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First record of *Satyrichthys moluccensis* (Bleeker, 1850) (Actinopterygii: Teleostei: Peristediidae) from Samoa, the Central Pacific

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ABSTRACT

A single specimen of the peristediid genus *Satyrichthys* Kaup, 1873 collected from off Samoa was identified as *Satyrichthys moluccensis* (Bleeker, 1850). The species had been known from Japan, East China Sea, South China Sea, Indonesia, New Guinea, Australia, Chesterfield Islands and New Caledonia. This report is the first record of the species from Samoa, approximately 3,000 km east of the previous easternmost record from New Caledonia. We include a detailed morphological description of the specimen and found a very long pectoral-fin length in this Samoan specimen (27 % SL) versus others (18–24). This Samoan specimen is the largest known (506 mm SL).

Key Words: distribution, peristediid, Oceania, intraspecific variation, armored searobin

INTRODUCTION

The Indo-Pacific genus *Satyrichthys* Kaup, 1873 (Peristediidae [armored searobins]) is characterized as follows: no teeth in upper jaw; lateral margin of head smooth; posterior parts of bony plates in lower lateral row separated from each other; only posteriormost lip and chin barbels branched (*S. clavilapis* Fowler, 1938 and *S. moluccensis* (Bleeker, 1850) lacking chin barbels); fewer than 20 dorsal-fin rays; and fewer than 20 anal-fin rays (Kawai, 2008, 2013). *Satyrichthys* comprises seven valid species, *i.e. S. clavilapis* Fowler, 1938, *S. laticeps* (Schlegel, 1852), *S. longiceps* (Fowler, 1943), *S. milleri* Kawai, 2013, *S. moluccensis* (Bleeker, 1850), *S. rieffeli* (Kaup, 1859) and *S. welchi* (Herre, 1925). In the congeners, *S. laticeps*, *S. milleri*, *S. moluccensis*, *S. rieffeli* and *S. welchi* have been recorded from the Oceanic region (del Cerro and Lloris, 1997; Kawai, 2013; Fricke *et al.*, 2019), but the remains of the congeners are restricted in the western central Pacific (Kawai, 2013).

A single specimen of *Satyrichthys* was collected from Samoa (Figure 1) and is identified as *S. moluccensis*. This species has never been known from Samoa. Therefore, we report this species as the first record from Samoa and provide a detail morphological description of it.

MATERIALS AND METHODS

Counts and proportional measurements follow Kawai (2013). All measurements were made to the nearest 0.1 mm with digital calipers and vernier calipers. Terminology for bony plates, barbels and cranial spines follow Yatou and Okamura (1985) and Miller (1967), respectively. Standard length is abbreviated as SL. Examined specimens are deposited in the following collections: Kochi University, Kochi, Japan (BSKU); Hokkaido University Museum, Hakodate, Japan (HUMZ); Museum Zoologicum Bogoriense, Cibinong, Indonesia (MZB); National Museum of Nature and Science, Tsukuba, Japan (NSMT); Osaka Museum of Natural History, Osaka, Japan (OMNH); Naturalis Biodiversity Center, Leiden, Netherlands (RMNH); Seikai National Fisheries Research Institute, Nagasaki, Japan (SNFR); Florida Museum of Natural History, University of Florida, Gainesville, USA (UF); Fish Collection of Ryukyu University (URM) deposited at the Research Center, Okinawa Churashima Foundation, Kunigami, Japan.

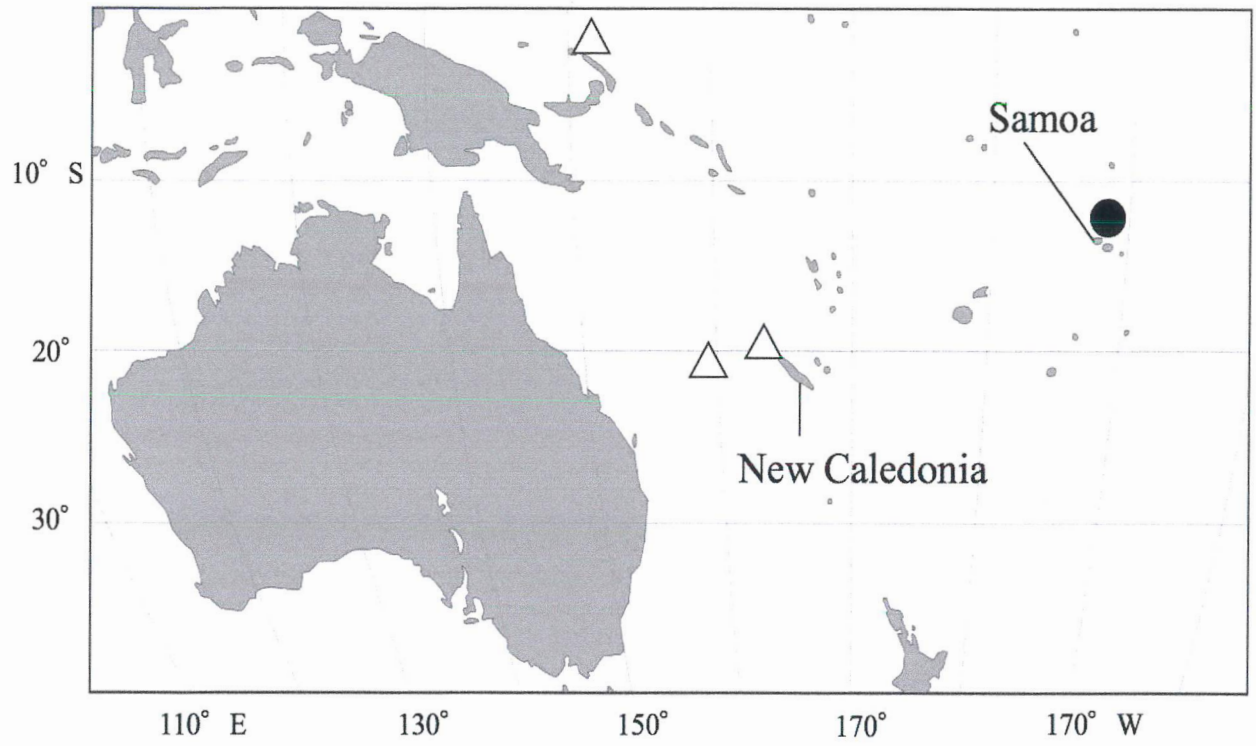


Figure 1. Distribution records of *Satyrichthys moluccensis* in Oceanian islands, based on present specimen from Samoa (circle) and previous records (triangles: del Cerro and Lloris, 1997; Fricke *et al.*, 2019).

***Satyrichthys moluccensis* (Bleeker, 1850)**
(Figure 2)

Diagnosis. A species of *Satyrichthys* with three lip and zero (rarely two) chin barbels; no dusky spots on head and body; antrorse spines on upper lateral bony plates of caudal peduncle; equal parietal bones in size of both sides on dorsal midline (Kawai, 2013).

Materials examined. UF 182813, 1 specimen, 506 mm SL, 5 miles north of Upolu, Samoa, 8 July 1987.

Description. Proportional measurements (% SL) and counts are listed in Tables 1, 2.

Body fusiform, covered with bony plates except eyes, ventral side of head, isthmus, pharynx, anus and all fins. The depth highest in front of dorsal-fin origin, decreasing to caudal peduncle. Head large, more depressed than body. Perifacial rim smooth. Rostral projections short and flat with rounded tips, interspace between both projections narrower anteriorly. Mouth large and inferior. Posterior margin of upper jaw anterior to anterior margin of orbit. Posterior margin of lower jaw just below anterior margin of orbit. Teeth on both jaws absent. Lip barbels three, anterior two not branched and posteriormost one (= filamentous barbel) extending, branched into five in left side and six in right side. Chin barbels absent. Interorbital space concaved. Nasal spine beside nostril small, directed upward. Mesethmoid spine slightly larger than nasal spine. Preocular spine as large as nasal spine, directed lateral upward. Frontal spine small with ridge. Parietal bones of each side equal in size on midline, with strong and large spine. Posttemporal spine small with strong ridge. Preopercular spine strong, the largest in cranial spines. Opercular spines two, lower spine large with strong ridge.

Bony plates on body arranged 4 rows. Each plate with single distinct spine directed backward except plates in dorsal row around caudal peduncle and before anus. Antrorse spine present on the 23rd to 31st bony plates in upper lateral row.

Dorsal fin originating just behind of first bony plate in dorsal row and ending at the 22nd bony plate in dorsal row. Anal fin originating just behind of second bony plate in ventral row and ending at the 18th bony plate in ventral row. Two detached pectoral-fin rays thick, upper ray longer than lower. When paired fins depressed, posterior tips of pectoral and pelvic fins posterior to anal-fin origin and slightly anterior to anus, respectively. Caudal fin small and truncate.

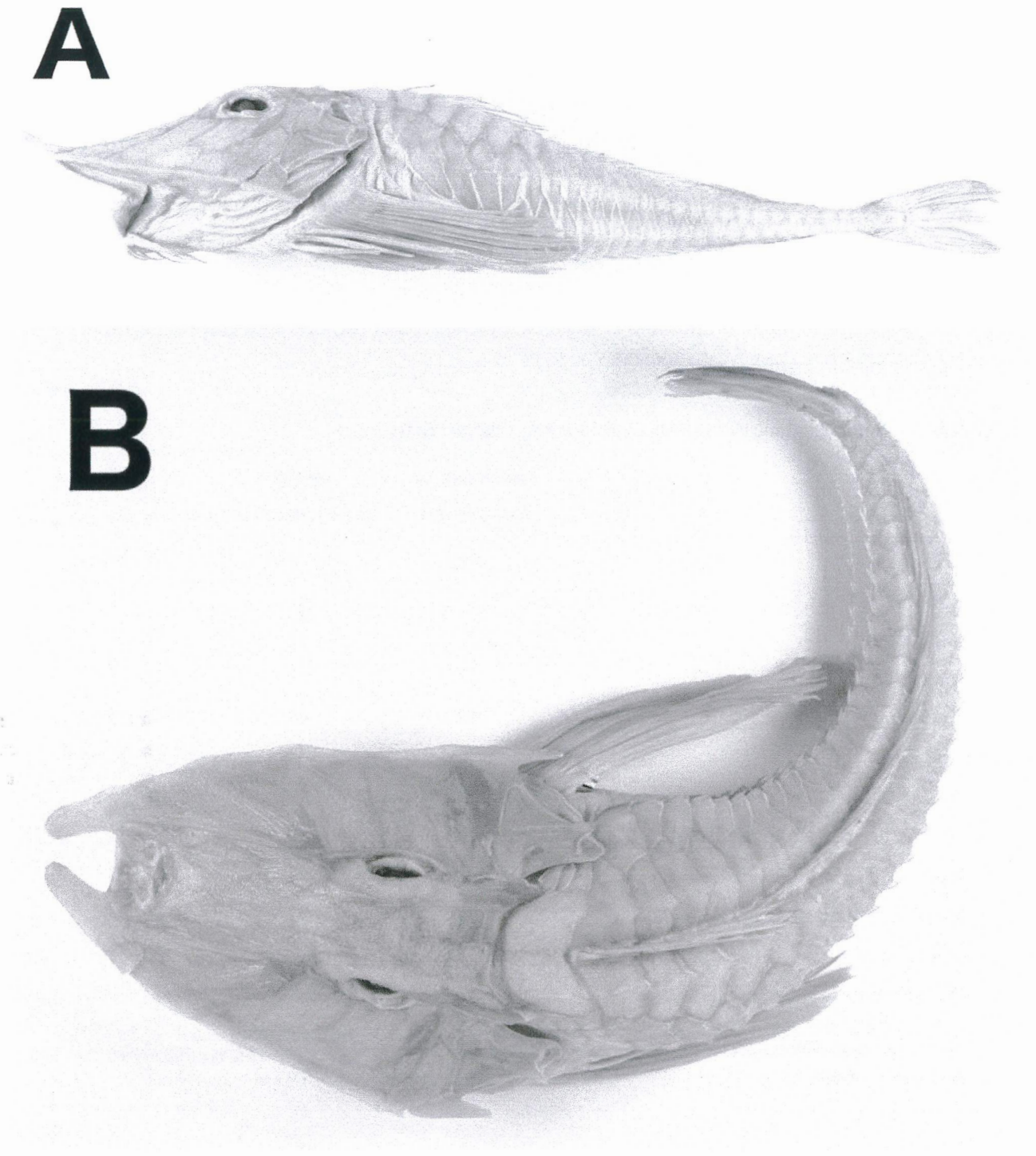


Figure 2. *Satyrichthys moluccensis*, UF 182813, 506 mm SL, 5 miles north of Upolu, Samoa. A, lateral view; B, dorsal view.

Color in alcohol. Dorsal side of head, and bony plates of body yellowish brown. Ventral side of head, anus and all fins uniformly beige and lacking spots.

Distribution. Japan, East China Sea, South China Sea, Indonesia, New Guinea, Australia, Chesterfield Islands, New Caledonia and Samoa (del Cerro and Lloris, 1997; Richards, 2000; Kawai, 2013; Fricke *et al*., 2019; present study).

Remarks. The present specimen is identified as *Satyrichthys moluccensis* in having the following

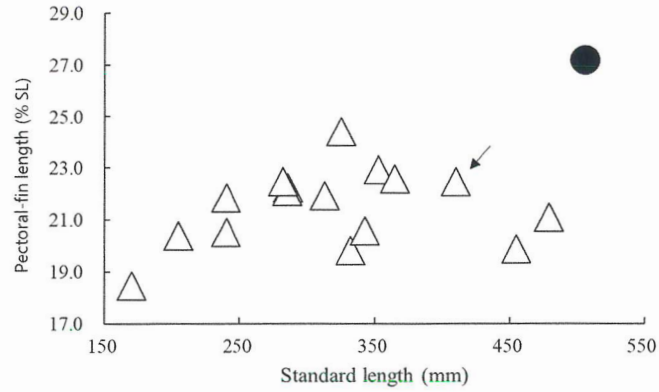


Figure 3. Comparison of pectoral-fin length in *Satyrichthys moluccensis* between present specimen from Samoa (circle) and others (triangles). Arrow indicates neotype.

Table 1. Proportional measurements of *Satyrichthys moluccensis*.

	present specimen	neotype	others
	UF 182813	RMNH.PISC. 2157	n=16
SL (mm)	506	ca. 410	170–480
Measurements (% SL)			
Body depth	21	15	16–21
Body width	17	18	13–18
Head length	40	40	40–43
Head depth	20	14	16–20
Head width	30	29	26–35
Distance from snout to dorsal fin	40	37	37–41
Distance from snout to anal fin	58	Broken	52–58
Distance from snout to anus	54	52	46–53
Snout length	22	21	20–24
Rostral projection length	6	Broken	6–9 (n=12)
Longest barbel length	16	Unmeasured	12–24 (n=14)
Upper jaw length	17	16	15–18 (n=14)
Lower jaw length	15	15	15–17 (n=14)
Orbital diameter	7	8	8 (n=15)
Interorbital width	8	8	7–9 (n=13)
Pectoral-fin length	27	22	18–24 (n=15)
Length of upper detached pectoral-fin ray	14	Unmeasured	13–20 (n=15)
Length of lower detached pectoral-fin ray	11	Unmeasured	11–16 (n=15)
Pelvic-fin length	20	17	18–20 (n=15)
Length of first dorsal spine	6	9	7–11 (n=15)
Caudal peduncle length	9	Broken	8–13 (n=14)
Caudal peduncle depth	3	3	3 (n=14)

characters, lip barbels 3, chin barbels absent, parietal bones of each side equal in size on midline and antrorse spines present on upper lateral row of posterior bony plates (Kawai, 2013). Most meristic characters and measurements correspond to those of comparative specimens, although only the pectoral-fin length of the present specimen is longer than that of the others (27.1 % SL vs. 18–24; Figure 3). Therefore, this difference is regarded as an intraspecific variation of this species, and the present specimen is identified as *S. moluccensis*. The present specimen (506 mm SL) is the largest record in this species compared with previous records (77.3–487 mm SL: del Cerro and Lloris, 1997; Kawai, 2013; Fricke *et al.*, 2019).

Satyrichthys moluccensis had been reported from Japan, East China Sea, South China Sea, Indonesia, New Guinea, Australia, Chesterfield Islands and New Caledonia (del Cerro and Lloris, 1997; Richards, 2000; Kawai, 2013; Fricke *et al.*, 2019). Therefore, the present specimen is the first record of the species from Samoa in Polynesia, approximately 3,000 km east of the previous easternmost record from New Caledonia (Figure 1).

Comparative specimens. *Satyrichthys moluccensis*: BSKU 10108, 1 specimen, 332 mm SL, Okinawa-jima, Japan, Nov. 1961; BSKU 29614, holotype of *Satyrichthys isokawae* Yatou and Okamura, 1985 (treated as a junior synonym of *S. moluccensis* in del Cerro and Lloris, 1997 and Kawai, 2013), *ca.* 286 mm SL, Okinawa Trough (25°45'N, 124°4'E), 220 m depth, 21 Sep. 1979; BSKU 94699, 1 specimen, 240 mm SL, Tosa Bay, off Aki, Shikoku, Japan, 29 Apr. 2008; BSKU 100536, 1 specimen, 285 mm SL, Mimase Fish Market, Kochi, Shikoku, Japan, 19 Oct. 2009; HUMZ 146630, 1 specimen, 343 mm SL, East China Sea (25°37.28'N, 126°5.35'E to 25°38.12'N, 126°7.83'E), 394–388 m depth, 2 Aug. 1994; HUMZ 212426, 1 specimen, 170 mm SL, East China Sea (27°45.0'N, 126°12.0'E), 218 m depth, 2 June 2011; MZB 719, 2 specimens, *ca.* 325–383 mm SL, Banda Sea, 1909; NSMT-P 92819, 1 specimen, 480 mm SL; NSMT-P 92820, 1 specimen, 353 mm SL; NSMT-P 92821, 1 specimen, 282 mm SL, off Western Australia (24°1.2'S, 112°30.6'E), 420 m depth, 6 Nov. 1975; OMNH-P 33763, 1 specimen, 455 mm SL, East China Sea (31°23'N, 129°50'E), 350 m depth, 24 Sep. 2007; RMNH.PISC. 2157, neotype, *ca.* 410 mm SL, Ambon, Indonesia, 1880; RMNH.

Table 2. Counts of *Satyrichthys moluccensis*.

	present specimen	neotype	others
	UF 182813	RMNH.PISC. 2157	n=16
Counts			
Dorsal-fin spines	7	7	7
Segmented dorsal-fin rays	17	18	17–18
Anal-fin rays	17	Broken	17–19
Pectoral-fin rays (including two detached rays)	16	17	15–18
Bony plates in dorsal row	28	27	26–28
Bony plates in upper lateral row	33	33	31–34
Bony plates in lower lateral row	22	21	20–23
Bony plates in ventral row	23	23	22–25
Bony plates before anus	2	2	2 (rarely 3)
Upper gill rakers	4	Uncounted	3–6
Lower gill rakers	15	Uncounted	15–18
Barbels (lip + chin)	3+0	3+0	3+0 (rarely 3+2)

PISC. 5937, 1 specimen, 365 mm SL; SNFR 13399, 1 specimen, 205 mm SL, East China Sea (27°46.76'N, 126°12.19'E to 27°45.20'N, 126°12.21'E), 192–215 m depth, 2 June 2008; SNFR 14218, 1 specimen, 240 mm SL, East China Sea (30°34.68'N, 127°50.47'E to 30°40.47'N, 127° 51.85'E), 231–206 m depth, 16 Aug. 2008; URM-P 1256, 1 specimen, 313 mm SL, Okinawa-jima, Japan.

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