



Review of the *Stemonosudis rothschildi* species complex, with descriptions of two new species from the Indo-west Pacific Ocean (Aulopiformes: Paralepididae)

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Abstract

Three barracudina species are recognized in the *Stemonosudis rothschildi* species complex, which includes *Stemonosudis rothschildi* Richards, 1967, and two new species described herein. *Stemonosudis multifasciatus* **sp. nov.** is described based on five specimens collected off northwestern Australia and Myanmar, Eastern Indian Ocean. It is characterized by having 16 brownish blotches on dorsum (10 before dorsal-fin origin); 49–51 caudal vertebrae; 93–95 total vertebrae; dorsal-fin origin relatively forward in position, distance between origins of pelvic and dorsal fins 52.3–63.0% of distance between origins of pelvic and anal fins; and combination of body proportions. *Stemonosudis retrodorsalis* **sp. nov.** is described based on 15 specimens collected from off the Philippines, Indonesia and northwestern Australia. It is characterized by having dorsal-fin origin at about vertical through anal-fin origin, insertion of anal fin relatively forward, preanal length 71.5–79.5% SL; 6 blotches on dorsum before DFO and 4 on abdominal ridge before VFO and unique combination of body proportions. A redescription of *S. rothschildi*, based on specimens collected from off Dongsha (Pratas) Islands, Australia and West Indies, is also included.

Key words. Pisces, Actinopterygii, Teleostei, Taxonomy, Ichthyology

Introduction

The slender barracudina genus *Stemonosudis* currently comprises 12 valid species, although there may be some changes in the validity or generic assignment of some species (Ho, unpub. data). Ege (1933, 1957) described many new species under the genus *Macroparalepis*. Harry (1951) established the new genus *Stemonosudis* (type species *Macroparalepis intermedius* Ege, 1933), which includes all the species in the group II of *Macroparalepis* recognized by Ege (1933, 1957).

Rofen (1966) provided a key to all 10 species recognized at that time, many of them based on juveniles and other data provided by Ege (1933, 1957). Two species, *Stemonosudis rothschildi* Richards, 1967 and *Stemonosudis siliquiventer* Post, 1970, were described subsequently to Rofen (1966).

Post (1982) documented a specimen of *S. rothschildi* (BMNH 1981.11.30.1, 146.4 mm SL, off eastern Java) with the dorsal fin far posterior, its origin only slightly before the anal fin, a unique condition for paralepidids. He concluded that “it might be that a backward progression of dorsal fin is part of ontogeny....Therefore, the value of dorsal fin position as an indicator of a specific difference seems doubtful.” By contrast, the first author examined a large number of specimens, including the type series of those species described by Ege, and found that the positions of the dorsal, pelvic and anal fins in the same taxon are quite stable in paralepidids, not shifting greatly in distance.

Recently, 12 well-preserved specimens collected off the Philippines (Sulu Sea) and one poorly preserved specimen collected from off northwestern Australia (the latter collected together with *S. rothschildi*) were found in col-

lections. These were identical to the description provided by Post (1982). A detailed examination on them showed they are distinct from *S. rothschildi* in having different body proportions and vertebral formula, and are therefore described herein as a new species.

Seven specimens of another *Stemonosudis* species with many saddles on the dorsal and ventral margins of the body, were collected off northwestern Australia, Myanmar and Indonesia during trawl surveys. These specimens differ from all congeners and were an undescribed species that closely resembles *S. rothschildi* but differed in having many more blotches on the body, more vertebrae and different body proportions.

In addition, a large number of specimens of *S. rothschildi* collected off Dongsha (Pratas) Islands, Australia and West Indies were also examined. Together with the two new species described, these three are recognized as the *S. rothschildi* species complex in sharing several common characters.

The purposes of the present study are to provide a redescription of *S. rothschildi* based on newly collected specimens, to describe two new species, and to provide additional useful diagnostic characteristics for identifying all three species.

Methods and materials

Methods for taking counts and measurements follows Ho & Golani (2019) and Ho *et al.* (2019). Specimens examined are deposited at the Australian Museum, Sydney (AMS), the Commonwealth Scientific and Industrial Research Organisation, Hobart (CSIRO), Museum Victoria, Melbourne (NMV), the National Museum of Marine Biology & Aquarium, Pingtung (NMMB-P), the Museum and Art Gallery of the Northern Territory (NTM), the Muséum national d'Histoire naturelle, Paris (MNHN), and the South African Institute for Aquatic Biodiversity (SAIAB).

Abbreviations used are: DFO, dorsal-fin origin; VFO, pelvic-fin origin; AFO, anal-fin origin; PVLL, PDLL and PALL, numbers of lateral-line scales before pelvic, dorsal and anal fins, respectively; V–A, horizontal distance between origins of pelvic and anal fins; V–D, horizontal distance between origins of pelvic and dorsal fins; and D–A, horizontal distance between origins of dorsal and anal fins.

Taxonomy

Family Paralepididae

Stemonosudis Harry, 1951

Stemonosudis Harry, 1951:32 (Type species: *Macroparalepis intermedius* Ege, 1933).

Distinguishing features. A genus of the subfamily Paralepidinae with body generally relatively slender; anus clearly situated before dorsal-fin origin; jaws slender; nostrils above posterior the end of maxilla (but unknown in some species because of a lack of adult specimens), and some are slightly further forward (i.e. three species treated in present study); ventral adipose fin well-developed between anus and origin of anal fin; anal-fin rays 34–50 (except *S. molesta* with 30); vertebrae more than 84 (usually more than 90).

Remarks. Prior to the present study, total of 12 nominal species were recognized in the genus *Stemonosudis*. The two new species described herein raise the number to 14. However, based on the examination of the type specimens of most of species, some may be reassigned to other genera, such as *Lestidiops*.

Harry (1951, 1953) listed many characters in his diagnosis of *Stemonosudis*. However, most of them are commonly shared by other genera. *Stemonosudis* is similar to *Macroparalepis* Ege, 1933 in having a very slender body, but *Macroparalepis* has the anus well behind the tip of the anal fin, no ventral adipose fin and 24–28 anal-anal fin rays, whereas *Stemonosudis* has the anus just situated above posterior tip of pelvic fin, ventral adipose fin well-developed between anus and AFO, and more than 34 anal-fin rays (except for one species with 30).

Of all the other genera in the Lestidiinae, *Stemonosudis* is most similar to *Dolichosudis* Post, 1969. Based on observations by the first author, no distinguishable character has been found between these two genera, except for the uniformly blackish color in adults of *Dolichosudis*, compared with an uneven color pattern, such as saddles, in *Stemonosudis*. These two genera are likely to be synonyms.

Stemonosudis also shares most characters with members of *Lestidiops* Hubbs, 1916. The two genera can be separated mainly by body shape (much more slender and narrow in *Stemonosudis* than in *Lestidiops*), shapes of jaws (more slender in *Stemonosudis* than in *Lestidiops*), and position of nostrils (above or behind posterior end of maxilla in *Stemonosudis* and well in front in *Lestidiops*). However, the three species treated here have moderately slender bodies and jaws and their nostrils are slightly in front of the end of the maxilla, conditions that are “intermediate” between these of the two genera. Further studies are needed in order to assess the validity of the two genera, and the species assigned to them may change.

***Stemonosudis rothschildi* Richards, 1967**

Rothschild’s barracudina

Figs. 1, 2A; Tables 1–2

Stemonosudis rothschildi Richards, 1967:35 (type locality: off Hawaii Islands). Masuda *et al.*, 1984: 77, pl. 68 (description; Japan); Paxton *et al.*, 1989:248 (list; Australia); Fukui & Ozawa, 2004:293; Mundy, 2005:207 (list; Hawaii); Paxton *et al.*, 2006:494 (list; Australia); Larson *et al.*, 2013:48 (list; Australia).

Maculisudis longipinnis Kotthaus, 1967:82, figs. 87–90 (type locality: East of Mombasa, Kenya, 450 meters). Post, 1971:738 (synonymization).



FIGURE 1. *Stemonosudis rothschildi* Richards, 1967, NMMB-P39061, 1 of 11, 176 mm SL. A. Lateral view. B. Lateral view of head. C. Lateral view of trunk region showing the fins position. Arrows indicate the DFO (above), VFO (lower left) and AFO (lower right). Anterior to left.

Specimens examined. Forty-six specimens, 105–212 mm SL. **Western Australia:** AMS I.22826-001 (4, 193–212), FRV Soela, sta. So 2/82/43,45, 18°44’S, 117°02’E, 210 km north west of Port Hedland, 396–406 m, Engel trawl, 13 Apr. 1982, coll. J. Paxton & M. McGrouther. AMS I.22822-020 (2, 187–193), FRV Soela, sta. So 2/82/39, 18°23’ S, 117°41’E, 200 km northwest of Port Hedland, 396–418 m, Engel trawl, 11 Apr. 1982, coll. J. Paxton & M. McGrouther. CSIRO CA 3754 (1, 192), CA 3755 (1, 176) and CA 3756 (1, 180), FRV Soela, sta. So 1/83/69, 18°3.5’S, 118°13’E–17°56.7’S, 118°21.2’E, SW of Imperieuse Reef, 418–420 m, prawn trawl, 5 Feb. 1983. CSIRO H 2074-

03 (1, 191) and H 2074-04 (2, 170–177), 17°50'S, 118°33'E, SW of Rowley Shoals, 420 m, Courageous trawl, 12 Feb. 1989, coll. A. Williams. CSIRO H 7136-21 (1, 192), 14°20'S, 122°10'E–14°16'S, 122°16'E, S of Scott Reefs, 358–360 m, demersal trawl, 14 Dec. 2010. CSIRO H 7137-04 (1, ca. 140), 16°00'S, 120°33'E–16°13'S, 120°27'E, W of Cape Leveque, 420 m, demersal trawl, 14 Dec. 2010. NMV A 29699-009 (2), 14°50'49"S, 121°26'26"E, NW of Cape Leveque (Leveque L27 transect), 382–401 m, 26 Jun. 2007. NMV A 29700-015 (1), 14°36'31"S, 121°19'46"E (Leveque L27 transect), 709–712 m, 26 Jun. 2007. NMV A 29702-011 (1), 14°49'02"S, 121°27'33"E (Leveque L27 transect), 392–407 m, 27 Jun. 2007. **Taiwan:** NMMB-P24631 (1, 125), Dong-gang, Pingtung, south-western Taiwan, 27 Jul. 2016. NMMB-P31496 (5, 105–140), NMMB-P30961 (11, 174–185), NMMB-P30962 (13, 175–187), Dongsha Islands, South China Sea, 13 Feb. 2019. **Japan:** NSMT-P92268 (1, 160), off Pacific coast of Tohoku, Honshu, western Japan, 1 Nov. 2008, coll. T.P. Satoh. **Western Atlantic Ocean:** NSMT-P31655 (1, 127), R/V Nisshin-maru, 7°44'N, 54°11'W, Suriname, trawl, 480 m, 29 Sep. 1979. NSMT-P40155 (1, 120), Suriname, no other data.

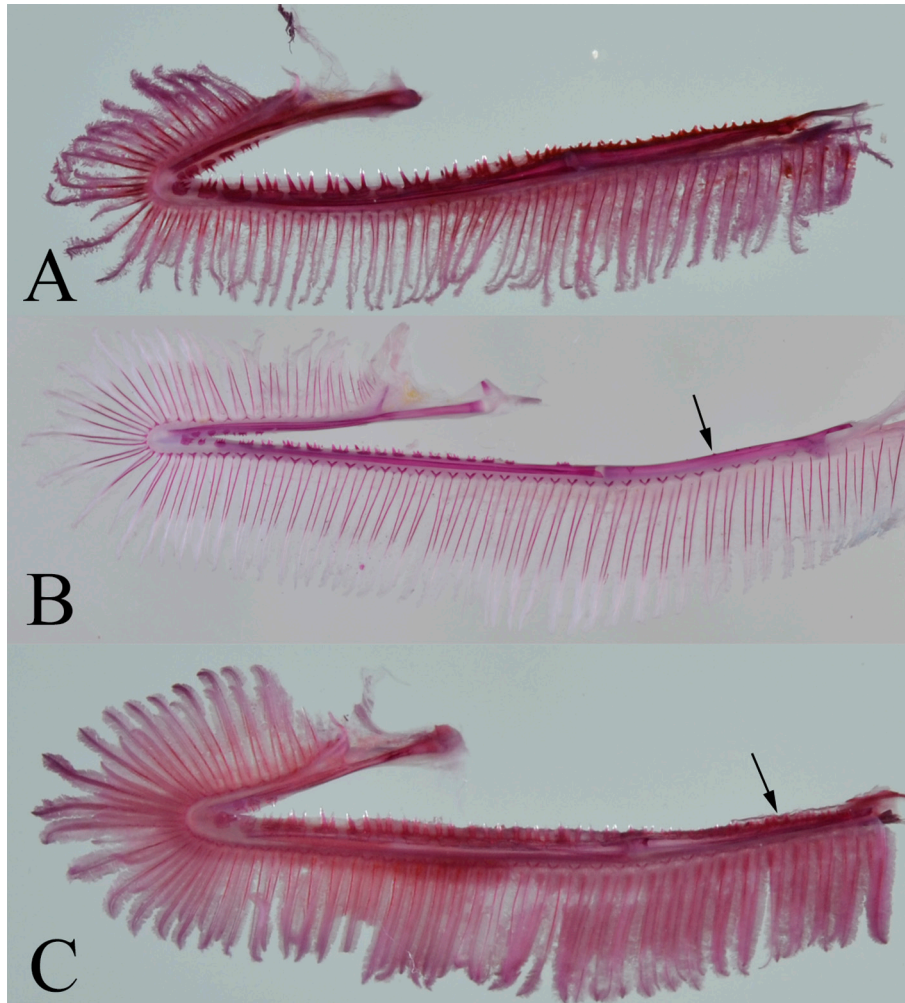


FIGURE 2. First gill arch and its rakers of three *Stemonosudis* species. A. *S. rothschildi*, NMMB-P39061, 176 mm SL. B. *S. multifasciata* sp. nov., NMMB-P30956, paratype, 247 mm SL, arrow indicates the rudimentary rakers. C. *S. retrodorsalis* sp. nov., from the holotype, arrow indicates the fused rakers. Anterior to right; not to scale.

Diagnosis. A species of the *S. rothschildi* species complex with relatively moderately slender body, both depth 15.9–18.8 in SL; 5 saddles on dorsum before DFO and 3 on abdominal margin before VFO; 39–41 prepelvic and 50–52 predorsal vertebrae; 9–13 vertebrae in V–D; and PVLL 39–41 and PDLL 50–52.

Description. Dorsal-fin rays 9 (rarely 10); pectoral-fin rays 12–13 (mainly 12); pelvic-fin rays 9; anal-fin rays 32–35. Lateral-line scales: 39–41 PVLL, 50–52 PDLL, 56–60 PALL, 75–84 in total, includes 3–5 small ones on rear portion. Vertebral counts: 42–44 prehaemal, 46–48 caudal, 39–41 prepelvic; 50–52 predorsal; 56–60 preanal and 89–92 in total.

Body moderately slender, strongly compressed, body depth 15.9–18.8 times in SL; ventral profile of belly nearly straight; greatest depth at about anterior 1/3 of the body. Caudal peduncle short, slightly longer than eye diameter. Well-developed, moderately narrow ridge between pectoral and pelvic fins. Ventral adipose fins weakly developed between pectoral and pelvic fins, well-developed between anus and anal fin. Anus at tip of appressed pelvic fin, well in front of DFO.

Head moderately slender, slightly wider at opercle than body, its length 4.5–5.1 in SL. Snout moderately long and pointed distally, its length 1.7–1.9 in HL. Mouth terminal, moderately large, its gape extending to or slightly beyond anterior margin of eye; tip of lower jaw slightly upturned, with small blunt fleshy tip. Eye small and rounded, its diameter 6.4–7.9 in HL. No light organ in front of or on lower margin of eye.

TABLE 1. Morphometric data of three *Stemonosudis* species in present study.

	<i>S. rothschildi</i>		<i>S. multifasciatus</i> sp. nov.			<i>S. retrodorsalis</i> sp. nov.		
	Non-types		Holotype	Types		Holotype	Types	
Standard length (mm)	120–185 (n = 14)		280	248–280 (n = 5)		151	104–161 (n = 7)	
% SL	Mean (Range)	SD		Mean (Range)	SD		Mean (Range)	SD
Head length	20.5 (19.5–22.4)	0.8	18.8	19.1 (17.5–20.9)	1.4	18.8	18.5 (16.8–19.1)	0.8
Head depth	5.0 (4.6–5.3)	0.2	4.3	4.3 (3.9–4.6)	0.3	5.2	5.0 (4.8–5.2)	0.1
Body depth	5.7 (5.3–6.3)	0.3	5.0	5.8 (5.0–6.4)	0.6	5.3	5.3 (3.6–6.0)	0.9
Predorsal length	74.1 (73.3–75.3)	0.7	71.9	72.6 (71.8–73.6)	0.7	73.2	76.5 (73.2–79.9)	2.9
Prepelvic length	60.8 (57.9–61.8)	1.2	62.4	61.3 (60.0–62.4)	1.0	59.9	59.9 (57.1–61.5)	1.5
Preanal length	79.6 (78.6–80.6)	0.5	80.6	80.3 (78.6–81.1)	1.0	72.5	76.3 (72.5–79.5)	3.0
V–A	18.7 (17.0–21.7)	1.2	19.3	18.6 (17.6–19.9)	1.0	12.6	16.4 (12.6–19.0)	2.4
V–D	13.1 (11.2–15.7)	1.2	12.1	10.9 (9.5–12.1)	1.1	13.2	16.7 (13.2–19.3)	2.2
D–A	5.5 (4.4–6.5)	0.8	7.1	7.7 (6.8–8.7)	0.8	*	*	
Pectoral-fin length	10.8 (9.1–12.2)	0.9	10.9	10.4 (9.2–10.9)	0.7	8.1	8.7 (8.1–9.4)	0.7
Dorsal-fin base	3.0 (2.8–3.1)	0.2	2.4	2.2 (2.0–2.4)	0.2	2.7	2.9 (2.5–3.4)	0.3
Anal-fin base	16.3 (15.7–17)	0.4	15.2	16.3 (15.2–17.0)	0.7	16.9	16.4 (15.9–16.9)	0.4
Eye diameter	2.9 (2.7–3.3)	0.2	2.7	2.6 (2.4–2.8)	0.1	3.2	3.2 (3.1–3.3)	0.1
Snout length	11.2 (10.7–11.6)	0.3	9.3	10.1 (9.3–10.8)	0.7	9.9	9.7 (8.9–10.3)	0.4
Interorbital width	2.1 (1.8–2.4)	0.2	1.8	1.8 (1.7–2.0)	0.1	2.5	2.3 (2.1–2.5)	0.1
Upper jaw	10.2 (9.6–10.8)	0.4	7.9	8.2 (7.5–9.2)	0.6	9.1	9.0 (8.2–9.3)	0.4
Lower jaw	13.1 (12.8–13.5)	0.3	10.5	11.0 (10.4–12.0)	0.7	11.9	11.7 (11.1–12.0)	0.4
% V–A								
V–D	69.7 (64.7–75.7)	4	63.0	58.7 (52.3–63.0)	4.0	105.3	101.4 (96.3–105.3)	3.2
% HL								
Head depth	24.6 (23.3–27.0)	1.1	22.6	22.8 (21.6–24.6)	1.1	27.5	27.4 (25.9–29.8)	1.3
Eye diameter	14.3 (12.7–15.5)	0.8	14.2	13.8 (13.2–14.3)	0.5	17.1	17.3 (16.5–18.3)	0.6
Snout length	54.9 (53.5–57.5)	1.2	49.1	52.7 (49.1–56.3)	2.7	52.8	52.5 (51.3–53.9)	1
Interorbital width	10.3 (8.7–11.4)	0.9	9.3	9.6 (9.3–9.8)	0.2	13.0	12.2 (11.7–13.0)	0.5
Upper jaw	49.5 (47.4–51.7)	1.5	41.9	42.8 (41.8–43.8)	0.9	48.6	48.4 (47.8–48.8)	0.3
Lower jaw	64.4 (62.2–67.4)	1.8	55.8	58.8 (55.8–62.5)	2.9	63.0	63 (60.1–66.3)	2

Two nostrils close together, slightly, but clearly before posterior end of maxilla, about 2/3 eye diameter in front of eye. Interorbital flattened, its width 8.8–11.4 in HL, with two lateral, compressed, longitudinal ridges on each side. Upper jaw length 1.9–2.1 in HL, maxilla terminating about 1/3–1/2 eye diameter before vertical through anterior margin of eye. Opercle thin, posterior margin bluntly pointed, its lower margin notched around base of pectoral fin. Gill membranes joined far forward, before vertical through anterior margin of eye, free from isthmus. Numerous

sensory canals on snout, cheek, operculum, and jaws; numerous sensory pores on dorsal surface of snout and lower surface of lower jaw.

Pectoral fin slender, originating above level of lower margin of eye, slightly behind vertical through posterior margin of gill cover. Small pocket behind pectoral-fin base. DFO about 1/4 SL before caudal fin, well behind VFO and midpoint of V–A. VFO well behind middle of body. Very small axial scale, mostly embedded, behind pelvic-fin base. Anal fin originating at about 1/5 SL before caudal fin.

Premaxilla with 2 or 3 small canines, followed by row of many small, closely-spaced, fixed, retrose teeth along upper jaw, gradually smaller posteriorly. Vomerine teeth absent. Mandible with 3 depressible fangs at front, followed by two rows of large broadly-spaced teeth, forming 5–8 tooth pairs, those in inner row long, with knife-like tip, and depressible; those in outer row much shorter, recurved and fixed. Two rows of teeth on each palatine, anterior 5–7 forming widely-spaced tooth pairs, those in inner two depressible and long, those in outer row short and fixed, followed by single row of short and fixed teeth. Tongue fleshy, spatulate anteriorly, with two parallel longitudinal rows of teeth extending length of glossohyal, each row with several small teeth. Basihyal without teeth.

TABLE 2. Meristic data of three *Stemonosudis* species. VFO–DFO means number of vertebrae between VFO and DFO.

	<i>S. rothschildi</i>	<i>S. multifasciatus</i> sp. nov.		<i>S. retrodorsalis</i> sp. nov.	
	Non-types (n = 25)	Holotype	Types (n = 7)	Holotype	Types (n = 11)
Dorsal-fin rays	9	9	8–9	9	9–10
Pectoral-fin rays	12–13	13	12–13	13	13
Pelvic-fin rays	9	9	9	9	9
Anal-fin rays	32–34	34	32–35	34	32–34
Lateral-line scales					
PVLL	39–41	40;41	40–41	40	39–41
PDLL	50–52	51;52	50–52	58	56–58
PALL	56–60	59;60	59–60	57	57–58
Total	74–84	78;79	75–79	77	75–77
Vertebrae					
Prehaemal	42–44	44	44–45	42	42–43
Caudal	46–48	49	49–51	48	46–49
Prepelvic	39–42	42	42	39	38–40
Predorsal	50–53	50	50–53	58	57–58
Preanal	56–58	58	58–61	57	56–58
Total	89–92	93	93–95	90	89–91
VFO–DFO	9–13	8	8–11	19	17–19
Gill rakers	3–5 + 14–16 + 11–14 = 29–35	7 + 18 + 0 = 25; 7 + 20 + 0 = 27	5–7 + 15–20 + 0–3 = 24–30	3 + 15 + ?	-

Gill rakers (Fig. 2A) present but not easy to observe without staining; better developed than in two other congeners (see below); better developed on the outer two arches than other two. Each raker with 1–3 small teeth and narrow base. Total rakers 29–35, 3–5 rakers on epibranchial, 14–16 relatively large rakers on ceratobranchial, and 11–14 small rakers on hypobranchial. Teeth on pharyngeal arch slender, in oval patch, about 5 rows at middle. Single row of small teeth on fifth ceratobranchial. Pseudobranchs present, inside deep pocket above first gill arch. Body devoid of scales, except for single row of lateral-line scales originating above pectoral girdle and running to above about posterior third to fourth of anal-fin base. Lateral-line scales as high as wide, becoming gradually smaller and narrower posteriorly; a cluster of 3–5 pores on each side of scale, outermost pore largest.

No luminescent duct in abdominal cavity. Peritoneal sections well-developed and separated in adults.

Coloration. Body translucent to light dusty when fresh, yellowish to grayish brown in preservation. Upper fourth of body covered with small chromatophores; lateral line densely covered with chromatophores, gradually becoming scattered on ventral half of body. Dense chromatophores on snout, both lips and abdominal ridge; scattered chromatophores on top of head, nape, and around eye. Very fine chromatophores forming large saddles on dorsum and ventral margin; 9 or 10 on dorsum, 5 before DFO, 1 at dorsal-fin base, 2 between dorsal and adipose fins, 1 or 2 on caudal peduncle; 8 saddles on ventral margin, 3 in front of VFO, 1 at pelvic-fin base, 1 near AFO, 1 on middle of anal-fin base and 1 or 2 on caudal peduncle; the last 2 or 3 pairs of dorsal and ventral saddles usually fused to each other at mid-flank. Peritoneal membranes divided into 9 to 11 (mostly 10) sections, visible through belly. Pectoral and pelvic fin transparent to slightly hyaline; upper half of dorsal fin black; posterior portion of anal-fin blackish; caudal fin black.

Size. The largest specimen examined in this study is 212 mm SL.

Distribution. Known from circumglobal in tropical seas, including the Hawaiian Islands, but not found in the eastern Pacific Ocean; collected from continental slope (358–712 m).

Remarks. Richards (1967) described *Stemonosudis rothschildi* based on a single specimen collected from the stomach of a lancetfish (*Alepisaurus richardsoni* [= *A. ferox*]) taken from the central North Pacific Ocean. Post (1971) documented five young adolescents from the Caribbean Sea and suggested it had a worldwide distribution.

Although this species were documented from Japan (Masuda *et al.*, 1984) Australian waters (Paxton *et al.*, 1989, 2006), no detailed morphological data were provided. We examined a number of specimens collected off Western Australia, Taiwan and Japan, and two specimens from the Caribbean Sea. Their meristic values agree with the original descriptions and additional information provided by Post (1971). Post (1971) also provided the evidence for synonymizing *Maculisudis longipinnis* Kotthaus, 1967 with *Stemonosudis rothschildi*.

Post (1982) reported one specimen collected from Java (146.4 mm SL) with several distinct characters; together with additional specimens, it is described as a new species below.

***Stemonosudis multifasciatus* sp. nov.**

Multi-blotch barracudina

Figs. 2B, 3A–D; Tables 1–2

Holotype. NMMB-P30955 (280), sta. 139, 11°01'49.8"N, 96°53'31.8"E, off Myanmar, Andaman Sea, Eastern Indian Ocean, 329.5–332 m, 24 Sep. 2018.

Paratypes. Six specimens, 248–283 mm SL: NMMB-P30956–7 (2, 248–249), sta. 114, 12°43'16.8"N, 96°45'21.6"E, off Myanmar, Andaman Sea, Eastern Indian Ocean, 308–310 m, 20 Sep. 2018. NTM S.12288-039 (1, 280), N.T. Fisheries, ca. 9°46'S, 130°14'E, east of Evans Shoal, Northern Territory, Arafura Sea, 270–300 m, 5 Sep. 1987. NTM S.12455-002 (1, 254), FV *Napier Pearl*, ca. 9°46'S, 130°00'E, north of Bathurst Island, Northern Territory, Arafura Sea, 275 m, 7 Jul. 1988. SAIAB 14159 (1, 283), Stn 558, 6°29'N, 97°54.4'E, off Sumatra, Andaman Sea, eastern Indian Ocean, trawl, 330 m, 18 Jul. 1980, coll. coll. P. Heemstra. SAIAB 65701(1, 267), 6°345'N, 98°00'E, Molluca Straits, Indonesia, Andaman Sea, eastern Indian Ocean, bottom Trawl, 320 m, 31 Jul. 1980, coll. P. Heemstra.

Diagnosis. A species of the *S. rothschildi* species complex with 16 saddles on dorsum, 10 before DFO; 49–51 caudal and 93–95 total vertebrae; vertebrae between VFO and DFO 8–11; DFO relatively forward in position, pre-dorsal length 71.8–73.6% SL, V–D 52.3–63.0% V–A; upper jaw 41.8–43.8% HL, lower jaw 55.8–62.5%.

Description. Holotype first, paratypes in brackets after. Dorsal-fin rays 9 (8–9); pectoral-fin rays 13 (12–13); pelvic-fin rays 9; anal-fin rays 34 (32–35). Lateral-line scales: 40/41 (40–41) PVLL; 51/52 (50–52) PDLL; 59/60 (59–60) PALL; 78/79 (75–79) in total, including 4 or 5 (3–5) smaller scales at rear. Vertebral counts: 44 (44–45) prehaemal; 49 (49–51) caudal; 42 prepelvic; 50 (50–53) predorsal; 58 (58–61) preanal; 93 (93–95) in total.

Body moderately elongate, relatively deep and strongly compressed, ventral profile of belly nearly straight or slightly convex; greatest depth of body right at anterior third of body. Well-developed, moderately narrow ridge between head and pelvic fins. Ventral adipose fins weakly developed between pectoral and pelvic fins, well-developed between anus and anal fin.

Head slender and pointed, length 5.3 (4.8–5.7) in SL. Snout moderately long, its length 2.0 (1.8–2.0) in HL. Two nostrils close together, at about same vertical through posterior end of maxilla or slightly forward, about 0.8

eye diameter before eye. Eye round, diameter 7.0 (7.0–7.6) in HL. Postorbital length less than half of HL. Interorbital flattened, width 10.8 (10.2–10.8) in HL, with two lateral, compressed, longitudinal ridges on each side of interorbital space.



FIGURE 3. *Stemonosudis multifasciata* sp. nov., holotype, NMMB-P30955, 280 mm SL. A. Lateral view. B. Head. C. Anterior trunk region showing dorsal blotches and peritoneal sections. D. Trunk region. Arrows indicate DFO (above), VFO (lower left) and AFO (lower right). Anterior to left.

Mouth terminal, moderately large, its gape extending slightly beyond anterior margin of eye; tip of lower jaw slightly upturned, with small blunt fleshy tip. Upper jaw length 2.4 (2.3–2.3) in HL, maxilla terminating about 0.8 eye diameter before vertical from anterior margin of eye. Opercle thin, with posterior margin bluntly pointed, its lower margin slightly notched around base of pectoral fin. Numerous sensory canals on snout, cheek, operculum, and jaws; numerous sensory pores on dorsal surface of snout and lower surface of lower jaw. Gill membranes joined at throat region, before a vertical through anterior margin of eye, and free from isthmus posteriorly.

Pectoral fin slender, originating level of lower margin of eye; fin rays long, about equal to snout length, fin length 9.2 (9.2–10.9) in SL. Dorsal-fin at about 1/4 SL before caudal fin, well behind VFO and middle of V–A. Pelvic fin originating well before vertical through DFO. Very small axial scale, mostly embedded behind pelvic-fin base. Anus slightly behind tip of the appressed pelvic fin (under tip of pelvic fin in some paratypes). Anal fin originating at about 1/5 SL before caudal fin.

Premaxilla with 3 small depressible canines followed by series of many closely-spaced, fixed, retrorse teeth. Mandible with single short fixed tooth on crown each side of symphysis behind which is a larger and depressible canine, then 3 smaller canines anteriorly; followed by 5 or 6 large broadly-spaced depressible canines, each accompanied anteriorly by short fixed tooth. Vomer without teeth. Palatine with 5 enlarged widely-spaced depressible teeth, each of second and third teeth accompanied by moderately large fixed tooth, followed by single row of short, fixed retrorse teeth. Tongue fleshy, spatulate anteriorly, with 2 parallel longitudinal rows of teeth extending length of glossohyal, each row with 7–9 small teeth. Basihyal without teeth.

Gill rakers small, present on the epibranchial and ceratobranchial on the outer 2 arches only, absent or only few rudimental teeth on all hypobranchials and the inner 2 arches. Each raker with 1–3 short teeth. Total 24–30 rakers; 5–7 rakers on epibranchial, 15–20 small ones on ceratobranchial, and 0–3 rudimental ones on hypobranchial (Fig. 2B). Row of small teeth on fifth ceratobranchial; teeth on pharyngeal arch small, in oval patch. Pseudobranches well-developed, inside deep pocket above first gill arch.

Body devoid of scales, except for single row of lateral-line scales originating from above pectoral girdle and running to above about posterior third of anal-fin base. Anterior lateral-line scales slightly wider than high, gradually becoming smaller and becoming narrower posteriorly; those in anterior half of lateral line shield-shaped, with concave on upper and lower margins; each scale with 3 pores above and below posterior half; scales in the posterior portion usually with 1 pore.

No luminescent duct in abdominal cavity. Peritoneal sections well developed and separated.

Coloration. Fresh color unknown. Color when preserved, body blackish, densely covered with fine chromatophores; 16 saddles, consisting of very fine chromatophores, on the dorsum, those in odd numbers larger; 10 before dorsal fin; 1 at dorsal-fin base; 3 between dorsal-fin and adipose fin; 1 at adipose fin and 1 at caudal fin base, latter 2 crossing caudal peduncle. Three indistinct ventral saddles before pelvic fin, 1 at pelvic-fin base, 1 at anterior portion of anal-fin base, 1 below adipose fin and 1 at caudal-fin base, the lateral 2 connecting to the last 2 saddles on dorsum, and forming bands.

Pectoral fin blackish with white base; pelvic fin with black base and white margin; dorsal fin with scattered chromatophores; adipose fin blackish; caudal fin with dense chromatophores on upper lobe and scattered ones on lower lobe, base and middle rays whitish. Dense chromatophores on anterior portions of jaws, dorsal surface of head, and branchiostegal membranes; gill chamber pale. Ventral ridge on abdomen with scattered chromatophores and ventral adipose fin densely pigmented.

Size. The largest specimen examined is 283 mm SL.

Etymology. The specific name is derived from the diagnostic character of many saddles on dorsal and ventral margins of body.

Distribution. Known from the type series collected from Arafura Sea and Andaman Sea at continental slope (270–332 m).

Remarks. *Stemonosudis multifasciata* is most similar to *S. rothschildi* in having relatively few anal-fin rays (32–35, vs. 35 or more in other *Stemonosudis*, except for one species which has 30) and more blotches on dorsum anterior to DFO (5 or more, vs. 0–3). It differs from *S. rothschildi* mainly in having 10 blotches on dorsum before DFO (vs. 5 in *S. rothschildi*), 93–95 total vertebrae (vs. 89–92). The two species also differ in: head depth 3.9–4.6% SL (vs. 4.6–5.3% SL); predorsal length 71.8–73.6% SL (vs. 73.3–75.3% SL); D–A 6.8–8.7% SL (vs. 4.4–6.5% SL), dorsal-fin base 2.0–2.4% SL (vs. 2.8–3.1% SL); snout length 9.3–10.8% SL (vs. 10.7–11.6% SL); upper-jaw length 7.5–9.2% SL (vs. 9.6–10.8% SL); lower-jaw length 10.4–12.0% SL (vs. 12.8–13.5% SL); V–D 52.3–63.0% V–A (vs. 64.7–75.7% V–A) (see Table 1). However, as only a few specimens of *S. multifasciata* were available, these ranges may increase and overlap, when more material is caught.

The gill rakers in *S. multifasciatus* are relatively weakly-developed (Fig. 2B) compared to the two other species in the complex (Figs. 2A & 2C). Ho & Duhamel (2019) documented that the adults of some members in the subfamily Paralepidinae had reduced jaw teeth and gill rakers. However, no member of Lestidiinae has been observed with reduction of teeth or gill rakers. Because all our specimens are relatively large (248–280 mm SL), and no small specimens were available, the condition of the gill rakers in juveniles awaits further investigation.

***Stemonosudis retrodorsalis* sp. nov.**

Back-fin barracudina

Figs. 2C, 4–5; Tables 1–2

Stemonosudis rothschildi (non Richards): Post, 1982:29 (description; Indonesia). Gloerfelt-Tarp & Kailola, 1984:79 (figure; Indonesia).

Holotype. BSKU 15795 (151 mm SL), R/V Hakuho-maru, KH-72-01, sta. 20, 5°40.9'N, 119°46.3'E–5°43.1'N, 119°47.0'E, off Tawitawi Island, the Philippines, Sulu Sea, 460–514 m, 30-foot otter trawl, 10 Jun. 1972, coll. O. Okamura.

Paratypes. BSKU 15794 (1, 161 mm SL), BSKU 15796–15802 (8, 100–142), NMMB-P30958 (3, 111–137), all collected together with the holotype. BMNH 1981.11.30.1 (1, 146.4), 8°44'S, 114°16'E southern coast of eastern Java, Indonesia, 40–180 m, midwater trawl, 15 Jul. 1979 [Fig. 4D; detailed description provided in Post, 1982].

Non-type. AMS I.26000-001 (1 of 5, 146), FRV Soela, sta. So 2/82/43,45, 18°44'S, 117°02'E, 210 km north west of Port Hedland, Northwest Shelf, Eastern Indian Ocean, 396–406 m, Engel trawl, 13 Apr 1982, coll. J. Paxton & M. McGruther.

Diagnosis. A species of the *S. rothschildi* species complex with dorsal fin situated far posteriorly, at about vertical through AFO; preanal length 73.2–79.9% SL; six saddles on dorsum before dorsal fin; four saddles on abdominal ridge before pelvic fin; V–D 96.3–105.3% V–A; vertebrae before DFO 57–58, before AFO 56–58; vertebrae between VFO and DFO 17–19; lateral-line scales before DFO 56–68 and before AFO 57–58.

Description. Holotype first, paratypes and non-types in brackets after. Dorsal-fin rays 10 (9–10, usually 10); pectoral-fin rays 13 (12–13); pelvic-fin rays 9; anal-fin rays 34 (32–34). Lateral-line scales: PVLL 40 (39–41); PDLL 58 (56–58); PALL 57 (57–58); and total 77 (75–77), including 7 (3–7) smaller scales on posterior end. Vertebral counts: 42 (42–43) prehaemal; 48 (46–49) caudal; 39 (38–40) prepelvic; 58 (57–58) predorsal; 57 (56–58) preanal and 90 (89–91) in total.

Body moderately elongate and strongly compressed, body depth at pectoral-fin base 19 (17–28) times in SL; ventral profile of belly nearly straight; greatest depth of body at approximately middle of body. Caudal peduncle short, slightly less than the eye diameter. Well-developed, moderately narrow ridge between head and pelvic fins. Anus above tip of the appressed pelvic fin, well in front of DFO.

Head moderately slender, slightly wider at opercles than the maximum body width. Snout moderately long and pointed distally. Mouth terminal, moderately large, extending beyond anterior margin of eye; tip of lower jaw slightly upturned, with small blunt fleshy tip. Postorbital head length less than half of head length. Eye round, diameter 5.8 (5.5–6.0) in HL. No light organs in front of or on lower margin of eye. Interorbital flattened, width 8.2 (7.7–8.6) in HL, with two lateral, compressed, longitudinal ridges on each side.

Two nostrils close together, slightly but clearly before posterior end of maxilla, about 0.8 eye diameter before eye. Upper jaw length 2.1 in HL, maxilla terminating about one-third eye diameter before a vertical through anterior margin of eye. Opercle thin, with posterior margin bluntly pointed, its lower margin slightly notched around base of pectoral fin. Gill membranes joined far forward, before vertical from anterior margin of eye, free from isthmus. Numerous sensory canals on snout, check, operculum, and jaws; numerous sensory pores on dorsal surface of snout and lower surface of lower jaw.

Pectoral fin slender, originating about level of lower margin of eye, slightly behind vertical through posterior margin of gill cover. Small pocket behind pectoral-fin base. DFO at about 1/5 SL before caudal fin, at about vertical through AFO (slightly before or behind in some). VFO well before vertical through DFO. Very small axial scale, mostly embedded, behind pelvic-fin base. Dorsal adipose fin above rear portion of anal-fin base. Ventral adipose fin moderately developed on abdomen ridge, wall-developed between margin of anus and AFO.

Premaxilla with 2 or 3 (usually 3) small depressible canines, followed by row of many small, closely-spaced, fixed, retrose teeth along upper jaw, gradually smaller posteriorly. Vomerine teeth absent. Mandible with 2 or 3 short fixed teeth at front, then small toothless gap, followed by two rows of large broadly-spaced teeth forming 7 or 8 pairs; teeth in inner row long, depressible, each with knife-like tip; in outer row short and fixed. Palatine with 2 rows of canines anteriorly forming 6 or 7 widely-spaced pairs, teeth in outer row small and fixed, followed by single row of short, fixed retrose teeth, in inner row long and depressible. Tongue fleshy, spatulate anteriorly, with two parallel longitudinal rows of teeth extending length of glossohyal, each row with 10–12 small teeth. Basihyal without teeth.

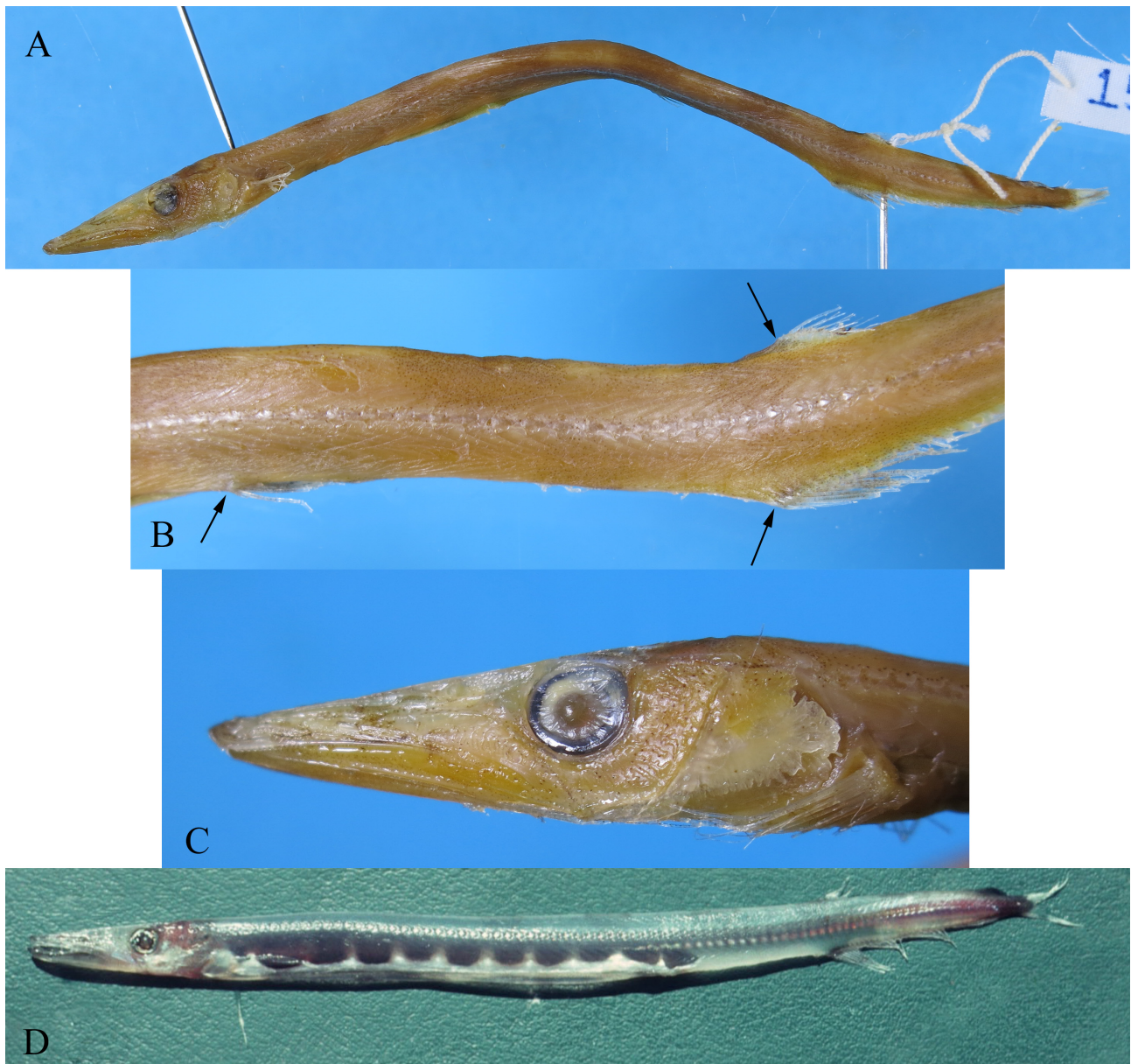


FIGURE 4. *Stemonosudis retrodorsalis* sp. nov., A–C. holotype, BSKU 15795, 151 mm SL. A, Lateral view. B. Lateral view of trunk, anterior to left. C. Lateral view of head (reversed). D. BMNH 1981.11.30.1, 146.4 mm SL, photo by T. Gloerfelt-Tarp. Arrows indicate the DFO (above), VFO (lower left) and AFO (lower right). Anterior to left.

Gill rakers (Fig. 2C) somewhat rudimentary and not easy to observe without staining; well developed in outer the two arches and poorly developed on the two inner arches. Each raker with 2 or 3 (mainly 2) short teeth. First arch with 3 small rakers on epibranchial, 15 on ceratobranchial, and several on posterior half of hypobranchial, those on anterior half with their bases fused to each other (Fig. 2C). Single row of small teeth on fifth ceratobranchial. Four gill arches, filament present on the first to fourth arches. The fourth mostly connected to the gill wall by membrane. Pseudobranches present, inside a deep pocket above first gill arch.

Body devoid of scales, except for lateral-line scales originating from above pectoral girdle and running to above about posterior third of anal-fin base. Anterior lateral-line scales slightly wider than high, gradually becoming smaller and becoming narrower posteriorly; those in anterior half of lateral line with concave on upper and lower margins; each scale with 3 pores above and below the posterior portions, the anteriormost one largest; posterior scales with only 1 pore in general.

No luminescent duct in abdominal cavity. Peritoneal sections well developed and clearly separated in adults.



FIGURE 5. *Stemonosudis retrodorsalis* sp. nov., BSKU 15800, 105 mm SL. A. Dorsolateral view. B. Lateral view of trunk. C. Ventral view showing ventral saddles on abdominal ridge, lines indicate the saddles. Arrows indicate the DFO (above), VFO (lower left) and AFO (lower right).

Coloration. Fresh coloration translucent with similar, but much paler pigmentation than in preservation (Fig. 4D). Coloration of preserved specimens (Figs. 4–5) with dorsal half of body generally brownish, with relatively large and scattered chromatophores and darker saddles consisting of numerous tiny and dense chromatophores. Ventral half of body mostly devoid of pigment, except for blotches similar to dorsal surface and a narrow stripe of chromatophores on submargin of abdominal ridge.

Anterior half of snout and lower jaw densely covered with chromatophores, somewhat blackish; other parts of head with unevenly and loosely scattered chromatophores. Top of head brownish. All fins blackish, except for pale pectoral fin sometimes with few chromatophores.

Dorsal saddles alternating with ventral saddles before AFO. Eight saddles on dorsum, 4 before VFO, fifth slightly before midpoint of V–A, sixth just in front of DFO, 7th relatively wide, above about middle of anal fin base, posterior portion connected to 8th saddles of ventral margin, and last fused with ventral saddle, forming broad band.

Nine saddles on ventral margin; 4 on abdomen before VFO, 5th at pelvic fin base; 6th at midpoint of V–A, 7th right at anterior quarter of anal-fin base, its base much longer than others; 8th right above posterior 1/3 of anal-fin base; and the last on caudal peduncle, fused with the last saddle of dorsum, forming a wide band.

Peritoneal membranes divided into 11 sections, 1st at pectoral-fin base; 8 between pectoral and pelvic fins, 1 at pelvic fin base and 1 behind pelvic fin base.

Size. The largest specimen examined in this study is 161 mm SL.

Distribution. Known from eastern Indian and western Pacific oceans off the Philippines (Sulu Sea; Western Pacific Ocean), eastern Java, Indonesia and Northwest Shelf of Australia. Specimens were collected by bottom trawl at continental slope (396–514 m), except for one collected by mid-water trawl (40–180 m) at night.

Etymology. The specific name is combination of *retro* means behind and *dorsalis* mean back, here the dorsal fin, in referring to the backward position of dorsal fin.

Remarks. *Stemonosudis retrodorsalis* sp. nov. is unique for the family in having the dorsal fin originated far back, at about same vertical as AFO. It is most similar to *S. rothschildi* in coloration, body proportions, and fin and vertebral formulae. Characters related to the backward position of dorsal fin are V–D = 96.3–105.3% V–A (vs. 64.3–73.1%); vertebrae before DFO 57–58 (vs. 50–53); lateral-line scales before DFO 56–68 (vs. 50–52); vertebrae between VFO and DFO 17–19 (vs. 9–12). It is notable that the predorsal length of both species are strongly overlapped, but the preanal length is relatively short in *S. retrodorsalis* (73.2–79.9% SL; vs. 79.1–80.0%), so that the position of the anal fin in *S. retrodorsalis* is relatively forward compared to that of *S. rothschildi*.

Other useful characters that distinguish *S. retrodorsalis* from *S. rothschildi* are smaller head, length 16.8–19.1% (vs. 19.7–22.4% SL); larger eye, diameter 16.5–18.3% HL (vs. 12.7–15.5% HL), a broader interorbital width 11.7–13.0% (vs. 8.7–11.4% HL); a shorter snout, length 8.9–10.3% SL (vs. 11.2–11.6% SL) and 51.3–53.9% HL (vs. 53.5–57.5% HL); and both jaws relatively short, upper jaw 8.2–9.3% SL (vs. 9.9–10.8% SL) and lower jaw 11.1–12.0% SL (vs. 12.8–13.5% SL).

Discussion

All other paralepidids have the dorsal fin situated well in front of AFO, and only the three species treated herein and *Lestidium blanci* Kartha, 1971 (= *Lestidiops blanci*) have their dorsal fin situated clearly behind mid-point of V–A, but the fin still distinctly before the AFO, except for *S. retrodorsalis*. Another departure from the norm is *Uncisudis posteropelvis* Fukui & Ozawa, 2004 which has the pelvic fin situated well behind DFO and very closed to AFO.

The first author has examined large numbers of specimens across most genera and species, and can confirm that the position of dorsal, pelvic and anal fins remains fairly consistent in the same species across all size classes in all paralepidids. On that basis, the proposal by Post (1982) that *S. rothschildi* have a “backward progression of dorsal fin” is not supported and can be a valuable means of differentiating species.

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