

Range Extensions of Two Deep-sea Macrourids *Coryphaenoides filifer* and *Squalogadus modificatus* to the Sea of Okhotsk

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In 1991 and 1993, during bottom trawl surveys off the Okhotsk coast of Abashiri, Hokkaido, three specimens of two deep-sea macrourids, *Coryphaenoides filifer* and *Squalogadus modificatus*, were collected from depths of 1285–1348 and 1393 m (Fig. 1). The former species has been known from the eastern North Pacific and the Bering Sea at depths of 2065–2904 m (Iwamoto and Stein, 1974). The latter occurs in all tropical to subtropical oceans, and the temperate western North Pacific and North Atlantic in depths of 600–1740 m (Shcherbachev and Piotrovskiy, 1982; Sazonov and Iwamoto, 1992). Herein, we first report these two macrourids from the Sea of Okhotsk, the westernmost and the northernmost records for *C. filifer* and *S. modificatus*, respectively.

Methods for taking counts and morphometric data follow Iwamoto (1970). The following abbreviations are used in the text: CAS, California Academy of Sciences; HUMZ, Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University.

Coryphaenoides filifer (Gilbert, 1895)
(New Japanese Name: Kitano-sokodara)
(Fig. 2)

Material examined. Two specimens: HUMZ 126365, 94 mm head length (HL), 505 mm total length (TL), 44°32.7'N, 145°05.2'E, 1348 m, bottom temperature 4.5°C, otter trawl (Ryoh-un Maru No. 1), 26 May 1993; HUMZ 126444, 109+ mm HL, 630+ mm TL, 44°30.4'N, 145°04.6'E, 1285 m, bottom temperature 3.7°C, otter trawl (Ryoh-un Maru No. 1), 27 May 1993.

Comparative materials from the eastern North Pacific: CAS 28729, 56387 (2 spec.), 56388, 64519, 64521, 77310, and 77624 (8 spec., 55–112 mm HL, 290–617 mm TL).

Description. First dorsal rays (1st D) II, 13–15; pectoral rays (P₁) 21–23; pelvic rays (P₂) 9–10; gill

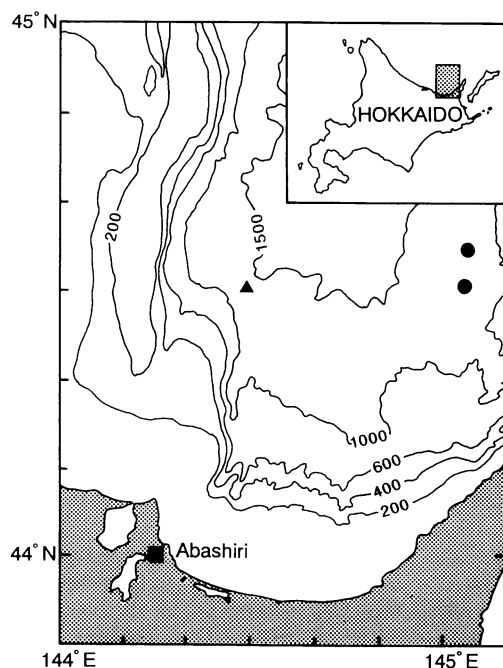


Fig. 1. Sampling localities of *Coryphaenoides filifer* (●) and *Squalogadus modificatus* (▲) in the Sea of Okhotsk, off Abashiri, Hokkaido.

rakers on first arch (GR) 2+11–12=13–14 (inner), 0–1+8–10=8–11 (outer); scales below first dorsal origin (1DO) 8.5–9; scales below middle of first dorsal 8.5–9.5; scales below second dorsal origin (2DO) 9–12; branchiostegal rays (BR) 6; abdominal vertebrae (AV) 13–14. HL 18.6% of TL. As % of HL; snout 27.5; preoral 12.9; orbit diameter 24.2; interorbital 24.9; orbit to angle of preopercle 46.1; suborbital 11.7; upper jaw 41.4; barbel 12.6; outer gill-slit 22.6; isthmus to anal 111.4; body depth 82.1; predorsal 109.8; interdorsal 25.1; preanal 164.2; first dorsal fin 98.1; pectoral fin 60.6; pelvic fin 74.1 (the morphometrics of HUMZ 126444 having a damaged snout were excluded from the data). An elongated ray in first dorsal and pelvic fins. Pelvic rays reach or extend far beyond anus. Rostral scute on tip of snout enlarged and serrated laterally. Scales possess 5–7 slightly divergent rows of small, reclined spinules. Head fully scaled except for a small region anteroventrally on snout, lips, and branchiostegal membrane. Broad suborbital shelf has 2 scale rows. Teeth of both jaws consist of 3–5 irregular rows near symphysis; an outer, much-enlarged series in upper jaw. Color in fresh specimens dark and grayish

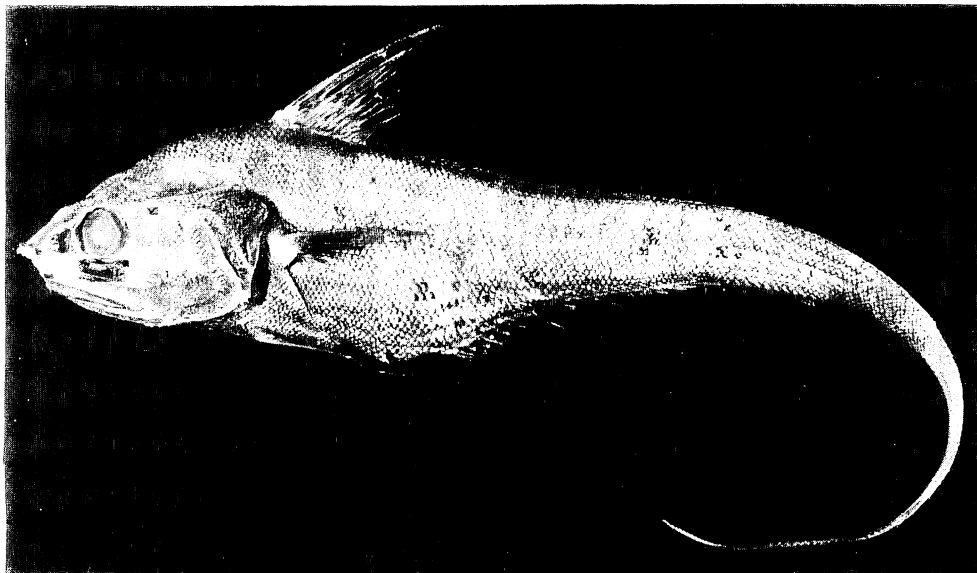


Fig. 2. *Coryphaenoides filifer* from the Sea of Okhotsk, off Abashiri, Hokkaido, HUMZ 126365, 94 mm HL, 505 mm TL.

brown, but blackish blue on underside of body and opercular; branchial membrane and pectoral fin black.

Remarks. Proportional and morphological characters of the present specimens agree well with those of *Coryphaenoides filifer* (Gilbert, 1895; Iwamoto and Stein, 1974; H. Endo, pers. obs.) except for the 1st D, 1DO, and 2DO counts over the known ranges. We regarded them as infraspecific variation in this species.

Among the *Coryphaenoides* species occurring in the northern North Pacific (Endo et al., 1993: table 2), *C. filifer* is easily distinguished from the following related species: *C. acrolepis*, by its fewer segmented rays (1st D 9–11 vs. 11–15 in *C. filifer*; P₂ 8–9 vs. 9–10); *C. cinereus*, by its narrower suborbital shelf (vs. broad in *C. filifer*) with an anteroventral process (vs. no process) (Iwamoto and Stein, 1974: 19, figs. 4–5). According to Iwamoto's (1990: 193, figs. 445–446) key to species of the genus *Coryphaenoides*, *C. filifer* is most similar to *C. altipinnis* (known only from the type taken off Tokyo), but differs from that species in having short pelvic fins that fall short of the anus (vs. extend beyond anus) and more scales below second dorsal origin (about 12 vs. 7–10). In addition, the oblique posterior margin of operculum and the forwardly placed pelvic fins of *C. altipinnis* are remark-

ably different from those of *C. filifer* (T. Iwamoto, pers. comm.). Scale counts, however, do not discriminate between the two species because of its extended range (7–12) in *C. filifer*, as mentioned above.

This species has been recorded from southwest of Pribilof Is. and off Yunaska Is. of the Aleutian chain, to southern California, at depths of 2065–2904 m (Iwamoto and Stein, 1974). The present specimens from the southern end of the Okhotsk Sea suggest a wide distribution of *C. filifer*, from the western to the eastern North Pacific and in the Bering and Okhotsk Seas. Moreover, the capture depths of 1285 and 1348 m for the Okhotsk specimens are shallower than previously recorded for the species. The bottom temperatures (3.7°C at 1285 m and 4.5°C at 1348 m) at the trawl sites are rather warmer than that of the eastern North Pacific, off the Aleutian chain and the Gulf of Alaska (about 2.0–1.5°C at 2000–3000 m: CTD data from Faculty of Fisheries, Hokkaido University, 1993). Since water temperatures generally increased from 1.5 to 2.5°C at the depths of 500–1500 m toward the bottom in the study area, the high temperatures at the trawling sites are aberrant. Hence, we only say that some other factor, not low temperatures, might have an effect on this shallower occurrence.

Squalogadus modificatus Gilbert and Hubbs, 1916
(Japanese name: Bake-dara)

Material examined. One specimen: HUMZ 121632, 33 mm HL, 104+ mm TL, 44°29.8'N, 144°28.8'E, 1393 m, bottom temperature 2.4°C, otter trawl (Ryoh-un Maru No. 1), 5 Sept. 1991.

Comparative material from the western North Pacific, off Tohoku, Japan: HUMZ 78126 (1 spec., 124 mm HL, 360+ mm TL).

Description. P₁ 24; P₂ 5; GR 4+16=20 (inner), 8+20=28 (outer); BR 7; AV 12. Head extremely large, swollen, and globose, having small eyes, inferior mouth, and no barbel. As % of HL: snout 33.8; preoral 39.8; orbit diameter 11.4; interorbital 42.5; upper jaw 30.5; body depth 65.8; predorsal 81.7; preanal 119.2; isthmus to anal 47.3; first dorsal fin 5.4; pectoral fin 26.9; pelvic fin 8.7. Single dorsal fin has no spinous ray. Pelvic fin small. Outer gill rakers long and slender. Small scales bear erect spinules. Color in alcohol dark brown, but blackish on operculum, gular and branchiostegal membranes, and abdomen.

Remarks. The monotypic *Squalogadus*, belonging to the subfamily Macrouroidinae, differs from the other related genus *Macrouroides* (also monotypic) in lacking pelvic fins (Iwamoto, 1990).

This species has a worldwide distribution in tropical to temperate waters, except in the central and eastern North Pacific and the western South Atlantic, in depths of 600–1740 m (Shcherbachev and Piotrovskiy, 1982; Sazonov and Iwamoto, 1992). Around Japan, the type specimens were collected from the Bungo Channel, off Kyushu; subsequent records were from the Pacific coast: Sagami Bay and off Choshi (Okamura, 1970); Suruga Bay (Shiobara, 1982); off Tohoku district (Sawada, 1983: HUMZ 78126, 39°03'N, 142°30'E, 1110 m). Hence, the southern Okhotsk specimen is the northernmost (44°N) record in the North Pacific, and also in the northern hemisphere (northernmost record in the Atlantic reported by Shcherbachev and Piotrovskiy, 1982: 40°08'N, 27°46'W, 1700 m, off Azores).

The occurrence of *S. modificatus* off Abashiri is quite unexpected based on its known distributional pattern, because the Sea of Okhotsk is cold and without the effects of warm currents, and its deep-sea fauna seems to be isolated from that of the temperate western North Pacific because of its topographical traits.

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オホーツク海から得られたソコダラ科のキタノソコダラ
(新称) とバケダラ

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北海道網走沖のオホーツク海南部で行われたトロール調査において、水深 1285-1393 m よりソコダラ科の 2 種 *Coryphaenoides filifer* (キタノソコダラ), *Squalogadus modificatus* (バケダラ) が採集された。前種はベーリング海からカリフォルニア沖にかけての北東太平洋に、後種は世界の熱帯域・亜熱帯域、および北西太平洋と北大西洋の温帯域にそれぞれ分布する。オホーツク海からの両種の記録により、それぞれの分布域は北西太平洋 (キタノソコダラ) およびオホーツク海 (バケダラ) へ拡大された。特にバケダラの閉鎖的で寒冷な水域での出現は、熱帯から温帯域を中心とする本種のこれまでの分布パターンとは異なる。

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