

## *Synchiropus moyeri*, a New Species of Dragonet (Callionymidae) from Miyake-jima, Japan

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**Abstract** *Synchiropus moyeri* sp. nov. is described on the basis of 24 specimens from Miyake-jima, Izu Islands, Japan. The new species is morphologically very similar to *Synchiropus ocellatus*, a wide-ranging species which also occurs commonly at Miyake-jima. *Synchiropus moyeri* has a strong mate preference for conspecifics, suggesting a complete behavioral isolation. The new species is distinguished from *S. ocellatus* and compared with allied species. Ecological notes are included.

The family Callionymidae is a group of benthic marine fishes. Members of *Synchiropus*, the second largest genus, are nearly circumtropical in distribution and occur in warm and temperate waters. Fricke (1981) revised the genus, recognizing five species from Japan. Nakabo (1983), in a revision of Japanese callionymid fishes, recorded three additional species referable to *Synchiropus*, two of which are junior synonyms of previously recorded species (as discussed by Fricke, 1983). A further member of the genus from Japan was described by Fricke and Zaiser (1983). A revision of the Indo-Pacific members of the family was recently published by Fricke (1983). He recognized 27 valid species of *Synchiropus*; seven of them occur in Japan. A new species of the genus not included in any of the above mentioned papers was found at Miyake-jima, Izu Islands, Japan. The species is herein described and compared with allied species.

### Methods and materials

Methods follow those used in Fricke (1983). The preopercular spine formula, explained by Fricke (1981), is calculated by the following scheme:  $a-\frac{b}{c}-d$ , when 'a' is the number of antrorse spines at the base, 'b' is the number of points or serrae at the dorsal edge, 'c' is the number of points or serrae at the ventral edge, and 'd' is 1 and reflects the main tip of the spine. Right spines have to be treated as left (e.g., the number of antrorse spines at the base, 'a', is always on the left side of the formula).

Specimens in the following collections have

been examined: Australian Museum, Sydney (AMS); British Museum (Natural History), London (BM(NH)); California Academy of Sciences, San Francisco (CAS); Muséum National d'Histoire Naturelle, Paris (MNHN); National Science Museum, Tokyo (NSMT-P); Northern Territory Museum of Arts and Science, Darwin, Australia (NTM); J.L.B. Smith Institute of Ichthyology of the Rhodes University, Grahamstown, South Africa (RUSI); Tatsuo Tanaka Memorial Biological Station, Miyake-jima, Japan (TMBS); National Museum of Natural History, Washington, D.C. (USNM); Western Australian Museum, Perth (WAM); Academy of Sciences of the U.S.S.R., Zoological Institute, Leningrad (ZIL); Zoologisches Museum und Zoologisches Institut der Universität Hamburg (ZIM); Zoologisches Museum der Humboldt-Universität, Berlin, G.D.R. (ZMB); and Department of Zoology, University Museum, University of Tokyo, (ZUMT).

### *Synchiropus (Synchiropus) moyeri* sp. nov.

(New Japanese name: Miyake-teguri)

(Figs. 1, 2)

**Material examined.** Holotype: USNM 26773, male, 57.8 mm SL, Igaya Bay, Miyake-jima, Japan, 34°06'N, 139°28'E, 12 m depth, at base of cliff on substrate of boulders, rubble, and sand, J. T. Moyer and M. J. Zaiser, 19 June 1983. Paratypes (all Igaya Bay, Miyake-jima, Japan, 34°06'N, 139°28'E): USNM 26771, 1 female, 40.1 mm SL, with the same data as the holotype. USNM 26772, 1 male, 32.9 mm SL, 8.5 m depth, M. J. Zaiser and J. T. Moyer, 30 Aug. 1982. ZIM 6603, 1 male, 33.5 mm SL, with the same data as USNM 26772. BM(NH)

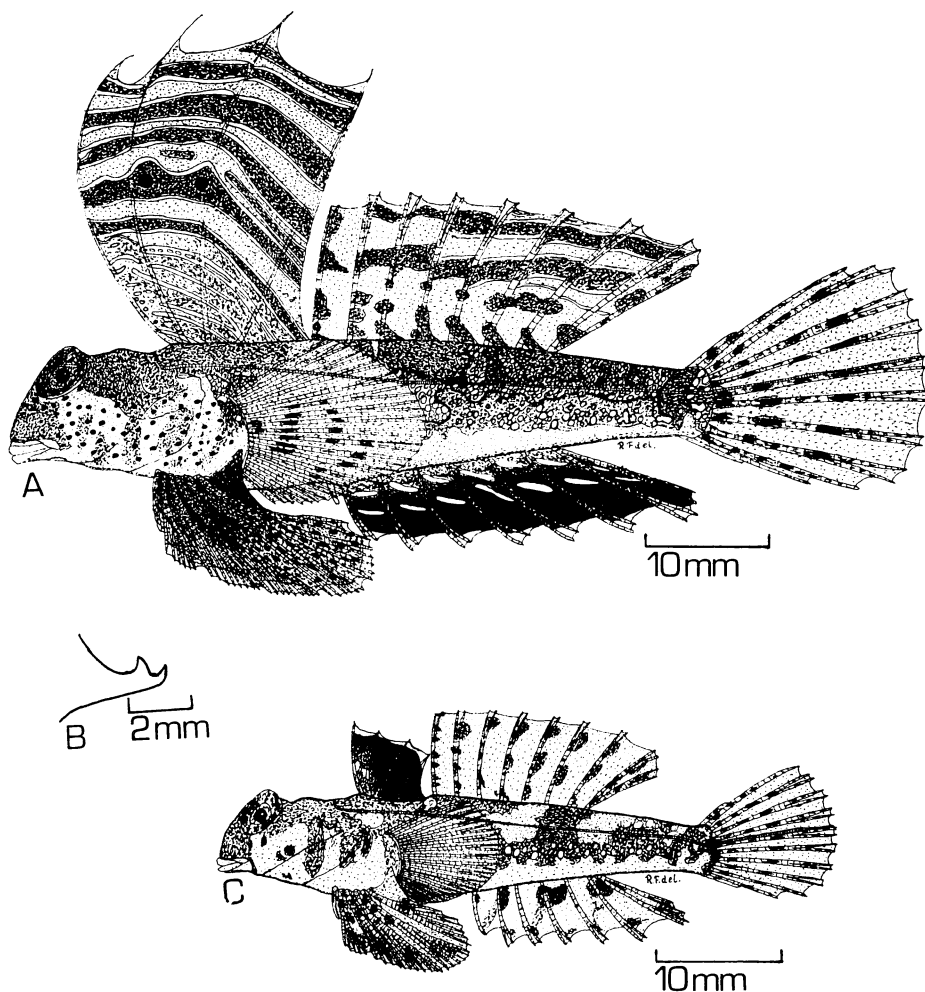


Fig. 1. *Synchiropus moyeri* sp. nov., Igaya Bay, Miyake-jima, Japan. A, lateral view of holotype, USNM 26773, male, 57.8 mm SL. B, left preopercular spine of holotype. C, lateral view of paratype, USNM 26771, female, 40.1 mm SL.

1984.11.6.4, 1 male, 60.8 mm SL, 15 m depth, substrate of small rocks and boulders with thick algal cover, 15 m depth, M. J. Zaiser and J. T. Moyer, 13 July 1983. BM(NH) 1984.11.6.5, 1 female, 40.4 mm SL, with the same data as BM(NH) 1984.11.6.4. CAS 55654, 1 male, 60.1 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 19 July 1983. MNHN 1984-704, 1 male, 59.4 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 28 July 1983. MNHN 1984-705, 1 female, 42.6 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 28 July 1983. AMS I.24794-001, 1 male, 57.7 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 16 July 1983. AMS I.24795-001, 1 female, 39.2 mm SL, 12 m depth, J. T. Moyer and M. J. Zaiser, 19 June 1983. RUSI 21638, 1 male, 57.1 mm SL, 15 m depth, J. T.

Moyer and S. Dolginow, 17 July 1983. RUSI 21639, 1 female, 39.1 mm SL, 12 m depth, J. T. Moyer and M. J. Zaiser, 19 June 1983. NSMT-P 23213, 1 male, 56.8 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 4 July 1983. NSMT-P 23214, 1 female, 38.2 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 28 July 1983. ZMB 31446, 1 male, 54.7 mm SL, 19 m depth, M. J. Zaiser and J. T. Moyer, 21 Aug. 1982. ZMB 31447, 1 female, 22.0 mm SL, 19 m depth, J. T. Moyer, 23 Aug. 1983. ZUMT 54586, 1 male, 52.8 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 13 July 1983. ZIL 47203, 1 male, 46.8 mm SL, 15 m depth, M. J. Zaiser and J. T. Moyer, 13 July 1983. WAM P.28366-001, 1 male, 33.1 mm SL, 19 m depth, J. T. Moyer and R. Fricke, 17 Oct. 1982. NTM S. 11243-001, 1 male,

32.7 mm SL, J. W. Shepard, 1 Sept. 1976. TMBS 830821-2, 1 male, 29.6 mm SL, 12 m depth, J. T. Moyer and K. M. Shepard, 21 Aug. 1983.

**Other material** (all Igaya Bay, Miyake-jima, Japan, 34°06'N, 139°28'E): TMBS 820819-1-2, 2 females, 11.8–21.4 mm SL, 19 m depth, M. J. Zaiser and J. T. Moyer, 19 Aug. 1982.

**Diagnosis.** A *Synchiropus* (*Synchiropus*) with 4 spines in the first dorsal fin, 8 rays in the second dorsal fin, 7 anal fin rays, 18–23 pectoral fin rays, a preopercular spine formula  $-\frac{1(-2)}{1}$ , branched anal fin rays (occasionally not the first), and in the male with a high first dorsal fin with 2 (rarely 3) black blotches on a dark brown line.

**Description.** D<sub>1</sub> IV; D<sub>2</sub> i, 7 or 8 (rarely 9); A i, 6 or 7; P<sub>1</sub> 0–iii, 15–21, 0–ii (totally; 18–23); P<sub>2</sub> I, 5; C (iii), i, 7, ii, (ii) (rarely: (iii), ii, 6, ii, (ii)). Vertebrae 6–7+14 (totally: 20–21). Proportions (expressed as hundredths of SL) see Table 1. Other proportions in the text. Proportions of the paratypes are in parentheses, as are mean ( $\bar{x}$ ).

Body elongate and slightly depressed in some specimens or slightly compressed in others. Head depressed, its length 3.9 (3.4–4.1) in SL ( $\bar{x}$ =3.75). Body depth 4.6 (4.5–5.7) in SL ( $\bar{x}$ =4.95). Body width 4.6 (4.2–5.4) in SL ( $\bar{x}$ =4.75). Eye diameter 2.9 (2.2–3.0) in head ( $\bar{x}$ =2.68). Preorbital length 2.9 (2.7–4.1) in head ( $\bar{x}$ =3.23 in males;  $\bar{x}$ =3.52 in females). Interorbital width 14.2 (9.0–18.6) in head ( $\bar{x}$ =14.3). Occipital region smooth or with two very low bony ridges. Branchial opening sub-lateral in position. Preopercular spine length 5.2 (3.6–6.6) in head ( $\bar{x}$ =5.04); preopercular

spine with an upcurved main tip, a smooth ventral margin, a smooth base, and one (rarely two) upcurved or slightly recurved points on its dorsal margin (formula:  $-\frac{1(-2)}{1}$ ; see Fig. 1B). Urogenital papilla elongate and conical in the male, its length 8.0 (3.5–18.0 in head); shorter or not visible in the female (more than 20.0 in head). Lateral line reaching from occipital region to end of about fourth branched caudal fin ray (counted from above); the lines of the opposite sides are interconnected by a commissure across the occipital region. Caudal peduncle length 4.5 (4.0–5.6) in SL ( $\bar{x}$ =4.68). Caudal peduncle depth 10.5 (9.5–12.0) in SL ( $\bar{x}$ =10.66). Maximum observed SL in the male 60.8 mm, in the female 42.6 mm.

First dorsal fin high in the male, each spine with a short filament, all spines subequal in length; fin low in the female, spines not filamentous, first spine shorter than first ray of second dorsal fin. First spine in the male 2.4 (1.7–5.1) in SL (showing allometric growth; dorsal fin spines in the male increasing much in length with age), in the female 6.3–9.1 in SL. Second spine in the male 2.1 (1.5–5.0) in SL, in the female 5.8–8.4 in SL. Third spine in the male 2.0 (1.5–4.3) in SL, in the female 6.1–9.6 in SL. Fourth spine in the male 2.3 (1.7–6.4) in SL, in the female 7.1–15.0 in SL. Predorsal (1) length 4.06 (2.82–4.11) in SL ( $\bar{x}$ =3.54). Second dorsal fin distally slightly convex. Rays branched (occasionally not the first), the last ray divided at its base. First ray in the male 5.0 (4.6–6.3) in SL ( $\bar{x}$ =5.36), in the female 5.2–6.7 in SL ( $\bar{x}$ =5.93). Last ray in the male 3.9 (3.4–

Table 1. Proportions of the holotype and paratypes of *Synchiropus moyeri* sp. nov., expressed as hundredths of SL.

	Holotype (male)	Paratypes (males)	Paratypes (females)
Predorsal (1) length	24.61	24.33–32.04	29.85–33.24
Predorsal (2) length	44.05	42.83–47.97	45.25–49.18
Preanal fin length	48.02	46.61–54.31	52.06–55.43
Prepelvic fin length	21.62	20.31–25.21	19.17–27.63
Head length	25.90	24.39–28.94	26.23–29.62
Caudal fin length	30.53	28.74–34.56	26.28–30.18
Eye diameter	8.97	8.17–12.56	9.28–12.87
First D <sub>1</sub> spine length	41.70	19.58–56.79	11.01–15.82
Last D <sub>2</sub> ray length	25.36	18.39–29.69	14.85–20.81
Last A ray length	22.05	18.27–23.79	15.57–21.50
Pelvic fin length	34.27	30.21–38.10	31.19–35.10

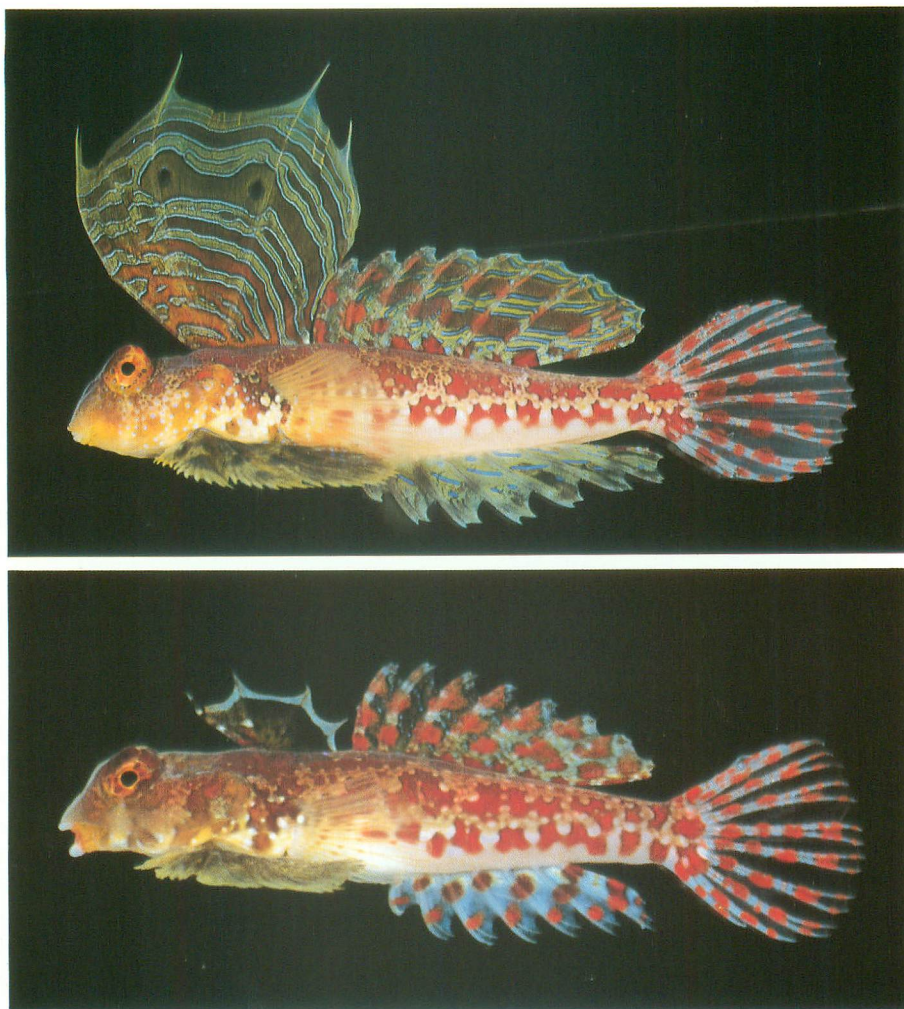


Fig. 2. Color in life of *Synchiropus moyeri* sp. nov. Above, male, RUSI 21638, 57.1 mm SL, paratype. Below, female, USNM 26771, 40.1 mm SL, paratype. From color transparencies by M.J. Zaiser.

5.4) in SL ( $\bar{x}$ =4.27), in the female 4.8–6.7 in SL ( $\bar{x}$ =5.63). Predorsal (2) length 2.27 (2.03–2.33) in SL ( $\bar{x}$ =2.14). Anal fin beginning on a vertical through about second to third ray of second dorsal fin. Rays branched (occasionally not the first), the last divided at its base. First ray in the male 11.3 (8.7–12.0) in SL ( $\bar{x}$ =10.05), in the female 9.3–12.4 in SL ( $\bar{x}$ =10.78). Last ray in the male 4.5 (4.2–5.5) in SL ( $\bar{x}$ =4.79), in the female 4.6–6.4 in SL ( $\bar{x}$ =5.32). Preanal fin length 2.08 (1.80–2.15) in SL ( $\bar{x}$ =1.92). Pectoral fin reaching to second or third anal fin ray base when laid back. Pectoral fin length in the male 4.0 (3.8–4.7) in SL ( $\bar{x}$ =4.27), in the female 4.2–

5.2 in SL ( $\bar{x}$ =4.68). Pelvic fin convex, reaching to base of first to third anal fin ray when laid back. Pelvic fin length in the male 2.9 (2.6–3.3) in SL ( $\bar{x}$ =2.92), in the female 2.8–3.1 in SL ( $\bar{x}$ =2.97). Prepelvic fin length 4.6 (3.6–5.2) in SL ( $\bar{x}$ =4.35). Caudal fin distally slightly convex. Caudal fin length 3.3 (2.9–3.8) in SL ( $\bar{x}$ =3.30).

Color in life: See Fig. 2.

Color in alcohol: Body marbled with red, with numerous white spots and blotches. Ventral parts of body white. Sides of head marbled with orange, in the male with light blue ocelli. Base of pectoral fin dark brown or blackish, with

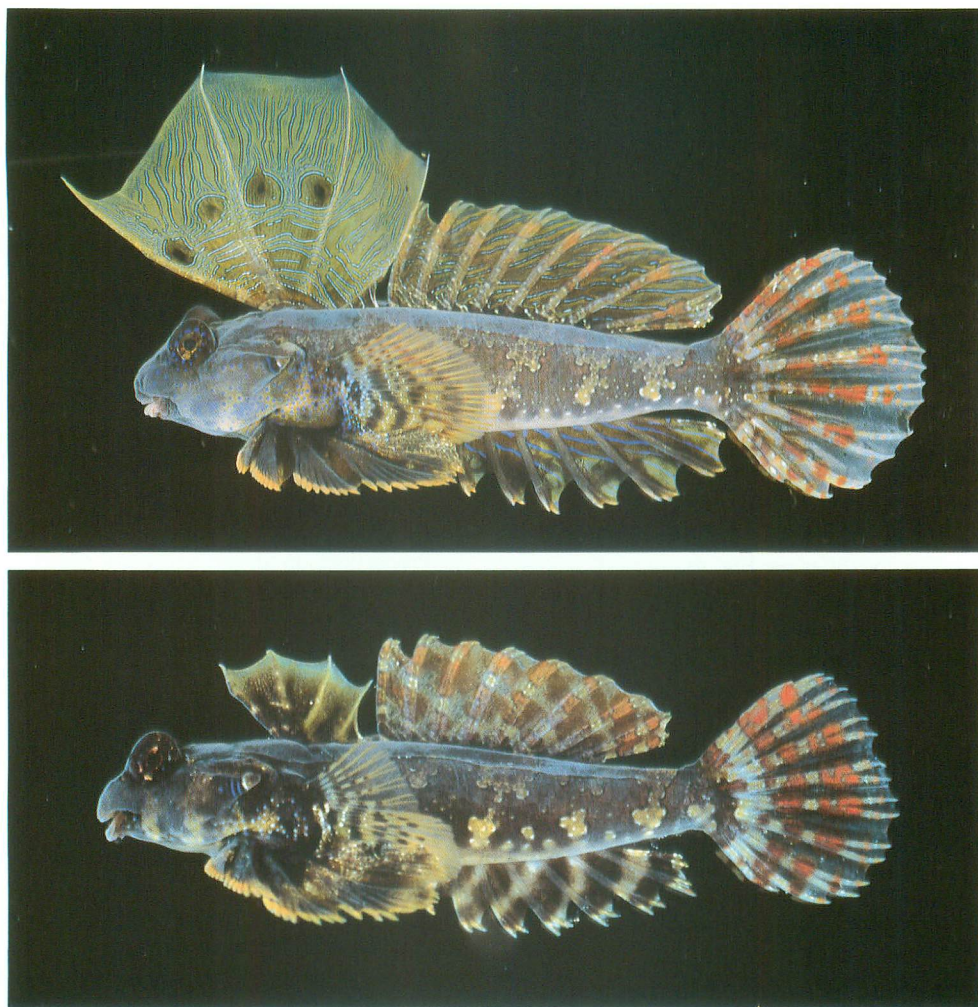


Fig. 3. Color in life of *Synchiropus ocellatus* from Igaya Bay, Miyake-jima, Japan. Above, male, TMBS 830711-1, 72.2 mm SL. Below, female, TMBS 830713-2, 53.5 mm SL. From color transparencies by M. J. Zaiser.

white spots. Eye orange, with reddish brown spots. Preserved specimens may also show a brown head, eye and body color, instead of red and orange.

First dorsal fin in the male light brown, with semi-circular dark brown lines (circles with the base of the first or second spine as center). In the distal one-third or distal half, one of the dark brown lines is broader than the others, with two (rarely three) slightly ocellate black blotches. First dorsal fin in the female dark brown to black, first membrane lighter than the others, with a few light spots; fin distally whitish.

Second dorsal fin rays with brown blotches; membranes with brown blotches, last membranes also with horizontal dark streaks. Anal fin in the male dusky, with about two light streaks on each membrane; in the female light, with about two dark brown blotches each. Caudal fin rays blotched with red or dark brown. Pelvic fin with large dusky areas, distal margin light. Median parts of pectoral fin base with some dark spots.

**Sexual dimorphism.** Males have a much higher first dorsal fin than females with short filaments (spines not filamentous in females), a

higher second dorsal fin with a longer last ray, a slightly longer caudal fin and larger pelvic fin, a longer urogenital papilla, and a different color pattern of the first dorsal fin (with stripes and ocelli), of the anal fin, and of the cheeks (with blue ocelli).

**Etymology.** This species is named in honor of Dr. Jack T. Moyer (director of the Tatsuo Tanaka Memorial Biological Station at Miyake-jima, Japan) in recognition of his noteworthy contributions to the knowledge of the fishes of Miyake-jima, and in deep appreciation of the encouragement and logistic support he has provided to both of the authors.

**Distribution.** *Synchiropus moyeri* is known only from the type locality, Miyake-jima of the Izu Islands, Japan (34°06'N, 139°28'E). It has been collected at depths between 8.5 and 19 meters (exact localities see Fig. 4).

**Ecological notes.** This species usually inhabits a substrate of boulders, rubble, and small rocks with thick algal cover, the exact density of such cover varying seasonally. *Synchiropus moyeri* sometimes occurs on rubble between living coral on eroded volcanic pinnacles and cliffs.

The species occurs sympatrically at Miyake-jima with three closely related species: *Synchiropus ijimai* Jordan et Thompson, 1914; *S. morrisoni* Schultz, 1960; *S. ocellatus* (Pallas, 1770). There is a distinct habitat separation from *S. ocellatus*, with *S. ocellatus* occurring on substrates that are shallower, closer to shore, and more bare (see below for details). However, *S. ijimai* and *S. morrisoni* are found in the same areas as *S. moyeri*, and considerable aggression is displayed in interspecific male-male encounters. *Synchiropus moyeri* is the most abundant of these species, *S. ijimai* is of regular but less frequent occurrence, and *S. morrisoni* is least common in Miyake-jima waters.

*Synchiropus moyeri* is a solitary site-attached species with females occupying relatively small home ranges. Males are more mobile than females, with each male's home range encompassing those of several females. Although male-male encounters in the presence of a female result in aggression, there is no evidence for territoriality.

The species is a pelagic spawner, spawning daily at dusk throughout the breeding season (approximately May to October). The spawn-

ing time corresponds to that of *Synchiropus kiyooae* Fricke et Zaiser, 1983, *S. ijimai*, *S. morrisoni*, *S. ocellatus*, and *Diplogrammus xenicus* (Jordan et Thompson, 1914) (Fricke and Zaiser, 1982; Zaiser, MS) at Miyake-jima.

Table 2. Counts and proportions of Miyake-jima material of *Synchiropus ocellatus*; all material deposited in TMBS.

	Males (n=12)	Females (n=5)
D <sub>1</sub> ; D <sub>2</sub>	IV; i, 7-8	IV; i, 7-8
A	i, 6	(i, 5-) i, 6
P <sub>1</sub>	i-ii, 16-20, i	i-iii, 16-20, i
C	(iii), i, 7, ii, (ii)	(iii), i, 7, ii, (ii)
Preopercular spine formula	$\frac{1}{-}1$	$\frac{1(-2)}{-}1$
Proportions: in SL		
Predorsal (1) length	3.08- 3.81	3.04- 3.30
Predorsal (2) length	2.07- 2.25	2.03- 2.13
Preanal fin length	1.83- 2.00	1.71- 1.85
Prepelvic fin length	3.95- 4.56	3.94- 4.24
Prepectoral fin length	2.51- 3.03	2.43- 2.66
Head length	3.46- 3.90	3.31- 3.80
Body depth	4.15- 5.70	4.37- 5.21
Body width	3.92- 5.17	3.74- 4.36
Caudal peduncle length	4.55- 5.25	4.61- 5.16
Caudal peduncle depth	9.13-11.63	9.16-11.29
Caudal fin length	3.14- 3.70	3.28- 3.40
First D <sub>1</sub> spine length	2.18- 5.30	5.86- 6.60
Second D <sub>1</sub> spine length	2.20- 4.21	6.22- 7.47
First D <sub>2</sub> ray length	5.01- 6.24	5.07- 5.81
Last D <sub>2</sub> ray length	3.97- 5.59	4.74- 5.96
First A ray length	8.43-11.79	8.18-10.06
Last A ray length	4.48- 5.51	5.19- 5.61
Pectoral fin length	3.90- 4.55	4.13- 4.41
Pelvic fin length	2.68- 3.00	2.68- 2.87
Proportions: in head		
Eye diameter	2.27- 3.38	2.49- 2.84
Preorbital length	2.58- 3.53	3.31- 3.60
Proportions: % of SL		
Predorsal (1) length	20.55-32.52	30.23-33.50
Predorsal (2) length	44.38-47.97	46.99-49.16
Preanal fin length	50.05-54.55	54.04-58.37
Prepelvic fin length	21.94-25.42	23.58-25.41
Head length	25.65-37.01	26.34-30.18
Caudal fin length	27.03-31.86	29.45-30.51
Eye diameter	7.88-12.37	9.62-11.58
First D <sub>1</sub> spine length	18.88-45.94	15.14-17.06
Last D <sub>2</sub> ray length	17.90-25.21	16.78-21.11
Last A ray length	18.13-22.31	17.82-23.52
Pelvic fin length	33.29-37.31	34.90-37.26

### Relationships

**Comparison with allied species.** *Synchiropus moyeri* is a member of the *ocellatus*-group of the subgenus *Synchiropus* (*Synchiropus*) (Fricke, 1981: 38). Members of the *ocellatus*-group (sensu stricto) are *S. bartelsi* Fricke, 1981 (Fricke, 1981: 103–106, fig. 32, Philippines and Indonesia; Fricke, 1983: 583–587, fig. 176, also Bismarck Archipelago), *S. morrisoni* Schultz, 1960 (Fricke, 1981: 98–102, fig. 132, Caroline Islands to American Samoa; Fricke, 1983: 630–635, figs. 195–196, also Miyake-jima in Japan, Marshall Islands, Fiji, Western Australia), *S. ocellatus* (Pallas, 1770) (Fricke, 1981: 90–97, figs. 28–29, Okinawa to Vietnam, Philippines, Australia and Tonga; Fricke, 1983: 635–642, fig. 197, also Miyake-jima in Japan, Marquesas Islands, Pitcairn, Marshall Islands), and *S. stellatus* Smith, 1963 (Fricke, 1981: 107–110, figs. 33–34, South Africa to Sri Lanka; Fricke, 1983: 677–681, figs. 209–210, also large male described). Another related species is *Synchiropus ijimai* Jordan et Thompson, 1914 (Fricke, 1981: 88–89, Japan; Fricke, 1983: 599–603, figs. 183–184, also Miyake-jima in Japan).

The closest related species is the sympatric (at Miyake-jima) *Synchiropus ocellatus* (Fig. 3). A total of 17 specimens of *Synchiropus ocellatus* from Miyake-jima (12 males and 5 females) was examined for comparative purposes. Their fin ray counts, preopercular spine formula, and proportions are given in Table 2. *Synchiropus moyeri* is compared morphologically with *S. ocellatus* in Table 3; for details of behavioral and habitat separation see below.

*Synchiropus moyeri* is distinguished from *S. bartelsi* by the preopercular spine formula of usually  $-\frac{1}{1}-1$  (*S. bartelsi* has constantly  $-\frac{2}{2}-1$ ), the much higher first dorsal fin of the male with different proportions and a different color pattern, the red body coloration, and the different color pattern of the body (back with large light areas in *S. bartelsi*), the second dorsal fin, the anal fin, the caudal fin, and the pectoral and pelvic fins. It differs from *S. morrisoni* in its preopercular spine formula ( $-\frac{1}{1}-1$  instead of  $-\frac{2}{2}-1$ ), the different shape and color pattern of the first dorsal fin of both sexes, the dorsal spine filaments in males, and the different coloration of the second dorsal and anal fins, the caudal fin, and the pectoral and pelvic fins. It can be distinguished from *S. stellatus* by the different shape and color pattern of the first dorsal fin in both sexes, the different body color pattern (also color brown in *S. stellatus*), and the different coloration of the second dorsal fin, the anal fin and the caudal fin. Large males of *S. stellatus* have vertical lines in the first dorsal fin, while *S. moyeri* does not have vertical lines there. *Synchiropus moyeri* differs from *S. ijimai* in the different shape, proportions and coloration of the first dorsal fin, in lacking a supraorbital tentacle, lacking an antrorse spine at the base of the preopercular spine, and the different coloration of the second dorsal fin, the anal fin, the caudal fin, the pelvic fin, the head sides, and the body.

**Behavioral isolation from *Synchiropus ocellatus*.** In an attempt to examine the possibility of a behavioral isolating mechanism between *Synchiropus moyeri* and *S. ocellatus*, interactions be-

Table 3. Comparison of morphological characters of *Synchiropus moyeri* sp. nov. and *S. ocellatus*, both from Miyake-jima, Japan.

	<i>S. moyeri</i> sp. nov.	<i>S. ocellatus</i>
Body width in SL	4.2– 5.4	3.7– 5.2
Eye diameter in head	2.2– 3.0	2.3– 3.4
Caudal peduncle depth in SL	9.5–12.0	9.1–11.6
First D <sub>1</sub> spine in SL (male)	1.7– 5.1	2.2– 5.3
Mean total vertebrae number (range 20–21)	20.58	20.80
2nd and 3rd D <sub>1</sub> spines (male)	with short filaments	not filamentous
Body coloration	red	brown
Number of ocelli in D <sub>1</sub> (male)	2 (–3)	(3–) 4 (–6)
Position of ocelli in D <sub>1</sub> (male)	above mid of membranes	in mid of membranes
Large blotches on cheeks	orange	dark brown
Blotches on caudal fin	irregular or in 3–4 vertical bands	in 2 vertical bands

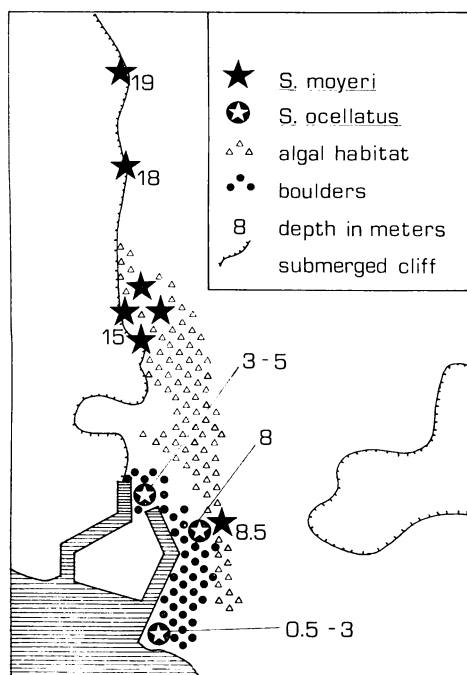


Fig. 4. Distribution of *Synchiropus moyeri* sp. nov. and *S. ocellatus* in Igaya Bay and near Igaya Port, Miyake-jima, Japan, including habitat differences. Numbers shown indicate depths in meters.

tween individuals of both species were observed in an aquarium. One adult of each sex of both species was placed in the aquarium, and a short period of time was allowed for acclimation to confinement. All interactions between individuals were recorded for 60 min during the usual spawning time at dusk. 79.14% of the 163 interactions were among members of the same species. Males of both species interacted significantly more often with conspecific females (91.48% of the 141 male-female interactions) than with females of the other species ( $X_{adj.} = 95.433$ ,  $df=1$ ,  $p<0.001$ ) (statistic follows Sokal and Rohlf, 1981). All of the 12 interspecific male-female interactions were displays that are used in both aggression and courtship. Thus, it was not possible to determine whether the intent of such actions was to initiate spawning or was of a strictly agonistic nature. All 27 spawning rises observed were among conspecifics.

The experiment was repeated with different specimens three times, always with similar re-

sults. It is evident that both species exhibit a strong mate preference for conspecifics, supporting reproductive isolation of the two forms.

#### Habitat separation from *Synchiropus ocellatus*.

Underwater surveys in Igaya Bay, Miyake-jima showed that *Synchiropus moyeri* and *S. ocellatus* occur in different habitat types. *Synchiropus moyeri* has been observed in depths of water of 8.5–19 meters, while *S. ocellatus* is found in shallower waters from about 0.5 m (even moving into the intertidal zone at high tide) to 8 m depth. *Synchiropus moyeri* lives in areas of thick algal growth (predominantly red *Gelidium* sp.) in boulders and rubble, whereas *S. ocellatus* lives among boulders and small rocks with minimal algal cover, and closer to shore than *S. moyeri*. Clusters of either species have never been found to include members of the other species. On one occasion, two small males of *S. moyeri* were found near to but not with *S. ocellatus*. In all other cases, however, individuals were found with members of the same species, and widely separated from areas where the other species occurred (see Fig. 4).

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#### Literature cited

- Fricke, R. 1981. Revision of the genus *Synchiropus* (Teleostei: Callionymidae). J. Cramer, Braunschweig, 194 pp.
- Fricke, R. 1983. Revision of the Indo-Pacific genera and species of the dragonet family Callionymidae (Teleostei). J. Cramer, Braunschweig, x+774 pp.
- Fricke, R. and M. J. Zaiser. 1982. Redescription of *Diplogrammus xenicus* (Teleostei: Callionymidae) from Miyake-jima, Japan, with ecological notes. Japan. J. Ichthyol., 29(3): 253–259.
- Fricke, R. and M. J. Zaiser. 1983. A new cal-



lionymid fish, *Synchiropus kiyoeae*, from the Izu Islands, Japan. Japan J. Ichthyol., 30(2): 122-128.

Nakabo, T. 1983. Revision of the dragonets (Pisces: Callionymidae) found in the waters of Japan. Publ. Seto Mar. Biol. Lab., 27(4/6): 193-259.

Sokal, R. R. and F. J. Rohlf. 1981. Biometry. 2nd ed. W. H. Freeman, San Francisco, 859 pp.

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三宅島から採集されたネズツボ科の新種ミヤケテグリ

Martha J. Zaiser • Ronald Fricke

三宅島から採集された 24 個体の標本に基づいて 1 新種ミヤケテグリ *Synchiropus moyeri* を記載した。本種は三宅島で普通にみられ、広域に分布するコウワンテグリ *S. ocellatus* に形態的に著しく類似している。ミヤケテグリは背鰭や体側の色斑が特殊であるうえ、強い配偶選択性を示し、近似種と完全な生殖的隔離をしている。本種は単独生活をし、雌は狭い行動圏を持ち、5~10 月の間に夕暮れ時に産卵する。

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