

Plotosus japonicus, a New Eeltail Catfish (Siluriformes: Plotosidae) from Japan

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Abstract A new eeltail catfish, *Plotosus japonicus* sp. nov., is described on the basis of specimens collected from Honshu Island to the Ryukyu Islands, Japan. This new species closely resembles *P. lineatus*, but is distinguished in having fewer rays in the confluent median fin (142–174, usually 146–167 vs. 163–196, usually 172–189), fewer vertebrae posterior to the anterior fused complex (Weberian complex) vertebra (48–52 vs. 52–56), fewer gill rakers (5–7+16–21=21–26 vs. 6–8+20–23=27–31), and a more complex dendritic organ. Confirmed distribution of the new species extends from Iriomote Island northward to Honshu Island, Japan where it is very common, whereas *P. lineatus* is widely distributed in the Indo-West Pacific region north to the Ryukyu Islands (very rarely found in Kyushu Island, southern Japan). Both species are sympatric in the Ryukyu Islands.

Key words: Plotosidae, description, *Plotosus japonicus* sp. nov., Japan.

Until now, the Japanese eeltail catfish “Gonzui”, a common venomous fish that is widely used in physiological experiments, has been considered to be composed of a single species and identified as *Plotosus lineatus* (Thunberg, 1787) or *Plotosus anguillaris* (Bloch, 1794), both originally described from India or the Indian Ocean. In the course of reviewing the eeltail catfish in the western North Pacific, it was found that there are 2 species in the region: *P. lineatus* (senior synonym of *P. anguillaris*), which is widely distributed in the Indo-West Pacific region and extends north to the Ryukyu Islands and an undescribed species which is common in southern Japan. The purpose of this article is to describe *Plotosus japonicus* sp. nov. and compare it to *P. lineatus*.

Materials and Methods

Counts and measurements mostly follow those of Gomon and Taylor (1982). Vertebrae exclud-

ing the vertebrae completely fused into an anterior complex vertebra (see Gomon and Taylor, 1982), and median fin rays were counted from radiographs. Counts of paired-fin rays and branchiostegal rays were taken on right side of the specimen after first cutting the skin and peeling it back. Terminology of caudal-fin rays and dorsal procurrent caudal-fin rays follow Gomon and Taylor (1982) and Tilak (1969), respectively. See Hirota (1895) and Lanzing (1967) for more information about dendritic organ. Precaudal-fin length and DProCAF (distance between procurrent caudal- and anal-fin origins) are defined as the distance from tip of snout to origin of dorsal procurrent caudal-fin, and difference in length from mid-caudal base to origin of dorsal procurrent caudal-fin and to origin of anal-fin, respectively. Standard length is expressed as SL. For meristic comparison with *Plotosus lineatus*, counts were taken from specimens (≤ 10 individuals covering a wide range of sizes larger than 40 mm SL, excluding deformed or decalcified in-

dividuals) selected from each 1 lot of many specimens to minimize the effect of possible populational or genetical variation. A total of 65 specimens of *P. lineatus* were selected in a similar manner from samples for comparison.

Institutional abbreviations follow Leviton *et al.* (1985). Additional institutional abbreviations are as follows: Fisheries Laboratory, Miyazaki University, Japan (FLMU); Kanazawa Aquarium, Kanazawa, Japan (KA).

***Plotosus japonicus* sp. nov.**

(Japanese name: Gonzui)

(Figs. 1–7)

Plotosus lineatus (not of Thunberg): Temminck and Schlegel, 1846: 228, pl. 104 (Nagasaki); Boeseman, 1947: 170 (Nagasaki); Sawada, 1984: 60, pl. 60-H (in part, southern Japan except Ryukyu Is.).

Plotosus anguillaris (not of Bloch): Steindachner and Döderlein, 1887: 287 (Tokyo, Enoshima, Seto Inland Sea, Kagoshima); Hirota, 1895: 367 (dendritic organ); Jordan and Fowler, 1903: 898 (Tokyo, Misaki, Wakanoura, Mogi, Nagasaki); Franz, 1910: 9 (Yokohama, Abratsubo, Nagasaki); Jordan *et al.*, 1913: 57 (southern Japan); Satō, 1937: 323, figs. 1–3 (barbel morphology); Fowler, 1941: 747 (in part, Japan); Matsubara, 1955: 313 (southern Japan); Ogawa, 1959, 350, figs. 1–3 (kidney morphology); Iwai, 1963: 271, figs. 1–3 (taste buds on gill rakers and gill arches); Lindberg and Legeza, 1965: 160 (Sea of Japan, Korea); Kinoshita, 1972: 241 (schooling behavior, aggregation pheromone); Moriuchi and Dotsu, 1973: (spawning be-

havior, larval development); Kajikawa, 1973: 5 (growth); Arai and Katsuyama, 1974: 188, pl. 2 figs. 2 and 4 (chromosome); Masuda *et al.*, 1975: 168, pl. 13-M (in part, southern Japan except Ryukyu Is.).

Holotype. NSMT-P 19279, 183.0 mm SL, Nabeta Cove, Shimoda, Shizuoka Prefecture, Japan, 17 Oct. 1980.

Paratypes. FRLM 0963 (1 specimen: 180.6 mm SL), Hamajima, Ago Bay, Mie, Japan, July 13, 1977; FRLM 7088 (1: 158.6 mm SL), Hamajima, Ago Bay, Mie, Japan, May 12, 1988; HUMZ 37361 (1: 147.0 mm SL), Goto Is., Nagasaki, Japan, collection date unknown; HUMZ 39001 (1: 199.5 mm SL), Usa, Kochi, Japan, Feb. 27, 1974; HUMZ 105936 (1: 204.7 mm SL), off Itado, Shimoda, Izu Peninsula, Japan, Nov. 15, 1985; NSMT-P 72967 (1: 174.6 mm SL), Tanabe Bay, Wakayama, Japan, 1960; NSMT-P 72968 (1: 208.2 mm SL), Nishiura, Suruga Bay, Japan, Nov. 14, 1981; NSMT-P 72969 (1: 90.5 mm SL), Shimizu, Shizuoka, Japan, May 10, 1982; NSMT-P 72970 (1: 175.3 mm SL), Sakatejima, Toba Bay, Mie, Japan, June–July, 1983; NSMT-P 72971 (1: 136.5 mm SL), Fukushima Wharf, Kushima, Miyazaki, Japan, Oct. 9, 1984; NSMT-P 72972 (1: 104.5 mm SL), Akamizu, Nobeoka, Miyazaki, Japan, June 26, 1987; NSMT-P 72973 (1: 184.8 mm SL), Kashiwajima, Kochi, Japan, Nov. 7, 1989; NSMT-P 72974 (1: 132.6 mm SL), Akamizu, Nobeoka, Miyazaki, Japan, Oct. 30, 1989; NSMT-P 72975 (1: 140.8 mm SL), off Kochi, Japan, May 13, 1990; NSMT-P 72976 (1: 81.7 mm SL), Koniya, Amami I., Japan, Apr. 3, 1990; NSMT-P 72977 (1: 175.0 mm SL), Uchiura, Suruga Bay, Japan, Nov. 1991; NSMT-P 72978 (1: 198.6 mm SL), Hanami, Noto Peninsula, Japan, July 30, 1992; NSMT-P 5976 (128) (1: 77.5 mm SL), Machitsutsu, Tsushima I., Japan, July 11, 1968; NSMT-P 73078 (1: 99.7 mm SL), Nishino-omote, Tane I.,

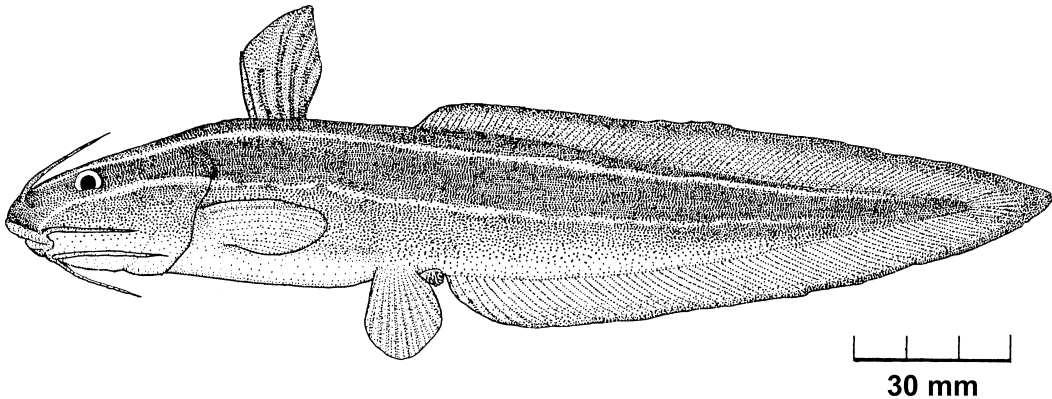


Fig. 1. *Plotosus japonicus* sp. nov., NSMT-P 19279, holotype, 183.0 mm SL, Nabeta Cove, Shimoda, Izu Peninsula, Japan.

Kagoshima, Japan, Oct. 1, 1974; NSMT-P 73079 (1: 94.0 mm SL), Ayamaru-zaki, Amami I., Japan, Aug. 29, 1990; NSMT-P 70534 (1: 70.6 mm SL), Kaminato, Hachijo I., Izu Is., Japan, Aug. 29, 1990; URM-P 43444 (1: 109.7 mm SL), Minatogawa, Okinawa I., May 1982; YCM-P 2240 (1: 161.8 mm SL), Tenjin I., Miura Peninsula, Sagami Bay, Japan, June 5, 1974; YCM-P 14163 (1: 125.1 mm SL), Hayama, Miura Peninsula, Sagami Bay, Japan, Aug. 30, 1983; YCM-P 14683 (1: 73.5 mm SL), Tenjin I., Miura Peninsula, Sagami Bay, Japan, June 12, 1976; YCM-P 16075 (1: 175.5 mm SL), Kamogawa, Chiba, Japan, Oct. 10, 1985; YCM-P 19482 (1: 99.7 mm SL), Tanoura, Shimoda, Izu Peninsula, Japan, July 17, 1988; YCM-P 25098 (1: 86.2 mm SL), Ayamaru-zaki, Amami I., Japan, Sep. 3, 1990.

Other specimens. FLMU 871028 (1: 201.4 mm SL), Totoro, Nobeoka, Miyazaki, Japan, Oct. 28, 1987; FRLM 0968 (1: 159.5 mm SL) and 0974 (1: 165.9 mm SL), Hamajima, Ago Bay, Mie, Japan, July 13–17, 1977; HUMZ 37222 (1: 105.6 mm SL), Kochi, Japan, collection date unknown; HUMZ 39058 (1: 170.5 mm SL), Usa, Kochi, Japan, Feb. 27, 1974; HUMZ 96483 (1: 151.6 mm SL), Haneji, Okinawa I., Apr. 9, 1983; NSMT-P 72979 (1: 117.9 mm SL), Tanabe Bay, Wakayama, Japan, 1960; NSMT-P 72980 (1: 88.8 mm SL), Tanabe Bay, Wakayama, Japan, May 14, 1965; IORD 81-203 (3: 164.0–183.9 mm SL), Mera Port, Izu Peninsula, Japan, Sep. 13, 1981; NSMT-P 72981 (21: 167.3–217.5 mm SL), Nishiura, Suruga Bay, Japan, Nov. 14, 1981; NSMT-P 72982 (1: 213.6 mm SL), Mouth of Okitsu River, Suruga Bay, Japan, May 2, 1982; NSMT-P 72983 (14: 78.0–113.4 mm SL), Shimizu, Suruga Bay, Japan, May 10, 1982; NSMT-P 72984 (1: 197.2 mm SL), Sakatejima, Toba Bay, Mie, Japan, June–July 1983; NSMT-P 72985 (8: 100.1–153.9 mm SL), Fukushima Wharf, Kushima, Miyazaki, Japan, Oct. 9, 1984; IORD 85-310 (6: 39.2–42.3 mm SL), Amitori Cove, Iriomote I., Japan, Aug. 17, 1985; NSMT-P 72986 (6: 101.0–154.3 mm SL), Akamizu, Nobeoka, Miyazaki, Japan, June 26, 1987; NSMT-P 72987 (4: 174.9–193.0 mm SL), Azuma-cho, Izumi, Kagoshima, June 15, 1988; NSMT-P 72988 (1: 196.0 mm SL), Kashiwajima, Kochi, Japan, Nov. 7, 1989; IORD 89-052 (8: 129.9–161.5 mm SL), Akamizu, Nobeoka, Miyazaki, Japan, Oct. 30, 1989; NSMT-P 72989 (8: 129.3–170.7 mm SL), off Kochi, Japan, May 13, 1990; NSMT-P 72990 (3: 87.8–89.6 mm SL), Koniya, Amami I., Japan, Apr. 3, 1990; NSMT-P 72991 (2: 128.9–138.0 mm SL), Ogawa port, Yaizu, Suruga Bay, Japan, May 13, 1990; NSMT-P 72992 (4: 51.3–57.8 mm SL), Shimizu, Suruga Bay, Japan, Oct. 1, 1990; IORD 90-090A (1: 74.7 mm SL), Akajima I., Kerama Is., Japan, May 12, 1990; NSMT-P 72993 (1: 86.5 mm SL), Akajima I., Kerama Is., Japan, July 5, 1990; NSMT-P 72994 (1: 176.9 mm SL), off Hanami, Noto Peninsula, Japan, July 30, 1992; NSMT-P 72995

(1: 182.2 mm SL), off Hanami, Noto Peninsula, Japan, July 30, 1992; NSMT-P 5975 (1: 77.6 mm SL), Machitsutsu, Tsushima I., Japan, July 11, 1968; NSMT-P 17926 (4: 40.6–110.1 mm SL), Suzaki, Nishino-omote, Tanegashima I., Japan, Oct. 1, 1974; NSMT-P 70532 (1: 170.1 mm SL), Nabeta Cove, Shimoda, Izu Peninsula, Japan, Oct. 17, 1980; NSMT-P 73080 (1: 86.6), Ayamaruzaki, Amami I., Japan, Sept. 17, 1989; URM-P 5424 (3: 53.0–61.8 mm SL), Nomozaki, Nagasaki, Japan, Oct. 24, 1982; URM-P 19852 (7: 75.8–104.1 mm SL), Minatogawa, Okinawa I., Japan, May 1982; YCM-P 0345 (1: 60.6 mm SL), Tenjinjima I., Miura Peninsula, Sagami Bay, Japan, Apr. 26, 1971; YCM-P 2243-4 (1: 96.1 mm SL), Tenjinjima I., Miura Peninsula, Sagami Bay, Japan, June 5, 1974; YCM-P 15665 (1: 53.0 mm SL), Yoshidaura, Minekawa, Nagasaki, Japan, Sept. 16, 1986; YCM-P 23713L (1: 141.0 mm SL), Ayamaruzaki, Amami I., Japan, Sept. 17, 1989; YCM-P 24995 (4: 69.6–80.8 mm SL), Ayamaruzaki, Amami I., Japan, Sept. 3, 1990.

Diagnosis. A species of *Plotosus* Lacepède, 1803 having the following combination of characters: 2 or 3 pale stripes on body, of which 2 extend onto head, a pair of dermal fold fringing base of dendritic organ; nasal and maxillary barbels extend well beyond posterior border of orbit; origin of dorsal procurent caudal-fin posterior to vertical thorough middle base of pelvic fins, and slightly anterior to vertical through origin of anal fin; number of gill rakers 21–26 (usually 23–25); total rays in confluent median fins 142–174 (usually 146–174); number of vertebrae excluding anterior complex vertebra, 48–52 (usually 49–51).

Description. Counts and proportional measurements of the holotype, paratypes and other specimens are given in Table 1.

Body elongate and compressed with tapering tail. Head depressed and broad; snout margin rounded viewed from above. Mouth subterminal; lips thick with laminated folds. Anterior nostril with a short rounded tube located dorsal to upper lip; posterior nostril slit-like, located at base of nasal barbel. Four pairs of barbels, each barbel somewhat broadened and flattened; nasal barbel extending slightly over posterior margin of eye; maxillary barbel extending well beyond posterior margin of eye; 2 mandibular barbels extending to level of preoperculum. Jaws with conical teeth in

Table 1. Counts and proportional measurements of 2 *Plotosus* species.

Characters	<i>Plotosus japonicus</i> sp. nov.			<i>Plotosus lineatus</i>
	Holotype NSMT-P 19279	Paratypes n=28	Other specimens n=129	non-type specimens n=65
Standard length (mm)	183	71–208	39–218	63–302
Measurements				
As % of standard length				
Head length	23.6	22.3–26.3 (24.6)	22.2–26.6 (24.3)	21.1–26.5 (23.7)
Body depth at anal-fin origin	15.2	12.4–16.3 (14.1)	11.6–16.9 (13.6)	10.8–17.7 (14.2)
Predorsal-fin length	27.1	25.6–28.8 (27.8)	25.4–30.1 (27.6)	22.7–29.2 (26.6)
Precaudal-fin length	43.9	40.9–47.0 (43.7)	39.8–47.0 (43.3)	36.8–42.9 (39.5)
Preanal-fin length	45.2	44.1–49.3 (46.3)	42.3–52.5 (46.1)	42.6–49.8 (46.1)
Prepelvic-fin length	38.3	36.5–42.3 (39.2)	35.8–42.6 (38.6)	36.3–41.5 (38.6)
Basal length of procurrent caudal fin	58.2	55.4–62.4 (58.2)	53.5–61.7 (58.3)	59.0–65.5 (62.2)
Basal length of anal fin	55.5	51.8–58.9 (55.1)	51.6–58.0 (55.1)	52.2–58.5 (55.1)
Distance between procurrent caudal and anal fins	2.7	0.6–7.6 (3.1)	–1.6–6.8 (3.1)	3.4–10.8 (7.1)
As % of head length				
Fleshy orbit diameter	14.6	11.8–19.3 (15.9)	11.9–22.5 (16.5)	11.2–19.8 (15.3)
Snout length	41.2	35.2–43.9 (40.2)	35.0–45.9 (40.3)	37.8–48.7 (41.0)
Fleshy interorbital width	31.5	28.9–37.9 (33.7)	28.1–40.0 (34.3)	32.5–40.3 (36.0)
Dorsal-fin length	60.0	48.4–80.2 (62.7)	48.0–78.9 (65.5)	41.6–80.8 (61.6)
Dorsal-fin spine length	30.3	28.4–42.4 (33.9)	25.0–48.0 (36.7)	19.1–49.1 (35.5)
Pectoral-fin length	61.8	48.5–70.2 (60.5)	54.5–70.4 (62.0)	46.7–69.3 (59.9)
Pectoral-fin spine length	33.1	29.5–43.4 (35.4)	26.0–45.0 (36.2)	25.8–43.5 (36.2)
Pelvic-fin length	40.7	30.5–46.1 (39.3)	30.6–45.3 (39.2)	31.4–46.3 (39.1)
Counts				
Dorsal fin	1,4	1,4 (1,4)	1,4 (1,4)	1,4 (1,4)
Anal fin	65	60–75 (66.4)	58–75 (65.4)	65–84 (73.4)
Dorsal procurrent caudal fin	86	72–95 (79.7)	70–95 (80.6)	89–111 (98.5)
Caudal fin	10	10–11 (10.1)	10–11 (10.0)	8–11 (9.9)
Pectoral fin	1,10	1,10–12 (1,10.5)	1,10–12 (1,10.5)	1,9–12 (1,10.6)
Pelvic fin	11	10–13 (11.4)	10–13 (11.5)	10–13 (12.0)
Branchiostegal rays	11	10–12 (11.0)	10–12 (11.0)	10–13 (11.0)
Gill rakers	5+18=23	5–6+16–20=21–26 (5.5+18.5=24.0)	5–7+16–20=21–27 (5.6+18.5=24.0)	6–8+19–23=25–31 (7.1+21.1=28.1)
Free vertebrae	52	48–52 (50.0)	48–53 (50.1)	52–58 (54.2)

almost 3 rows near symphysis, 1 row in lateral side; teeth on lower jaw rather blunt; vomerine tooth patch crescent-shaped with blunt conical teeth, outer ones larger and stronger. No teeth on maxilla, palatines, and tongue. Gill openings wide extending anteriorly to a vertical through anterior orbital margin; gill membranes free from isthmus and each other. Each gill arch without vermiform papillae.

Head and body without bony plates and scales except for a row of minute tubular scales embedded under skin along lateral line. Lateral line complete, running along middle of body and extending to caudal-fin base. A dendritic organ

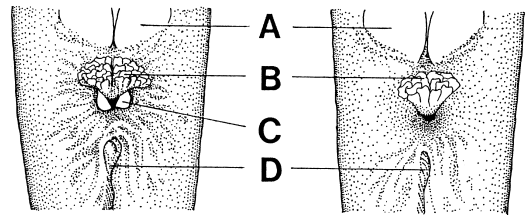


Fig. 2. Dendritic organ of *Plotosus japonicus* sp. nov. (left) and *P. lineatus* (right). A, pelvic fin; B, dendritic organ; C, dermal fold; D, anal fin.

composed of 2 tufts of lamellae between anus and anal fin, with a pair of dermal folds (rarely fused into 1) at the base (Fig. 2). Dorsal fin sin-

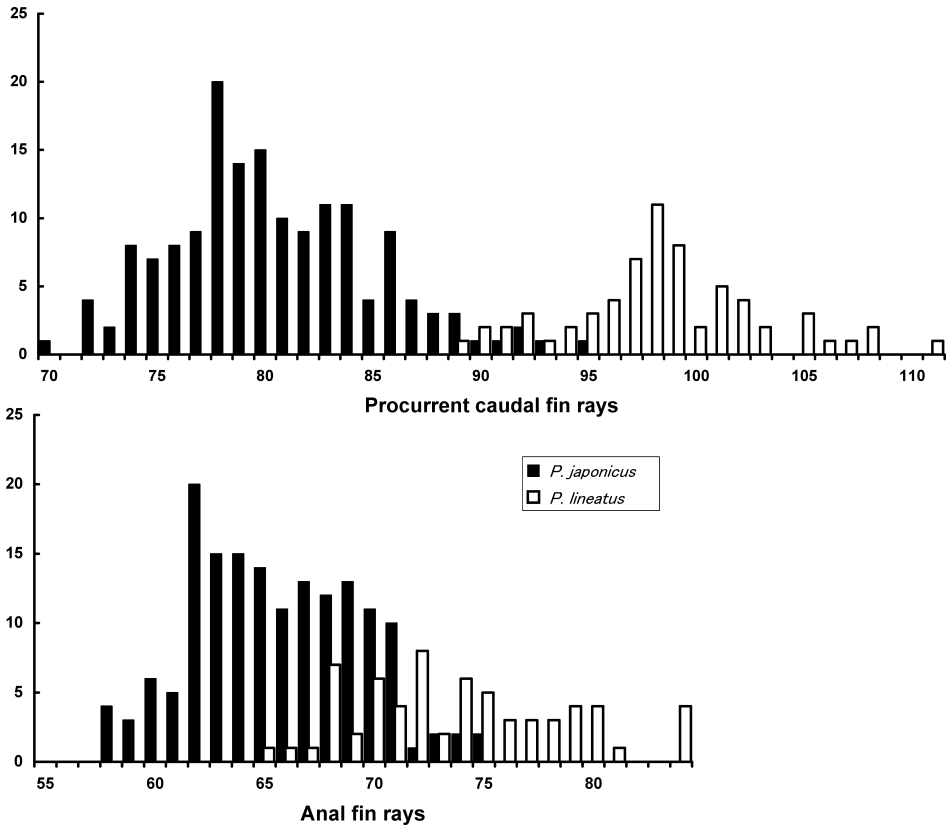


Fig. 3. Frequency distribution of counts of procurent caudal rays and anal-fin rays in *Plotosus japonicus* sp. nov. (black bars) and *P. lineatus* (white bars).

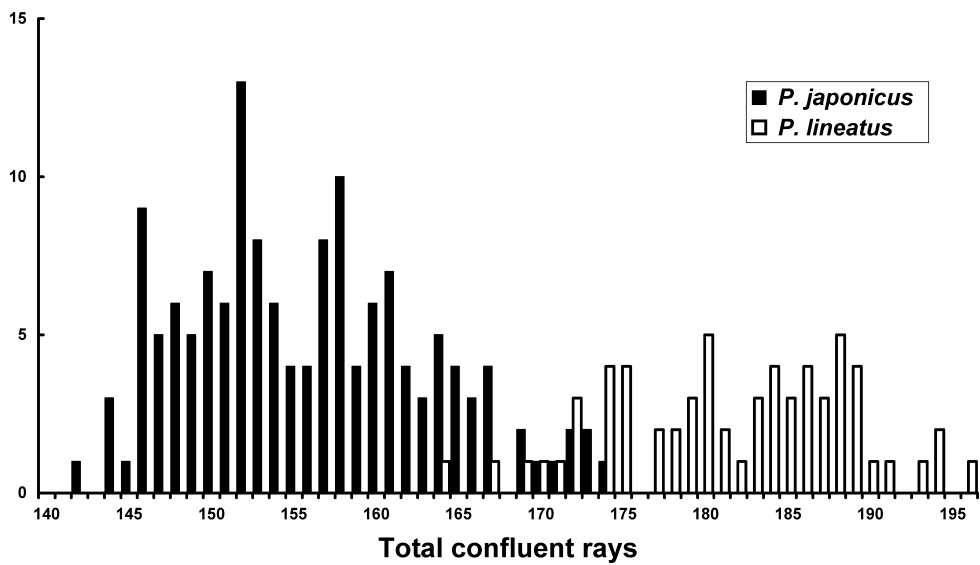


Fig. 4. Frequency distribution of counts of total confluent rays in *Plotosus japonicus* sp. nov. (black bars) and *P. lineatus* (white bars).

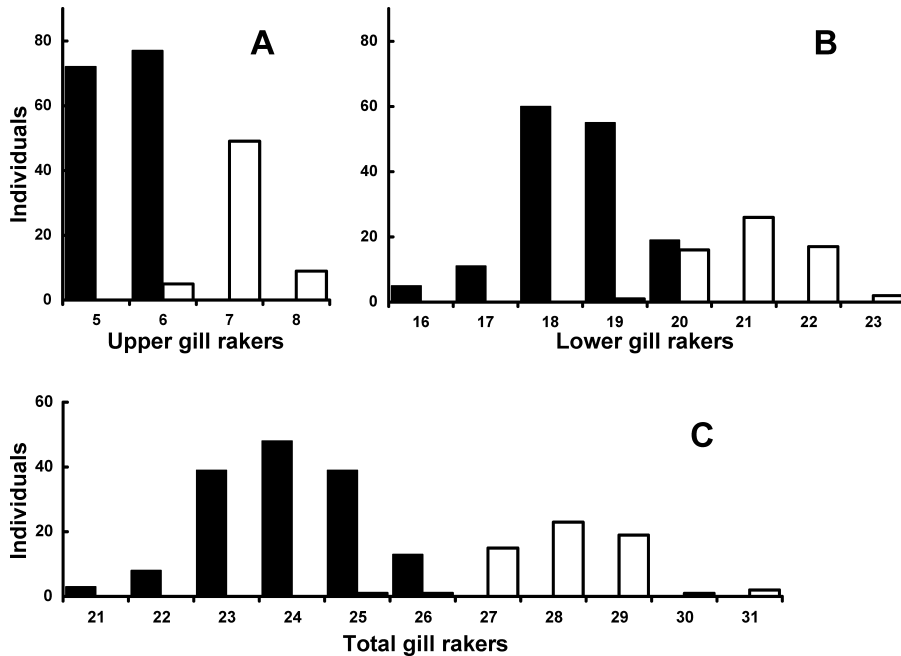


Fig. 5. Frequency distribution of gill-raker counts in *Plotosus japonicus* sp. nov. (black bars) and *P. lineatus* (white bars).

gle and located posterior to head, with a sharp spine serrated with fine basally directed teeth on both edges; distal margin convex. Pectoral fin rounded, not reaching to pelvic insertion, with a sharp spine serrated with fine antrorse teeth on both edges. Pelvic fin with rounded distal margin; the insertion located posterior to rear tip of pectoral fin, and slightly anterior to vertical through origin of dorsal procurrent caudal fin. Adipose fin absent. Caudal fin lanceolate, with greatly enlarged upper procurrent rays (=dorsal procurrent caudal-fin rays) forming a “second dorsal fin”. Anal and caudal fins (including dorsal procurrent caudal-fin) confluent, forming a continuous median fin along more than posterior half of body dorsally and ventrally.

Coloration. In fresh: head and body dark brown, becoming cream or white ventrally; 2 to 3 narrow pale-yellow longitudinal stripes on body, of which 2 extending onto head; barbels dark brown, gradually becoming paler distally; anal and caudal fins hyaline with dark brown distal margins; dendritic organ yellowish brown. In

preservative: head and body brown, paler below; longitudinal pale stripes on head and body often indistinct.

Distribution. This species is very common in southern Japan including the Ryukyu Islands, where it is sympatric with *Plotosus lineatus*. Distribution of *P. japonicus* outside Japan is not confirmed, but reports of *P. lineatus* or *P. anguillaris* from continental coasts of China, Taiwan and the Korean Peninsula may refer to the present new species. Reexamination of the specimens reported by Chang and Chang (1962), Chang (1963), Ni and Wu (1986), Shen and Tzeng (1993), and Choi *et al.* (2002) is required.

Etymology. Specific name “*japonicus*” derived from the type locality of the species.

Remarks. Smith (1941) pointed out that *Silurus lineatus* Thunberg, 1787, a senior synonym of *Platystacus anguillaris* Bloch, 1794, was the oldest available name applicable to the striped eeltail catfish widely distributed in Indo-West Pacific. As described above, however, these two nominal species were described based on speci-

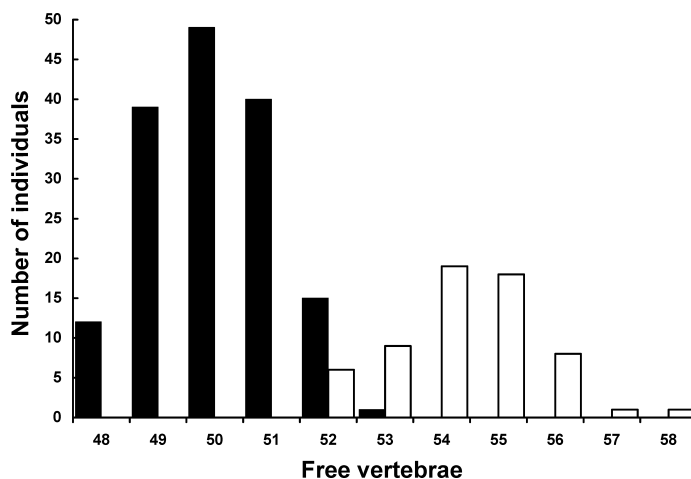


Fig. 6. Frequency distribution of free vertebral counts in *Plotosus japonicus* sp. nov. (black bars) and *P. lineatus* (white bars).

mens from India. Recent authors do not recognize the presence of more than 1 species of striped eeltail catfish in India and Southeast Asia (Jayaram and Majumdar, 1967; Jayaram, 1969; Tilak, 1970; Gomon and Taylor, 1982; Gomon and Jayaram, 1984; Ferraris, 1999; Ferraris in Randall and Lim, 2000), and their meristic counts of the species agree well with those of our *Plotosus lineatus* or compilation of previous reports covering wide geographical range including Japan. The following 10 nominal species are treated here as junior synonyms of *S. lineatus* after Gomon and Taylor (1982), Taylor and Gomon (1986), and Ng and Sparks (2002): *Platystacus anguillaris* Bloch, 1794 from Tranquebar; *Plotosus thunbergianus* Lacepède, 1803 (objective synonym); *Plotosus marginatus* Bennett, 1830 from Sumatra; *Plotosus ikapor* Lesson, 1831 from Waigeo (Waigiou); *Plotosus vittatus* Swainson, 1839 (objective synonym of *Platystacus anguillaris*, Bloch, 1794); *Plotosus lineatus* Valenciennes in Cuvier and Valenciennes, 1840 from Malabar and Mauritius (also a junior homonym); *Plotosus castaneus* Valenciennes in Cuvier and Valenciennes, 1840 from Mahé, Malabar; *Plotosus castaneoides* Bleeker, 1851 from Riau (Riouw), Indonesia; *Plotosus flavolineatus* Whitley, 1941 from Sydney. We also agree with Taylor and Gomon (1986) in syn-

onymizing *Plotosus brevibarbus* Bessednov, 1967 from Tonkin Bay with *S. lineatus*, because the reported meristic characters (e.g., dorsal procurent caudal-fin rays, anal-fin rays, and gill rakers, 96, 77, and 29, respectively) of the holotype of *P. brevibarbus* agree well with our data of *P. lineatus*.

Consequently the following 7 species of *Plotosus* are currently considered as valid species: *Plotosus abbreviatus* Boulenger, 1895; *Plotosus canius* Hamilton, 1822; *Plotosus fisadoha* Ng and Sparks, 2002; *Plotosus limbatus* Valenciennes in Cuvier and Valenciennes, 1840; *Plotosus lineatus* (Thunberg, 1787); *Plotosus nkunga* Gomon and Taylor, 1982; and *Plotosus papuensis* Weber, 1910 (Gomon and Taylor, 1982; Ferraris in Randall and Lim, 2000; Ng and Sparks, 2002). Among these, *P. lineatus* shares the unusual color pattern consisting of 2 or 3 yellow stripes on body and at least 2 extending onto head together with *P. japonicus* sp. nov. (vs. body without stripes, or with 2 pale stripes never extending onto head in other species). Moreover, these 2 species share fewer total vertebrae except for *P. fisadoha* and *P. abbreviatus* (less than 60 vs. more than 67) (Ng and Sparks, 2002; this study). Both *P. fisadoha* and *P. abbreviatus* lack pale stripes on body and are thereby easily distinguished from *P. lineatus* and *P. japonicus* sp. nov.

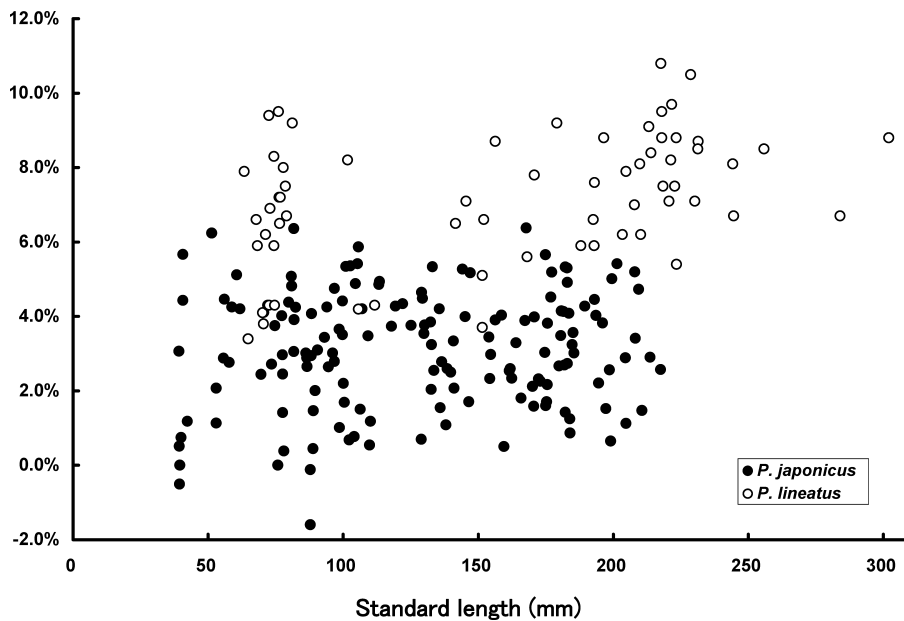


Fig. 7. Relationship between standard length and DProCAF (distance between procurrent caudal- and anal-fin origins) in *Plotosus japonicus* sp. nov. (black circles) and *P. lineatus* (white circles).

(Boulenger, 1895; Gomon and Taylor, 1982; Ng and Sparks, 2002; this study).

Plotosus japonicus sp. nov. is most similar to *P. lineatus* but is easily distinguished from the latter species in having fewer anal-fin rays (60–75, mean 65.6 vs. 65–84, mean 73.4), fewer dorsal procurrent caudal-fin rays (72–95, mean 80.5 vs. 89–111, mean 98.5), fewer total rays in confluent median fins (142–174, mostly 146–167 vs. 163–196, mostly 172–189), fewer gill rakers (5–7+16–21=20–26, mostly 21–26 vs. 6–8+19–23=25–31, mostly 27–31), and fewer free vertebrae (48–52 vs. 52–56) (Table 1, Figs. 3–5). *Plotosus japonicus* sp. nov. also has a shorter basal length of the procurrent caudal-fin (53.5–62.4% in SL vs. 59.0–65.5% in SL), and longer precaudal-fin length (39.8–47.0% SL vs. 36.8–42.9% SL) than *P. lineatus* (Table 1). Accordingly, the relative distance between the origins of procurrent caudal fin and anal fin in *P. japonicus* is shorter than in *P. lineatus* (Fig. 7).

Comparative materials. *Plotosus lineatus*: FLMU 880512 (3: 244.2–255.8 mm SL), Akamizu, Nobeoka, Miyazaki, Japan, May 12, 1988; HUMZ 38360 (1: 179.1

mm SL), 38465 (1: 193.0 mm SL), 38472 (1: 156.3 mm SL), 38609 (1: 145.5 mm SL), and 38622 (1: 196.5 mm SL), North-west off Borneo, 47–49 m deep, trawl, Nov. 22, 1973; HUMZ 96484 (1: 192.6 mm SL), Haneji, Okinawa I., Japan, Apr. 9, 1983; HUMZ 107791 (1: 284.0 mm SL), Okinawa I., Apr. 23, 1986; NSMT-P 33526 (3: 70.1–74.3 mm SL), Mangrove swamp in Palawan I., Philippines, Feb. 8, 1985; NSMT-P 72996 (4: 204.7–230.2 mm SL), Amitori Cove, Iriomote I., Japan, Dec. 16, 1976; IORD 77-0793–0794 (2: 168.1–170.7 mm SL), Amitori Cove, Iriomote I., Japan, Nov. 8, 1977; IORD 87-0161 (1: 141.6 mm SL), Amitori Cove, Iriomote I., Japan, May 18, 1987; NSMT-P 72997 (2: 203.4–231.4 mm SL), Shirahama Cove, Iriomote I., Japan, Dec. 1989; NSMT-P 72998 (4: 207.8–228.6 mm SL), Shirahama Cove, Iriomote I., Japan, Jan. 1990; NSMT-P 72999 (8: 67.8–81.1 mm SL), Amitori, Cove, Iriomote I., Japan, July 23, 1991; OCTU-P 89048 (1: 217.6 mm SL), Shirahama Cove, Iriomote I., Japan, Dec. 1989; OCTU-P 90001–90002 (2: 213.9–231.3 mm SL), Shirahama Cove, Iriomote I., Japan, Jan. 1990; URM-P 3528–3531 (4: 210.2–223.3 mm SL), and 3533–3536 (4: 213.2–221.6 mm SL), Haneji, Okinawa I., Japan, July 18, 1982; URM-P 4938 (8: 63.3–79.0 mm SL), Nagura River, Ishigaki I., Japan, Sept. 5, 1982; URM-P 6224 (1: 302.0 mm SL), Haneji, Okinawa I., Japan, Dec. 19, 1982; URM-P 6314 (1: 152.0 mm SL), Teima River, Okinawa I., Japan, July 5, 1982; URM-P 13904 (1: 72.5 mm SL), Angsira, Gulf of Thailand, Feb. 5, 1984; URM-P 23617 (1: 188.0 mm SL), 23624 (1:

192.9 mm SL), and 23641 (1: 111.7 mm SL), Oh-ura River, Okinawa I., Japan, Sept. 22, 1989; URM-P 24604–24605 (2: 151.5 mm SL), Oh-ura River, Okinawa I., July 22, 1990; YCM-SSP 9696 (2: 68.2–72.9 mm SL), Oh-hara, Iriomote I., Japan, Aug. 18, 1978; YCM-P 10333 (2: 101.6–105.6 mm SL), Sukuji River, Ishigaki I., Japan, Nov. 4, 1981.

Acknowledgments

We are very grateful to the following persons who lent or gave specimens: K. Shimoji (Akajima Marine Biological Station), O. Okamura and Y. Machida (BSKU), T. Kanda (FLMU), S. Kimura (FRLM), K. Amaoka and M. Yabe (HUMZ), K. Sakai (KA), G. Shinohara and K. Matsuura (NSMT), C. Araga and H. Tanase (SMBL), H. Manabe (Shiroyama Fisheries Co. Ltd.), M. Hayashi (YCM). Grateful thanks are also due to H.-J. Paepke (ZMB) for providing the information on and kindly sending the photograph of Bloch's type specimens, and to M. N. Feinberg (AMNH) for her comments on the designation of the lectotype to Bloch's specimens. This study was partially supported by the 21st Century COE program of the University of the Ryukyus.

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- Manuscript received 6 February 2006; revised 21 January 2008; accepted 31 January 2008.
- Associate editor: S. Kimura.