



First adult record, redescription and distribution of *Stemonosudis elongata* (Aulopiformes: Paralepididae)

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Abstract

The original description of *Macroparalepis elongatus* Ege, 1933 (family Paralepididae) was based on a young specimen taken from Sri Lanka. No adult information is available since it was described. Six additional specimens, including three adults and three young specimens, were found in the museum collections. The adult morphology is described for the first time and its distribution range is now extended to South Pacific Ocean off New Caledonia and Australia, and the Western Indian Ocean off Madagascar. Detailed description and comparison of these specimens and the holotype, as well as a revised diagnosis for the species, are provided.

Key words: Taxonomy, Actinopterygii, barracudina, developmental change

Introduction

Ege (1933) described *Macroparalepis elongatus* based on a single young specimen (117 mm SL), collected from off Sri Lanka, Indian Ocean. Later, Ege (1957) provided description of the juveniles and discussed their development. In his treatment of the genera of Paralepididae, Harry (1953) assigned the species to the genus *Stemonosudis* based on a number of characters, e.g. body very elongate, nostrils behind tip of maxillary, ventral adipose fin (ventral carina) moderately developed, upper jaw terminating approximately one orbital diameter before anterior margin of eye. Since then, *S. elongata* has remained largely unknown, except for its listing in some checklists (Fukui & Ozawa, 2004; Mundy, 2005).

As part of a review of the family Paralepididae, the first author examined most specimens deposited in museum collections worldwide, including the type series described by Ege, which are mostly based on juveniles and lack adult information. Of the specimens examined, six have distinctly high anal-fin ray counts (49–50) and together with vertebral formula, fin positions and morphology, they were identified as *Stemonosudis elongata*. For the first time, the adult morphology of this species is provided. Morphological variation, as well as a revised diagnosis of the species, are provided.

Methods and materials

Methods for taking counts and measurements followed Ho & Golani (2019). Due to the condition of specimens, some measurements or counts could not be taken. Abbreviations: DFO, dorsal-fin origin; AFO, anal-fin origin; VFO, pelvic-fin origin. V–D, distance or space between origins of pelvic and dorsal fins, V–A, distance or space between origins of pelvic and anal fins. Specimens examined were deposited at Australian Museum, Sydney (AMS),

Commonwealth Scientific and Industrial Research Organisation, Hobart (CSIRO), Muséum national d'Histoire naturelle, Paris (MNHN), Museums Victoria, Melbourne (NMV), and Zoological Museum, Natural History Museum of Denmark, Copenhagen (ZMUC).

Results

Family Paralepididae

Stemonosudis elongata (Ege, 1933)

Figs. 1–2; Table 1

Macroparalepis elongatus Ege, 1933:233 (type locality: southwest of Sri Lanka, Indian Ocean). Ege, 1957:36, fig. 8-5.

Stemonosudis elongata (Ege, 1933): Harry, 1953:242 (new combination). Rofen, 1966:423 (in Key). Post, 1972:153 (list). Mundy, 2005:207 (list).

Specimens examined. Holotype of *Macroparalepis elongatus*: ZMUC P. 2318729 (117 mm SL), Dana station 3908, 4°28'N, 82°13'E, Southeast of Ceylon (Sri Lanka), depth about 300 meters (1000 meters wire out), 22 Nov. 1929. **Non-types.** AMS 41990-003 (1, 136), 13°46'30"S, 148°05'49"E, Queensland, Australia, Coral Sea, MIDOC plankton tow, 200 m, 9 May 1997. CSIRO H 2543-11 (1, 272), FRV Southern Surveyor, sta. SS0191/3, 20°07'48.0"S, 112°55'06.0"E–20°07'48.0"S, 112°56'18.0"E, 854–868 m, Engel highrise demersal trawl, 23 Jan. 1991. MNHN 2000-0452 (2, 292–351), Halipro 2 expedition, sta. bt40, 25°42'S, 167°00'E, New Caledonia, Coral Sea, South Pacific Ocean, 1070–1170 m, 14 Nov. 1996. MNHN 1964-0617 (1, 178), 15°40'1.2"S, 46°19'58.8"E, Madagascar, Western Indian Ocean, coll. Crosnier. NMVA 26574-016 (1, 139), R/V Alis, 23°34'17"S, 167°15'19"E–21°32'21"S, 167°13'47"E, between New Caledonia and Loyalty Islands, 97 m, 16 Aug. 2011.

Diagnosis. A species of *Stemonosudis* with a very slender body; very long anal-fin base, with 49–51 rays; anterior nostril above posterior end of maxilla; VFO at about middle of the fish, prepelvic length 46.8–51.4% SL; DFO at about middle of V–A, V–D 48.5–57.1% V–A; usually 1 or 2 small, stout teeth on each gill raker; prehaemal vertebrae 48–49, total vertebrae 115–121; total lateral-line scales 102–108; caudal peduncle long, its length about 3 times eye diameter; body uniformly dark brown to black in adults (Harry, 1953; Ege, 1957; this study).

Description of holotype. The holotype is a young specimen; its body became fragile after long-term preservation. Data provided in Ege (1957) are adopted and provided in Table 1.

Body rather thin and slender. Ventral adipose fin weakly developed on abdominal ridge and well developed between anus and AFO. DFO well behind VFO and anus; DFO at about midpoint of V–A; anus clearly behind tip of pelvic fin, before midpoint of V–D. Peritoneal sections faded. Caudal peduncle long, the posterior end of anal fin base well in front of base of lower procurent rays, by about 1 eye diameter.

Posterior end of maxilla about 1 eye diameter before anterior margin of eye; nostrils close to eye, anterior margin of anterior nostril at about same vertical above posterior end of maxilla, posterior margin of posterior nostril about half eye diameter before anterior margin of eye and slightly behind posterior end of maxilla. Eye small, its diameter about 5 times in snout length.

Teeth few, some probably lost. Gill rakers weakly developed. Lateral line runs to about above two-thirds of anal-fin base length from the anal fin origin. Anterior tip of lower jaw with a small fleshy tissue. Fin ray numbers same as original description. Other information not available due to the condition of the specimen.

Description of adults and young specimens. Based mainly on 3 adult specimens (MNHN 2000-0452 and CSIRO H 2543-11), with additional information of the other three young specimens, where different.

Dorsal-fin rays 10 (9–10 in young specimens); pectoral-fin rays 13 (12–13); pelvic-fin rays 9–10; anal-fin rays 49–50. Vertebrae: prepelvic 44–45 (42–43, n=2), prehaemal 48–49; caudal 70–73 (66, n=1); predorsal 55–57 (54, n=2); preanal 67–69 (64–65); and total vertebrae 119–121 (115, n=2). Gill rakers: upper limb 15 and lower limb 51–56 (25–27 on ceratobranchial, 26–28 on hypobranchial); total 66–71; not available in young specimens. Lateral-line scales: prepelvic 42–45; predorsal 52–57; preanal 64–68; total 102–108, 89–95 large scales + 11–15 very small scales on posterior portion (ca. 90–99, scales lost distally).

Body very slender and compressed (rather thin in young specimens). Caudal peduncle slender, its length 2.8 (3.5, n=1) times eye diameter. Abdomen with well-developed fresh ridge between pectoral and pelvic fins, with

weakly developed ventral adipose fin; ventral adipose fin well developed on margin between anus and anal fin. Anus slightly behind tip of appressed pelvic fin, clearly before dorsal-fin origin and situated at about midpoint of V–A.

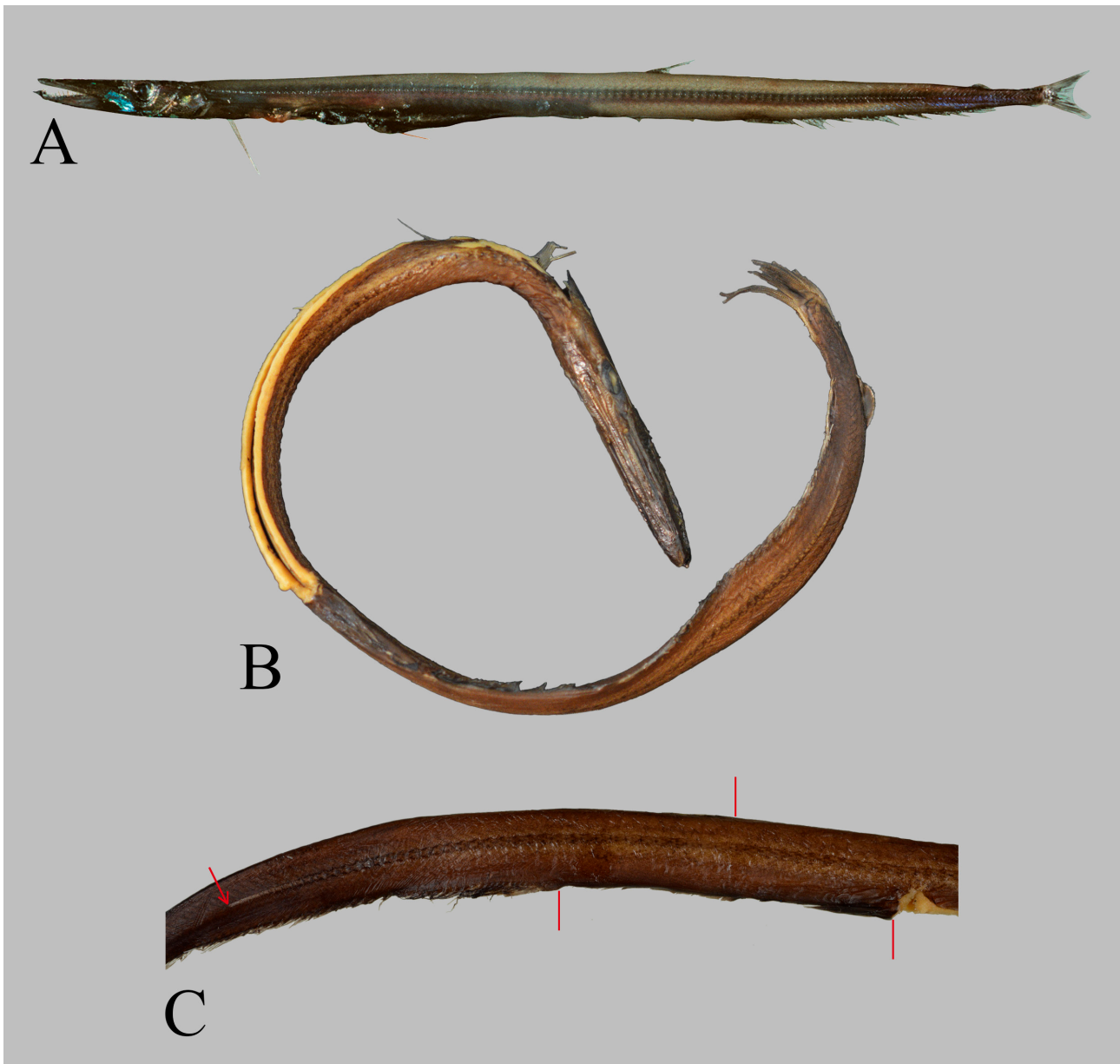


FIGURE 1. Adult of *Stemonosudis elongata* (Ege, 1933). A. CSIRO H 2543-11, 272 mm SL, fresh. B–C. MNHN 2000-0452, 351 mm SL. B. Whole fish, with belly cut off. C. Lateral view of body, bars indicate VFO (right), DFO (middle) and AFO (left), and arrow points to end of lateral line.

Head very slender, slightly less than the trunk, wider than rest of body, pointed anteriorly. Mouth terminate, large; mouth gape extends to about a vertical through anterior margin of eye; lower jaw barely upturned at tip, with a small fleshy tissue at tip. Eye moderately large (relatively small in young specimens). Snout long, bluntly pointed anteriorly (relatively short and pointed in smaller specimens). Suborbital bones narrow, not expanded. Interorbital space moderately broad and flattened, interorbital width 1.4–1.6% SL (1.2–1.4% in young specimens); ridges on dorsal surface of head and snout.

Posterior end of maxilla extends to about one eye diameter before anterior margin of eye (ca. 1.5 in young specimens). Anterior nostril right above and posterior nostril slightly behind tip of maxilla, about one eye diameter before anterior margin of eye (about 1.5 in young specimens). Most of head, including snout, jaw, cheek, operculum covered by regular sensory canals, but not on superclethrum (not clear in smaller specimens).

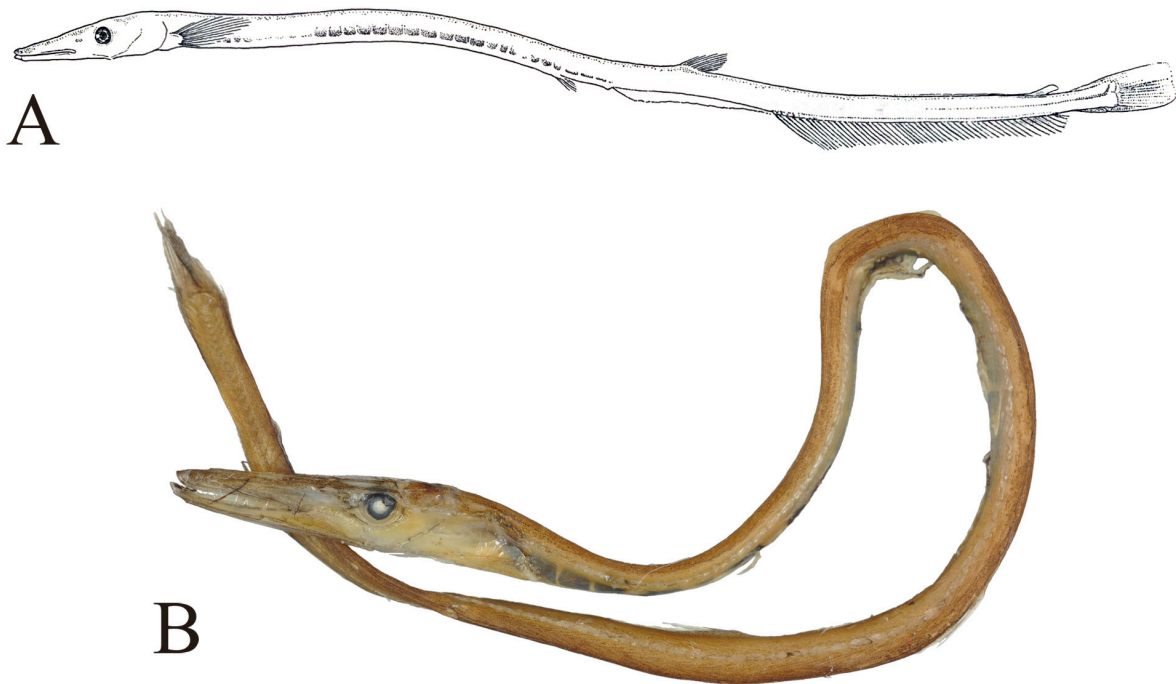


FIGURE 2. *Stemonosudis elongata* (Ege, 1933). A. Drawing of holotype, 117 mm SL, from Ege (1957). B. Young specimen, NMV A26574-016, 139 mm SL.

Gill filaments present on all four gill arches. Fourth arch mostly connected to the gill wall by a membrane. Pseudobranchs present, with anterior half within a deep pocket.

Dorsal-fin origin well behind middle of body, far behind pelvic-fin origin and at about midpoint of V–A. Pectoral fin well above the chest, the uppermost ray slightly lower than level of lower margin of eye; a small pocket behind pectoral-fin base. Pelvic-fin at about middle of the body, its origin well in front of that of dorsal-fin origin; a small axial scale behind pelvic-fin base. Anus situated slightly but clearly behind tip of adpressed pelvic fin, far in front of DFO. Anal fin originating at posterior portion of body, preanal-length 69.1–70.5% SL. Anal-fin base very long, 22.7–25.7% SL. Adipose fin above rear portion of anal-fin base, well in front of caudal-fin base, its base about same length as eye diameter.

Two or 3 small fangs at tip of upper jaw, followed by single row of numerous small, stout, retrorse teeth along upper jaw, gradually smaller on posterior portion. Vomerine teeth absent. Two rows of fangs on palatine, anterior teeth enlarged, forming 5 (3 or 4 in smaller specimens) tooth pairs, those of inner row long and depressible with knife-like tip, outer row much shorter, recurved and fixed, followed by single row of small and pointed teeth. Front of lower jaw with 2 slightly enlarged fangs, followed by two rows of fangs, forming tooth pairs, those in outer row fixed and smaller than those in inner row, which are knife-like and depressible. Teeth on tongue small, arranged in two rows at middle. Tongue surrounded by broad flap.

Gill rakers present on epibranchial, ceratobranchial and hypobranchial; shield shaped, usually bearing 1 or 2 stout teeth on each gill raker, tips extend slightly outside margin of gill arch (1 small tooth on each raker in young specimens); tiny teeth on fifth ceratobranchial forming a scattered patch; on pharyngeal arch forming a small, narrow patch in about 3 or 4 rows. Pharyngeal teeth relatively short, forming a long patch in about 4 rows. Teeth assumed absent on fifth ceratobranchial (small teeth present in young specimens).

Body naked except for lateral line which is covered by scales; lateral line incomplete, ending at about two-thirds of caudal-fin base length (to middle of base in young specimens, but with scales lost distally). Luminous organ and duct absent.

Coloration. The 351 mm specimen has a uniformly black body, including mouth cavity and gill chamber, peritoneal membranes; anterior portion of tongue pale. The 292 mm and 272 specimens are uniformly dark brown.

Young specimens with dorsum dark brown and ventral half of body pale to light brown; all fins covered loose melanophores. Peritoneal sections present in juveniles and young specimens, absent in adults.

Distribution. Previously recorded in Indo-Pacific Ocean off east Africa, Philippines, Fiji, Hawaii, Marquesas, based on holotype and post-larvae (Ege, 1957) and newly recorded from Madagascar, Australia (Western Australia and Queensland) and New Caledonia in this study. The adults were collected at depths of 854–868 m and 1070–1170 m, respectively, whereas young specimens were collected from depths 97–300 m.

TABLE 1. Morphometric and meristic data of *Stemonosudis elongata* examined in present study. * Holotype, data adopted from Ege (1957), with those of additional specimens in parentheses. LLS=lateral-line scales; vert. =vertebrae.

	MNHN 2000-0452	MNHN 2000-0452	CSIRO H 2543-11	MNHN 1964-0617	NMV A26574-016	AMS I.41990-003	*ZMUC P. 2318729
SL	351	292	272	178	139	136	117
% SL							
Head length	18.2	18.1	18.0	15.3	14.4	-	14.7
Body depth	4.2	4.2	4.4	3.5	3.2	-	3.2
Predorsal length	61.3	59.6	60.1	59.0	59.4	58.8	61.1
Prepelvic length	51.3	51.4	50.7	47.8	46.8	48.5	50.4
Preanal length	69.8	70.5	69.9	67.4	69.8	69.1	70.1
V–D	9.6	9.7	12.4	11.2	12.6	10.3	10.7
V–A	19.7	19.5	25.5	19.7	23.0	20.6	19.7
Head depth	3.9	3.9	3.7	3.3	3.1	3.1	-
Snout length	10.4	10.6	9.7	8.9	8.0	8.7	7.9
Eye diameter	2.1	2.3	2.2	1.9	1.6	1.4	1.5
Interorbital width	1.5	1.6	1.4	1.2	-	-	1.4
Upper-jaw length	8.2	8.4	7.5	6.7	6.1	-	6.2
Lower-jaw length	12.0	11.8	11.3	9.6	8.3	-	-
Pectoral-fin length	8.9	7.2	7.7	5.9	5.8	-	-
Caudal peduncle length	5.9	6.3	6.1	-	5.5	-	5.6
Anal-fin base length	23.9	23.4	23.7	24.4	22.7	25.7	24.4
V–D/V–A	48.5%	49.6%	48.5%	57.1%	54.7%	50.0%	54.3%
Meristics							
Dorsal-fin rays	10	10	10	10	-	9	11
Pectoral-fin rays	13	13	13	13	12	12	13
Anal-fin rays	50	49	49	50	49	49	50 (49–51)
Pelvic-fin rays	9	10	10	-	-	9	9
Prepelvic LLS	44	45	43	45	42	42	-
Predorsal LLS	56	56	54	57	52	53	-
Preanal LLS	68	68	66	67	64	65	-
Total LLS	95+11=106	95+13=108	89+13=102	99+	91+	90+	-
Prepelvic vert.	45	45	44	43	42	-	-
Predorsal vert.	56	57	55	54	54	-	-
Prehaemal vert.	48	49	49	49	-	-	(48)
Preanal vert.	68	69	67	64	65	-	-
Caudal vert.	73	72	70	66	-	-	-
Total vert.	121	121	119	115	115	-	(115–119)
Gill rakers	15+27+28=70	15+25+26=66	15+26+26=67	-	-	-	-

Remarks. Although the abdominal cavity of two larger specimens were removed and their gonads not available for examination, both are recognized as adults because their body sizes are similar to the adults of other species in the subfamily Lestidinae (largest records reaching 200–350 mm SL, Ho, pers. obs.) and the uniform brown to black color is similar to the adults of several other species of Lestidinae. Both specimens are in good condition but with their bodies twisted (Fig. 1). The young specimens (including holotype) are in poor condition with parts of the body damaged and bent or twisted. As a result, some of the body proportions and meristic data are not available, or values are approximate (Table 1).

Discussion

Ege (1957) gave a detailed description of the holotype and post-larval specimens. The holotype was observed in detail but not measured due to its fragile condition; morphometric data are adopted from Ege (1957). Based on the six additional specimens, all of them larger than the holotype, and specimens examined by Ege (1957), especially three adult specimens examined here, we provide the following observations.

Ege (1957) counted 11 dorsal-fin rays, which is confirmed by HCH, and we count 1 specimen with 9 and 4 with 10 rays. He counted 13 pectoral-fin rays in holotype and we counted 4 with 13 and 2 with 12 rays (first 2 rays attached to each other in general). He counted 49–51 ($n=13$) anal-fin rays and we counted 49 or 50 rays in our specimens. He counted 10 pelvic-fin rays in the holotype and we count 9 ($n=2$) or 10 ($n=2$). He gave 48 ($n=1$) prehamal vertebrae and we counted 48 ($n=1$) or 49 ($n=3$). He gave 115–119 ($n=12$) total vertebrae, and we counted 115 ($n=2$), 119 ($n=1$) and 121 ($n=2$). He gave the peritoneal section 23–24 and 27 in non-types and 31 or 32 in holotype, and we counted one specimen (139 mm SL) which had at least 26 sections (but partly damaged); the peritoneal membrane is uniformly black in the 272 mm specimen. All these data slightly extend the range of counts, except for the numbers of anal-fin rays and peritoneal sections, and the diagnosis is revised accordingly.

The body proportions in three young specimens are similar to those of holotype (Table 1), however, there are some clear differences in the three adult specimens, showing growth changes as provided below.

The head length is short in the young specimens (14.4–15.3% SL), whereas the adults have a longer head (18.0–18.2% SL). The body depth is 3.2–3.5% SL in the young specimens, whereas the adults have deeper body (4.2–4.4% SL). The V–D distance is slightly longer (10.3–12.6% SL) in the young specimens, whereas two larger adults have the V–D 9.6–9.7% SL, but 12.4% SL in the 272 mm specimen. The snout is shortest in the holotype (7.9% SL), slightly longer in young specimens (8.0–8.9% SL), whereas adults have longer snout (9.7–10.6% SL). The eyes are smaller in the young specimens (1.4–1.9% SL), whereas adults have a larger eye (2.1–2.3% SL). The head depth is shallower (3.1–3.3% SL in young specimens, whereas adults have a relatively deep head (3.7–3.9% SL). The upper and lower jaws are shorter in the young specimens (6.1–6.7% SL and 8.3–9.6% SL, respectively), whereas adults have longer jaws (7.5–8.4% SL and 11.3–12.0% SL, respectively). The pectoral fins are short in the young specimens (5.8–5.9% SL), whereas adults have longer pectoral fins (7.2–8.9% SL). These proportions likely represent growth changes; whereas other proportions are similar in the holotype and six additional specimens.

It is notable that the coloration clearly shows growth change, e.g. adults have their body uniformly dark brown (272 and 292 mm) to black (351 mm), whereas the young specimens have their body dark brown on the dorsum and pale to light brown on the ventral half.

The adults were collected by bottom trawl at depths of 854–868 m and 1070–1170 m, respectively, whereas the young specimens were collected by mid-water trawl at depths 97–300 m, suggesting a depth shift from shallow to deep waters, which may also relate to the growth changes mentioned above. It is common that the proportions related to head become larger with growth in species of Lestidinae (Ho, pers. obs.).

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