformes: Ceratioidei: Diceratiidae) from the western Pacific and eastern Indian oceans. *Journal of Ichthyology*, 46 (Supplement 1), 97–100.
<http://dx.doi.org/10.1134/S0032945206100067>
- Pietsch, T.W., Ho, H.-C. & Chen, H.-M. (2004) Revision of the deep-sea anglerfish genus *Bufoceratias* Whitley (Lophiiformes: Ceratioidei: Diceratiidae), with description of a new species from the Indo-West Pacific Ocean. *Copeia*, 2004 (1), 98–107.
<http://dx.doi.org/10.1643/CI-03-166R>
- Pietschmann, V. (1926) Ein neuer Tiefseefisch aus der Ordnung der Pediculati. *Anzeiger der Akademie der Wissenschaften in Wien*, 63 (11), 88–89.
- Prokofiev, A.M. (2014) New species and new records of deepsea anglerfish of the family Oneirodidae. *Journal of Ichthyology*, 54 (8), 602–607.
<http://dx.doi.org/10.1134/S0032945214050075>
- Regan, C.T. & Trewavas, E. (1932) Deep-sea angler-fishes (Ceratioidea). *Dana Report*, 2, 1–113, pls. 1–10.
- Smith, H.M. & Radcliffe, L. (1912) New pediculate fishes from the Philippine Islands and contiguous waters. Scientific results of the Philippine cruise of the Fisheries steamer "Albatross," 1907–1910. No. 16. In: Radcliffe, L. (Ed.), *Proceedings of the United States National Museum*, 42 (1896), 199–14, pls. 16–27.
- Stewart, A.L. & Pietsch, T.W. (1998) The ceratioid anglerfishes (Lophiiformes: Ceratioidei) of New Zealand. *Journal of the Royal Society of New Zealand*, 28 (1), 1–37.
<http://dx.doi.org/10.1080/03014223.1998.9517553>
- Swinney, G.N. & Pietsch, T.W. (1988) A new species of the ceratioid anglerfish genus *Oneirodes* (Pisces: Lophiiformes) from the eastern North Atlantic off Madeira. *Copeia*, 1988 (4), 1054–1056.
<http://dx.doi.org/10.2307/1445731>
- Tanaka, S. (1918) *Figures and descriptions of the fishes of Japan including Riukiu Islands, Bonin Islands, Formosa, Kurile Islands, Korea and southern Sakhalin*, 27, 475–494, pls. 131–135.
- Uwate, K.R. (1979) Revision of the anglerfish Diceratiidae with descriptions of two new species. *Copeia*, 1979 (1), 129–144.
<http://dx.doi.org/10.2307/1443739>