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Pandaka trimaculata, a New Species of Dwarf Goby
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Abstract A species of dwarf goby closely allied to *Pandaka lidwilli* is described as a new species *Pandaka trimaculata* with a new Japanese name "mitsuboshigomahaze". It was collected from the most southerly group of islands in Okinawa Prefecture, Japan, and Mindanao Island, the Philippines. The differences between the two species are the number of scales in longitudinal series and the pattern of spots on the ventral side. The genus *Berowra* is synonymized with *Pandaka*.

Gobius lidwilli (= *Pandaka lidwilli*, see following discussion on p. 65) was originally described by McCulloch (1917: 185) from specimens collected in Australia. Thereafter Tomiyama (1936: 66) reported its occurrence in Kōchi Prefecture, Japan with a Japanese name "gomahaze". *P. lidwilli* has been collected in Hyōgo, Tokushima, Kōchi, Nagasaki, Kumamoto, Kagoshima and Miyazaki Prefectures (Dōtu, 1957: 86) and Okinawa Prefecture in Japan. Specimens of a dwarf goby closely resembling *P. lidwilli* were collected from Ishigakijima in 1964, 1965, 1968, and 1971 and from Iriomotejima in 1965 by the junior author and from Ishigakijima in 1967 and from Iriomotejima in 1968 by the late Mr. Saitō; both these islands belong to the most southerly group of islands in Okinawa Prefecture, Japan. The same form was collected from Mindanao Island, the Philippines in 1966 by Dr. Dōtu. We found that the specimens are different from *P. lidwilli* in the number of scales in a longitudinal series and the pattern of spots on the ventral side. For that reason we describe it as a new species. Vertebral counts include urostyle. Spiny part of the caudal fin refers only to the upper and lower simple caudal rays.

Pandaka trimaculata, sp. nov.

(New Japanese name: mitsuboshigomahaze)

(Fig. 1)

Holotype. NSMT—P (The Department of Zoology, National Science Museum, Tokyo) 17900, 12.8 mm in standard length (S.L.), mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan, April 5, 1964.

Paratypes. Two specimens (NSMT—P 17901 and 17902), 12.4 and 12.7 mm S.L. and three specimens (NMI—National Museum, Manila, 5534~5536), 10.2~11.1 mm S.L., mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan, April 5, 1964; two specimens (NSMT—P 17903 and 17904), 10.9 and 11.9 mm S.L., near Komi, Iriomotejima, Okinawa Pref., Japan, March, 1965; three specimens (AMS—Australian Museum, Sydney. I. 18078-001), 8.5~11.6 mm S.L., about 700 m up from the mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan, October 10, 1968.

Other specimens of *Pandaka trimaculata*. One specimen (LICPP—Laboratory of Ichthyology, the Crown Prince's Palace, Tokyo, 1964095), 10.8 mm S.L., mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan, April 5, 1964; four specimens (LICPP 1965019), 10.5~10.9 mm S.L., near Komi, Iriomotejima, Okinawa Pref., Japan, March, 1965; eight specimens (LICPP 1966097), 10.8~12.8 mm S.L., mouth of Kaubwagan river, Mindanao Island, the Philippines, July 26, 1966; ten specimens (LICPP 1968313), 11.3~12.5 mm S.L., Kabira, Ishigakijima, Okinawa Pref., Japan, April 2, 1968; two specimens (LICPP 1968316), 11.9~12.5 mm S.L., Sonai, Iriomotejima, Okinawa Pref., Japan, April 3, 1968; 13 specimens (LICPP 1971188), 8.7~10.7 mm S.L., mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan, October 27, 1971.

Comparative material of other species.

Pandaka lidwilli: holotype (AMS I. 13628), 12.0 mm S. L. and ten paratypes (AMS I. 17815-001),

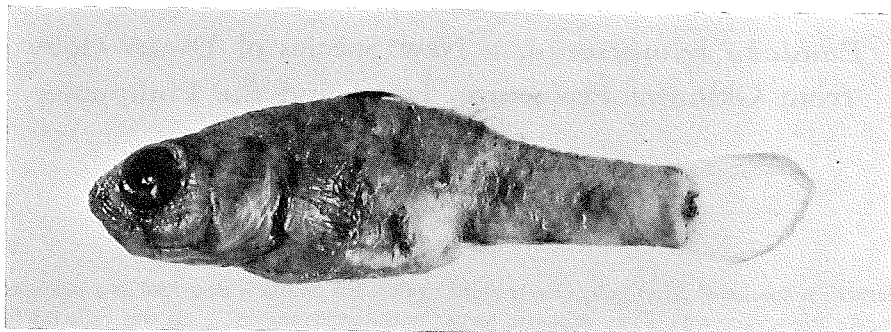


Fig. 1. *Pandaka trimaculata* sp. nov., holotype, NSMT-P 17900, 12.8 mm in standard length, from the mouth of Miyara river, Ishigakijima, Okinawa Pref., Japan.

10.5~12.0 mm S.L., Cowan Creek, New South Wales, Australia, May, 1915; 11 specimens (LICPP 1939001), 9.8~12.5 mm S.L., August 5, 1939 and seven specimens (LICPP 1948007), 13.0~14.2 mm S.L., April 25, 1948, mouth of Mizunashi river, Matsugaura, Satsuma Peninsula, Kagoshima Pref., Japan; ten specimens (LICPP 1951008), 13.4~15.4 mm S.L., Tomioka, Reihoku, Amakusa, Kumamoto Pref., Japan, July 30, 1951; four specimens (LICPP 1963091), 10.0~10.3 mm S.L., mouth of Fukuchi river, Higashi, Kunigami, Okinawajima, Okinawa Pref., Japan, November 3, 1963; three specimens (LICPP 1964093), 10.0~10.6 mm S.L., a river of Chūbu, Okinawajima, Okinawa Pref., Japan, June, 1964; 18 specimens (LICPP 1968311), 12.3~14.4 mm S.L., April 2, 1968 and one specimen (LICPP 1968310), 15.7 mm S.L., April 15, 1968, Tekebu, Amamiōshima, Kagoshima Pref., Japan; 22 specimens (LICPP 1968307), 10.0~12.5 mm S.L., April 11, 1968 and two specimens (LICPP 1968306), 11.3~11.9 mm S.L., April 15, 1968, Kominato, Amamiōshima, Kagoshima Pref., Japan; five specimens (LICPP 1971192), 10.5~11.2 mm S.L., mouth of Fukidō river, Ishigakijima, Okinawa Pref., Japan, October 27, 1971; four specimens (LICPP 1971191), 8.3~11.1 mm S.L., Nagura, Ishigakijima, Okinawa Pref., Japan, October 28, 1971; one specimen (LICPP 49), 11.7 mm S.L., Shōji river, Kagehara, Taniyama-shioya, Kagoshima, Kagoshima Pref., Japan; four specimens (LICPP 50), 11.0~12.0 mm S.L., Sesō, Setouchi, Kakeromajima, Kagoshima Pref., Japan; three specimens (LICPP 51), 15.2~15.5 mm S.L., Kagoshima Pref., Japan.

Pandaka pygmaea : ten specimens (LICPP 1964152), 9.5~11.3 mm S.L., Dagatdagatan Fishery Research Station, Malabon Rizal, Luzon, the Philippines, June, 1964.

Diagnosis. Pectoral fin rays usually 13~14; scales in a longitudinal series usually 20~21; scales in a transverse series 6; the spines of first dorsal fin of both sexes not reaching the origin of second dorsal fin when depressed; pale body with dark markings; three spots on the ventral side between the anal fin and the spiny part of caudal fin; a dark spot between the first and fifth dorsal spines.

Description of the holotype and ten paratypes. Proportions are expressed as per cent of standard length. Counts and proportions of holotype given followed by those of paratypes in parentheses. First dorsal fin rays VI (VI); second dorsal fin rays i, 6 (i, 5~i, 6); anal rays i, 6 (i, 5~i, 6); pectoral fin rays 14 (13~15); pelvic fin rays I, 5 (I, 5); scales in a longitudinal series 21 (20~21); scales in a transverse series 6 (6). Head length 34.4 (30.6~36.7); head depth and width at posterior margin of preopercle 22.7 (19.4~24.5) and 23.4 (19.3~24.5) and body depth at origin of pelvic fin 25.8 (22.1~25.7); body width at origin of pectoral fin 25.0 (16.3~24.3); body depth at origin of anal fin 21.9 (20.2~24.2); depth at caudal peduncle 14.1 (10.1~14.3). Anterior nostril not reaching lower margin of upper lip. Posterior end of maxillary not extending below anterior margin of pupil. No difference in upper jaw length between sexes. Spines of first dorsal fin of both sexes not reaching the origin of second dorsal fin when

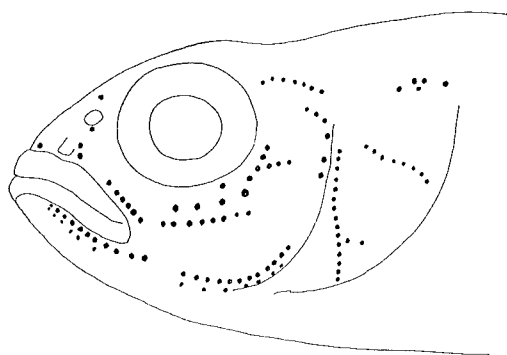


Fig. 2. Arrangements of pit organs of *Pandaka trimaculata* sp. nov., holotype, NSMT—P. 17900.

depressed. Pelvic fins united into a disc and distal margin of interspinal frenum serrated. Genital papilla tapering to tip in male and round in female, distal end without processes. Tongue blunted. No sensory canal, pit organs consisted of large independent ones and small ones in rows as shown in Fig. 2.

Coloration of holotype and paratypes in formalin. Two transverse blackish lines, one from eye, the other on preopercle. A transverse blackish line at base of pectoral fin. Six blackish bands across back between first dorsal fin and spiny part of caudal fin; one beneath first dorsal fin, one before second dorsal fin, one beneath second dorsal fin, two on caudal peduncle and one beneath spiny part of caudal fin. Four blackish lateral spots from below anterior part of second dorsal fin to base of caudal fin. A blackish spot on anterior part of caudal fin. A blackish band or spot before genital papilla. Three blackish spots on ventral side between base of anal fin and spiny part of caudal fin, one beneath anal fin, one on caudal peduncle and one beneath spiny part of caudal fin. Spot beneath spiny part of caudal fin covering three scales longitudinally. A blackish spot between first and fifth dorsal spines. A blackish spot anteriorly on proximal third of second dorsal and anal fins covering about two thirds of length of fins respectively.

Colour in life. Besides these markings mentioned above an orange spot is found behind blackish spot on dorsal fin.

Description of some characters of ten stained specimens from Ishigakijima and Iriomotejima,

Japan. Segmented caudal fin rays $9+8=17$ (5 specimens). Predorsal scales 0~1 (5). No scales on head, body covered with ctenoid scales except for cycloid scales before first dorsal fin. Outer row of teeth large, inner rows small on both jaws. Calcified gill-rakers absent. Vertebrae 25. First pterygiophore of first dorsal fin inserted between neural spines of third and fourth vertebrae. First and second pterygiophores of second dorsal fin mounting over neural spine of ninth vertebra. Last pterygiophore of first dorsal fin inserted between neural spines of sixth and seventh vertebrae (LICPP 1965019, 1968313, 1971188).

Specimens from the Philippines. No differences were found between the specimens from Japan and the Philippines, except for 2 predorsal scales in the two stained specimens from the Philippines (LICPP 1966097).

Distribution. *P. trimaculata* was collected from Ishigakijima ($24^{\circ}21'N$, $124^{\circ}10'E$) and Iriomotejima ($24^{\circ}19'N$, $124^{\circ}46'E$) in the most southerly group of islands in Okinawa Prefecture, Japan and Mindanao Island, the Philippines. *P. trimaculata* and *P. lidwilli* are sympatric in their distribution as both species were collected from Ishigakijima.

Habitat. *P. trimaculata* inhabits mainly in pools and small streams under the mangrove near the river mouth.

Etymology. The name for this species is taken from the character of three spots on the ventral side distinguishing this species from *Pandaka lidwilli*.

Comparison with other species of the genus *Pandaka*. As Koumans (1940 : 163) stated the genus *Berowra* Whitley, 1928 (type species : *Gobius lidwilli*) is closely allied to *Pandaka* Herre, 1927 (type species : *P. pussilla*). We did not find sufficient difference between specimens of *Berowra lidwilli* and *Pandaka pygmaea*, and the description and figures of *P. pussilla* (Herre, 1927 : 197, pl. 15, figs. 1 and 2) to separate into two genera as both *B. lidwilli* and *P. pygmaea* are of minute size with the first fin rays of the second dorsal and the anal fins unbranched and segmented; a character not usually found in gobies. Thus *Berowra* is synonymized with *Pandaka* here.

Characteristics of *P. minuta* Smith, *P. pussilla* Herre and *P. silvana* (Barnard) are not based, in

Table 1. Counts of left pectoral fin rays and scales in a longitudinal series of *Pandaka trimaculata* and *P. lidwilli*.

Species	Pectoral fin rays				Scales in a longitudinal series				
	13	14	15	16	20	21	22	23	24
<i>Pandaka trimaculata</i>									
Holotype (Japan)			1			1			
Japan	9	26	1		12	15	1		
Philippines		3	3		2	3	1		
<i>P. lidwilli</i>									
Holotype (Australia)		1							1
Japan	2	40	50	3		2	51	44	3
Australia	3	38	11				28	14	

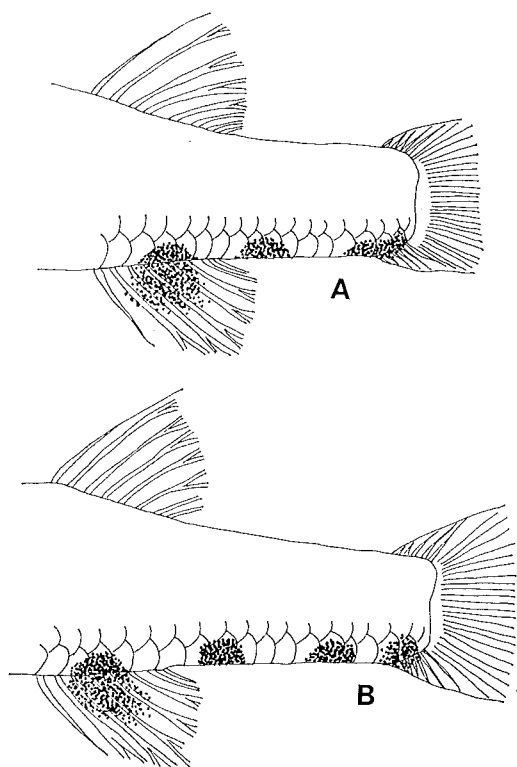


Fig. 3. Spots on the ventral side in *Pandaka trimaculata* (A) and *P. lidwilli* (B).

this case, on examination of specimens. *P. trimaculata* is very similar to *P. lidwilli*, but differs from the latter in the following characters. The scales in a longitudinal series in *P. trimaculata* are 20~21 except for two out of 35 specimens examined; those in *P. lidwilli* are 22~24 except for two out of 143 specimens (Table 1). As for the midventral spots of *P. trimaculata* one is located beneath the anal fin,

one on the caudal peduncle and one beneath the spiny part of caudal fin, whereas in *P. lidwilli*, one is located beneath the ventral fin, two on the caudal peduncle and one beneath the spiny part of caudal fin. The spot beneath the spiny part of the caudal fin covers three scales longitudinally in *P. trimaculata*, whereas in *P. lidwilli* it covers one or two scales and there is one scale between the last two spots (Fig. 3). *P. trimaculata* differs from *P. pygmaea* and *P. minuta* in the characteristics which distinguish *P. trimaculata* from *P. lidwilli* (Smith, 1959 : 205, fig. 21). *P. trimaculata* differs from *P. pussilla* in the number of scales in a longitudinal series, in *P. trimaculata* usually 20~21 and in *P. pussilla* 22~24; scales in a transverse series, in *P. trimaculata* 6 and in *P. pussilla* 7~8; in the elongated spines of first dorsal fin in male in *P. pussilla* (Herre, 1927 : 196, pl. 15, figs. 1 and 2). *P. trimaculata* differs from *P. silvana* in the number of pectoral fin rays, mostly 13~14 in *P. trimaculata* and 16 in *P. silvana* (Penrith and Penrith, 1972 : 105, fig. 1).

Acknowledgments

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- (The Crown Prince's Palace, Motoakasaka, Minatoku, Tokyo, 107 Japan)
- 沖縄県とフィリピンで採集されたハゼの新種 *Pandaka trimaculata* ミツボシゴマハゼ
- 明仁親王・目黒 勝介
- ゴマハゼ *Pandaka lidwilli* に類似する小型のハゼの新種 *Pandaka trimaculata* を記載し、ミツボシゴマハゼの和名を附した。本種は沖縄県石垣島と西表島およびフィリピンのミンダナオ島で採集された。ミツボシゴマハゼとゴマハゼの相違は縦列鱗数と腹部の斑紋にある。ゴマハゼの属名として用いられた *Berowra* は *Pandaka* 属との類似のため、*Pandaka* 属のシノニムとした。
- (107 東京都港区元赤坂 東宮御所)