

Dolichopteryx pseudolongipes, a new species of spookfish (Argentinoidei: Opisthoproctidae) from the eastern Pacific Ocean

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Abstract A new species of opisthoproctid, *Dolichopteryx pseudolongipes*, is described on the basis of three specimens (48.7–79.9 mm in standard length: SL) collected from the eastern Pacific Ocean. This species is characterized by small tubular eyes (diameter 2.7–3.9% SL), presence of an adipose fin, anal fin base originating under the dorsal fin base, relatively short predorsal (73.3–73.8% SL), prepelvic (64.3–67.9% SL), preanal (77.4–80.1% SL), and preanus (71.5–75.7% SL) lengths; 31–33 (=9–10 + 22–24) gill rakers and 43–45 vertebrae. Although *D. pseudolongipes* had previously been confused with *Dolichopteryx longipes*, many differences between the species are apparent [e.g., adipose fin absent, anal fin base origin just behind dorsal fin base, greater prepelvic length (70.3–72.7% SL), 25 gill rakers, and 46–47 vertebrae in *D. longipes*].

Keywords *Dolichopteryx pseudolongipes* · New species · Opisthoproctidae · Eastern Pacific Ocean

Introduction

Species of *Dolichopteryx* Brauer 1901 (Argentinoidei: Opisthoproctidae), distributed worldwide in oceanic mid-water depths (Paxton and Cohen 1999), are characterized by an elongate body, tubular or pouch-like eyes being dorsally or anterodorsally directed, two branchiostegal rays, multi-serial vomerine teeth, and internal organs enclosed by the peritoneum and skin (Brauer 1901, 1906; Beebe 1932; Parr 1937; Cohen 1964; Ahlstrom et al. 1984; Badcock 1988; Moser 1996; Kobylanskii and Fedorov 2001). Seven species, *Dolichopteryx anascopa* Brauer 1901, *Dolichopteryx binocularis* Beebe 1932, *Dolichopteryx longipes* (Vaillant 1888), *Dolichopteryx minuscula* Fukui and Kitagawa 2006b, *Dolichopteryx parini* Kobylansky and Fedorov 2001, *Dolichopteryx rostrata* Fukui and Kitagawa 2006a, and *Dolichopteryx trunovi* Parin 2005, are currently regarded as valid (Badcock 1988; Kobylanskii and Fedorov 2001; Parin 2005; Fukui and Kitagawa 2006a, b), with an additional species briefly described but not yet named (see Moser 1996). *Dolichopteryx longipes* has been recorded from warm waters worldwide (Brauer 1901, 1906; Grey 1952; Cohen 1964; Fitch and Lavenberg 1968; Cohen 1984; Paxton and Cohen 1999), although specimens recorded as that species from the eastern Pacific Ocean (off California; Fitch and Lavenberg 1968) differed from others in having an adipose fin (lacking in *D. longipes* from other areas). Three specimens of the imitative “*Dolichopteryx longipes*,” collected off California and subsequently deposited in the Scripps Institution of Oceanography (SIO), were distinguished from all known species of *Dolichopteryx* by the

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combination of tubular eyes, presence of an adipose fin, and 43–45 vertebrae. Their specimens are herein described as a new species.

Methods

Counts and measurements followed Cohen (1964) and Nakabo (2002), except for preadipose length (distance from snout tip to adipose fin origin), preanal length (distance from snout tip to anal fin origin), preanus length (distance from snout tip to anus posterior edge), and prepelvic length (distance from snout tip to pelvic fin origin). Body measurements were made to the nearest 0.1 mm. Standard length is abbreviated “SL.” Gill rakers were counted on the outer side of the first arch on the right side. Vertebral counts were made from radiographs. Because the urostyle is clearly subdivided into three parts in *Dolichopteryx*, it was here considered as three. Institutional abbreviations follow Leviton et al. (1985).

***Dolichopteryx pseudolongipes* sp. nov.** (Figs. 1, 2, Tables 1, 2)

Dolichopteryx longipes (not of Vaillant 1888): Grey 1952: 87–90 (eastern Pacific, off Galapagos Is.); Fitch and Lavenberg 1968: 24–26, fig. 5 (eastern Pacific, off California); Moser 1996: 220–221, fig. Opisthoproctidae 2 (eastern Pacific, off California) (flexion and postflexion larvae, 13.4–27.8 mm body length).

Holotype. SIO 73-417, 79.9 mm SL, eastern Pacific Ocean, off California (32°42.7'N, 117°33.0'W), 12 March 1974, coll. by RM-4 net, capture depth 400 m to surface.

Paratypes. Two specimens: SIO 74-38, 52.3 mm SL, eastern Pacific Ocean, off Baja California (26°57'N, 117°03'W), 29 December 1975, coll. by Isaacs-Kidd Midwater trawl (IKMT) net, capture depth 310 m to

surface; SIO 65-554, 48.7 mm SL, eastern Pacific Ocean, off California (32°45'N, 118°20'E), 17 October 1965, coll. by IKMT net (wire out 2,000 m).

Diagnosis. Eyes small (diameter 2.7–3.9% SL) and tubular; adipose fin present; anal fin base originating under dorsal fin base; relatively short predorsal (73.3–73.8% SL), prepelvic (64.3–67.9% SL), preanal (77.4–80.1% SL), and preanus (71.5–75.7% SL) lengths; gill rakers 31–33 (=9–10 + 22–24); vertebrae 43–45.

Description. Counts and measurements are presented in Table 1. The holotype description is given first, followed by those of paratypes in parentheses when different. Body elongate, cross section broadly trapezoid on head, thereafter rectangular, compressed on caudal peduncle. Head short. Snout short, horizontal distance from tip of snout to anterior margin of eye 1.19 (1.28) times that from posterior margin of eye to posterior margin of operculum. Head and body depth increasing from snout tip, greatest depth just before posterior margin of operculum, thereafter gradually becoming shallow. Head and body width gradually increasing from snout tip, greatest width 10.6% (8.4%) SL just before posterior margin of operculum, thereafter gradually becoming narrow, approximately 7/10 of maximum body width at insertion of pelvic fin base, approximately 2/5 (2/5–1/5) at adipose fin base. Branchiostegal rays two. Gill membranes broadly united, separated from isthmus. Mouth terminal, small. Premaxillary apparently absent. Two or three rows of long conical teeth inwardly-directed on vomer; a row of short needle-like teeth upwardly-directed on dentary. Nostrils small, with two short papillae, located at anterior 1/7 of head length. Eyes tubular, protruding to dorsally; a small black sac developed on ventral aspect; lens small, directed dorsally. Orbital width relatively narrow, approximately 1/10 of maximum body width. Gill rakers developed, those on outer side of first arch forming a triangular patch, those on inner side small, spinous. Trunk and tail covered by thin

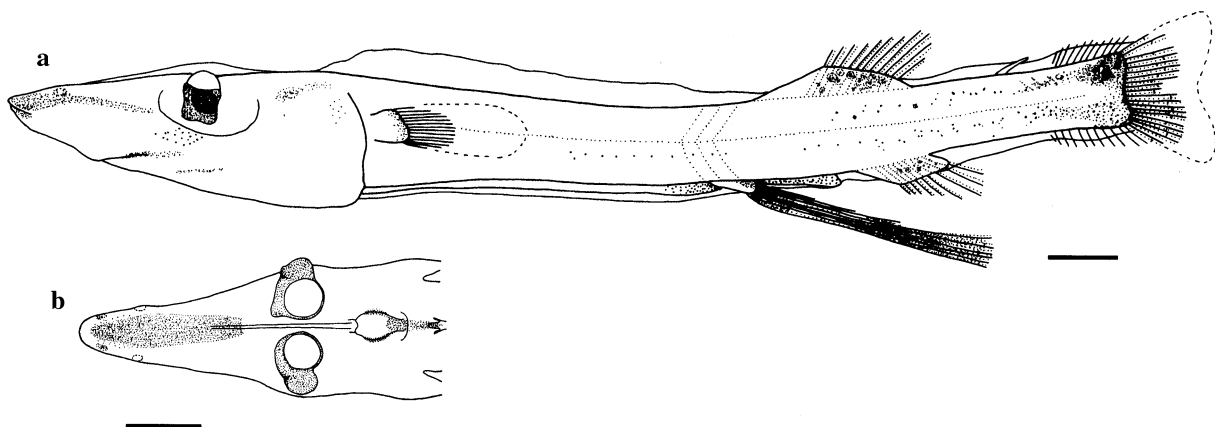
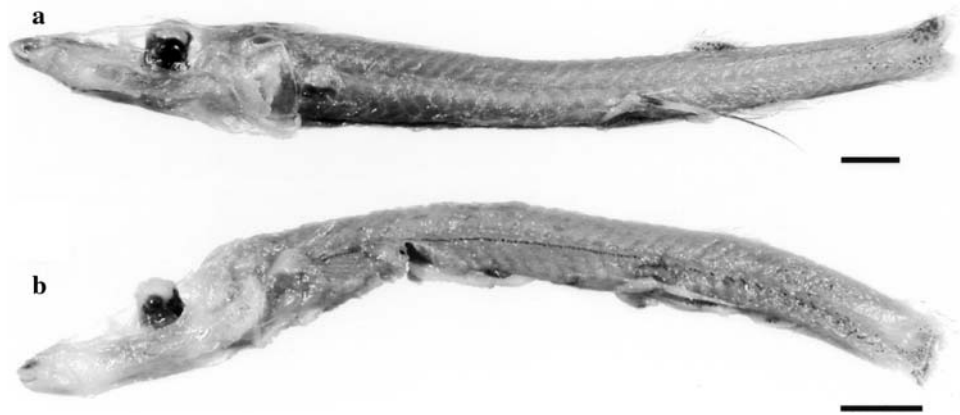


Fig. 1 *Dolichopteryx pseudolongipes* sp. nov., SIO 73-417 (holotype), 79.9 mm SL, eastern Pacific, off California. **a** Lateral view; **b** dorsal view of head. Bar 5 mm

Fig. 2 Comparison of two valid species of *Dolichopteryx*.

a *Dolichopteryx pseudolongipes*, sp. nov., SIO 73-417 (holotype), 79.9 mm SL, eastern Pacific, off California;
b *Dolichopteryx longipes*, BMNH 1969.6.26.534 (non-type), 57.1 mm SL, Caribbean Sea, Gulf of Honduras. Bar 5 mm



transparent skin, thicker just before dorsal fin. Dorsal margin of epaxial and ventral margin of hypaxial portions of trunk undeveloped, gut enclosed along ventral margin by peritoneum and skin. Anus below 28th (27th–28th) myomere. Deep cleavage from nape to origin of caudal procurrent ray on dorsal midline; shallow cleavage from just after anus to origin of caudal procurrent ray on ventral midline; both cleavages becoming shallower posteriorly. Dorsal and anal fin pterygiophores extending above dorsal and below ventral margins of body, respectively, being inserted proximally into each cleavage. First ray of dorsal fin slightly before a vertical line from anus. Anal fin first ray in line vertically with tenth ray of dorsal fin. Horizontal distance from posterior end of anal fin base to base of lowest principal caudal fin ray 17.8% (16.3–16.8%) SL. Pelvic fin base with a small knot of musculature, inserted slightly before anus, ventrally between 20th and 21st myomeres; tip of longest ray extending to end of anal fin base (damaged in paratypes). Pectoral fin with a long stalk-like base, inserted on a horizontal line from ventral margin of eyes; rays broken on left, ninth ray longest on right, its tip not extending to insertion of pelvic fin base (damaged in paratypes). Caudal fin with 11 (9) upper and lower procurrent rays. Distal parts of fin rays and membranes, except those of pelvic fin, damaged (all damaged in paratypes). Adipose fin elongate, strongly projecting from skin (rudimentary, projecting slightly from skin). Scales not found. With growth, several body proportion ratios increased slightly (e.g., prepelvic length to SL, 64.3–67.9%; preanus length to SL, 71.5–75.7%) (Table 1) and the adipose fin became more elongate.

Color in alcohol. Head light yellow (light yellow to light brown) with a pale brownish band and several blotches; body light yellow (light yellow to light brown) with brownish dots, except brownish to blackish on posterior of tail; peritoneum silvery-white with blackish blotches (Fig. 2a). Melanophores brownish to blackish, punctate and stellate. On head, a longitudinal band from snout tip below nostrils to before anterior margin of orbit, directed slightly

dorsally until nostrils, thereafter slightly ventrally in lateral view (Fig. 1a); a mid-dorsal band widening gradually from just behind snout tip until nostrils, thereafter becoming narrow (Fig. 1b), band length approximately 4/5 snout length; a cluster of melanophores on dentary; a broad cluster of 20 (6–8) slightly larger melanophores below eyes; two short longitudinal lines below cluster; a cluster on posterior part of operculum; a dense cluster above brain. From approximately midpoint of SL, a longitudinal row of scattered melanophores on dorsal one-third of hypaxial portion of trunk. Tail, except posteriorly, with two rows of melanophores almost centrally on both epaxial and hypaxial portions; melanophores increasing in number beyond adipose fin, dense (light in SIO 65-554) and “W” shaped around caudal peduncle. A blackish line following base of cleavages along dorsal and ventral midlines, from cleavage origin to dorsal fin origin and first caudal procurrent ray origin, respectively. Many melanophores present on pterygiophore regions of dorsal fin, several on those of anal fin (absent in SIO 65-554) and insertion of pelvic fin base. Several melanophores on inner and outer surfaces of stalked base of pectoral fin, and on distal part of longest ray of right pectoral fin. Pelvic fin ray blackish, except proximally at approximately one-fourth length of longest ray. External peritoneum silvery-white, blackish internally, with numerous punctate and stellate melanophores. With growth, melanophores comprising a cluster below eye increased in number from 6–8 to 20; melanophores also developed more strongly on tail and appeared on anal fin pterygiophores.

Etymology. The specific name is a combination of Greek *pseudo* meaning “false” and *longipes* from the species name of *Dolichopteryx longipes*, to which new species is the most similar in appearance.

Distribution. Known only from the eastern North and Central Pacific oceans.

Remarks. Of the eight valid species of *Dolichopteryx*, five have tubular eyes, *D. minuscula*, *D. parini*, and *D. rostrata* having pouch-like eyes (Cohen 1964; Trunov 1997; Kobylanskii and Fedorov 2001; Mecklenburg et al.

Table 1 Counts and proportional measurements of *Dolichopteryx pseudolongipes* sp. nov.

	Holotype	Paratypes	
	SIO 73-417 79.9 mm SL	SIO 74-38 52.3 mm SL	SIO 65-554 48.7 mm SL
Counts			
Dorsal fin rays	11	11	11
Anal fin rays	9	9	9
Pectoral fin rays	14	13	Damaged
Pelvic fin rays	11	10	11
Principal caudal fin rays	10 + 10	Damaged	10 + 9
Gill rakers	31 (= 9 + 22)	33 (= 9 + 24)	33 (= 10 + 23)
Vertebrae ^a	44	45	43
Proportional measurements (% SL)			
Head length	32.4	31.4	30.8
Snout length	15.5	Damaged	16.0
Body depth	11.5	9.9	10.5
Caudal peduncle depth	6.1	6.3	5.5
Body width	10.6	8.4	8.4
Predorsal length	73.3	73.8	73.3
Prepelvic length	67.3	67.9	64.3
Preanal length	79.8	80.1	77.4
Preadipose length	89.0	88.3	88.3
Preanus length	75.7	75.5	71.5
Pectoral fin length	10.3 ^b	Damaged	Damaged
Pelvic fin length	22.0	Damaged	Damaged
Eye diameter	3.9	2.9	2.7
Eye height	3.3	Damaged	3.7
Lens diameter	3.6	2.5	2.7
Interorbital width	1.1	Damaged	0.4
Dorsal fin base	6.5	5.9	6.0
Anal fin base	5.0	4.4	5.1
Pectoral fin base	3.1	4.2	Damaged
Pelvic fin base	1.3	1.3	2.1

^a Total vertebrae (abdominal/caudal vertebral transition uncertain)

^b Right side only

2002; Parin 2005; Fukui and Kitagawa 2006a, b). Among the first five species, only *D. pseudolongipes* sp. nov. and *D. trunovi* have an adipose fin (Table 2). However, *D. pseudolongipes* clearly differs from *D. trunovi* in having the anal fin base under the dorsal fin base (vs. after in *D. trunovi*), low vertebral number (43–45 including urostyles) (vs. 46–47 excluding urostyles), and greater head (30.8–32.4% SL) (vs. 25.3% SL) and prepelvic lengths (64.3–67.9% SL) (vs. 55.1% SL). Although *D. pseudolongipes* is similar to an adult *Dolichopteryx* sp. recorded by Moser (1996) in having tubular eyes and an adipose fin, the former is clearly different in having the anal fin first ray just below the tenth dorsal fin ray, a brownish longitudinal band before the eye, and 43–45 vertebrae (including urostyles) [after dorsal fin base, band absent, and 47 vertebrae

(including urostyles), respectively, in the latter (SIO 93-246)].

This new species has previously been confused with *Dolichopteryx longipes* described by Vaillant (1888) (e.g., Fitch and Lavenberg 1968), as a result of both species' possessing tubular eyes, similar numbers of dorsal, anal and pectoral fin rays, short pectoral fin rays, and slightly elongate pelvic fin rays (Table 2). However, many differences were apparent between the species (Table 2): adipose fin present (*D. pseudolongipes*) vs. absent (*D. longipes*); anal fin base origin before vs. just behind end of dorsal fin base; gill rakers 31–33 vs. 25, and vertebrae 43–45 vs. 46–47. In addition, the pelvic fin and anus positions differed slightly (prepelvic and preanus lengths to SL in Table 2). Moreover, several body proportions showed no

Table 2 Comparison of characters, counts, and proportional measurements in five species of *Dolichopteryx* with tubular eyes

	<i>D. pseudolongipes</i> sp. nov.	<i>D. longipes</i> ^a	<i>D. anascopa</i> ^g	<i>D. binocularis</i> ⁱ	<i>D. trunovi</i> ^m
Standard length (mm)	48.7–79.9	54.9–127.4	36.2	220–242	81.4
Adipose fin	Present	Absent ^b	Absent	Absent	Present
Position of anal fin base origin relative to end of dorsal fin base	Before	Just below ^c	Before	Before	After
Longitudinal brownish band below eyes	Absent	Absent ^b	Absent	Absent	ND
Counts					
Dorsal fin rays	11	10–11	ND	14–15 ^j	11
Anal fin rays	9	9	ND	10–11 ^j	10
Pectoral fin rays	13–14	13–14	14	14 ^j	14
Pelvic fin rays	10–11	10	12	7?–9 ^j	9
Principal caudal fin rays	10 + 9–10	10 + 9–10	ND	9 + 1 + 9	ND
Gill rakers	31–33 (=9–10 + 22–24)	25 (=7 + 1 + 17) ^d	ca. 31 (=ca. 8 + 23)	25 (=7 + 1 + 17)	11 (=4 + 7)
Vertebrae	43–45	46–47 (=28–29 + 17–18) ^c	ND	58 (=41 + 17) ^k	46–47 ^{i,n}
Myomeres	ND	ND	44	ND	48
Proportional measurements (% SL)					
Head length	30.8–32.4	29.4–30.6	30.9 ^h	26.5	25.3
Snout length	15.5–16.0	13.9–15.5	14.4	10.3	12.4–14.6 ⁱ
Body depth	9.9–11.5	12.0–13.3	ND	11.4–14.5	9.5
Caudal peduncle depth	5.5–6.3	7.1–8.0	ND	7.4–7.9	5.5
Body width	8.4–10.6	8.5–10.5	ND	ND	ND
Predorsal length	73.3–73.8	74.3–78.4	78.4 ^h	81.0–81.5	72.5
Prepelvic length	64.3–67.9	70.3–72.7	61.1 ^h	80.0–82.6	55.1
Preanal length	77.4–80.1	81.1–81.6	81.3 ^h	86.2–86.4	87.8 [*]
Preadipose length	88.3–89.0	–	–	–	93.9 [*]
Preanus length	71.5–75.7	78.0–79.5	ND	ca. 82 ^l	83.5
Pectoral fin length	10.3	12.9 ^e	ND	57.5–64.1	ND
Pelvic fin length	22.0	16.4–17.0	ND	ND	ND
Eye diameter	2.7–3.9	4.2–6.8	5.0 ^h	7.9	6.7–7.1 ⁱ
Eye height	3.3–3.7	4.1–5.7 ^f	ND	ND	ND
Lens diameter	2.5–3.6	2.9–3.9	ND	5.2 [*]	ND
Interorbital width	0.4–1.1	0.6–0.9	ND	ND	ND
Dorsal fin base	5.9–6.5	6.0–6.8	ca. 7 ^h	9.2 [*]	7.3
Anal fin base	4.4–5.1	3.5–4.0	8.6 ^h	5.2 [*]	6.6
Pectoral fin base	3.1–4.2	2.7–4.4	ND	2.9 [*]	ND
Pelvic fin base	1.3–2.1	1.4–2.3	ND	2.3 [*]	ND

ND No data

^a BMNH 1969.6.26.534 and IORD 04-63, 86-344, 86-343 (3 specimens)

^b MNHN 1887-0136 (holotype, damaged, photograph), BMNH 1969.6.26.534, and IORD 04-63, 86-344, 86-343, 02-107, 02-108, 86-342 (6 specimens)

^c BMNH 1969.6.26.534 and IORD 04-63, 86-344, 86-343, 02-107, 02-108, 86-342 (6 specimens)

^d IORD 04-63

^e Data from Cohen (1964, fig. 18)

^f BMNH 1969.6.26.534 and IORD 04-63, 86-344, 86-343, 86-342 (4 specimens)

^g ZMB 17428 (holotype, heavily damaged)

^h Data from Brauer (1901, 1906)

ⁱ Data from Trunov (1997) with asterisk meaning data from figure

^j Data from Cohen (1964) and Trunov (1997)

^k BMNH 1930.1.12.10

^l Data from Beebe (1932, fig. 8)

^m Data from Parin (2005) with asterisk meaning data from figure

ⁿ Urostyles not counted

overlap between the species (e.g., caudal peduncle depth and eye height to SL). Melanophore distribution differed as follows: brownish longitudinal band before eye approximately 4/5 snout length vs. absent or less than 1/2 snout length; many vs. few or absent on pterygiophore region of dorsal fin; few or absent vs. many on pterygiophore region of anal fin; clusters along ventral margin of trunk before pelvic fin insertion absent rather than present; developed rather than undeveloped (only around caudal peduncle) on caudal epaxial section. Although Grey (1952) described *D. longipes* with an adipose fin and long longitudinal band on the snout from the Galapagos Islands, eastern Pacific Ocean, that specimen is now recognized as *D. pseudolongipes*. Similarly, flexion and postflexion larvae (13.4–27.8 mm body length) of *D. longipes* from off California, figured by Moser (1996) were, in fact, *D. pseudolongipes*, by virtue of having tubular eyes, and a long longitudinal band on the snout (same length as snout length), and low vertebral number [41 in Moser (1996)], although an adipose fin was unformed.

Comparative materials. *Dolichopteryx anascopa*: one specimen, ZMB 17428 (holotype, badly damaged), 36.2 mm SL [34.75 mm SL in Brauer (1906)], Indian Ocean, west of Cocos-Islands (10°08.03' S, 97°14.15'E), bottom depth 2,400 m. *Dolichopteryx binocularis*: one specimen, BMNH 1930.1.12.10, 118.0 mm SL, southeast Atlantic Ocean (33°50.00'S, 16°04.00'E). *Dolichopteryx longipes*: eight specimens, MNHN 1887-0136 (holotype, damaged), 45.0 mm SL, East Atlantic Ocean, off Morocco (29°02.00'N, 12°29.00'W); BMNH 1969.6.26.534, 57.1 mm SL, Caribbean Sea, Gulf of Honduras (16°22.00'N, 86°40.00'W); IORD 04-63, 127.4 mm SL, western North Pacific Ocean (15°59.58'N, 140°45.31'E), bottom depth 4,726 m, 26 June 2004, coll. by IKMT net (wire out 1,869 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-04-2; IORD 86-344, 73.1 mm SL, western North Pacific Ocean (15°00.60'N, 127°10.10'E), bottom depth approximately 5,000 m, 3 September 1986, coll. by IKMT net (wire out 1,500 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-86-4; IORD 86-343, 54.9 mm SL, western North Pacific Ocean (16°00.30'N, 129°35.20'E), bottom depth approximately 5,500 m, 2 September 1986, coll. by IKMT net (wire out 1,500 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-86-4; IORD 02-107, 53.0 mm SL, western North Pacific Ocean (14°20.00'N, 137°00.40'E), bottom depth 4,950 m, 2 July 2002, coll. by IKMT net (wire out 1,200 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-02-2; IORD 02-108, 51.0 mm SL, western North Pacific Ocean (15°00.10'N, 144°00.00'E), bottom depth 4,020 m, 7 August 2002, coll. by IKMT net (wire out 1,200 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-02-2; IORD 86-342, 49.2 mm SL, western North Pacific

Ocean (20°59.80'N, 129°35.20'E), bottom depth approximately 6,000 m, 31 August 1986, coll. by IKMT net (wire out 1,500 m, mesh size 0.5 mm), R/V *Hakuho-maru* cruise KH-86-4. *Dolichopteryx* sp.: one specimen, SIO 93-246, 70.9 mm SL, eastern Pacific Ocean (33°47'N, 119°46'E), 22 May 1962, coll. by IKMT net (wire out 1,062 m).

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