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Notes on *Halosauropsis macrochir* (Halosauridae: Notacanthiformes) from Japan

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The monotypic deep-sea fish genus *Halosauropsis* is well characterized by a deeply pigmented sheath on the lateral line, the absence of scales from the top of its head, the presence of scales on the opercular bone, the long and segmented first dorsal ray, and the long unpigmented pyloric caeca (McDowell, 1973). A comprehensive study of the Atlantic and South African specimens was made by McDowell (1973). Paulin and Moreland (1979) first reported *H. macrochir* from the Pacific, based on material from the Bay of Plenty, New Zealand. A recent study by Filatova (1985) revealed that this species is widely distributed in the Indian Ocean. The first report of *H. macrochir* from Japanese waters was based on underwater photographs and trawled specimens collected during ecological surveys in Suruga Bay and Sagami Bay (Ohta, 1983). No taxonomic description of the specimens was given.

In this paper we report specimens of *H. macrochir* collected from central and southern Japan (Fig. 1) and present a new Japanese name, kuroobi-tokagegisu, in reference to the black, sheath on the lateral line. We discuss meristic characteristics of our specimens in relation to the distribution of this species, as well as underwater photographic observations. Our material is deposited in the Department of Biology, Faculty of Science, Kochi University (BSKU) and the Ocean Research Institute, University of Tokyo (ORIUT).

Halosauropsis macrochir (Günther, 1878)

(New Japanese name: Kuroobi-tokagegisu)
(Fig. 2)

Material examined. Thirteen specimens, 165–272 mm in GPL (=gnathoproctal length, the distance from the anteriormost tip of the mandible to the middle of the vent). BSKU 19675, 1 specimen, male, 225 mm GPL, 32°24.7′N, 140°03.6′E, north of Torishima, central Japan, 1,490 m, trawled by the R. V. Soyo Maru, 10 Feb. 1969; BSKU 43473, 1 specimen, female, 227 mm GPL, 32°03.9′N, 132°17.7′E–32°08.9′N, 132°18.7′E, Hyuga Basin off Cape Ashizuri, southern Japan, 1,514–1,463 m, trawled by the R. V. Tansei Maru, 3 Nov. 1986; ORIUT·KT·8213·013300–KT·8213·013302, 3 specimens, 1 male and 2 females, 230–272 mm GPL, 34°52.7′N, 139°27.5′E–34°52.8′N, 139°29.0′E, Sagami Bay, central Japan, 1,505–1,665 m, trawled by the R. V. Tansei Maru, 7 Dec. 1982; ORIUT·KT·8601·03·3303–KT·8601·03·3307, 5 specimens, 4 males and 1 female, 165–240 mm GPL, 34°30.1′N, 138°34.0′E–34°29.3′N, 138°34.2′E, Suruga Bay, central Japan, 2,716–2,743 m, trawled by the R. V. Tansei Maru, 26 Feb. 1986; ORIUT·KT·8606·063308–KT·8606·063309, 2 specimens, male and female, 229–250 mm GPL, 33°46.6′N, 136°40.0′E–33°46.6′N, 136°37.6′E, Kumano Basin, southern Japan, 2,026–2,045 m, trawled by the R. V. Tansei Maru, 27 May 1986; ORIUT·KT·8616·153310, 1 specimen, female, 199 mm GPL, 32°21.3′N, 132°27.9′E–32°23.2′N, 132°28.7′E, Hyuga Basin, 1,642–1,651 m, trawled by the R. V. Tansei Maru, 2 Nov. 1986.

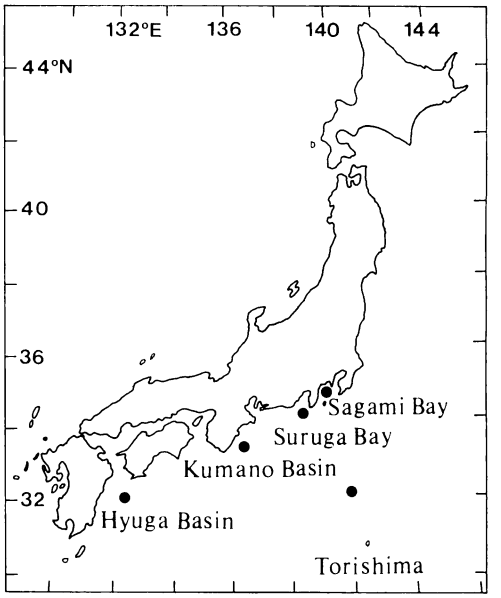

Fig. 1. Distribution of *Halosauropsis macrochir* around Japan.

Description. Counts and proportional measurements are given in Table 1.

Head depressed anteriorly, tail strongly compressed posteriorly. Preoperculum posteriorly elongate, scarcely reaching to below the base of pectoral fin. Posteriormost branchiostegal ray broad and expanded. First dorsal ray segmented

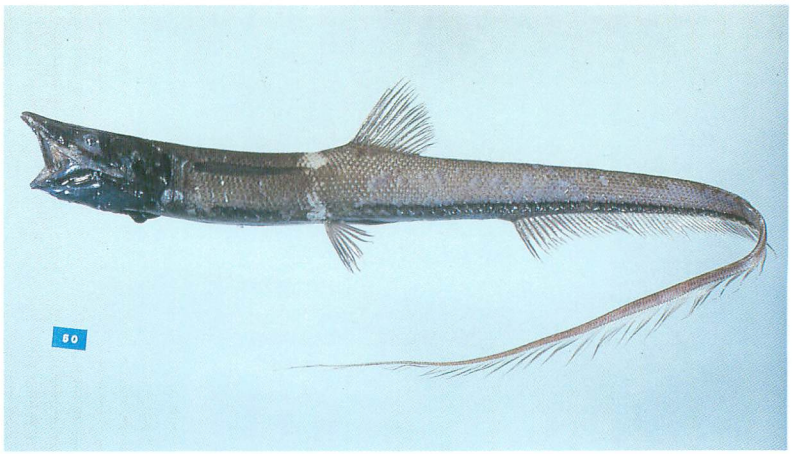

Fig. 2. Lateral aspect of *Halosauropsis macrochir*, BSKU 43473, female, 227 mm GPL. (Photographed by Okamura.)

Table 1. Comparison of meristic counts and proportional dimensions of *Halosauropsis macrochir* from different areas. * % of preanal.

Regions	Middle and North Atlantic	New Zealand and Great Australian Bight	Indian Ocean and Great Australian Bight	Japan
Authors	McDowell (1973)	Paulin and Moreland (1979)	Filatova (1985)	Present study
Counts				
Dorsal rays	11–13	11–12	10–13	11–13 (12)
Anal rays		158–172		ca. 172–194
Pectoral rays	12–13	12	10–14	11–12 (12)
Pelvic rays	10	9½	8–10	9–10 (10)
Gill rakers	15–16	12–13	12–16	3+1+11–12= 15–16 (15)
Branchiostegal rays	11–13 (12)	11–12	10–13	12
Lateral line scales to pelvic origin	12–16 (15)	14	12–16	12–14 (13)
Scales above lateral line	14–16 (14)	12–14	10–13	13–14 (13)
Pyloric caeca	10–12 (12)	11–12	7–13	9–11 (9)
% of preanal or GPL				
Head length	27.8–30.7	29.9–31.7	22.5–32.5*	33.7–38.7
Body depth			13.2–20.9*	14.4–17.4
Head depth	10.7	8.5–10.0		10.9–13.2
Predorsal			43.2–77.5*	66.8–73.9
Prepectoral			33.0–44.0*	36.1–40.3
Prepelvic			62.2–73.2*	66.0–72.5
Edge of preopercle to pelvic origin	33.6–38.2	32.3–40.4		31.1–36.6
Occipital commissure to dorsal origin	44.0–49.0	39.7–49.1	38.0–48.8*	38.0–45.6
Eye diameter	4.2– 5.4	3.9– 4.6	2.8– 4.8*	3.2– 4.2
Snout length	14.3–17.7	15.6–19.0	12.1–19.2*	15.0–17.6
Preoral snout	3.4– 5.4	4.7– 5.8		4.2– 5.9
Interorbital width		7.2– 8.4		8.2– 9.7

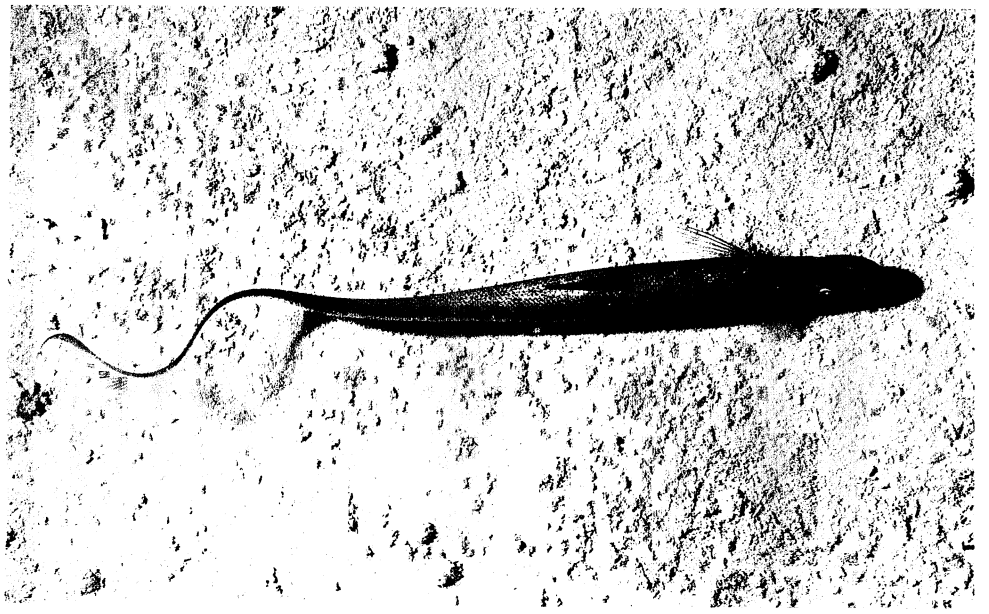

Fig. 3. Underwater photograph of *Halosauropsis macrochir* on the ocean bottom of Kumano Basin at a depth of 2,050 m. (Photographed by Ohta.)

and as long as 2nd dorsal ray. Body and tail completely covered with cycloid scales. Scales absent from top of head, lateral side of head before posterior margin of dermal cornea, underside of head, and branchiostegal membranes. Opercular bone scaly. One lateral line scale for every two vertical scale rows. Pyloric caeca long, arranged in a single row at the base.

Overall coloration as in Fig. 2. Lateral line sheath black. Mouth cavity bluish gray except for blackish palatine tooth bands. Peritoneum brownish. Pyloric caeca creamy white.

Remarks. Table 1 shows intraspecific variations in the meristic counts and proportional dimensions of *Halosauropsis macrochir* from different areas in the world. Our material differs slightly from the Atlantic specimens described by McDowell (1973) in the counts of the pyloric caeca (9–11, mode 9 vs. 10–12, usually 12). It also differs from the Atlantic specimens from off the Sahara (Golovan, 1976) in the counts of lateral line scales from the head to vent (25–26 vs. 27–29, mode 28). Paulin and Moreland (1979) found that four specimens from the southwest Pacific and the Great Australian Bight have 11 to 12 pyloric caeca and 11 to 12 branchiostegal rays. However, of our 13 specimens, only one has 11 pyloric caeca and none has less than 12 branchiostegal rays. These differences, though slight, suggest there are slight differences between our material and the four specimens reported by them. Some meristic characters of 83 Indian Ocean specimens of *H. macrochir* displayed considerably large variation (Filatova, 1985): specimens from Madagascar and the southeast Indian Ocean have ten dorsal rays; specimens from the "Zvezda Kryma" Bank (eastern Indian Ocean off Western Australia) and the Great Australian Bight have 14 pectoral rays; and specimens from the "Zvezda Kryma" Bank and the southern part of the eastern Indian Ocean (west of "Zvezda Kryma" Bank) have eight pelvic rays.

H. macrochir is not uncommon, as evidenced by the catch frequency in our study (13 specimens in six trawls). The species inhabits the lower bathyal zone between 1,490 and 2,740 m in Japan. The global bathymetric range for this species is 1,080 to 3,105 m (Filatova, 1985). Using underwater photographic census, Ohta (1983) estimated the population density of *H. macrochir* in Suruga Bay to be about 2.5 individuals/1,000 m^2 between the depths of 2,035 and 2,055 m. For the western North Atlantic population of this species, there are some quantitative studies. Grassle et al. (1975) estimated the population density on the continental slope at depths ranging from 1,798 to

1,830 m to be 1.10 individuals/1,000 m^2 on the basis of photographic census using the deep research submersible Alvin. According to Cohen and Pawson (1977), *H. macrochir* was the fourth most common species of benthic fishes which were seen from the Alvin in "Deep-water Dumpsite 106" at depths ranging from 1,704 to 2,808 m, and its greatest abundance based on visual census was 2.37 individuals/1,000 m^2 at a depth range of 1,768–1,960 m. In the Norfolk Canyon area, its abundance expressed as individuals per 1,000 m^2 ranged from 0.03 to 0.35 with the greatest abundance at a depth range of 1,500–1,999 m (Wenner, 1978). Though the estimated density of *H. macrochir* based on benthic trawls by Wenner is lower than others, the population density and main bathymetric range of this species in Suruga Bay agree well with those in the western North Atlantic.

Ohta (1983) also reported that *H. macrochir* is less abundant in Suruga Bay than the common halosaur *Aldrovandia affinis*. The population density of *A. affinis* reaches a maximum of about 23.2 individuals/1,000 m^2 between the depths of 1,172 and 1,716 m. Sulak (1982) reported that *H. macrochir* was trawled in the western North Atlantic from the depths ranging from 2,146 to 3,094 m and *A. affinis* from the depths ranging from 1,239 to 2,354 m. Though the bathymetric range of *H. macrochir* slightly overlapped with that of *A. affinis*, these two species were not trawled simultaneously at the designated depth range in Sulak's survey (Sulak, 1982: 70). Thus, *H. macrochir* was not usually found in the same depth range as *A. affinis*.

H. macrochir has a short based, single dorsal fin, a long tail and an anal fin with long rays. Frequent photographic observations revealed that individauls hover very close to the ocean bottom, facing into the bottom current with the tapered tail curved upward (Fig. 3). This hovering attitude was observed by Sedberry and Musick (1978), and is very similar to that of *Aldrovandia affinis* as reported by Marshall and Bourne (1964), Stanley (1971) and Ohta (1983). Undulation of the tail and anal fin causes the tapered tail to be curved up and because of the hydrodynamics of its fin pattern, the tail beat helps the animal to assume a head-down attitude. Combined with information on stomach content analysis (Sedberry and Musick, 1978) and submersible observation (Grassle et al., 1975), we conclude that *H. macrochir* lives close to the bottom, gulping down infaunal and epifaunal organisms, detritus and sediments.

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トカゲギス科の一種クロオビトカゲギス（新称）の日本からの記録

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トカゲギス科の *Halosauropsis macrochir* は大西洋，南アフリカ，インド洋，オーストラリア湾，ニュージーランドおよび日本から知られている．日本では Ohta (1983) により駿河湾と相模湾から初めて記録されたが，標本の分類学的記載はなかった．我々は近年得られた標本を検討し，この種が日本の中部から南部にかけての太平洋に分布することを確認し，その色彩的特徴に由来する新和名を提唱した．本種のいくつかの計数形質には若干の地理的変異がみられる．トロールでの捕獲例数から判断して，本種は日本近海の 1,500 から 2,700 m の海洋底においてさほど稀な種ではない．深海カメラによる駿河湾での本種の主な生息水深での推定密度は，西部北大西洋でのアルビン号を使っての目視と写真撮影による推定密度とよく似ており，主な生息水深は両地域においてより高密度に分布する本科のトカゲギスのそれより深い．本種の背鰭と臀鰭の形態，生態写真および食性からみて，この種は海洋底に強く依存した生活をしていると考えられる．

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