Japanese Journal of Ichthyology
Vol. 29, No. 4 1983

魚類学雑誌
29巻4号 1983年

The Gempylid, *Nesiarchus nasutus* from Japan and the Sulu Sea

Izumi Nakamura, Eiichi Fujii and Takao Arai

(Received June 16, 1982)

Abstract Two juvenile specimens of a gempylid species obtained from Suruga Bay, Japan and the southern Sulu Sea were identified as *Nesiarchus nasutus* Johnson originally described from the Atlantic Ocean. These are first records of *N. nasutus* in Japan and the Sulu Sea. Habitat and distribution of *N. nasutus* are briefly discussed. A method of measurements for the Gempylidae is proposed.

A rather rare member of the family Gempylidae, *Nesiarchus nasutus* Johnson, 1862, had been only known from the North Atlantic until the review by Parin and Bekker (1972) who reported it from the tropical South Pacific, South Indian and tropical Atlantic oceans. Recently this species was recorded from Mariana Islands (Parin, 1976) and New Zealand (Nakamura et al., 1981).

Two juvenile gempylid specimens recently obtained from the waters of Japan and the Sulu Sea were identified as *Nesiarchus nasutus*. These are the first records of this species in Japan and the Sulu Sea respectively. Consequently, eleven species of the Gempylidae are now known from Japan. Because we feel that a revisional work on the genera of Gempylidae is needed, the following eleven species are arranged alphabetically (scientific names followed by Japanese names):

Diplospinus multistriatus Maul
Hosokurotachi
Epinnula magistralis Poey Aosumiyaki
Gempylus serpens Cuvier Kurotachikamasu
Lepidocybium flavobrunneum (Smith)
Aburasokomutsu
Nealotus tripes Johnson Furaikamasu
Neoepinnula orientalis (Gilchrist et Von Bonde)
Toyokamasu
Nesiarchus nasutus Johnson
Hashinagakurotachi
(New Japanese name)
Promethichthys prometheus (Cuvier)
Kuroshibikamasu
Rexea prometheoides (Bleeker)
Kagokamasu
Ruvettus pretiosus Cocco Baramutsu
Thyrsitoides marleyi Fowler
Nagatachikamasu

Methods

Measurements shown in Fig. 1 are defined as: 1. total length—from anteriormost part of head (upper or lower jaw) to posteriormost tip of caudal fin when caudal rays squeezed together; 2. fork length—measured from tip of snout to middle point on posterior margin of middle caudal rays; 3. standard length—measured from tip of snout to caudal base (theoretically posterior margin of hypural bones); 4. head length—measured from tip of snout to most distant point on opercular membrane; 5. snout length—measured from tip of snout to anterior margin of fleshy orbit; 6. length of upper jaw—measured from anteriormost point of premaxillary to posteriormost point of maxillary; 7. length of orbit—greatest distance between free orbital rims; 8. length of eye—greatest distance between margins of eye-ball; 9. postorbital length of head—greatest distance between posterior margin of fleshy orbit and membranous opercular margin; 10. suborbital width—least measurement from fleshy orbit to supramaxillary or maxillary; 11. interorbital width—least measurement between uppermost point on fleshy margin of orbits; 12. body depth—greatest vertical distance between dorsal and ventral body margins; 13. body width—measured at widest point; 14. first predorsal length—measured from tip of snout to orgin of first dorsal fin; 15. second predorsal length—measured from tip of snout to origin of second dorsal fin; 16 prepectoral length—measured from tip of snout to insertion of anterior basal margin of pectoral fin; 17.

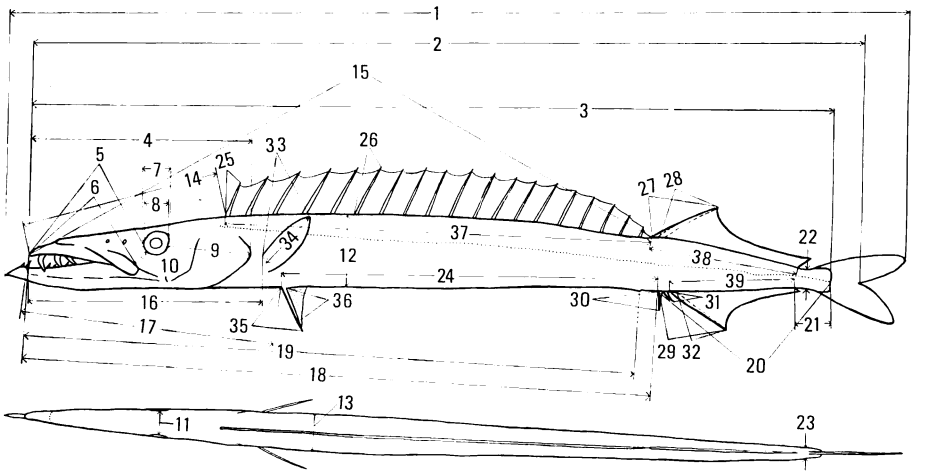

Fig. 1. Measurements for the Gempylidae. Explanation of measurements and corresponding numbers given in text under methods.

prepelvic length—measured from tip of snout to intersection of anterior basal margin of pelvic fin with belly when fin is held erect; 18. preanal length—measured from tip of snout to origin of anal fin (including detached spines); 19. preanus length—measured from tip of snout to anterior margin of anus; 20. length of tail—measured from origin of anal fin (including detached spines) to base of middle caudal rays; 21. length of caudal peduncle—oblique distance between end of anal base and base of middle caudal rays; 22. depth of caudal peduncle—least depth of caudal peduncle; 23. width of caudal peduncle— measured at origin of upper lobe of caudal fin; 24. length of abdomen—measured from origin of pelvic fin to origin of anal fin (including spines); 25. height of first spine of first dorsal fin—measured from base of first spine to its tip; 26. length of longest first dorsal spine—measured from base of longest spine to its tip; 27. height of second dorsal fin—measured from origin of second dorsal fin to tip of anterior lobe; 28. length of longest second dorsal ray—measured from base of longest ray to its tip; 29. height of anal fin—measured from origin of anal fin to tip of anterior lobe; 30. length of first anal spine—measured from base of first spine to its tip; 31. length of second anal spine—measured from base of second spine to its tip; 32. length of longest anal ray—measured from base of longest ray to its tip; 33. length of pectoral fin—measured from base of dorsalmost ray to tip of fin; 34. length of longest pectoral ray—measured from base of longest ray to its tip; 35. length of pelvic spine—measured from base of spine to its tip; 36. length of longest pelvic soft ray—measured from base of longest soft ray to its tip; 37. length of first dorsal base—measured from origin of first dorsal fin to origin of second dorsal fin; 38. length of second dorsal base—measured from origin to end of posteriormost ray base (including finlets if present); 39. length of anal base—measured from origin (excluding detached spines) to end of posteriormost ray base (including finlets if present). Counts were taken in accordance with Hubbs and Lagler (1958). Radiographs of skeletal structures were taken to observe osteological features. Abbreviations used are as follows: BMNH—British Museum (Natural History), London; BSKU—Department of Biology, Faculty of Sciences, Kochi University, Kochi; FRSKU—Fisheries Research Station, Kyoto University, Maizuru; USNM—United States National Museum, Washington, D.C.

Nesiarchus nasutus Johnson, 1862
(New Japanese name: Hashinagakurotachi)
(Figs. 2～4)

Nesiarchus nasutus Johnson, 1862: 173～175, pl. 22 (type-locality: Madeira; holotype: BMNH 1862.6.14.13).

Prometheus paradoxus Capello, 1867: 260, pl. 4 (type-locality: Eastern Atlantic).

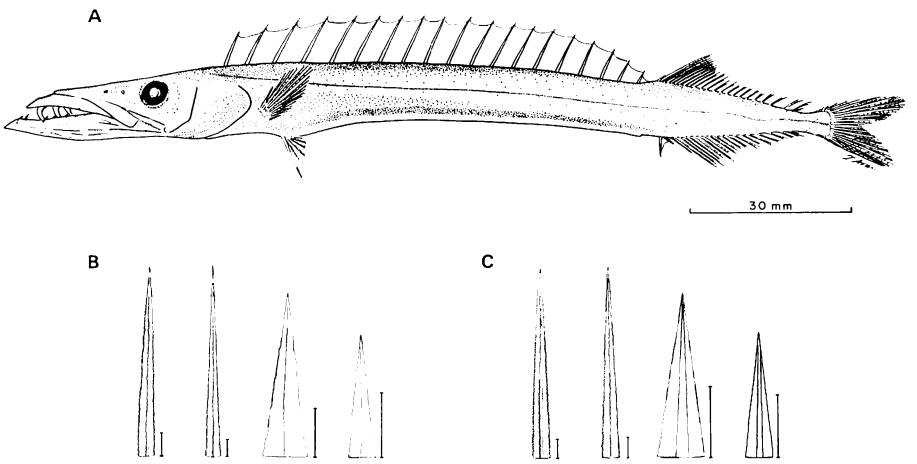

Fig. 2. A: Juvenile of *Nesiarchus nasutus* (FRSKU S1605, 149.4 mm SL) stranded on Miho beach, Shizuoka Pref. Japan. B: Fin spines in anterior view of a 149.4 mm SL juvenile (FRSKU S1605). From left to right: Pelvic spine of left side, 6th spine of first dorsal fin, 1st spine of anal fin and 2nd spine of anal fin. Scales indicate 1 mm. C: Fin spines in anterior view of a 104.4 mm SL juvenile (BSKU 16014). From left to right: pelvic spine of left side, 6th spine of first dorsal fin, 1st spine of anal fin and 2nd spine of anal fin. Scales indicate 1 mm.

Nesiarchus nasutus: Steindachner, 1867: 103, pl. 9; Günther, 1887: 37; Goode and Bean, 1895: 197～198, 1 fig.; Holt and Byrne, 1909: 279; Roule, 1927: 9, 1 fig.; Borodin, 1931: 79; de Buen, 1935: 99, pl. 23 (fig. 45); Nobre, 1935: 264～265, pl. 37 (fig. 120); Fowler, 1936: 633～634, fig. 286; Noronha and Sarmento, 1948: 117; Forest and Legendre, 1950: 1; Lozano y Ray, 1952: 546, pl. 42 (fig. 4); Brandes et al., 1953: 47～48; Grey, 1953: 136～137, 139; Nunes, 1953: 180～181, 1 color fig.; Rost, 1954: 1～4, fig. 1; Voss, 1954: 124～135, figs. 3～5; Grey, 1955: 298, fig. 55; Tucker, 1956: 122～127, fig. 22; Rollefsen et al., 1960: 164; Jónsson, 1969: 160～161; Wheeler, 1969: 384, fig. 125; Hognestad, 1970: 116～117; Quero, 1970: 280～282; Parin and Bekker, 1972: 148～151, figs. 12～13; Parin and Bekker, 1973: 459; Parin et al., 1973: 140; Parin et al., 1974: 121; Wheeler, 1975: 263, 1 fig.; Parin, 1976: 200; Parin and Golovan, 1976: 268; Parin et al., 1978: 178; Golovan, 1978: 277.

Thyrsitops violaceus Bean, 1887: 513～514 (type-locality: Le Have Bank, south of Newfoundland, 125 fathoms; type: USNM 39278).

Thyrsitops violaceus: Goode and Bean, 1895: 195～196, pl. 57 (fig. 209).

Escolar violaceus: Jordan and Evermann in Goode and Bean, 1895: 519 (new generic name *Escolar* proposed); Jordan and Evermann, 1898: 2843; Halkett, 1913: 90; Vladikov and Mackenzie, 1935: 85, 1 fig.

Bipinnula violacea: Jordan and Evermann, 1896: 878～879 (new generic name *Bipinnula* proposed).

Material examined. BSKU 16014, 101.4 mm SL, the Sulu Sea (5°43′1″N, 119°47′0″E), sandy mud at depth of 460～515 m, caught by beam trawl of R.V. Hakuho Maru at speed of 0.3 knots, 06: 30～07: 33, June 10, 1972; FRSKU S1605, 149.4 mm SL, Miho, Suruga Bay, Shizuoka, Japan, stranded on beach and collected by Takao Arai and Tsutomu Miyake on February 4, 1974.

Description. Counts and measurements are given in Table 1. Body extremely elongate and fairly compressed (Fig. 2). Scales absent or completely peeled off. Head large, more than 1/4 of standard length. Snout elongate, conical, acutely pointed; lower jaw also sharply pointed, projecting beyond tip of snout. A conical dermal process at tip of each jaw. Mouth very large, maxillary extending nearly below anterior edge of eye. Three non-depressible fangs and 3 scars presumably of missing fangs (FRSKU S1605), 6 fangs, 3 depressible and 3 non-depressible (BSKU 16014) at sym-

Table 1. Measurements and counts of *Nesiarchus nasutus*. Measurements are in mm followed by in parentheses percentages of the standard length.

Character	BSKU 16014	FRSKU S1605
Measurements:		
total length	114.7 (113.1)	163.6 (109.7)
fork length	106.2 (104.7)	155.8 (104.3)
standard length	101.4 (100.0)	149.4 (100.0)
head length	29.4 (29.0)	43.1 (28.8)
snout length	15.0 (14.8)	21.8 (14.6)
length of upper jaw	19.5 (19.2)	21.0 (14.7)
length of orbit	4.8 (4.7)	6.1 (4.1)
length of eye	4.2 (4.1)	4.5 (3.7)
postorbital length of head	9.9 (9.8)	15.7 (10.5)
suborbital width	2.1 (2.1)	2.7 (1.8)
interorbital width	2.5 (2.5)	4.5 (3.0)
body depth	10.1 (10.0)	13.1 (8.8)
body width	3.0 (3.0)	5.0 (3.0)
first predorsal length	25.1 (24.8)	37.0 (24.8)
second predorsal length	81.5 (80.4)	115.3 (77.2)
prepectoral length	31.8 (31.4)	47.2 (31.6)
preanal length	81.4 (80.3)	118.0 (79.0)
preanus length	79.0 (.78.0)	113.0 (75.8)
length of tail	3.3 (3.3)	7.6 (5.1)
depth of caudal peduncle	2.3 (2.3)	3.6 (2.4)
width of caudal peduncle	1.5 (1.5)	2.0 (1.3)
length of abdomen	49.8 (49.1)	70.8 (47.4)
height of 1st spine of 1st dorsal fin	6.2 (6.1)	7.0 (4.7)
length of longest 1st dorsal spine	9.1 (9.0)	10.3 (6.9)
height of 2nd dorsal fin	6.3 (6.2)	7.7 (5.2)
length of longest 2nd dorsal ray	5.8 (5.7)	6.5? (4.4)
height of anal fin	5.1 (5.0)	10.0 (6.7)
length of 1st anal spine	2.3 (2.3)	2.0 (1.3)
length of 2nd anal spine	3.2 (3.2)	2.1 (1.4)
length of longest anal ray	3.9 (3.8)	7.3? (4.9)
length of pectoral fin	4.2 (4.1)	11.3 (7.6)
length of longest pectoral ray	4.1 (4.0)	10.1 (6.8)
length of pelvic spine	9.4 (9.3)	8.2 (5.5)
length of longest pelvic soft ray	7.1 (7.0)	5.7 (3.8)
length of 1st dorsal base	57.2 (56.4)	79.3 (53.0)
length of 2nd dorsal base	19.0 (18.7)	26.9 (18.0)
length of anal base	18.1 (17.9)	24.4 (16.3)
Counts:		
D	XXI, i, 20	XIX, i, 22
A	II, 20	II, 19
P_1	13	14
P_2	I, 5	I, 5
Branchiostegals	7	7
Vertebrae	20+14=34	20+14=34

physis of upper jaw. Lateral premaxillary teeth uniserial, compressed and caniniform, those of lower jaw (anteriormost one larger than about 10 remainders) larger than those of upper jaw (about 10). No teeth on vomer or palatines. Gill rakers rudimentary, many fine spinescent rakers on first gill arch. Pseudobranchial filaments developed. No spines on postorbital region. Left and right gill membranes not united to each other, free from isthmus. Nostrils

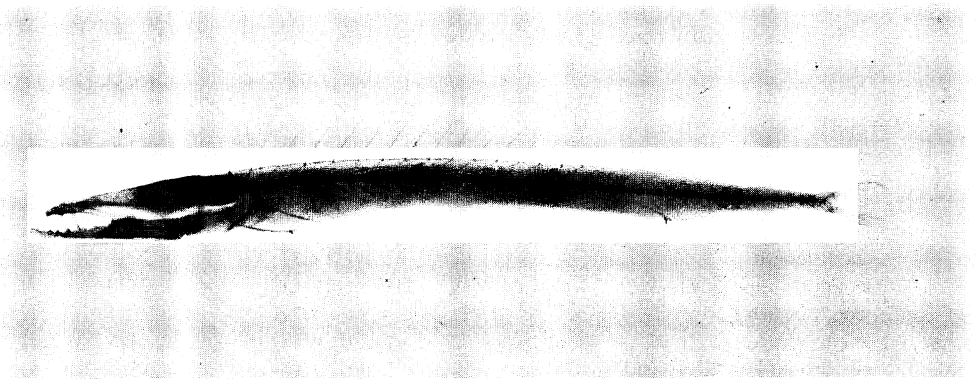

Fig. 3. Radiograph of a juvenile specimen of *Nesiarchus nasutus* (FRSKU S1605, 149.4 mm SL).

round and well separated; posterior one larger than anterior one. Eye moderate in size, closer to hind margin of opercle than to tip of snout. Interorbital possessing a longitudinal furrow. Lateral line single, inserted above upper margin of opercle, gradually curved ventrad and posteriorly running along middle of body to caudal fin base. First dorsal fin inserted slightly anteriorly and dorsad of upper angle of opercle, its base extremely long when compared to second dorsal fin base. Second dorsal fin with a small spine anteriorly. Anal fin with two detached dagger-shaped spines anteriorly. Both dorsal and anal fins situated posteriorly on body with their bases of about equal length. Pectoral fin rather large and extending beyond lateral line in 149.4 mm SL specimen (FRSKU S1605), but smaller and not reaching lateral line in the other 101.4 mm SL specimen (BSKU 16014). Pelvic fin fully developed, inserted a little behind base of 3rd dorsal spine, that of 101.4 mm SL specimen (BSKU 16014) longer than that of the 149.4 mm SL specimen (FRSKU S1605). Pelvic fin longer than pectoral fin in BSKU 16014, vice versa in FRSKU S1605. Caudal fin slightly forked. First dorsal and pelvic fin spines finely serrated, anal fin spines slightly or not serrated (Fig. 2).

Colour observed in stranded specimen: body uniformely silvery white with reddish purple caudal peduncle region (FRSKU S1605). Colour in formalin: body uniformly yellowish white with brownish caudal peduncle region and pale purplish abdomeinal region; ventral margin of branchiostegal membrane black; eye brownish black; all fins semi-transparent except brownish tip of caudal fin.

Osteological features observed from the radiographs (Fig. 3): both upper and lower jaws stout and having well-developed dentition; neurocranium extremely elongate; first vertebra short, less than half as long as second vertebra; postcleithrum elongate and slender; vertebrae elongate, except first and posteriormost three short; neural and haemal spines slender; intermuscular bones developed only in anterior part of body; vertebrae number 20+14=34; forked caudal fin supported by last three vertebrae; base of caudal fin rays not deeply forked and firmly attached only to distal portions of 1 neural spine, 3 epurals, 5 hypurals, 1 parhypural and 2 heamal spines,

Habitat and distribution. *N. nasutus* is oceanic and benthopelagic, living near the surface to a considerable depth (about 1000 m). Adults of this species are usually found in deeper water than the young and their food consists of practically any deep-water fish species, squids, or crustacians they encounter (Wheeler, 1975). The geographical distribution of this species is shown in Fig. 4. There seems to be a tendency for large fish to be distributed in higher latitudes. This species was thought to be exclusively from the North Atlantic Ocean since its original description (Johnson, 1862), until the recent publication of the following range extensions: tropical South Pacific, South Indian and tropical Atlantic oceans (Parin and Bekker, 1972); south west of Mariana Islands (Parin, 1976), Gulf of Guinea (Dragovich and Potthoff, 1972; Parin et al., 1978); off west coast of southern

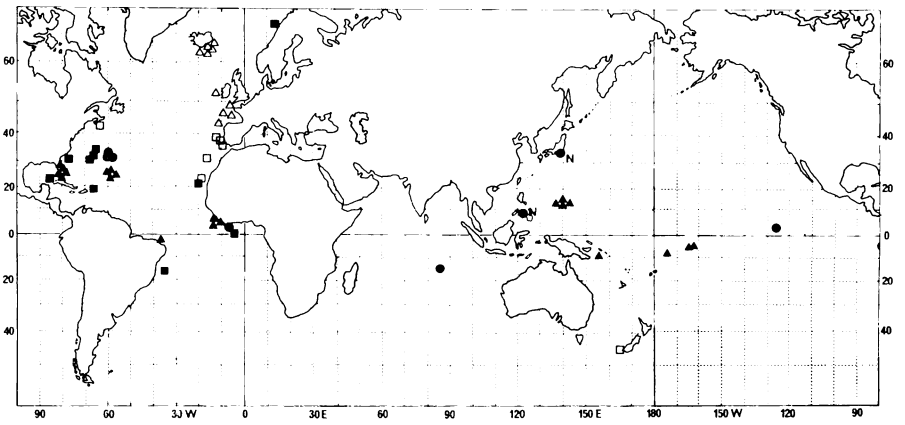

Fig. 4. Capture location of *Nesiarchus nasutus* based on our records and literature. ▲, less than 100 mm SL; ●, 100 to 300 mm SL; ■, 300 to 800 mm SL; □, more than 800 mm SL; △, size unknown; N, new record.

South Island, New Zealand (Nakamura et al., 1981); Japan and the Sulu Sea (present study).

Twenty-seven larvae were caught at depths of 0 m to about 200 m off Florida and two juveniles were caught at depths of 376 m to 394 m off South Calorina (Voss, 1954). Thirteen juveniles were caught at depths of 60 m to 1000 m southwest of Mariana Islands (Parin, 1976). Juveniles of this species are thought to be in the open tropical waters of all oceans (Parin and Bekker, 1972), so our two juveniles may have come from tropical open waters to the coastal waters like Suruga Bay (FRSKU S1605) and to the marginal sea like the Sulu Sea (BSKU 16014).

Discussion

Two juveniles of *N. nasutus,* 188 and 182 mm SL, (which are larger than ours) were described and illustrated from the Florida Straits (Voss, 1954) and from the Caribbean Sea (Tucker, 1956). Our specimens agree with the description of these specimens, although some slight proportional differences are recognized between their specimens and ours. We consider that these differences are within the range of ontogenetic and individual variations. Our juvenile specimens have two dagger-shaped spines in front of the soft anal fin, while adults usually have one spine in front of the soft anal fin. Grey (1953) described no anal spines in the description of *N. nasutus* but in the discussion she stated: "The two smallest examples possess two dagger-shaped spines in front of the anal fin, instead of the single spine found in larger specimens." It seems most likely that the detached anal spines in front of the soft anal fin decrease in number or become hard to observe as the fish grows larger.

Our two juvenile specimens have the same meristic characters as adults but differ morphometrically. The serrated fin spines of our specimens (Fig. 2) are characteristic of the postlarva and juveniles of this species (Voss, 1954: figs. 3 and 4).

Acknowledgements

We are grateful to Prof. Osamu Okamura, Department of Biology, Faculty of Sciences, Kochi University, for the loan of the specimens from the R. V. Hakuho Maru Collections of the Ocean Research Institution, University of Tokyo. We thank Dr. Teruya Uyeno of National Science Museum, Tokyo, Mr. Thomas Potthoff and Mr. Joseph L. Russo of National Marine Fisheries Service, NOAA, for the critical review of the manuscript. The technical assistance of Mrs. Reiko Nakamura is acknowledged.

We also thank Dr. P. J. P. Whitehead, Mr. A. Wheeler and Mr. O. Crimmen (BMNH) and Dr. R. H. Gibbs, Jr. (USNM) for their help to examine the specimens including types.

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(IN: Fisheries Research Station, Kyoto University, Maizuru 625, Japan; EF: 4-44-11 Koenjikita, Suginami-ku, Tokyo 166, Japan; TA: 6-18-21 Nishi-oi, Shinagawa-ku, Tokyo 140, Japan)

Postscript

After the manuscript had been submitted, several specimens of this species were recorded from Japan: 1 specimen 568 mm SL, collected by commercial bottom trawl in Suruga Bay (Ishii, T., person. comm.); number of specimens unknown, off Iwate, 39°58′～40°27′N, 142°10′～143°10′E, bottom trawl, in 600～1200 m depth, No. 1 Kinei Maru, July-August in 1979～1981 (Iwate-ken Suisan Shikenjo, 1981: 83, 1 photo; mentioned as Acinaceidae sp.). The latter might be large fish judging from the photograph. More extensive surveys may reveal that *Nesiarchus nasutus* has a local population around Japan.

Iwate-ken Suisan Shikenjo, 1981. Showa 54 nendo shinkaigyojo kaihatsu shiken chosa hokokusho (dai 3 po). (Report of the survey of deep water fishing grounds development in 1969 (III)). Rep. Iwate Pref. Fish. Exper. Sta., 55 (Fish. 3): 1～109. (In Japanese).

日本とスルー海に初記録のクロタチカマス科魚類，ハシナガクロタチ

中村　泉・藤井英一・荒井孝男

クロタチカマス科魚類の1種，ハシナガクロタチ（新称）*Nesiarchus nasutus* Johnson は従来北大西洋だけから知られていたが，最近になって赤道太西洋，南大西洋，インド洋および太平洋からも記録されるようになり，ほぼ全世界に分布することが明らかになって来た．今回の2記録は北西太平洋での，それぞれ最北（日本）と最西（スルー海）の分布を示すもので，その測定値とともにここに報告する．本科魚類の測定規準は確立していないので，その測定規準にも言及した (Fig. 1).

(中村：625 舞鶴市長浜　京都大学農学部附属水産実験所；藤井：166 東京都杉並区高円寺北 4-44-11；荒井：140 東京都品川区西大井 6-18-21)