

# *Mastigopterus imperator* Smith and Radcliffe, 1913, a senior synonym of *M. praetor* Smith and Radcliffe, 1913 (Ophidiidae, Ophidiiformes)

Yoshihiko Machida<sup>1</sup>✉, Junsheng Zhong<sup>2,3</sup>, Hiromitsu Endo<sup>1</sup>, and Hanling Wu<sup>2</sup>

<sup>1</sup>Laboratory of Marine Biology, Faculty of Science, Kochi University, 2-5-1 Akebono-cho, Kochi 780-8520, Japan (e-mail: machida@cc.kochi-u.ac.jp)

<sup>2</sup>Aquaculture and Livestock Production Laboratory, United Graduate School of Agricultural Science, Ehime University, 200 Monobe-Otsu, Nankoku, 783-8502, Japan

<sup>3</sup>Laboratory of Fishes, Shanghai Fisheries University, 334 Jun Gong Road, Shanghai 200090, People's Republic of China

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**Abstract** A rare deep-sea ophidiid genus *Mastigopterus* known to contain two species, *M. imperator* Smith and Radcliffe, 1913 and *M. praetor* Smith and Radcliffe, 1913, was reviewed on the basis of six specimens including the holotypes of both species. Dorsal and anal fin ray counts and the size of cephalic sensory pores previously thought to be diagnostic characteristics to discriminate the two species did not suggest the presence of two forms, the large (*M. imperator*) and the small species (*M. praetor*), in the genus. Apparently the genus is represented by a single species, *M. imperator*, known from off Madagascar, the East and South China Seas and Papua New Guinea.

**Key words** Ophidiidae · *Mastigopterus imperator* · *Mastigopterus praetor* · Synonym

The deep-sea ophidiid fish genus *Mastigopterus* Smith and Radcliffe in Radcliffe, 1913, which is well characterized by having pectoral fins with greatly elongated rays, contains two nominal species, *M. imperator* Smith and Radcliffe and *M. praetor* Smith and Radcliffe (Radcliffe, 1913; Cohen and Nielsen, 1978; Shcherbachev, 1980; Nielsen and Cohen, 1999). Each species was based on only a single specimen, i.e., the holotype of *M. imperator* from between Leyte and Mindanao, the easternmost area of the Sulu Sea of the Philippines and the holotype of *M. praetor* from the Patiente Strait in the Molluca Sea, Indonesia. Cohen and Nielsen (1978) noted a third specimen of the genus from off Madagascar. Su (1995) gave a new Chinese name, “bian-you-wei,” for *Mastigopterus*, although this genus had not been known from Chinese waters. Although details of the third specimen have not been reported, Nielsen (personal communication to Y.M.) strongly suggested that the names *M. imperator* and *M. praetor* refer to the same species.

During our study on deep-sea ophidiids occurring in the western Pacific Ocean, we found two specimens referable to *Mastigopterus*, one from the East China Sea, and another from the South China Sea. In addition, we had an opportunity to examine two additional *Mastigopterus* specimens, one from off Madagascar and another from north of Papua New Guinea, through the courtesy of Dr. Jørgen G. Nielsen. The purpose of this article is to describe these four recently caught specimens in some detail and discuss the validity of the two species.

All measurements are straight-line measurements. The method for counting developed rakers on the first gill arch follows Cohen and Nielsen (1978). Counts of vertebrae and

vertical fin rays were taken from radiographs. Scale rows were counted from the base of the first anal fin ray obliquely to the base of the dorsal fin as was done in the original descriptions of *M. imperator* and *M. praetor* by Radcliffe (1913). Standard and head lengths are abbreviated as SL and HL, respectively. Institutional abbreviations used in the text are as follows: BSKU, Department of Biology, Faculty of Science, Kochi University; IOAN, Academy of Science, Institute of Oceanology, Moscow; MNHN, Museum National d'Histoire Naturelle, Paris; SFU, Laboratory of Fishes, Shanghai Fisheries University; USNM, United States National Museum of Natural History.

## Genus *Mastigopterus* Smith and Radcliffe in Radcliffe, 1913

(New Japanese name: hagaromo-ashiro zoku)

*Mastigopterus* Smith and Radcliffe in Radcliffe, 1913: 158 (type species *Mastigopterus imperator* Smith and Radcliffe, 1913, by original designation); Norman, 1939: 88; De Beaufort and Chapman, 1951: 434; Cohen and Nielsen, 1978: 35; Shcherbachev, 1980: 156; Su, 1995: 412 (in key); Nielsen and Cohen, 1999: 75.

**Diagnosis** (modified from Nielsen and Cohen, 1999). Head large; mouth subterminal. Eye diameter less than snout length. Opercular spine weak, broad, and flattened. Prominent cephalic sensory pores below eyes and on rear margin of preoperculum. Median basibranchial tooth patches 2. Vomer with V-shaped tooth patch. Anterior gill arch with 10–12 long rakers. Pectoral fin with 12–15 rays, the

longest of which are about one-half or more SL. Pelvic fins with 2 joined rays in each. Caudal fin rays 6. Branchiostegal rays 8. Precaudal vertebrae 15–16.

### *Mastigopterus imperator* Smith and Radcliffe in Radcliffe, 1913

(New Japanese name: hagoromo-ashiro)

(Figs. 1–4)

*Mastigopterus imperator* Smith and Radcliffe in Radcliffe, 1913: 159, pl. 12, fig. 1 (original description); Norman, 1939: 88 (list); Cohen and Nielsen, 1978: 35 (generic diagnosis, distribution, and species name); Shcherbachev, 1980: 156 (species name and locality after Cohen and Nielsen, 1978); Nielsen and Cohen, 1999: 75 (generic diagnosis, distribution, and species name).

*Mastigopterus praetor* Smith and Radcliffe in Radcliffe, 1913: 160, pl. 12, fig. 2 (original description); Norman, 1939: 88 (list); De Beaufort and Chapman, 1951: 434, fig. 76 (description after Smith & Radcliffe, 1913); Cohen and Nielsen, 1978: 35 (generic diagnosis, distribution, and species name); Shcherbachev, 1980: 156 (species name and locality after Cohen and Nielsen, 1978); Nielsen and Cohen, 1999: 75 (generic diagnosis, distribution, and species name).

**Material examined.** Six specimens of *Mastigopterus imperator*: BSKU 82359, 492 mm SL, female, 28°15' N, 128°24' E (Okinawa Trough), East China Sea, commercial bottom trawler *No. 58 Kosho Maru* chartered by the Japan Marine Resources Research Center, otter trawl, 1594–1597 m, 9 July 1994; SFU-1819, 237 mm SL, male, ca. 20° N, ca. 116° E (deep-sea mounts near Dongsha Is.), South China Sea, 394–525 m, R/V *No. 704 Nanfeng*, bottom trawl, April 1982; MNHN 2000-0756, 508 mm SL, sex unknown, 17°50' S, 43°07' E, Mozambique Channel off Madagascar, bottom trawl, 1475–1530 m, 16 Jan. 1975; IOAN uncataloged specimen, 295 mm SL, sex unknown, 5°21.6' S, 146°13.9' E, Bismarck Sea north off Papua New Guinea, R/V *Dmitry Mendelew*, IKMT, 1380–1400 m, 14 Feb. 1977; USNM 74142, holotype of *Mastigopterus imperator* (radiographs only), 9°06'30" N, 125°00'20" E (between Leyte and Mindanao), Philippines, R/V *Albatross*, bottom trawl, 1786 m, 2 Aug. 1909; USNM 74143, holotype of *M. praetor* (radiographs only), 0°28'30" S, 127°45'00" E (Patiente Strait), Indonesia, R/V *Albatross*, bottom trawl, 2363 m, 30 Nov. 1909.

**Description.** Proportional measurements and meristic counts are given in Table 1. Body compressed, deepest at dorsal fin origin. Length of head nearly equal to 1/2 preanal length (Fig. 1). Head compressed behind posterior margin of preopercle. Snout slightly projecting beyond mouth, broadly round from dorsal view. Anterior nostril round, near tip of snout. Posterior nostril slightly larger than anterior one, situated just in front of mideye. Eye elliptical-oval, its horizontal diameter slightly shorter than snout length. Mouth large, slightly oblique, extending backward 2/3 eye

diameter beyond posterior margin of eye. Rear margin of maxillary expanded, its depth nearly equal to eye diameter. Interorbital region weakly convex, its width 1.6–2.3 times eye diameter. Opercular spine very thin and weak. Margin of preopercle smooth. Branchiostegal membranes free from isthmus, united with each other slightly behind eye. Gill filaments short. Developed gill rakers on 1st arch 10–12 (Fig. 2), the longest about 3/4 eye diameter. Pseudobranchial filaments absent. Branchiostegal rays 8. Cephalic sensory pores distinct: infraorbital pores 8; supraorbital pores 4, 3rd pore at middle of interorbital region; preoperculomandibular pores 10; postorbital pores 6 (Fig. 3). Teeth small, granular, forming bands in jaws and on vomer and palatines (Fig. 4). Vomerine tooth patch V-shaped. Palatine tooth patch broad, its anterior tip strongly incurved. Median basibranchial tooth patches 2. Dorsal and anal fins continuous with caudal fin. Dorsal fin high, longest ray nearly equal to the length of snout plus eye. First dorsal fin ray above 4th vertebra. Height of anal fin slightly shorter than that of dorsal. First anal fin ray below 18th vertebra. Longest caudal fin ray about 1/2 HL. Pectoral fin on narrow base, whiplike, rays greatly prolonged, ca. 1/2 to 1/3 SL (tips broken). Pelvic fins with 2 rays each. Inner pelvic ray longer, reaching to vent. Scales cycloid, small, deciduous, covering head, body, and bases of dorsal, anal, and pectoral fins. Oblique scale rows about 40–45. Lateral line indistinct.

**Color in 65% alcohol.**—Head and body uniformly dusky light brown; opercular region, pectoral fin and margins of dorsal, anal, and caudal fins dark brown; opercular membrane black. Mouth cavity grayish white, peritoneum dark brown.

**Remarks.** The pectoral fin with greatly elongated rays that are longer than one-half of SL or more is one of the

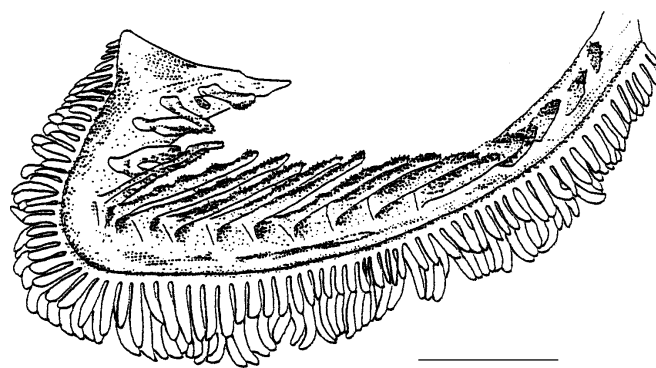
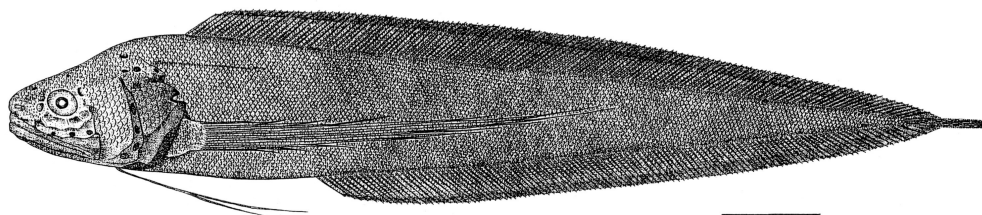
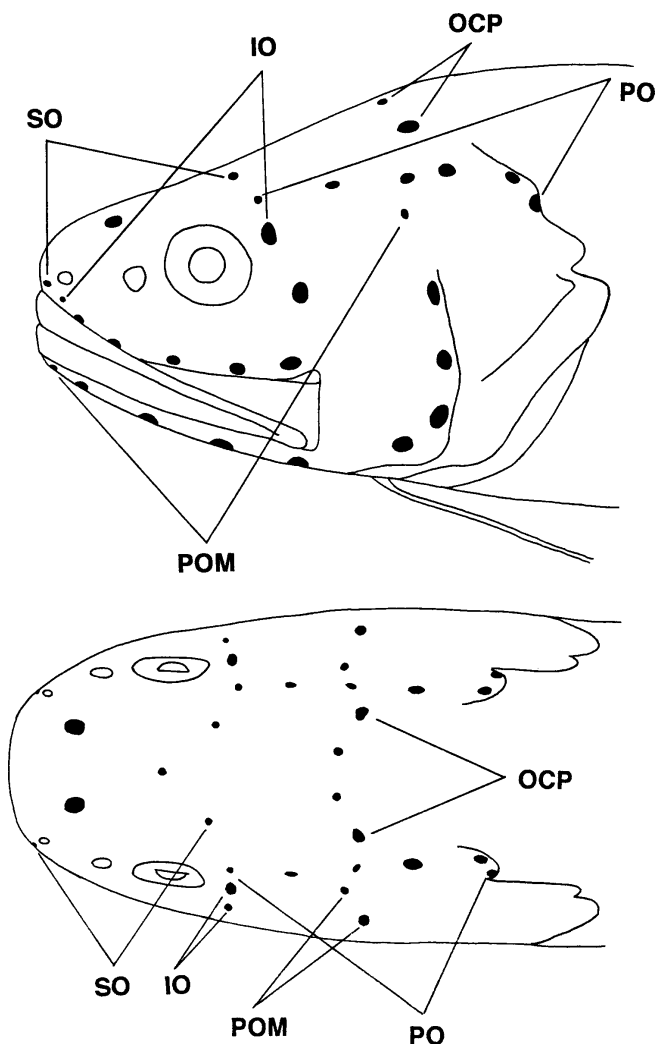


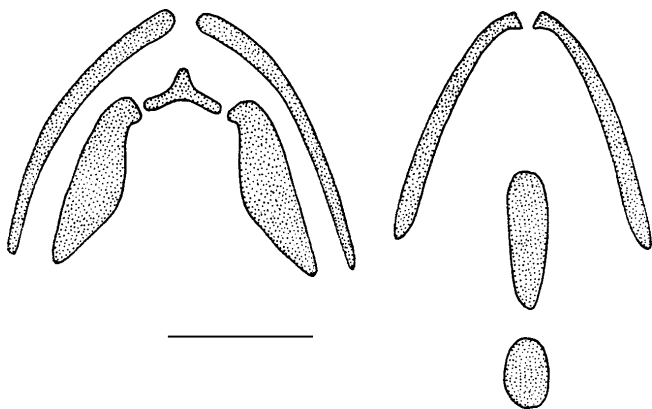
Fig. 2. Left first gill arch of *Mastigopterus imperator*, BSKU 82359. Bar 1 cm

Fig. 1. *Mastigopterus imperator*, BSKU 82359, 492 mm SL, from the East China Sea. Bar 5 mm





**Fig. 3.** Arrangement of cephalic sensory pores of *Mastigopterus imperator*, BSKU 82359. *SO*, supraorbital pores; *IO*, infraorbital pores; *OCP*, occipital pores; *PO*, postorbital pores; *POM*, preoperculo-mandibular pores



**Fig. 4.** Upper (left) and lower (right) jaw dentition of *Mastigopterus imperator*, BSKU 82359. Bar 2 cm

generic characters of *Mastigopterus* (Radcliffe, 1913; Cohen and Nielsen, 1978). Although pectoral fin rays of the present specimens are apparently elongated, those of the three specimens do not reach one-half of SL, because the tips of the pectoral fins were damaged (see Table 1).

Cohen and Nielsen (1978) noted pectoral fin rays to be 12–14 for the genus, although both species had 11 rays in the original description (Radcliffe, 1913). We confirmed 12 pectoral fin rays in the *M. imperator* holotype and 14 in the *M. praetor* holotype; the count ranged from 12 to 15 in the recently caught specimens (Table 1). Cohen and Nielsen (1978) noted that the genus had 8 branchiostegal rays, 15 precaudal vertebrae, and 2 median basibranchial tooth patches, none of which were described in the original description. These three important meristic counts of the present specimens agreed with those reported by Cohen and Nielsen (1978), although the number of precaudal vertebrae of BSKU 82359 and IOAN uncatalogued specimen was 16. The numbers of developed gill rakers on the first arch in the present specimens (11–12) were similar to the count for the genus (10) given by Cohen and Nielsen (1978). Six caudal fin rays, 2 pelvic fin rays, small eyes shorter than the length of snout, a broad and weak opercular spine, and prominent cephalic sensory pores in the present specimens agreed well with the diagnostic characters of *Mastigopterus* given by Cohen and Nielsen (1978) and Nielsen and Cohen (1999). Although the present specimens are devoid of pseudobranchial filaments, the holotypes of both species have two filaments (Nielsen, personal communication to Y.M.), indicating that in the present specimens those had probably fallen off during capture or preservation.

Radcliffe (1913) regarded *M. praetor* as distinguishable from *M. imperator* by its slender form of head and body, more conspicuous sinuses and pores on head, large eyes and correspondingly narrower interorbital, less deeply bifid ventrals, longer pectoral fins, and fewer dorsal and anal fins. Radcliffe (1913) gave the number of dorsal and anal fin rays as 142 and 130, respectively, in *M. imperator* and as 131 and 115 in the *M. praetor* holotype. The four recently caught specimens had 124–148 dorsal and 107–124 anal fin rays, filling in the gap between the two species and indicating that the genus is composed of a single species, i.e., the numbers of dorsal and anal fin rays exhibit a wide intraspecific variation in the genus *Mastigopterus*. The variation in the number of pectoral fin rays (12–15 in the recently caught specimens) seems to be a result of intraspecific variation.

Radcliffe (1913) noted that cephalic sensory pores were more conspicuous in the holotype of *M. praetor* (384 mm SL) than in the holotype of *M. imperator* (535 mm SL). MNHN 2000-0756 (508 mm SL), which is similar to the *M. imperator* holotype in body length, had rather large cephalic sensory pores. We were unable to confirm the number of cephalic sensory pores of SFC 1819 (237 mm SL) because its head was damaged. The cephalic sensory pores of the IOAN specimen (295 mm SL), which is smaller than the *M. praetor* holotype, are conspicuous as in MNHN 2000-0756 and BSKU 82359 (492 mm SL). Therefore, we think that this

**Table 1.** Counts and proportional measurements of six *Mastigopterus imperator* specimens

Cat. no.	BSKU 82359	SFC 1819	MNHN 2000-0756	IOAN (uncatalogued)	USNM 74142 (holotype)	USNM 74143
SL (mm)	492	237	508	295	535 <sup>a</sup>	384 <sup>a</sup>
Counts						
Dorsal fin rays	128	134	141	148	144	132
Anal fin rays	107	111	117	124	131	115
Caudal fin rays	6	6	6	6	6	6
Pectoral fin rays	14	15	13	12	12	14
Pelvic fin rays	2	2	2	2	2 <sup>a</sup>	2 <sup>a</sup>
Developed gill rakers on 1st arch	11	11	11	12	10 <sup>a</sup>	10 <sup>a</sup>
Dorsal fin origin above vertebra no.	4	4	4	4	4	4
Anal fin origin below vertebra no.	18	18	18	18	18	19
Oblique scale rows	ca. 45	ca. 40	—	—	ca. 45 <sup>a</sup>	40–45 <sup>a</sup>
Vertebrae	16 + 59 = 75	15 + 61 = 76	15 + 60 = 75	16 + 60 = 76	15 + 60 = 75	15 + 60 = 75
Measurement (% SL)						
HL	19.0	16.8	17.8	17.0	18.5 <sup>a</sup>	17.1 <sup>a</sup>
Body depth	14.6	12.7	13.9	13.9	18.1 <sup>a</sup>	15.4 <sup>a</sup>
Predorsal length	20.8	17.3	18.8	17.9	21.4 <sup>a</sup>	18.3 <sup>a</sup>
Preanal length	37.6	33.9	35.1	34.7	37.7 <sup>a</sup>	—
Pectoral fin length	42.0+	38.4+	53.6+	40.7+	64.8 <sup>a</sup>	76.9 <sup>a</sup>
Pelvic fin length	16.3	—	17.0	17.8	23.1 <sup>a</sup>	21.4 <sup>a</sup>
Measurements (% HL)						
Eye diameter	15.2	16.9	12.6	16.1	13.5 <sup>a</sup>	18.7 <sup>a</sup>
Snout length	25.2	23.1	23.4	22.1	25.3 <sup>a</sup>	25.4 <sup>a</sup>
Interorbital width	31.3	28.2	28.9	28.3	30.3 <sup>a</sup>	30.5 <sup>a</sup>
Maxillary length	55.6	52.6	57.0	53.8	54.9 <sup>a</sup>	57.8 <sup>a</sup>
Depth of maxillary end	12.7	16.9	17.6	16.1	20.3 <sup>a</sup>	18.7 <sup>a</sup>

<sup>a</sup>Data from Radcliffe (1913)

character does not correlate with fish growth, and it seems difficult to separate them into two forms, a small and a large species.

Although we were unable to clarify morphometric characteristics correlated with fish growth because of the small sample size, the present study clearly demonstrates that the genus is monotypic. We gave precedence to the name of *M. imperator*, the type species of the genus *Mastigopterus* as the First Reviser (ICZN, 1999: Art. 24.2.2). It is thus evident that *M. imperator* inhabits the deep-sea floor at depths ranging from 394 to 2365 m in the tropical to temperate waters of the Indo-West Pacific Ocean.

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