



## *Synchiropus sycorax*, a new species of dragonet from the Philippines (Teleostei: Callionymidae)

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### Abstract

*Synchiropus sycorax* n. sp. is described from six specimens (22.6–40.1 mm SL) collected from Jolo Island, Sulu Archipelago, Philippines. It appears to be most closely related to *S. tudorjonesi*, which ranges from the Maldives through Indonesia and the Philippine Islands to southern Japan. The new species differs from *S. tudorjonesi* and other congeners in live coloration: head and body bright red, bright yellow ventrally, with prominent white spots on head (one spot or blotch over preopercular spine, two elongate spots behind middle of eye, and one spot behind upper part of eye at about 1 o'clock position) and body (in three rows, an uppermost row beginning below soft dorsal, tracking lateral line to caudal peduncle, a lowermost row extending from above anterior anal fin to caudal peduncle, and a middle row extending obliquely from above pectoral fin to anterior part of lowermost series of spots); males with pelvic fin and pelvic-pectoral membrane bright yellow with broad bluish or greenish grey to black submarginal band across distal third of fin.

**Key words:** ichthyology; taxonomy; Jolo Island, Sulu Archipelago

### Introduction

The family Callionymidae consists of small, bottom-associated fishes. Many species are brightly coloured and popular as aquarium specimens. One such species from the Philippine Islands is commonly marketed as the ‘ruby dragonet’, but has not been taxonomically described. We herein describe the species and compare it with related species.

Generic placement of the new species is problematic, and we therefore adopt a conservative approach in tentatively assigning it to the genus *Synchiropus* Gill (1859). There are two contrasting generic classifications in use for callionymid fishes. Nakabo (1982) recognised 19 genera, mostly on the basis of osteological and external characters (see Nakabo 1983). Conversely, Fricke (1983) recognised only nine genera, placing the bulk of the species in two genera, *Synchiropus* and *Callionymus* Linnaeus (1758). Although Nakabo’s (1982, 1983) characters and proposed classification have not been critiqued cladistically, we believe his work offers a more realistic starting point for reevaluating the composition and relationships of callionymid genera. The new species agrees with Nakabo’s new genus *Neosynchiropus*, but as noted by Fricke (2002), *Neosynchiropus* Nakabo is unavailable as it is preoccupied by *Neosynchiropus* Nalbant (1980). However, the type species of Nalbant’s genus, *N. bacescuii* Nalbant, was included in *Neosynchiropus* by Nakabo—as *N. marmoratus* (Peters, 1855), a senior synonym (Fricke 2002)—and agrees with his definition of the genus. Therefore, the two nominal genera are synonymous if Nakabo’s classification is accepted. By contrast, however, Fricke (2002: 7) divided species in Nakabo’s *Neosynchiropus* among two separate subgenera of *Synchiropus*: *Neosynchiropus* for species with branched anal-fin rays, and an undescribed subgenus (“*Synchiropus* (subgen. 1)”) for species with unbranched anal-fin rays. The latter subgenus was recently described by Fricke (2016) as *Acommissura* Fricke. Although we assign the new species to *Synchiropus*, we also acknowledge that *Synchiropus* sensu Fricke is unlikely to be monophyletic. We

have not adopted Fricke's subgeneric classification—though the new species agrees well with his subgenus *Acommissura*—in part because recognition of *Acommissura* (diagnosed from *Neosynchiropus* by a single apomorphy: all anal-fin rays unbranched) renders *Neosynchiropus* undiagnosed cladistically. Further cladistic studies are required to clarify genera within the Callionymidae.

## Materials and methods

Methods of counting and measuring mostly follow Nakabo (1982: fig. 1) and Fricke (1981). All measurements were made point to point with digital calipers, recorded to the nearest 0.1 mm. All measurements to the snout tip were to the tip of the snout, excluding the upper jaws (in contrast to Nakabo 1982). Standard length (SL) was measured from the snout tip to the posterior edge of the hypural plate. Head length was measured from the snout tip to the anterior edge of the gill opening. Snout length was measured from the snout tip to the anterior edge of the orbit. Predorsal, preanal and prepelvic lengths were measured from the snout tip to the base of the first ray in each fin. Body depth was measured where greatest. Caudal peduncle depth was the least depth. Caudal peduncle length was measured between the base of the last anal-fin ray and the vertical through the hypural plate at the ventral edge of the caudal peduncle. Pelvic fin length was measured from the base of the fin spine to the tip of the longest ray. Pectoral fin length was the length of the longest ray. Body width was measured at the pectoral-fin bases. Interorbital width was the least fleshy measurement. Eye diameter was the greatest diameter. Preopercular spine length was measured as the length of the exposed portion of the spine. The last 'split-to-the-base' ray in the dorsal- and anal-fin rays was counted as a single ray. Nomenclature of cephalic lateral-line canals follows Nakabo (1982).

Counts are presented first for the holotype, followed where different by frequency distributions or minimum and maximum value ranges for paratypes. Frequency distributions are presented in the form "x fn", where x is the meristic value and n is its frequency. Where bilateral counts are presented, the first count is from the left side. Type specimens are deposited in the Australian Museum, Sydney (AMS), California Academy of Sciences (CAS), National Museum of Natural History, Smithsonian Institution (USNM) and Zoological Reference Collection, National University of Singapore (ZRC).

### *Synchiropus sycorax* n. sp.

Ruby Dragonet

Figures 1–5

**Holotype.** AMS I.47200-001, 39.4 mm SL male, Philippines, Sulu Archipelago, Jolo Island, B. Pagkaliwagan, 29 November 2015.

**Paratypes.** AMS I.47200-002, 26.7 mm SL female; CAS 241566, 34.8 mm SL male; USNM 438956, 35.5 mm SL male; ZRC 54776, 22.6 mm SL female, 40.1 mm SL male (all collected with the holotype).

**Diagnosis.** *Synchiropus sycorax* differs from congeners in the following live coloration details: head and body bright red, bright yellow ventrally, with prominent white spots on head (one spot or blotch over preopercular spine, two elongate spots behind middle of eye, and one spot behind upper part of eye at about 1 o'clock position) and body (in three rows, an uppermost row beginning below soft dorsal, tracking lateral line to caudal peduncle, a lowermost row extending from above anterior anal fin to caudal peduncle, and a middle row extending obliquely from above pectoral fin to anterior part of lowermost series of spots); males with pelvic fin and pelvic-pectoral membrane bright yellow with broad bluish or greenish grey to black submarginal band across distal third of fin.

**Description.** Dorsal-fin rays IV + 8, all segmented rays branched; anal-fin rays 7 (6 f1; 7 f4), final ray branched; pectoral fin rays 20/20 (19 f1; 20 f5; 21 f4), the upper 2/2 (1–3) and lower 1/1 (0–2) rays branched; membrane from pelvic fin connected to pectoral base opposite 3<sup>rd</sup>/5<sup>th</sup> (4<sup>th</sup> to 7<sup>th</sup>) basal-most pectoral ray; pelvic-fin rays I,5; upper unsegmented caudal-fin rays 3; upper unbranched, segmented caudal-fin rays 1; upper branched caudal-fin rays 4; lower branched caudal-fin rays 3; lower unbranched segmented caudal-fin rays 2; lower unsegmented caudal-fin rays 2; total caudal-fin rays 15. Preopercular spine with two dorsally directed serrations, a terminal tip, and no antrorse processes or serrations ventrally (Figure 4).

Morphometric values are summarized in Table 1.

**TABLE 1.** Morphometric values for *Synchiropus sycorax* new species, expressed as percentages of SL.

	Holotype	Paratypes				
	AMS I.47200-001	ZRC 54776	AMS 1.47200-002	CAS 241566	USNM 438956	ZRC 54776
Sex	male	female	female	male	male	male
SL	39.4	22.6	26.7	34.8	35.5	40.1
Head length	29.2	33.2	28.5	28.4	28.5	29.0
Snout	6.3	5.8	6.4	5.7	5.9	7.2
Eye diameter	9.9	12.4	12.0	10.3	10.1	9.7
Body width	22.6	21.7	25.8	24.4	23.7	23.0
Interorbital width	2.0	2.2	2.6	2.0	2.3	2.5
Body depth	21.8	19.0	18.4	21.6	18.0	19.5
Predorsal 1	34.0	36.3	37.1	33.9	31.5	30.4
Predorsal 2	47.2	53.5	54.7	49.1	49.0	47.6
Prepelvic	23.1	26.5	30.0	24.4	25.9	25.2
Preanal	51.0	62.3	62.2	55.5	58.9	51.9
Caudal peduncle depth	12.2	12.0	10.4	10.9	10.7	12.0
Caudal peduncle length	19.3	17.7	15.4	19.5	19.7	16.7
1 <sup>st</sup> dorsal spine	47.5	13.3	13.5	49.7	53.2	45.9
2 <sup>nd</sup> dorsal spine	44.4	15.0	14.6	48.3	51.5	45.9
3 <sup>rd</sup> dorsal spine	46.2	14.2	13.9	45.4	48.5	45.4
4 <sup>th</sup> dorsal spine	40.6	8.8	9.4	41.1	43.1	39.7
1 <sup>st</sup> dorsal ray	18.5	17.7	19.5	20.4	21.4	17.2
Last dorsal ray	21.3	18.6	18.0	23.9	28.5	21.7
1 <sup>st</sup> anal ray	8.1	11.1	9.0	9.5	12.1	7.2
Last anal ray	23.6	20.4	18.7	23.9	26.8	21.2
Pectoral	27.2	23.5	24.0	25.0	26.8	25.4
Pelvic	37.3	34.5	39.3	34.8	40.3	35.2
Caudal	31.2	28.7	31.8	32.8	32.4	27.4
Preopercle spine	7.9	12.0	7.9	8.0	7.3	7.7

Cephalic lateral-line system (Figure 4): infraorbital canal short, reaching only posteroventral edge of eye; postocular canal not connecting with preoperculomandibular canal; preoperculomandibular canal disjunct, consisting of four short sections, the dorsal-most spanning the preopercular spine base, and the lowermost just behind and below the corner of the mouth (terminal pore between preopercle and retroarticular); remainder of cephalic lateral-line system typical of *Neosynchiropus* sensu Nakabo (see Nakabo 1982: fig. 24B). Lateral line on body single, extending along dorsal part of body to about basal one quarter to one third of caudal fin, running along dorsal edge of lowermost ray on upper part of fused hypural complex; no dorsal commissure connecting lateral lines on caudal peduncle.

Colour in life. Males (Figures 1–2) head and body bright red, bright yellow ventrally; head with large prominent white markings, including a spot or blotch over preopercular spine, two elongate spots behind middle of eye, and one spot behind upper part of eye (at about 1 o'clock position); additional small white spots may be present, scattered over the head; dorsal edge of snout and lips often white; small black spots present behind lower part of eye (at about 4 o'clock position), sometimes merging into oblique bar; small blue spots often on lower part of head within yellow area; eyes bright red, usually with small white spots; prominent large white spot on dorsal part of body, just behind termination of first dorsal fin; body with three rows of enlarged white spots, an uppermost row beginning below soft dorsal, tracking lateral line to caudal peduncle, a lowermost row extending from above

anterior anal fin to caudal peduncle, and a middle row extending obliquely from above pectoral fin to anterior part of lowermost series of spots; small black spot on upper part of caudal peduncle just in front of caudal-fin base; remainder of body with additional rows of smaller white spots, and often smaller scattered black spots; first dorsal yellow to yellow-brown with 5–9 black, curving stripes (increasing in number with size of specimen), the lowermost 1–4 broken into spots, and uppermost often restricted to last interradial membrane; stripes edged narrowly with pale blue, followed by black; second dorsal fin with red rays, fin membranes red, becoming reddish grey to black posteriorly, crossed by 2–3 yellow stripes; yellow stripes edged narrowly with black, followed by blue; anal fin bluish grey, often with stippled with fine black spots, and sometimes with yellow basally with dark grey spots, the distal tips of rays sometimes striped red and white; caudal fin rays red, finely striped with white or blue; caudal-fin membranes hyaline, often with blue spots; 1–2 prominent black spots on upper 1–2 rays on lower lobe of caudal fin; pelvic fin and pelvic-pectoral membrane bright yellow with broad bluish or greenish grey to black submarginal band across distal third of fin; basal two thirds of fin and pelvic-pectoral membrane with variously developed reddish grey to black spots, and small blue to white spots; pectoral fin base with large yellow-brown to black spot, edged posteriorly and sometimes dorsally with white to pale blue; pectoral fins yellowish hyaline with closely spaced red bars, breaking into spots proximally. Females (Figure 3) similar to males, except: first spine of first dorsal fin red, the remainder of fin black with pale blue to white distal margin; second dorsal fin hyaline with red rays, red stripes through middle and distal part of fin, reddish grey to black on base of fin, and scattered white spots; anal fin with yellow rays, yellowish hyaline to hyaline membranes, and scattered white to pale blue spots; pelvic fins without broad submarginal grey to black band.

Colour in alcohol. Similar to live coloration; dark grey to black markings and white markings remain; red markings become pale reddish brown; yellow markings become pale tan.



**FIGURE 1.** *Synchiropus sycorax*, new species, male holotype when freshly dead, AMS I.47200-001, 39.4 mm SL, Jolo Island, Sulu Archipelago, Philippines (Y.K. Tea).

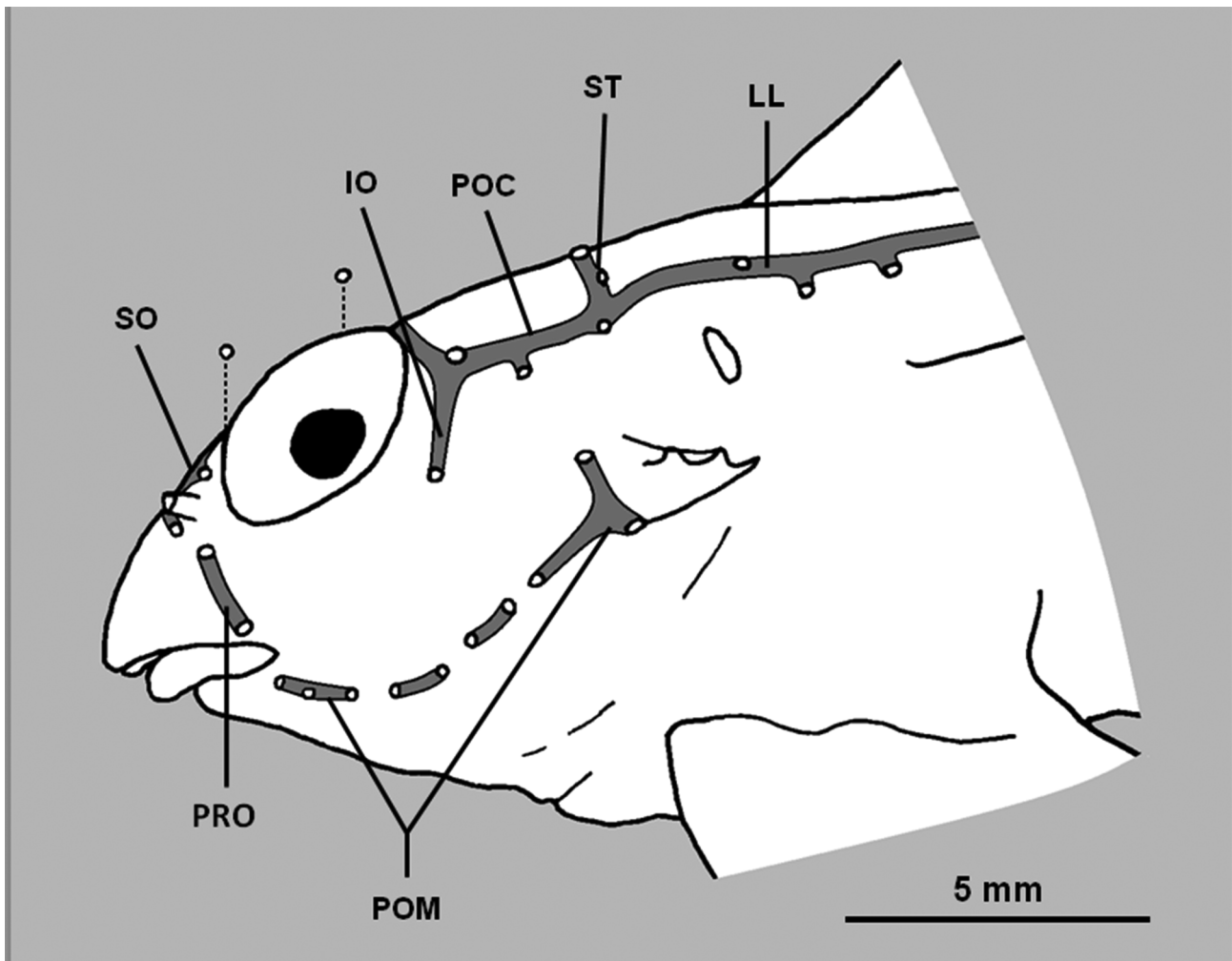




**FIGURE 2.** *Synchiropus sycorax*, male paratype in an aquarium, ZRC 54776, 40.1 mm SL, Jolo Island, Sulu Archipelago, Philippines (Y.K. Tea).



**FIGURE 3.** *Synchiropus sycorax*, female, aquarium specimen from Jolo Island, Philippines. Specimen not retained; approximately 20 mm SL (Y.K. Tea).



**FIGURE 4.** *Synchiropus sycorax*, holotype, AMS I.47200-001, 39.4 mm SL; diagram showing cephalic sensory pores. Abbreviations: IO, infraorbital canal; LL, lateral line canal; POC, postocular canal; POM, preoperculo-mandibular canals; PRO, preorbital canal; SO, supraorbital canal; ST, supratemporal canal. Dashed lines indicate positions of unpaired, median supraorbital pores.

**Distribution and habitat.** *Synchiropus sycorax* is currently known only from Jolo Island, Sulu Archipelago, Philippines (Figure 5). According to B. Shutman (pers. comm.) it occurs at depths of 20–38m in areas of broken coral rubble interspersed with outcrops of soft and stony corals.

**Etymology.** The species is named after the red-robed and caped Sycorax warriors from the BBC sci-fi series *Dr. Who*, in showing similarities in both coloration and grandiloquence of their garb. The epithet *sycorax* is a noun in apposition.

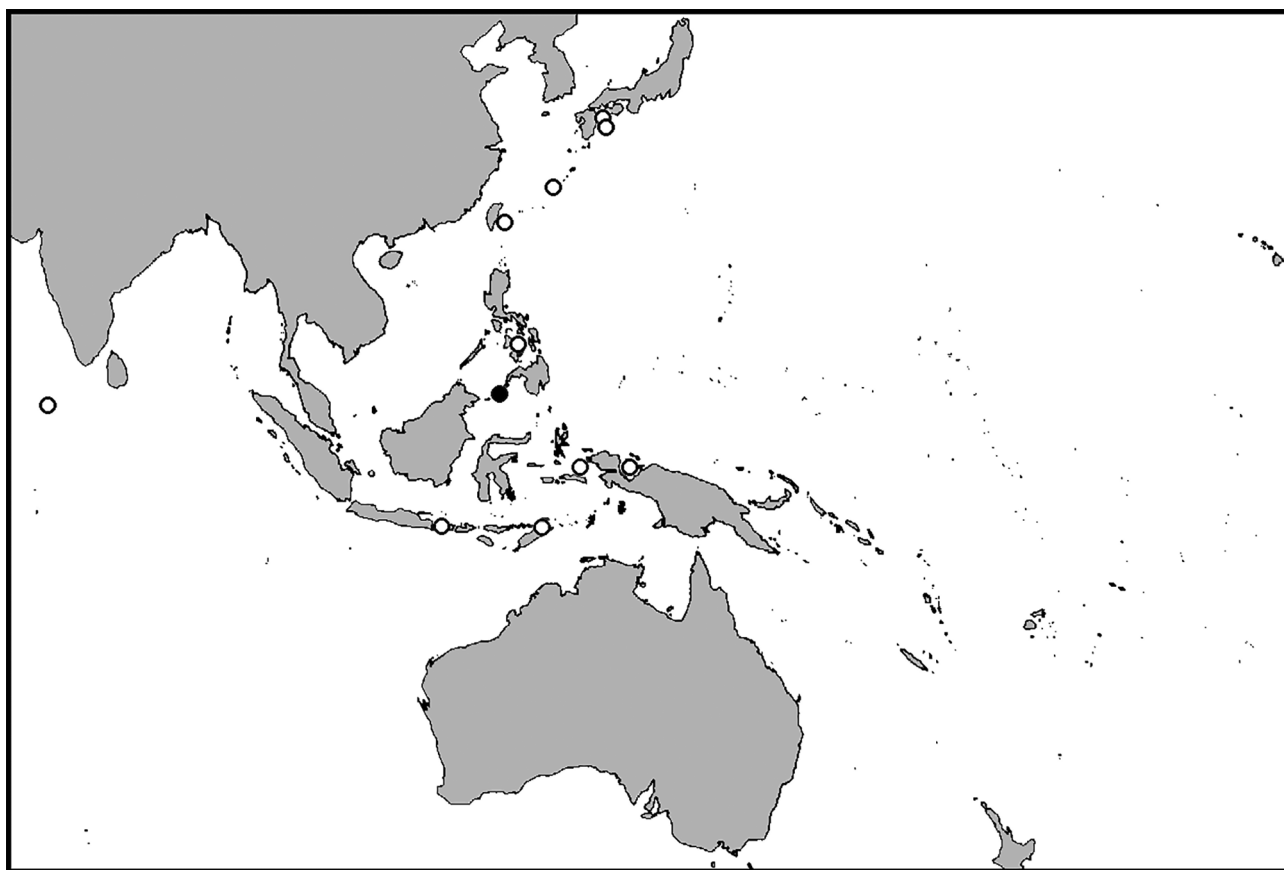
**Comparisons.** The new species agrees with Fricke’s (2016) definition of *Synchiropus* (*Acommisura*) in fin-ray counts, branched second dorsal-fin rays, unbranched anal-fin rays, preopercular spine shape and in lacking a lateral-line commissure on the dorsal surface of the caudal peduncle. Aside from minor details (such as the degree of development of the caudal-fin lateral line), *S. sycorax* differs from Nakabo’s account for *Neosynchiropus* in having the preopercular part of the laterosensory system fragmented into four short portions (cf. Figure 4 with Nakabo 1982: fig. 24B).

*Synchiropus sycorax* appears to be closely related to *S. tudorjonesi* Allen and Erdmann (2012a; Figures 6–7) — which it resembles in general coloration — and keys to that species using Fricke’s (2016) key to species of the subgenera *Neosynchiropus* and *Acommisura*. Allen and Erdmann’s original description of *S. tudorjonesi* is erroneous in recording eight spines in the first dorsal fin and all unbranched rays in the second dorsal fin. The first dorsal spine count was corrected (without comment) to four by Allen and Erdmann (2012b), but no mention was

made of branching in the second dorsal fin. However, it is apparent from their photographs of the type specimens that all second dorsal-fin rays are branched. The two species may be distinguished by details of their colour pattern. In particular, *S. tudorjonesi*: lacks the prominent white markings on the head; has less conspicuous white markings on the body; has a less intense red coloration; is at most dusky yellow on the lower head (versus bright yellow); has a prominent dark grey to black stripe or series of large blotches laterally on the body; and has distinct banding on the caudal-fin membranes. Males of *S. tudorjonesi* differ further in pelvic-fin coloration, particularly in lacking the broad, dark submarginal band.

*Synchiropus sycorax* and *S. tudorjonesi* probably differ in the construction of the first dorsal fin of males, though further samples are needed for more detailed comparison. In *S. sycorax* the first dorsal-fin spine is longest, measuring 45.9–53.2 % SL in the four available males (34.8–40.1 mm SL). By contrast, the third spine is longest in *S. tudorjonesi*, 23.9 % SL in the 35.5 mm SL male holotype and about 35 % SL in the approximately 50 mm SL male in Figure 6.

The two species overlap in the Philippines, but *S. tudorjonesi* is more widely distributed (Figure 5). Allen and Erdmann (2012a) described *S. tudorjonesi* from Cenderwasih Bay, West Papua Province, Indonesia, but noted that it had been photographed in Bali, Indonesia and recorded as “*Synchiropus cf. morrisoni*”, by Kuitert & Tono-zuka (2001). G.R. Allen (pers. comm.) has also collected the species in Misool and Timor Leste. We confirm the Bali record on the basis of aquarium specimens (Figures 6, 7) and an additional photograph in the Database of Fishes in the Kanagawa Prefectural Museum of Natural History (KPM-NR 66457). Additional photographic records extend its range northward to Green Island, Taiwan (B. Greene, pers. comm.), the Ryukyu Islands and southern Japan (Okinawa - KPM-NR 76022; Sukomo Bay - KPM-NR 96608, KPM-NR 92462, KPM-NR 95820), and westward to the Maldives (Randall 1997).



**FIGURE 5.** Distribution map showing locality records for *Synchiropus tudorjonesi* (open circles) and *S. sycorax* plus *S. tudorjonesi* (filled circle).





**FIGURE 6.** *Synchiropus tudorjonesi*, male aquarium specimen, collected from Bali, Indonesia. Specimen not retained; approximately 50 mm SL (Y.K. Tea).



**FIGURE 7.** *Synchiropus tudorjonesi*, female aquarium specimen, collected from Bali, Indonesia. Specimen not retained; approximately 35 mm SL (Y.K. Tea).



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