THREE NEW EELS OF THE GENUS *DYSOMMA* ALCOCK, 1889 FROM OFF PHUKET ISLAND, THAILAND (TELEOSTEI: ANGUILLIFORMES: SYNAPHOBRANCHIDAE)

Artem M. Prokofiev*

* A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Leninskii prospect 33, Moscow 119071, Russia* and P. P. Shirshov Institute of Oceanology, Russian Academy of Sciences, Nakhimovsky prospect 36, Moscow 117218, RUSSIA. E-mail: prokartster@gmail.com

[Prokofiev, A. M. 2019. Three new eels of the genus *Dysomma* Alcock, 1889 from off Phuket Island, Thailand (Teleostei: Anguilliformes: Synaphobranchidae). Munis Entomology & Zoology, 14 (1): 317-325**]**

ABSTRACT: Three new species of the ilyophine genus *Dysomma* are described from the Andaman Sea off Phuket Island, Thailand. A detailed comparison with the related species is given and a revised key for the species of the genera *Dysomma* and *Dysommina* is provided.

KEY WORDS: Synaphobranchid eels, Ilyophinae, *Dysomma*, new species, Andaman Sea

In October 2008 I visited Phuket Marine Biological Centre, Thailand (PMBC) where I was able to study a collection of demersal fishes trawled off Phuket Island in 1999-2000 during the BIOSHELF project. Within the numerous anguilliform fishes sampled I discovered seven specimens representing three undescribed species of the synaphobranchid eels of the genus *Dysomma*. This is the most species-rich synaphobranchid genus belonging to the subfamily Ilyophinae and currently comprising 17 species (Fricke et al., 2019; Ho & Tighe, 2018) distributed in tropical and subtropical latitudes of Atlantic and Indo-west-Pacific. They live mainly in the continental shelf and slope, and some species may have a rather restricted distribution. Three new species described herein, bringing the total number of species of *Dysomma* to 20, may be endemic for the north-eastern Indian Ocean.

MATERIAL AND METHODS

Data were taken from fishes fixed and stored in 4 % formaldehyde. Counts, measurements and terminology follow Böhlke (1989). All measurements were made point to point. Data for holotype are given first, followed by the paratypes in parentheses. Comparative data were taken from Robins & Robins (1989), Chen & Mok (2001), Ho et al. (2015), Fricke et al. (2018) and Ho & Tighe (2018). Abbreviations: TL, total length (from tip of snout to distal tip of caudal fin).

TAXONOMY

Dysomma achiropteryx sp. nov.

(Fig. 1)

Material examined: Holotype, 240 mm TL, PMBC uncatalogued, 240 mm TL, Andaman Sea off Phuket Island, depth 508–518 m, BIOSHELF st. 6–8/T, 20.11.1999, otter-trawl. Paratypes, 4 specimens, 220–235 mm TL, collected with the holotype.

Diagnosis: No pectoral fins; dorsal fin originates behind gill opening; lateral line complete; trunk length 22.6–24.4 % TL, body depth at anal-fin origin 4.6–5.8 % TL; body colouration brown, peritoneum black.

Description: Dorsal-fin origin positioned somewhat closer to anus than to gill opening; anus situated at anal-fin origin; pectoral fins absent; caudal fin well developed. Snout protruded anteriorly, rounded in lateral view; eye small, situated closer to snout tip than to rictus; interspace between gill openings clearly smaller than gill opening length. Anterior nostril opens near tip of snout as a short (sometimes poorly expressed) tube with scalloped margins. Posterior nostril opens at antero-ventral margin of eye as a pore with raised rim (sometimes almost as short tube) with smooth but somewhat irregular margins. Supraorbital pores 3 in number (before, above and behind anterior nostril); infraorbital pores 5 in number (1st, behind anterior nostril; 2nd and 3rd, below anterior and posterior border of posterior nostril, respectively; 4th, half eye-diameter behind hind border of eye; 5th, midway between hind border of eye and rictus); preoperculomandibular pores 7 in number; supratemporal pores 0–1 in number (usually present). Body lateral line complete. Two compound intermaxillary teeth in transverse row, not very enlarged; vomer with three, rarely four compound teeth, conspicuously enlarged from first to third one; if present, fourth tooth much smaller than third; maxillary teeth very small, conical, arranged in a single row. Intermaxillary teeth separated from maxillary row of teeth by small interspace; no space between intermaxillary and vomerine teeth. Lower jaw dentition consists of five or six compound teeth anteriorly followed by a row of very small conical teeth.

Colouration of body brown, vertical fins paler, darkened in posterior fourth of their length; mouth and gill chamber, stomach and intestine pale; peritoneum black, translucent through body wall.

Measurements (in % TL): head length 12.5 (11.8–12.9), snout length 2.5 (2.7–3.1), horizontal eye diameter 0.6 (0.5–0.7), length of mouth gape 5.4 (4.6–5.5), interorbital width 2.1 (1.9–2.2), body depth at anal-fin origin 4.6 (4.7–5.8), predorsal and preanal distance 19.2 (20.0–20.9) and 23.3 (22.6–24.4), respectively.

Etymology: The species epithet (Greek, “without pectoral fin”) reflects one of the diagnostic characters of this species; noun in apposition.

Comparisons: This new species is similar to *D. brachygnathos* Ho et Tighe, 2018, *D. brevirostre* (Facciola, 1887), *D. bussarawiti* sp. nov., *D. dolichosomatum* Karrer, 1983, *D. muciparus* (Alcock, 1891) and *D. tridens* Robins, Böhlke et Robins, 1989 in the absence of the pectoral fins. *D. achiropteryx* differs from *D. brachygnathos* in much longer trunk (22.6–24.4 % vs. 5.3–7.0 % TL), more posteriorly displaced dorsal-fin origin (slightly in front of gill opening in *D. brachygnathos*), presence of 5 (vs. 4) infraorbital and 2 (vs. 0) preopercular pores and complete (vs. incomplete) body lateral line. *D. achiropteryx* differs from *D. brevirostre* in somewhat longer trunk (18 % TL according to Robins & Robins (1989) in *D. brevirostre*), presence of 5–6 (vs. 3) compound teeth on lower jaw and 3–4 (vs. 5) compound teeth on vomer, 5 (vs. 4) infraorbital and 7 (vs. 6) preoperculomandibular pores and complete (vs. incomplete) body lateral line, and in darker body colouration. The new species can be distinguished from *D. dolichosomatum* in its longer trunk (14.3–17.7 % TL in *D. dolichosomatum*), uniserial (vs. biserial) maxillary dentition, 5 (vs. 4) infraorbital pores and complete (vs. incomplete) body lateral line, and in darker body colour. *D. achiropteryx* differs from the poorly known *D. muciparus* in possession of 5–6 compound teeth followed by a row of small teeth (vs. 4

compound teeth on the lower jaw followed by a band of small teeth) and 3–4 (vs. 5) compound teeth on vomer, trunk about twice longer than head (vs. shorter than head). The new species can be easily distinguished from *D. tridens* in presence of two intermaxillary teeth of moderate size (vs. 3 long teeth in *D. tridens*). Furthermore, *D. achiropteryx* can be distinguished from *D. brachygnathos* and *D. brevirostre* in the poorly ornamented tips of snout and of lower jaw. For comparison with *D. bussarawiti*, see below.

***Dysomma bussarawiti* sp. nov.**
(Fig. 2)

Material examined: Holotype, 249 mm TL, Andaman Sea off Phuket Island, depth 520–532 m, BIOSHELF st. 25–8/T, 27.01.1999, line 4, T1.
Diagnosis: No pectoral fins; four supraorbital pores; lateral line complete; trunk length 27.3 % TL, body depth at anal-fin origin 2.8 % TL; body colouration light tan, peritoneum pale.
Description: Body very elongate; dorsal-fin origin positioned somewhat closer to anus than to gill opening; anus situated at anal-fin origin; pectoral fins absent; caudal fin well developed. Snout somewhat protruded anteriorly, rounded in lateral view; eye small, situated closer to snout tip than to rictus; interspace between gill openings clearly smaller than gill opening length. Anterior nostril opens near tip of snout as a poorly expressed tube with scalloped margins; posterior nostril opens at antero-ventral margin of eye, its rim raised almost as short tube. Supraorbital pores 4 in number (above anterior and posterior border of anterior nostril, above posterior nostril and on vertical of 5th infraorbital pore); infraorbital pores 5 in number (1st, behind anterior nostril; 2nd, midway between anterior and posterior nostrils; 3rd, below posterior nostril; 4th, half eye-diameter behind hind border of eye; 5th, midway between hind border of eye and rictus); preoperculomandibular pores 7 in number; supratemporal pores absent. Body lateral line complete. Two compound intermaxillary teeth in transverse row, not very enlarged; three compound teeth on vomer, conspicuously enlarged from first to third one; maxillary teeth very small, conical, arranged in a single row. Lower jaw dentition consists of five compound teeth anteriorly followed by a row of very small conical teeth.

Colouration of body light tan, fins whitish; mouth and gill chamber, peritoneum, stomach and intestine pale.

Measurements (in % TL): head length 9.6, snout length 1.4, horizontal diameter of eye 0.3, length of mouth gape 4.0, interorbital width 1.2, body depth at anal-fin origin 2.8, predorsal and preanal distance 19.7 and 27.3, respectively.
Etymology: This species is dedicated to Dr. Somchai Bussarawit, who made this material available for me.
Comparisons: This new species is very similar to the preceding one but can be easily distinguished by its paler body colouration, pale (vs. black) peritoneum, presence of 4 (vs. 3) supraorbital pores and much more elongated trunk and body (preanal length and body depth at anal-fin origin 27.3 % and 2.8 % TL vs. 22.6–24.4 % and 4.6–5.8 % TL in *D. achiropteryx*).

***Dysomma phuketensis* sp. nov.**
(Fig. 3)

Material examined: Holotype, 225 mm TL, Andaman Sea off Phuket Island, depth 464–467 m, BIOSHELF st. Z–3/T, 24.01.1999, trawl.

Diagnosis: Pectoral fins present; intermaxillary teeth absent; maxillary and lower jaw dentition representing by multiple rows of conical teeth; anus situated well behind gill openings; lateral line complete; snout length 25.7 % of head, 4.0 % of TL; lower jaw shorter than upper one; 3 supraorbital, 4 infraorbital and 6 preoperculomandibular pores; body colouration pale with margins of fins and outlines of lateral-line pores blackish.

Description: Pectoral fins nearly equal in length to length of gill opening, with 16 rays; pectoral-fin base situated fully above gill opening and separated from the latter by a short distance. Dorsal fin originates above the distal half of adpressed pectoral fin. Anus situated at anal-fin origin. Snout protruded anteriorly; tips of snout and of lower jaw symphysis with deep longitudinal folds; snout bearing small spinules. Eye positioned closer to rictus than to snout tip. Length of gill slit slightly exceeding interspace between right and left gill openings. Anterior nostril opens as a very short (hardly expressed) tube with irregular margin of its rim; posterior nostril opens at antero-ventral border of eye as a hardly expressed tube with irregular rim margin. Supraorbital pores 3 in number (1st and 2nd, above anterior nostril; 3rd, just behind a vertical through 1st infraorbital pore); infraorbital pores 4 in number (1st, behind anterior nostril; 2nd, between anterior and posterior nostrils; 3rd, between posterior nostril and eye; 4th below posterior third of eye); preoperculomandibular pores 6 in number. Body lateral line complete. Intermaxillary teeth absent. Vomer possesses four large compound teeth occupying almost all length of mouth roof. Maxillary and dentary teeth small, conical arranged in bands (about four rows of teeth anteriorly, reducing to three rows at midlength of tooth band and to two rows near rictus).

Colouration of body very light, margins of dorsal, anal and caudal fins blackish; lateral-line pores margined with black; mouth and gill chamber, stomach and intestine pale; peritoneum dark-brown to blackish.

Measurements (in % TL): head length 15.6, snout length 4.0, horizontal diameter of eye 1.3, length of mouth gape 6.2, interorbital width 2.2, body depth at anal-fin origin 5.1, pectoral-fin length 2.9, predorsal and preanal distance 17.3 and 24.0, respectively.

Etymology: This species is named from its type locality.

Comparisons: *D. phuketensis* is similar to *D. goslinei* Robins et Robins, 1976, *D. melanurum* Chen et Weng, 1967, *D. longirostrum* Chen et Mok, 2001 and *D. robinsorum* Ho et Tighe, 2018 in the absence of the intermaxillary teeth and of the compound teeth in the lower jaw dentition, and in the presence of the wide bands of the conical teeth on the maxillary and dentary. It can be easily distinguished from *D. goslinei* and *D. robinsorum* in the complete (vs. incomplete) lateral line, from *D. goslinei*, *D. melanurum* and *D. robinsorum* in the anus positioned well behind gill openings (vs. below gill openings in the compared species), and from *D. melanurum* in the snout overhanging the lower jaw (vs. lower jaw projecting before tip of snout in *D. melanurum*). The new species appears to be most similar to *D. longirostrum* from the western Pacific Ocean particularly in the long snout, but differs from that species in the presence of 3 supraorbital, 4 infraorbital and 6 preoperculomandibular pores (vs. 5, 8 and 9, respectively), 4 (vs. 5) compound vomerine teeth, anterior and posterior nostrils forming very short (vs. long) tubes and pale (vs. brownish) body colouration with lateral-line pores margined with black (vs. not stained).

KEY FOR THE IDENTIFICATION OF THE SPECIES OF THE GENERA *DYSOMMA* ALCOCK, 1889 AND *DYSOMMINA* GINSBURG, 1951

Nota Bene: As the limits between the genera *Dysomma* and *Dysommina* are uncertain, members of both these genera are included in the present key as it is commonly done (Fricke et al., 2018; Ho & Tighe, 2018).

1a. Pectoral fins absent **2**
1b. Pectoral fins present **8**

2a. Upper jaw with three elongated, ventrally protruded intermaxillary teeth ..... ***Dysomma tridens*** **Robins, Böhlke et Robins, 1989**
2b. Upper jaw with two blunt intermaxillary teeth in a transverse row **3**

3a. Tip of snout bulbous, strongly plicate, symphysis of lower jaw strongly plicate; dorsal-fin origin slightly before or slightly behind the level of gill opening **4**
3b. Tip of snout pointed or rounded, as well as symphysis of lower jaw smooth or weakly plicate; dorsal-fin origin well behind gill opening **5**

4a. Trunk length 5.3–7.0 % TL; dorsal-fin origin slightly in front of gill opening; total vertebrae about 136 ..... ***Dysomma brachygnathos*** **Ho et Tighe, 2018**
4a. Trunk length about 18 % TL; dorsal-fin origin slightly behind gill opening; total vertebrae 190–205 ..... ***Dysomma brevirostre*** **(Facciola, 1887)**

5a. Lateral line complete [5 infraorbital pores; lower jaw dentition behind compound teeth uniserial] **6**
5b. Lateral line incomplete, with 8-11 pores only **7**

6a. Three supraorbital pores; body depth at anal-fin origin 4.6–5.8 % TL; peritoneum black ..... ***Dysomma achiropteryx*** **sp. nov.**
6b. Four supraorbital pores; body depth at anal-fin origin 2.8 % TL; peritoneum pale ..... ***Dysomma bussarawiti*** **sp. nov.**

7a. Five infraorbital pores; lower jaw dentition behind compound teeth arranged in a band ..... ***Dysomma muciparus*** **(Alcock, 1891)**
7b. Four infraorbital pores; lower jaw dentition behind compound teeth arranged in 1–2 irregular rows ..... ***Dysomma dolichosomatum*** **Karrer, 1983**

8a. Intermaxillary teeth present; maxillary and dentary teeth uniserial **9**
8b. Intermaxillary teeth absent; maxillary and dentary teeth in multiple rows **16**

9a. Anus anterior, trunk shorter than head length **10**
9b. Anus posterior, trunk much longer than head length ..... ***Dysomma opisthoproctus*** **Chen et Mok, 1995**

10a. Lower jaw with a series of 35–40 small, widely spaced teeth ..... ***Dysomma bucephalus*** **Alcock, 1889**
10b. Lower jaw with a series of 7–32 teeth in varying sizes **11**
11a. Two large compound teeth followed by row of 22–31 smaller ones on lower jaw ..... ***Dysomma polycatodon*** **Karrer, 1983**
11b. Seven to 17 large compound teeth on lower jaw may be followed by some small teeth **12**

12a. Peritoneum pale, may be covered by pigment spots **13**
12b. Peritoneum uniformly dark **15**

13a. Vomerine teeth 4; body depth at anus 2.4–6.0 % TL; vertical fins not uniformly pale **14**

13b. Vomerine teeth 3; body depth at anus 7.8 % TL; vertical fins pale ..... ***Dysomma alticorpus*** **Fricke, Golani, Appelbaum-Golani et Zajonz, 2018**

14a. Body lateral line with 17–33 pores; total vertebrae 128–133; dorsal fin pale, base of posterior part of anal fin and lower part of caudal fin solid black ..... ***Dysomma formosa*** **Ho et Tighe, 2018**
14a. Body lateral line with 57–75 pores; total vertebrae 119–128; dorsal and anal fins black, with a white margin ..... ***Dysomma anguillare*** **Barnard, 1923**

15a. Total vertebrae 134–140; lateral-line pores 29–49 ..... ***Dysomma taiwanense*** **Ho, Smith et Tighe, 2015**
15b. Total vertebrae 119–124; lateral-line pores 57–63 ..... ***Dysomma fuscoventralis*** **Karrer et Klausewitz, 1982**

16a. Anus anterior, below pectoral fin **17**
16b. Anus posterior, well behind pectoral fin **19**

17a. Lower jaw projects beyond snout; body lateral line nearly complete ..... ***Dysomma melanurum*** **Chen et Weng, 1967**
17b. Snout overhanging the lower jaw; body lateral line incomplete **18**

18a. Total vertebrae 130–131 ..... ***Dysomma goslinei*** **Robins et Robins, 1976**
18b. Total vertebrae 122–124 ..... ***Dysomma robinsorum*** **Ho et Tighe, 2018**

19a. Body lateral line complete or almost complete **20**
19b. Body lateral line fully absent **21**

20a. Vomerine teeth 4; supraorbital pores 3, infraorbital pores 4, preoperculomandibular pores 6; anterior and posterior nostrils forming very short tubes; lateral-line pores margined with black ..... ***Dysomma phuketensis*** **sp. nov.**
20b. Vomerine teeth 5; supraorbital pores 5, infraorbital pores 8, preoperculomandibular pores 9; anterior and posterior nostrils forming long tubes; lateral-line pores unpigmented ..... ***Dysomma longirostrum*** **Chen et Mok, 2001**

21a. Vomerine teeth 3; predorsal vertebrae 11–12 ..... ***Dysommina orientalis*** **Tighe, Ho et Hatooka, 2018**
21b. Vomerine teeth 4; predorsal vertebrae 14–15 ..... ***Dysommina rugosa*** **Ginsburg, 1951**

ACKNOWLEDGEMENTS

I am sincerely grateful to Dr. Somchai Bussarawit and his staff in PMBC for their hospitality and encouragement. This work was supported by a grant (19–14–00026) of the Russian Science Foundation.

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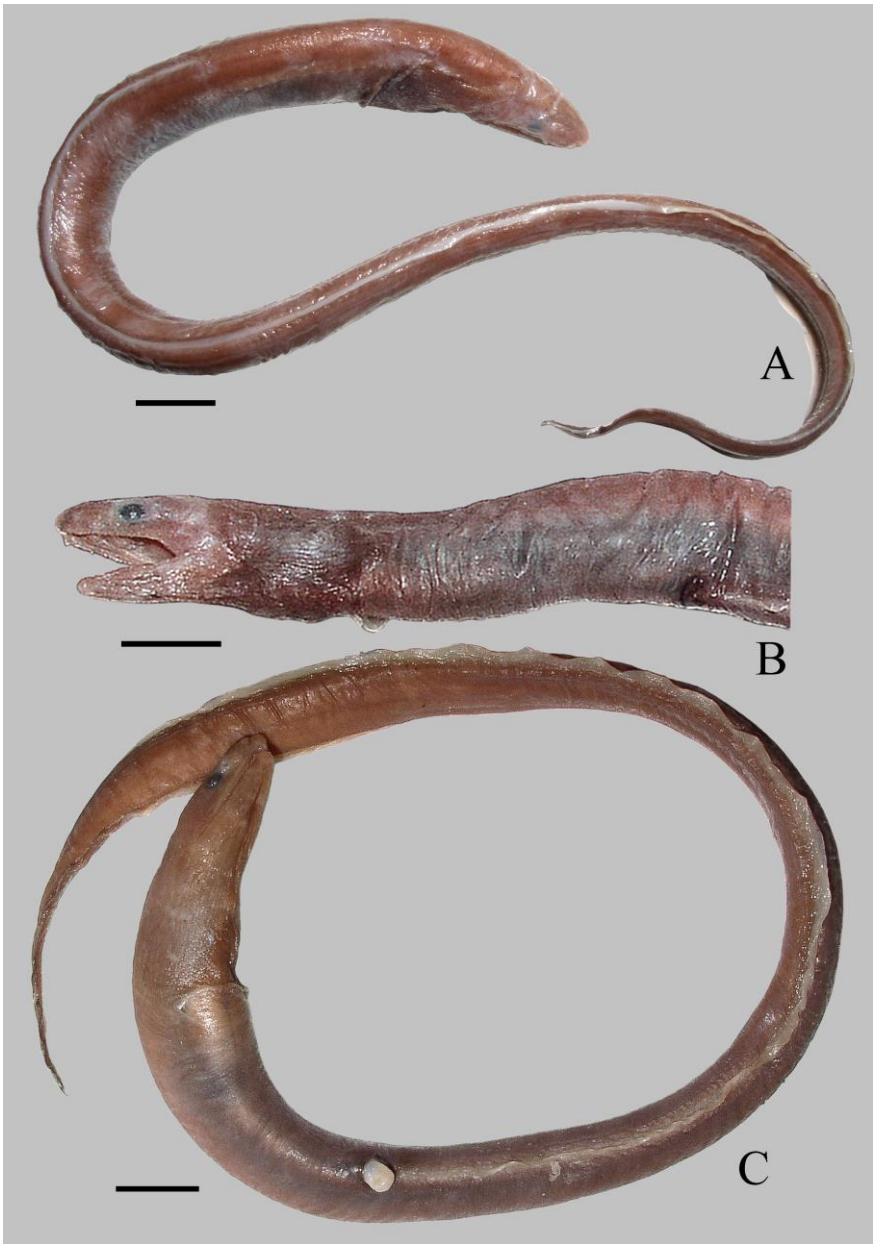

Figure 1. *Dysomma achiropteryx* sp. nov., holotype (A, B) and 220-mm TL paratype (C): (A) dorsal view; (B) head and trunk, lateral view; (C) ventral view. Scale bars: 10 mm.

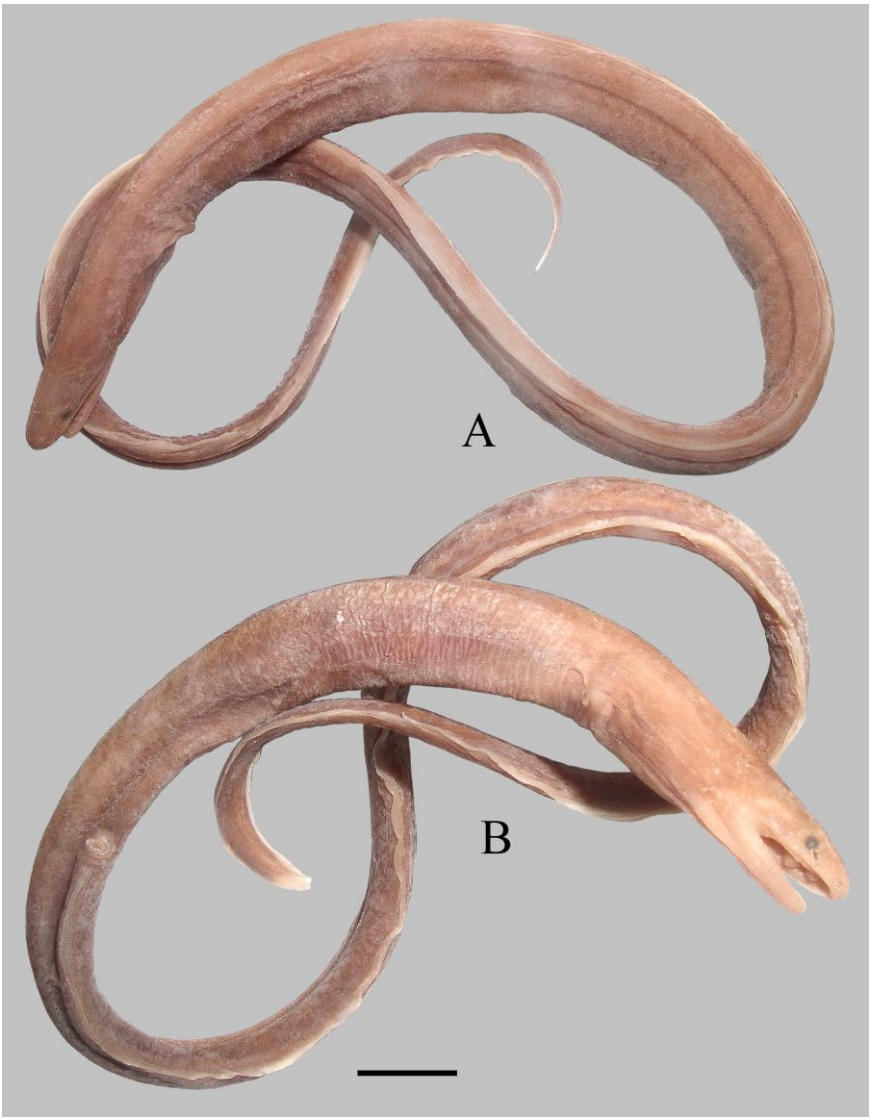

Figure 2. *Dysomma bussarawiti* sp. nov., holotype: (A) dorsal view; (B) lateral and ventral view. Scale bar (common): 10 mm.

Figure 3. *Dysomma phuketensis* sp. nov., holotype: (A) dorsolateral view; (B) ventral view. Scale bar (common): 10 mm.