

Pacific Records of the Deep-Sea Fish *Porogadus miles* (Ophidiiformes, Ophidiidae)

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The deep-sea ophidiid fish, *Porogadus miles*, was described by Goode and Bean (1885) from a single specimen from the Atlantic Ocean (38°27' N, 70°02' W). Although it is now known to be rather common on both sides of the Atlantic Ocean (Nielsen and Cohen, 1986), records of the species elsewhere have been restricted to a single report from the Indian Ocean (Shcherbachev, 1980).

Recently, Amaoka in Amaoka et al. (1983) reported a single specimen of *Porogadus* with strong head spines, from the Pacific Ocean off the Tohoku District, northern Japan. Subsequently we have located four additional specimens in Japanese collections. Their localities are shown in Fig. 1. Comparison of the Japanese specimens with Atlantic *P. miles*, including the holotype, confirmed their conspecificity.

Counting and measuring methods follow Amaoka et al. (1983) except for the following: gnathoproctal

length (GPL) is measured from the mandible tip to the middle of the vent; gill raker counts on the first arch follow Cohen and Nielsen (1978). Vertebrae and median fin rays were counted from radiographs.

Institution abbreviations follow Leviton et al. (1985).

Porogadus miles Goode et Bean, 1885
(New Japanese name: Kowatoge-taraitachiuo)

Porogadus miles Goode and Bean, 1885: 602; Grey, 1956: 211; 1958: 175; Cohen and Nielsen, 1978: 38; Shcherbachev, 1980: 166, figs. 19–20; Carter and Sulak,

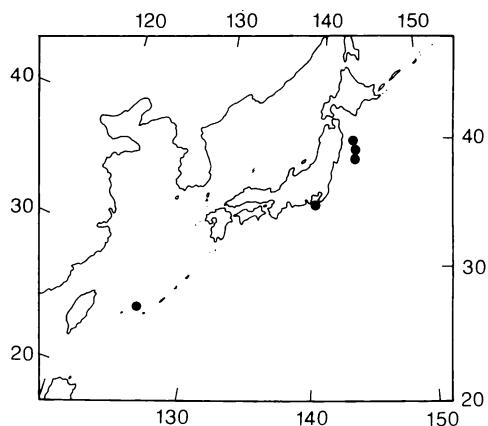


Fig. 1. Records of *Porogadus miles* from off Japan.

Table 1. Morphometric characters of *Porogadus miles* from Japan and the western North Atlantic.

Cat. No.	Japanese specimens				Atlantic specimens		
	BSKU 35715	ZUMT 54315	ZUMT 54316	HUMZ 78226	ORIT KT·8212 B1·0001	USNM 35625 (Holotype)	USNM 214666, 214672 (6 specimens)
SL (mm)	354	279	236+	347	282	145	124–335
GPL (mm)	111	84	74	112	86	40	35–ca. 104
In % of SL or GPL*							
HL	16.9	16.1	55.3*	16.6	17.3	15.7	16.0–17.7
Predorsal length	18.5	17.8	63.9*	18.5	18.4	18.9	16.9–19.0
Preanal length	33.2	32.3	—	35.2	33.7	31.7	30.2–34.0
Prepelvic length	14.4	13.5	48.7*	13.4	14.5	13.8	12.8–15.3
Body depth at vent	9.0	9.2	28.6*	10.0	8.0	9.0	7.6– 9.9
In % of HL							
Head width	36.9	36.4	38.9	39.1	40.8	37.9	33.1–38.1
Maxillary length	52.0	52.7	57.1	54.8	55.7	57.3	52.7–58.8
Lower jaw length	61.0	63.7	64.3	64.2	63.8	68.3	60.2–66.7
Snout length	30.2	31.9	33.6	32.5	31.0	28.6	28.2–33.6
Interorbital width	12.6	13.1	12.8	14.3	16.2	14.1?	12.6–16.7
Eye diameter	13.5	14.4	15.1	12.3	14.5	16.7	16.2–19.2
Pectoral fin length	52.6	52.4	62.4	55.8	65.0	—	50.2–56.3
Pelvic fin length	52.4	57.6	75.5	64.4	60.9	—	57.5–65.9+



Fig. 2. Lateral view of *Porogadus miles*, BSKU 35715, 354 mm SL, from the Pacific Ocean off Iwate Pref., northern Japan.

1984: 376, fig. 6c; Nielsen and Cohen, 1986: 350, fig. 96.21.

Porogadus sp.: Amaoka, 1983: 129, pl. 81.

(References in the synonymy given by Grey (1956) are not repeated here.)

Material examined. *Porogadus miles*. Pacific Ocean (5 specimens): BSKU 35715, 354 mm standard length (SL), male, 38°44.0' N, 143°11.1' E–38°46.3' N, 143°12.0' E, R.V. Hakuho-Marū cr. KH-81-4, st. 8, 1,950–1,960 m, 4 m beam trawl, 25 Jul., 1981; HUMZ 78226, 347 mm SL, female, 39°40.0' N, 142°58.0' E–39°45.6' N, 143°01.5' E, R.V. Kyoyo-Marū No. 2, 1,500–1,505 m, bottom trawl, 24 Sep., 1978; ORIT · KT · 8212 · B0001, 282 mm SL, male, 34°52.7' N, 139°27.5' E–34°52.8' N, 139°29' E, R.V. Taisei-Marū cr. KT-82-12, st. B1, 1,505–1,665 m, 17 Dec., 1982; ZUMT 54315, 279 mm SL, female, 38°40.9' N, 143°11.1' E–38°46.3' N, 143°12.0' E, R.V. Hakuho-Marū cr.

KH-67-2, st. 7, 3,960–4,090 m, beam trawl, 14 Aug., 1967; and ZUMT 54316, 236+ mm SL, male, 26°03.8' N, 125°00.8' E–26°03.8' N, 125°01.0' E, R.V. Hakuho-Marū cr. KH-68-2, st. T13, 1,650 m, beam trawl, 25 May, 1968.

Atlantic Ocean (7 specimens): USNM 35625, holotype, 152 mm SL, 38°27' N, 73°02' W, R.V. Albatross st. 2230, 2,125 m; USNM 214666, 4 specimens, 124–176 mm SL, 38°50' N, 72°34.5' W, R.V. Delaware II cr. D-2-74, st. 4B, ca. 2,196 m, 16 May, 1974; USNM 214672, 2 specimens, 246–328 mm SL, 37°03.8' N, 74°07.3' W, R.V. Eastward cr. E-2-74, st. 33, 2,120–2,200 m, 19 Apr., 1974.

Single specimen of *Porogadus nudus*: MNHN 86537, holotype, 198 mm SL, R.V. Talisman st. XCVIII, eastern North Atlantic off Africa, 2,324 m.

Description. Proportional dimensions and meristic counts are given in Tables 1 and 2, respectively. Body long, compressed, depth at vent contained

Table 2. Meristic characters of *Porogadus miles* from different localities. * After Grey (1958); ** after Shcherbachev (1980).

Locality No. of specimens	Japan 5	Western North Atlantic (Holotype) 6	Gulf of Mexico* 1	Indian Ocean** 4
Dorsal fin rays	165–174	ca. 188	170–186	170
Anal fin rays	136–144	ca. 156	142–154	ca. 135
Caudal fin rays	6–7	ca. 6	6–7	6
Pectoral fin rays	19	ca. 16	17–19	16
Pelvic fin rays	2	2	2	19–20
Branchiostegal rays	8	8	8	2
Gill rakers on first arch:				
upper short	iii–iv	iii	iii	ii–iii
developed	1+12–16= 13–17	1+14=15	1+13–15= 14–16	1–2+1+11–13= 14–15
lower short	v–vii	iv	v–vii	v–viii
Pseudobranchial filaments	2	2	2	2
Vertebrae	17–18+106–107 =124–125	17+111 =128	17–18+109–111 =126–129	17–18+106?–109 =123?–127

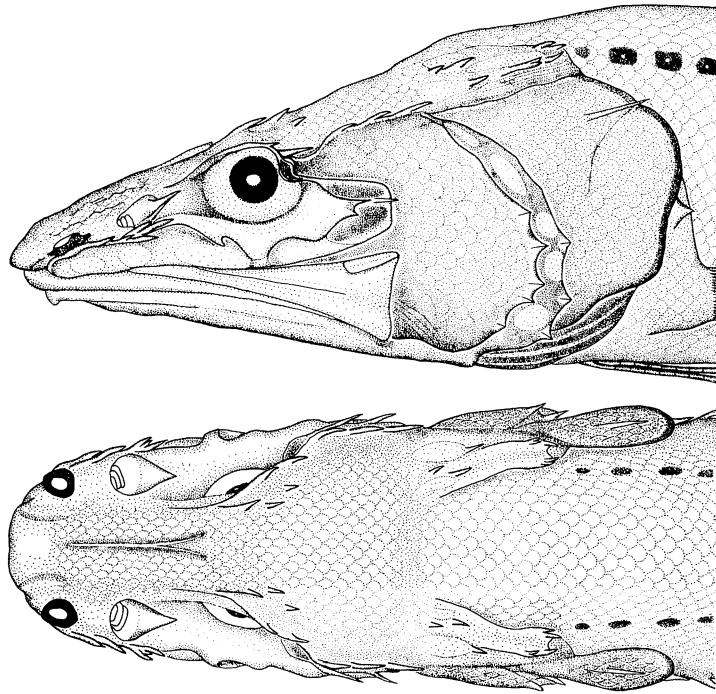


Fig. 3. Lateral and dorsal views of the head of *Porogadus miles*, ZUMT 54316, 74 mm GPL, from the East China Sea off Yaeyama Is., Okinawa Pref., southern Japan. Scale=1 cm.

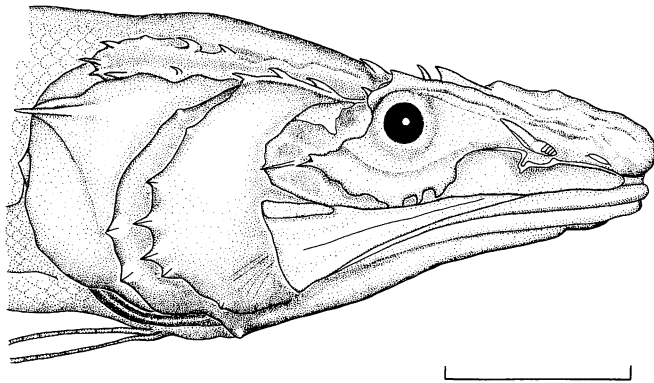


Fig. 4. Lateral view of the head of *Porogadus nudus*, MNHN 86537, holotype. Left side is damaged and squamation not clear. Scale=1 cm.

more than 10 times in SL; tail tapered posteriorly (Fig. 2). Head about one-half preanal length. Snout long, projecting beyond anterior margin of upper jaw. Anterior nostril near tip of snout, large, tubular, smaller than posterior nostril. Posterior nostril not tubular, the posterior edge with a strong, large, posteriorly directed spine from the lateral ethmoid.

Head spines are shown in Fig. 3. Prefrontal armed

with strong, posteriorly directed spines; 2 spines posterodorsally on orbital margin, 3 spines situated more medially from behind least interorbit; 3 weakly curved spines dorsolaterally from behind eye to upper angle of preoperculum. Supra- and post-temporals with 2-4 and 5-6 parallel spines, respectively. Lachrymal extending considerably forward to above tip of lower jaw, its anterior upper margin

with 5–6 sharp spines. Fifth infraorbital double-margined posteriorly, each margin with 1–2 small but pointed spines. Anterior and posterior margins of preoperculum with 4–5 and 3–6 spines, respectively. Opercular spine strong, sharp.

Teeth villiform, in bands in jaws, and on pre-omer, palatine and basibranchials. Prevomerine tooth patch V-shaped. Median basibranchial tooth patch single. Developed rakers on first arch slender, dentigerous. Pseudobranchial filaments 2, much reduced. Tongue long, pointed.

Dorsal fin origin slightly behind pectoral fin axil. Anal fin origin below 24th or 25th dorsal ray. Pectoral fin low on body. A single, flat spine on cleithrum. Pelvic fin with 2 filamentous rays, not reaching level with tip of pectoral fin.

Top of head, opercular and preopercular regions scaled. Scales absent from maxillary and branchiostegal membrane. Body covered with small, cycloid, imbricate scales. Three rows of circular organs on body, running along dorsal fin base, mid-body, and from lower angle of pectoral fin base, along ventral margin of body to caudal fin. A short lateral line comprising 9–12 pored and modified scales extending from upper angle of gill opening to above tip of pectoral fin. Dorsal and anal fins scaleless.

Approximately 5, very short pyloric caeca. Swimbladder large, thick walled.

Color in life: See Amaoka in Amaoka et al. (1983: 128, fig. 81). Head pinkish white, but blackish ventrally and on opercular and preopercular regions. Body uniformly pinkish white, belly faintly grayish blue. Margins of posterior part of dorsal and anal fins black. Pectoral and pelvic fins black. Color in alcohol: Head grayish to pale-brown, opercular and preopercular regions much darker; opercular membranes dark brown. Body grayish to faintly brownish. Scales on lateral line dark brown. Pectoral fin dark brown. Margins of posterior part of dorsal and anal fins, and caudal fin blackish. Mouth and gill cavities brownish. Peritoneum blackish brown; intestine yellowish.

Remarks. All of the proportional dimensions, except for eye diameter, of our material overlap those of the Atlantic *P. miles* examined (Table 1). However, the eye diameter of our material, 2.0–2.5% of SL, overlaps the range, 2.4–2.7% of SL, for four *P. miles* from the Indian Ocean (Shcherbachev, 1980). Table 2 compares important meristic counts of *P. miles*. Vertebral and vertical fin ray counts of the Atlantic material are given here for the first time,

except for Grey (1958) who reported vertical fin ray counts for a single specimen from the Gulf of Mexico. These data confirm the identification of the Pacific Ocean specimens as *P. miles*.

Additional confirmatory evidence is seen in the consistent shape and arrangement of the head spines in *P. miles*. Strong spines are present on the prefrontal, supra- and post-temporals, lateral ethmoid, lachrymal, fifth infraorbital, preoperculum and operculum. We paid attention to the strong lachrymal spines of this species, although there are no detailed descriptions of these spines in the previous studies. Examination of the holotype of *P. nudus* (and the only available specimen), which was characterized together with *P. miles* in having “strongly developed head spines” (Nybelin, 1957), showed no distinct lachrymal spines (Fig. 4). Thus, the presence of strong lachrymal spines is an important species character of *P. miles*.

The Pacific Ocean specimens differ from the Atlantic Ocean *P. miles* in overall coloration. The latter are of apparently deeper coloration, being uniformly dark brown. According to Shcherbachev (1980), the body color of the Indian Ocean *P. miles* is grayish brown, showing a closer resemblance to our material. We think that the differences in coloration and relative eye diameter between Pacific and Atlantic Ocean specimens represent geographical variations of *P. miles*.

This study shows that *P. miles* inhabits the waters around Japan at bathyal and abyssal depths from about 1,500 to 4,000 m, and suggests in a worldwide distribution of the species.

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アシロ科のコワトゲタライタチウオ (新称) の太平洋からの記録

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アシロ科タライタチウオ属の *Porogadus miles* は大西洋両岸に広く分布し、近年はインド洋からも報告されている。日本からは Amaoka (1983) が *Porogadus* sp. として本種を発表したが、その後さらに4個体が日本近海で採集されていることが判明した。これらを *P. miles* の完模式標本を含む西部大西洋産の標本と直接比較し、インド洋産の標本との比較を文献に基づいて行った。その結果、本種が日本近海の1,500-4,000 mの深海底に生息することを確認した。本種にその強い頭部棘に由来する新和名コワトゲタライタチウオを提唱する。日本産の標本は眼径及び頭部と体部の色彩が大西洋産の標本とは異なるが、インド洋産の標本とは前者が重複し、後者もより似ている。計数形質では、背鰭と臀鰭の鰭条数にかなりの変異が認められているものの、3地域の数値に明瞭な差はない。本種の頭部棘を詳細に検討し、涙骨の前方上縁部に強い数本の棘を認めた。本種と同様に強い頭部棘をもつ *P. nudus* はこの骨に棘が無いことから、この棘は本種の新たな標徴形質と考えられる。

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