

## Revision of the Bathyal Fish Genus *Homostolus* (Ophidiiformes, Ophidiidae)

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**Abstract** The ophidiid fish genus *Homostolus* is revised on the basis of 44 specimens. Meristic and morphometric characters strongly indicate that the genus as presently known contains a single species, *Homostolus acer* Smith et Radcliffe, 1913, with *Homostolus japonicus* Matsubara, 1943, reduced to synonymy. Geographical variations found in certain meristic characters indicate that *H. acer* expanded its range from Philippine waters into both northern and southern waters. The species is distributed on deep-sea floors from the Pacific Ocean off central Japan, to the Indian Ocean off northern Western Australia, and to the Tasman Sea off New South Wales, at bathyal depths from about 400 to 700 m.

The bathyal ophidiid fish genus *Homostolus* contains two nominal species, *H. acer* Smith et Radcliffe, 1913, described from a single specimen from Iligan Bay, Mindanao, Philippines, and *H. japonicus* Matsubara, 1943, described from two specimens from Heda (sometimes reported as Heta), Suruga Bay, central Japan (Cohen and Nielsen, 1978). However, the type specimens of *H. japonicus* were lost just after the Second World War (I. Nakamura, pers. comm.).

Occurrence of this genus in Japanese waters was first reported by Kamohara (1938) (as *H. acer*). Although Kamohara (1950, 1952, 1954) later considered *H. japonicus* to be a variant of *H. acer*, rather than a separable species, he did not follow the matter further. Matsubara (1955), Cohen and Nielsen (1978) and Machida (1984) treated *H. japonicus* as a valid species, but to date no revisional study of this poorly known genus has been made.

In this paper, we recognize a single species, *H. acer*, in the genus *Homostolus*, on the basis of 44 specimens from the waters around Japan, the Philippines, Indonesia and Australia, and discuss geographical variations found in some meristic characters of the species.

Counting and measuring methods mostly follow Okamura and Kitajima (1984), except for the following: gnathoproctal length is measured from the mandible tip to the middle of the vent. Vertebrae and vertical fin rays were counted from radiographs. Total, standard, and head lengths are expressed throughout as TL, SL and HL, respectively. Institution abbreviations follow Leviton et al. (1985).

### *Homostolus* Smith et Radcliffe, 1913

(Japanese generic name: Itohiki-itachiuo zoku)

*Homostolus* Smith and Radcliffe in Radcliffe, 1913: 146 (type species by monotype *H. acer* Smith et Radcliffe in Radcliffe, 1913); Cohen and Nielsen, 1978: 32.

**Generic diagnosis** (modified from Cohen and Nielsen, 1978). Lower jaw ending in a rather blunt point. Eye diameter equal to or larger than snout length. Opercular spine strong. One or two short spines at lower angle of preopercle. Supraethmoid and lachrymal forming a raised, bony structure enveloping olfactory organ. Jaw teeth granular. Prevomer with a semicircular tooth patch. Median basibranchial high, with a single, narrow tooth patch. Developed rakers on first gill arch 33 to 43, those near angle with small dentigerous knobs on inner surface. Caudal fin rays 8. Pectoral fin placed low on body, with 20 to 23 rays. Pelvic fins with 1 ray in each, longer than head. Branchiostegal rays 8. Precaudal vertebrae 13.

**Remarks.** *Homostolus* seems to be most closely related to the bathyal Indo-West Pacific genus *Glyptophidium*. Both genera share characters such as a large eye and numerous rakers on the first gill arch. Nielsen and Machida (1988: 240) pointed out that *Glyptophidium* has a raised bony structure, formed by the supraethmoid and lachrymal, enveloping the olfactory organ. This structure is also found in *Homostolus*. In addition, the small, dentigerous knobs on the inner surface of the long rakers on the

Table 1. Morphometric and meristic characters of *Homostolus* species. \*after Radcliffe (1913); \*\*after Matsubara (1943).

Locality	Philippine Holotype of <i>H. acer</i> (USNM 74132)	Japan** Types of <i>H. japonicus</i> (n=2)	Japan (n=7)	Philippine and Seram Sea (n=18)	Timor Sea and Australia (n=18)	Total of non-types (n=43)
SL (mm)	183.7	171-179	103.6-189.0	87.2-175.1	72.2-150.0	72.2-189.0
In % of SL						
HL	24.3	24.9	26.4-27.1	24.0-27.7	24.9-29.1	24.0-29.1
Body depth	16.1	18.0-19.0	17.0-19.4	13.4-16.7	17.5-21.2	13.4-21.2
Predorsal length	26.9	25.5-27.4	26.7-30.3	25.5-29.6	26.6-31.0	25.5-31.0
Preanal length	40.6	42.7-44.4	44.3-49.1	40.6-48.2	44.1-50.5	40.6-50.5
Gnathoproctal length	37.8		40.9-45.4	38.1-45.4	40.8-49.5	37.8-49.5
Pectoral fin length	11.2+	13.4-15.9	12.3+-15.9	12.7+-16.7	10.8+-15.5	10.8+-16.7
Pelvic fin length	14.6+	35.1-40.3	40.9-45.4	17.9+-35.4	20.2+-37.4	17.9+-45.4
In % of HL						
Head width	36.8		30.3-38.2	32.1-41.1	31.5-38.6	30.3-41.1
Maxillary length	56.3	56.5-57.8	56.0-58.6	54.6-59.2	53.8-59.9	53.8-59.9
Lower jaw length	63.8		62.6-67.9	62.4-66.8	62.3-68.0	62.3-68.0
Eye diameter	27.5	24.3-25.4	22.2-26.5	25.9-28.7	23.5-27.8	22.2-28.7
Interorbital width	20.6	20.2-21.6	19.4-22.1	19.2-24.9	19.0-23.5	19.0-24.9
Snout length	23.9	22.5-23.5	21.4-26.2	22.1-26.1	20.2-26.4	20.2-26.4
Counts						
Dorsal fin rays	97	94-96	94-96	90-100	88-98	88-100
Anal fin rays	79	76-80	76-79	74-81	75-80	74-81
Caudal fin rays	10*	10	8	8	8	8
Pectoral fin rays	21	23	20-22	20-22	21-23	20-23
Pelvic fin ray	1	1	1	1	1	1
Branchiostegal rays	8	8	8	8	8	8
Median basibranchial tooth patch	1		1	1	1	1
Gill rakers on first arch	10+24=34	12+29-30=41-42	11+28-30=39-41	9-11+23-30=33-41	10-12+27-32=38-43	9-12+23-32=33-43
Pseudobranchial filaments	9	5-6	7-8	5-10	6-10	5-10
Pyloric caeca	11	10-12	8-11	8-12	8-11	8-12
Vertebrae	13+44=57		13+42-43=55-56	13+41-45=54-58	13+39-44=52-57	13+39-45=52-58

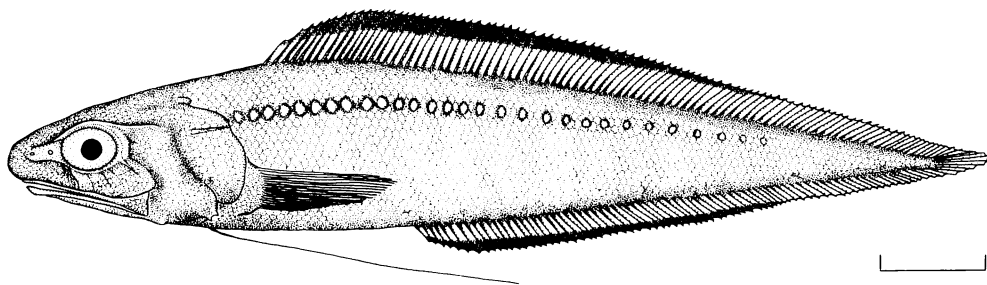


Fig. 1. *Homostolus acer*, BSKU 45387, 177 mm SL, female, from Heda, Suruga Bay, central Japan. Scale bar = 2 cm.

first gill arch of *Homostolus* (Matsubara, 1943: 49, fig. 9) are similar to those in *Glyptophidium* (Nielsen and Machida, 1988: 301, fig. 9). However, *Homostolus* differs from *Glyptophidium* in having a strong opercular spine, a single, narrow and high median basibranchial tooth patch, a semicircular tooth patch on the prevomer, and cranial bones lacking distinct crests.

***Homostolus acer* Smith et Radcliffe, 1913**

(Japanese name: Itohiki-itachiuo)

(Figs. 1–2)

*Homostolus acer* Smith and Radcliffe in Radcliffe, 1913: 146, pl. 8, fig. 3 (type locality, Iligan Bay, Mindanao, the Philippines); Kamohara, 1938: 68, fig. 38; Kamohara, 1950: 274; Kamohara, 1952: 93, fig. 91; Kamohara, 1954: 7, fig. 5; Cohen and Nielsen, 1978: 33; Nolf, 1980: 87, pl. 7, fig. 15; Schwarzhans, 1981: 96, fig. 105; Fourmanoir, 1984: 95; Fourmanoir, 1985: 44.

*Homostolus japonicus* Matsubara, 1943: 47, fig. 9 (type locality, Heda, central Japan); Matsubara, 1955: 798, fig. 296; Cohen and Nielsen, 1978: 33; Machida, 1984: 100, pl. 85-C.

**Material examined.** (44 specimens). Holotype: USNM 74132, female, 183.7 mm SL, Albatross st. 5508, Iligan Bay, Mindanao, the Philippines, trawl, ca. 486 m. Non-type material: AMS I22809037, female and sex unknown, 130.4–138.5 mm SL, 18°40'S, 116°42'E, Indian Ocean north of Western Australia, R. V. Soela, trawl, 584–592 m, Apr. 4, 1982; AMS I24449005, 1 female and 4 males, 81.9–131.8 mm SL, 18°53'S, 116°10'E, Indian Ocean north of Western Australia, R. V. Soela, trawl, 450 m, Jan. 30, 1984; AMS I 24852011, 3 specimens, sexes unknown, 72.2–117.3 mm SL, 33°32'S, 152°03'E–33°37'S, 151°59'E, Tasman Sea east of New South Wales, R. V. Kapala, trawl, 512–530 m, Sep. 11, 1984; AMS I27041001, 1 specimen, sex unknown, 124.8 mm SL, 33°40'S, 151°57'E, Tasman Sea east of New South Wales, R. V. Kapala, trawl, 476–530 m, Dec. 9, 1985;

BSKU 4600–4601, 2 females, 103.6–126.8 mm SL, Mimase Fish Market, facing Tosa Bay, Kochi Pref., southern Japan, Apr. 30, 1955; BSKU 13812, female, 136.2 mm SL, Mimase Fish Market, Kochi Pref., Jan.–Mar., 1968; BSKU 16678, female, 115.9 mm SL, 9°27.0'S, 127°58.6'E–9°28.5'S, 127°56.1'E, Hakuho Maru cr. KH-72-1 st. 26, Timor Sea, Indonesia, 3 m beam trawl, 610–690 m, Jun. 18, 1972; BSKU 16704, female, 123.4 mm SL, 9°30.9'S, 127°56.6'E, Hakuho Maru cr. KH-72-1 st. 27, Timor Sea, Indonesia, 3 m beam trawl, 465–490 m, June 19, 1972; BSKU 45387–45388, 2 females, 145.7–176.8 mm SL, Suruga Bay off Heda, Shizuoka Pref., central Japan, trawl, 400–500 m, Sep. 18, 1979; BSKU 45389, female, 189.0 mm SL, off Heda, trawl, 400–500 m, May 11, 1980; FUMT-P1209, female, 115.6 mm SL, Kumano Nada off Mie Pref., southern Japan; LACM 43619-1, 5 females, 132.4–150.5 mm SL, 18°05'S, 118°08'E, Indian Ocean southwest of Rowley Shoals, north of Western Australia, trawl, 440–442 m, Aug. 22, 1983; MNHN 1984-617, female and male, 120.5–150.8 mm SL, 13°38.4'N, 121°44.1'E, Mus. ORSTOM 2, Philippines st. 49, Sulu Sea, trawl, 445 m, Nov. 26, 1980; MNHN 1984-640, 3 females, 146.6–165.0 mm SL, 13°38.4'N, 121°44.1'E, Mus. ORSTOM 2, 3 females, 144.0–147.8 mm SL, 3°12.2'S, 128°06.2'E, Seram Sea, Indonesia, R. V. Corindon, trawl, 562 m; USNM 76677, 6 females and 4 males, 87.2–175.1 mm SL, Pacific Philippine Is., R. V. Albatross, trawl, 1907–1908.

**Diagnosis.** As for genus.

**Description.** Proportional measurements and meristic counts are given in Table 1.

Body elongate, compressed; tail tapered (Fig. 1). Snout rounded in lateral view, slightly longer than eye diameter, projecting beyond upper jaw. Anterior nostril well above upper lip, about midway between snout tip and anterior margin of eye. Posterior nostril immediately in front of eye at mid-eye level, larger than anterior nostril. Supraethmoid and lachrymal forming a raised bony structure enveloping olfactory organ. Eye elliptical. Interorbital region

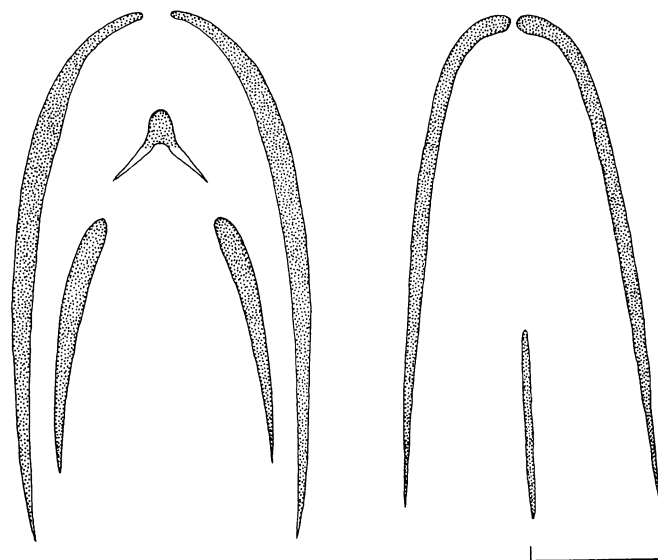


Fig. 2. Upper (left) and lower (right) dentition of *Homostolus acer*, BSKU 45387. Scale bar=5 mm.

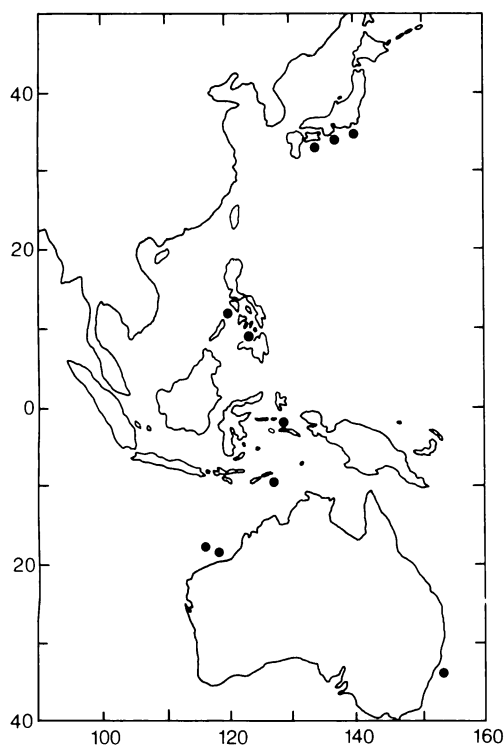


Fig. 3. Distribution of *Homostolus acer*.

slightly convex, narrower than horizontal diameter of eye. Mouth slightly oblique. Maxillary extending one-half of eye diameter beyond posterior margin of

eye, depth of expanded posterior end equal to one-half of eye diameter. Upper part of maxillary covered with dermal cheek fold. Supramaxillary single. Lower angle of preopercle with 1 or 2 spinules. Teeth small, granular, forming bands in jaws, prevomer and palatines (Fig. 2). Prevomer inverted V-shaped, with a small semicircular tooth patch. Median basibranchial high, with a single, narrow tooth patch. Gill rakers on 1st arch well developed, longest one 1.5 times eye diameter, those near angle with small, dentigerous knobs on inner surface. Pseudobranchial filaments very short.

Dorsal fin origin just above or slightly anterior to posterior margin of opercular membrane. Preanal length slightly shorter than twice head length. Caudal fin rays much longer than adjacent dorsal and anal fin rays. Pectoral fin low on body, scarcely reaching level with vent. Each pelvic fin with a single, filamentous ray reaching below bases of 10th to 15th anal rays, inserted just below posterior margin of preopercle.

Head and body covered with small, imbricate, cycloid scales. Scales above lateral line 7 to 8, below lateral line ca. 18–20. Lateral line single, originating at upper angle of gill-opening, extending parallel to dorsal contour along anterior four-fifths of body. Scales on lateral line larger than dorsally and ventrally adjacent scales.

Pyloric caeca rather long, finger-like, arranged in a ring around pylorus. Air bladder large, thick walled.

Color in alcohol: Head and body uniformly light tan, much paler on belly. Margins of anterior part of dorsal and anal fins black. Pectoral, pelvic and caudal fins pale. Buccal and gill cavities dark brown.

**Distribution.** This species occurs on the ocean floor from the Pacific Ocean off central Japan to the Indian Ocean off northern Western Australia, and to the Tasman Sea off New South Wales, at depths ranging from about 400 to 700 m (Fig. 3).

**Remarks.** In order to determine whether or not more than a single species existed, we divided the non-type material into three geographical groups. As shown in Table 1, the ranges of all meristic and morphometric characters considered overlap across

the three groups, strongly indicating that we are dealing with one species only. This data also agrees well with that of the type specimens of *H. acer* and *H. japonicus*. Matsubara (1943) considered that *H. japonicus* differed from *H. acer* in the following characters: gill rakers on 1st arch  $12+29-30=41-42$  vs.  $7+20=27$ ; HL 4.28 in TL (4.02 in SL) vs. 4.75 (4.50); eye 3.90 to 4.12 in HL vs. 3.41; snout 4.25 to 4.45 in HL vs. 3.41; and interorbital width 4.62 in HL vs. 3.72. It is evident that these morphometric characters of *H. japonicus* fall within the range of the present material, including the holotype of *H. acer*. Although Radcliffe (1913) described the number of gill rakers on the first arch of *H. acer* as  $7+20=27$ ,

Table 2. Frequency distribution for five meristic characters of *Homostolus acer* from different localities. Numerals with \*, • and ○ include counts from the holotype of *H. acer*, and the holotype and paratype of *H. japonicus* (= *H. acer*), respectively.

Locality	Number of gill rakers on first arch												
	33	34	35	36	37	38	39	40	41	42	43		
Japan						1	3	2	2 <sup>○</sup>	1 <sup>●</sup>			
Philippine and Seram Sea	1	7*	2	3	2	1	2		1				
Timor Sea and Australia						3	1	1	5	6	2		
Locality	Number of dorsal fin rays												
	88	89	90	91	92	93	94	95	96	97	98	99	100
Japan							6 <sup>○</sup>	1	2 <sup>●</sup>				
Philippine and Seram Sea			1		1	1	4	2	2	5*	1	1	1
Timor Sea and Australia	1			2	2	3	6	1	2		1		
Locality	Number of anal fin rays												
	74	75	76	77	78	79	80	81					
Japan				2 <sup>○</sup>	3	2	1	1 <sup>●</sup>					
Philippine and Seram Sea	1	2	1	2	2	4*	4		3				
Timor Sea and Australia	1	2	4	6	2	2	1						
Locality	Number of pectoral fin rays												
	20		21		22		23						
Japan	1		5		1		2 <sup>●○</sup>						
Philippine and Seram Sea	5		11*		2								
Timor Sea and Australia			8		8		2						
Locality	Number of caudal vertebrae												
	39	40	41	42	43	44	45						
Japan				2	5								
Philippine and Seram Sea			1	4	3	6	5*						
Timor Sea and Australia	1		3	9	4	1							

reexamination of the holotype showed that this count should be corrected to  $10 + 24 = 34$ ; that is, within the range of non-type material from the Philippines and Seram Sea. The type specimens of *H. acer* and *H. japonicus* were stated to have ten caudal fin rays. It is impossible to confirm these counts since the caudal fin of the holotype of *H. acer* is missing, and the type specimens of *H. japonicus* are lost. However, the fact that all of the non-type specimens have eight caudal fin rays strongly indicates that this

Table 3. Results of Fisher's LSD test for five meristic characters of *Homostolus acer*. The mean of each character is given in parenthesis. Asterisks denote  $p < 0.01^{**}$  and  $p < 0.05^{*}$ . Abbreviations: JPN = Japanese population; PS = Philippine and Seram Sea population; and TA = Timor Sea and Australian population.

Mean	Gill rakers on first arch		
	TA (40.9)	JPN (39.9)	PS (35.8)
PS (35.8)	5.1**	4.1**	—
JPN (39.9)	1.0	—	—
TA (40.9)	—	—	—
Mean	Dorsal fin rays		
	PS (95.5)	JPN (94.6)	TA (93.4)
TA (93.4)	2.1**	1.2	—
JPN (94.6)	0.9	—	—
PS (95.5)	—	—	—
Mean	Anal fin rays		
	PS (78.4)	JPN (77.6)	TA (76.9)
TA (76.9)	1.5*	0.7	—
JPN (77.6)	0.8	—	—
PS (78.4)	—	—	—
Mean	Pectoral fin rays		
	TA (21.7)	JPN (21.4)	PS (20.8)
PS (20.8)	0.9**	0.6*	—
JPN (21.4)	0.4	—	—
TA (21.7)	—	—	—
Mean	Caudal vertebrae		
	PS (43.5)	JPN (42.7)	TA (42.0)
TA (42.0)	1.5**	0.7	—
JPN (42.7)	0.8	—	—
PS (43.5)	—	—	—

count is stable in the genus and that those in the original descriptions of both species were in error. Consequently, we recognize only one species, *H. acer*, in the genus *Homostolus*.

As shown in Table 1, some meristic counts of *H. acer* exhibit rather wide variation. Accordingly, frequency distributions for the main meristic counts of *H. acer* are given in Table 2, and means compared between populations using Fisher's LSD (least significant difference) test (Table 3). The mean of gill raker counts of Philippines and the Seram Sea specimens (PS) is significantly lower than those of the Japanese (JPN) and Timor Sea and Australian specimens (TA). However, no significant differences exist between JPN and TA. Similar variation is seen in geographical variation of the pectoral fin ray counts. Each mean of the dorsal fin ray, anal fin ray and caudal vertebral counts of PS is significantly higher than that of TA, but is not significantly different from JPN. However, there are no significant differences in means between JPN and TA. These facts, especially geographical variation in gill raker counts, strongly indicate that *H. acer* expanded its range from Philippine waters to both northern and southern waters.

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# イトヒキイタチウオ属の分類学的再検討

町田吉彦・岡村 収

アシロ科の *Homostolus* イトヒキイタチウオ属には *H. acer* Smith et Radcliffe, 1913 と *H. japonicus* Matsubara, 1943 が記載されている。本研究で、44 個体に基づき、本属の分類学的再検討を行った。標本を産地により 3 群に分け、計測・計数形質を比較したが、いずれの数値も 3 群間で重複した。同時に、これらの数値は *H. acer* の完模式標本と、*H. japonicus* の原記載の数値と一致することから、本属は *H. acer* のみを含むと判断される。*H. acer* の計数形質にみられる地理的変異を統計処理した結果、特に第 1 鰓弓の平均鰓耙数は、フィリピン・セラム海産の標本が日本産およびチモール海・オーストラリア産の標本に比べ明らかに少ないが、後 2 群間には有意差が認められなかった。したがって、本種はフィリピン海域から南北両方向へ分布を拡大したと考えられる。本種が日本、フィリピン、インドネシア、オーストラリア北西部のインド洋と東部のタスマン海にかけての水深 400-700 m の海洋底に生息することが判明した。

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