

New record of the Armored Gurnard *Satyrichthys laticeps* (Schlegel, 1852) (Scorpaeniformes: Peristediidae) from Java South Sea (Eastern Indian Ocean)

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Abstract. Andeimida A, Wiadnya DGR, Hardiyan FZ. 2022. New record of *Satyrichthys laticeps* (Schlegel, 1852) (Scorpaeniformes: Peristediidae) from Java South Sea (Eastern Indian Ocean). *Indo Pac J Ocean Life* 6: 74-79. Armored gurnard *Satyrichthys laticeps* (Schlegel, 1852) was originally described by H. Schlegel in 1852 based on a specimen collected by E. A. Forsten from Ambon. *S. laticeps* belongs to the family Peristediidae and is known to be the fourth oldest peristediid fish ever described after *Peristedion cataphractum* (Linnaeus, 1758), *P. orientale* Temminck & Schlegel, 1843, and *S. moluccensis* (Bleeker, 1850). *S. laticeps* is known to have a wide distribution in temperate and tropical Indo-Pacific, but its records in Indonesian waters are still very limited. So far, only three recorded specimens of *S. laticeps* have been collected from Indonesian waters. A single *Satyrichthys* specimen was collected from a market vendor at Pondokdadap Fishing port in November 2022 and preserved under the PDD 2211-01 (341 mm SL) label. Based on its morphometrical characteristics and measurements, the specimen of *Satyrichthys* found in Pondokdadap was characterized as *S. laticeps* by examining the possession of the antrorse spines on the caudal peduncle, four lip barbels, and two chin barbels on each side of the head, asymmetrical parietal bones, and no distinct markings on the dorsal fin. This study provides a new record of *S. laticeps* existence in the Java South Sea after a single specimen was collected from off the south coast of Java and Bali, Indonesia (BMNH 1987.1.23.73, 291 mm SL) in 1987.

Keywords: Eastern Indian Ocean, Java south sea, a new record, Peristediidae, *Satyrichthys*

INTRODUCTION

The armored gurnard genus *Satyrichthys* can be separated from its relatives by the absence of teeth on the upper jaw, a long preopercular spine that visible from dorsal view, smooth lateral side of the head, and soft fin rays of dorsal and anal fin that fewer than twenty (Carpenter and Niem 1999; Kawai 2008). There are currently seven recognized species of *Satyrichthys*, which are; *Satyrichthys rieffeli* (Kaup, 1859), *S. moluccensis* (Bleeker, 1850), *S. laticeps* (Schlegel, 1852), *S. welchi* (Herre, 1925), *S. clavilapis* Fowler, 1938, *S. longiceps* (Fowler, 1943), and the recently described *S. milleri* Kawai, 2013 (Kawai, 2013; Higuchi and Kawai 2020). Six of seven extant species from the *Satyrichthys* genus are recorded to inhabit Indonesian Waters, except for *S. welchi* that has never been recorded from Indonesian Waters (Kawai 2013).

Satyrichthys laticeps was described as *Peristedion laticeps* by Schlegel (1852) based on a specimen collected by Forsten at Ambon Island (van Oijen et al. 2013). *S. laticeps* is among the earliest member of peristediid fishes that have been described, after the *Peristedion cataphractum* (Linnaeus, 1758), which was originally described as *Trigla cataphracta* Linn. *P. orientale* Temminck & Schlegel, 1843, and *S. moluccensis* (Bleeker, 1850), making it the fourth oldest peristediid fishes ever

recorded by the date of the first description of the species (Schlegel 1852; van Oijen et al. 2013). *S. laticeps* is a deep sea species known to inhabit temperate and tropical waters with depths of 58–300 m (Kawai 2013). It also has the most widespread distribution in Indo-Pacific, which is present in both the Indian and Pacific Oceans (Kawai 2013; Pogoreutz et al. 2014; Kawai et al. 2017). However, the information on the distribution of most peristediid fishes is very limited and poorly understood (Pogoreutz et al. 2013). Currently, a total of 53 *S. laticeps* specimens have been recorded. Three originate from Indonesian Waters, two from Ambon, and one from off the south coast of Java and Bali (Kawai 2013). Additionally, a study conducted on the deep sea of West Java has successfully recorded another *Satyrichthys* species, namely *S. clavilapis* and *S. moluccensis*, in Indonesian Waters (Ho et al. 2021).

The information on the deep sea fishes that inhabit below 200 m in depth is still very limited, whereas the deep sea off southern Java is presumed to have a high diversity of marine deep-sea fishes (Ho et al. 2021). The most recent survey on the deep-sea fishes community in South Java (Eastern Indian Ocean) is the South Java Deep-Sea (SJADES) Biodiversity Expedition that was conducted in 2018 by a joint team of researchers from Indonesia and Singapore that successfully describes 222 species from 54 families (Ho et al. 2021). These records also include two recently described species, *Platygiopsis hadiatyae* and

Chelidoperca favolineata (Matsunuma et al. 2019; Larson et al. 2020). Deep sea surveys increasingly provide valuable data on representing the deep-sea fish community, but their main challenges are the high cost and effort incurred in every survey and collection (Shao et al. 2014). However, the marine fish diversity information collected from the fish markets is mostly overlooked (Situ & Sadovy 2004). In Indonesia, several taxonomical breakthroughs have originated from fish market surveys, from the discovery of *Latimeria menadoensis* Pouyaud et al. 1999 in Sulawesi to the discovery of two new species of shovel-nose sharks *Rhinobatos jimbaranensis* Last et al. 2006 and *R. penggali* Last et al. 2006 from Bali, all originated from specimens collected from the fish market (Wirjoatmodjo & Tjakrawidjaja 2002; Last et al. 2006). The Indonesian part of the Eastern Indian Ocean, which borders the islands of Java, Bali, and Nusa Tenggara, is known to have a very high concentration of fishing ports which falls under the Indonesian Fisheries Management Zone (id: Wilayah Pengelolaan Perikanan/WPP) number 573 and is known to have a high diversity of marine fishes species, including the deep-sea fishes (White et al. 2013).

This study reports a new record of *S. laticeps* based on one specimen collected from the Pondokdadap fishing port market in South Malang. However, this species is known to inhabit Indonesian Waters, and the detailed distribution of this species is very little known. Therefore, the specimen found in this study represents a new confirmed record of *Satyrichthys laticeps* from Java South Sea, Eastern Indian Ocean.

MATERIALS AND METHODS

Pondokdadap fishing port is administratively located in Dusun Sendang Biru, Desa Tambakrejo, Kecamatan

Sumbermanjing Wetan, Malang, East Java Province, Indonesia (Dwiyanto et al. 2019). The geographical position of Pondokdadap fishing port is 8°26'02.1 "S 112°40'56.6 "E. Pondokdadap fishing port is one of the most important tuna fishing bases in Java South Sea (Budianto et al. 2021). The majority of the fishing vessels of Pondokdadap fishing port operate at more than 12 nautical miles, with the dominant catch composed mainly of the Scombridae family with a small portion of fish from Coryphaenidae, Istiophoridae, Xiphiidae, and Carangidae, and occasional bycatch from Gempylidae, Lampridae, Molidae, and Mobulidae family (Wiadnya et al. 2019; Budianto et al. 2021).

The specimen of *Satyrichthys* sp. was collected opportunistically from a market vendor at Pondokdadap fishing port's fish market in November 2022. The exact origin of the specimen is uncertain, but the fishermen that caught the fish stated the fish caught on less than twelve miles offshore from Pondokdadap fishing port. A single specimen was temporarily preserved in the freezer and deposited at the Pondokdadap fishing port's office, labeled as PDD 2211-01. The morphometric measurements and counts of the specimen were made following Kawai (2013). All the measurements are measured using metal caliper and reported as a percentage of standard length (%SL), while the standard length is stated in millimeters. The morphological description of the specimen was in agreement with the morphological characteristics of *Satyrichthys* following Kawai (2008), who stated that the defining features consist of: No teeth on the upper jaw; lateral margin (side) of head smooth; rear scutes of lower lateral rows of bony plates are separated; only the rearmost lip and chin barbels are branched (chin barbels absent in some species), and the dorsal and anal fin has fewer than 20 soft rays.

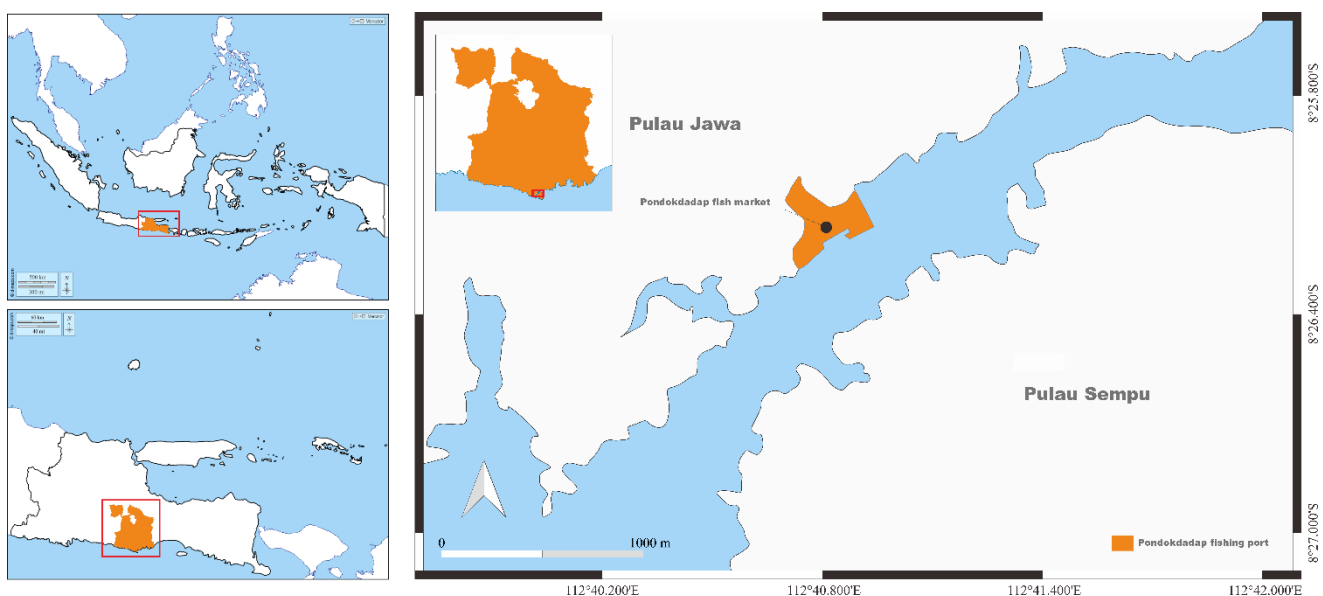


Figure 1. Location of Pondokdadap fishing port, pinpointing the location where the *Satyrichthys* sp. specimen was found

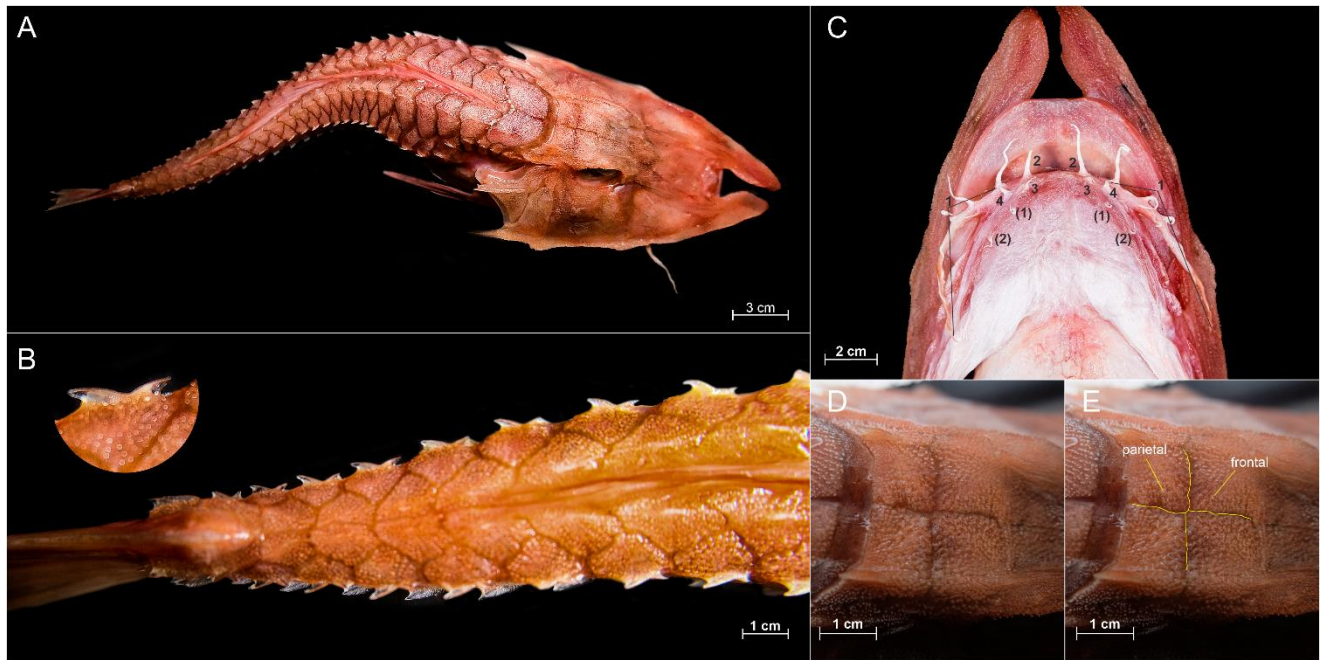


Figure 2. Dorsal view of the specimen *Satyrichthys laticeps* PDD 2211-01 (A), caudal peduncle showing forward-directed spine (B), counts of lip and chin barbels, numbers in parentheses are showing chin barbels, where numbers without parentheses are showing lip barbels (C), parietal bones showing asymmetrical size (D) highlighted by yellow lines (E)

RESULTS AND DISCUSSION

Family Peristediidae Jordan & Gilbert, 1883

Satyrichthys Kaup, 1873

Satyrichthys laticeps (Schlegel, 1852)

Peristedion laticeps Schlegel, 1852: 43

(Figure 2; Table 1)

Material examined

PDD 2211-01, 1 specimen, 341 mm SL; Pondokdadap Fishing port fish market, Malang, East Java Province, Indonesia, caught off the South Coast of Malang, Eastern Indian Ocean, November 2022 (Figure 2; Table 1).

Diagnosis

A species of *Satyrichthys* with (1) four (some specimens might possess 3 or 5) lips and 2–5 chin barbels, (2) Upper lateral bony plates of the caudal peduncle possess forward-directed (antrorse) spines, (3) Unequal parietal bones size on midline, (4) Dorsal fin does not possess any dusky spots.

Description

Measurements and counts of the specimen are shown in Table 1. Dorsal-fin rays VII,17; anal-fin rays 15; Dorsal and anal fin rays are not branched; pectoral fin rays 15, including two detached rays on the lower part of the pectoral fins; body scaleless, but covered with bony plates and spines; bony plates on dorsal row 24 on both side; bony plates on upper lateral row 31 on both side, where the bony plates on caudal peduncle possess forward-directed spines; bony plates on lower lateral row 19 on both side;

bony plates on ventral row 20 on both side; bony plates before anus 2 on both side.

The body is elongated with a large and broad head, where the head length is 40.5% SL, and head width is 26.4% SL; the lateral margin of the head below the eyes is curved; a pair of flattened, turned rostral projection on the anterior side of the head inwards; rostral projection length about 8.8% SL; orbital diameter 7.3% SL and interorbital diameter 7.3% SL; body depth about 24.0% SL and body width about 19.4% SL.

Mouth sub-terminal and large, located on the ventral side of the body; lower jaw length 15.2% SL, and upper jaw length 16.1% SL; teeth are absent on both jaws; it has 4 lip barbels on the left and right side, where the outer lip barbels are the longest and possess 8 smaller barbels (flagella) on each barbel; It also has 2 chin barbels that are much smaller compared to the lip barbels.

Origin of the dorsal fin on the second dorsal bony plate, the distance from snout to dorsal fin is about 39.6% SL; few first rows of dorsal fin with bony rays while the remaining dorsal fin with soft rays; the distance from snout to anal fin about 52.8% SL; pectoral fin length 17.9% SL, with upper detached pectoral ray 15.2% SL and lower detached pectoral ray 12.9% SL; pelvic fin length 17.3% SL; length of first dorsal fin 12.0% SL; caudal peduncle length 11.4% SL and its depth 2.9% SL; caudal fin slightly forked.

Colour when fresh (Figure 2)

Body reddish, with pinkish-white ventral parts. Spines on the bony plates with clear-translucent tips. Dorsal and pectoral fins are reddish and translucent, while pelvic fins and anal fins are translucent and paler. The caudal fin is reddish with a tint of orange on the edge.

Distribution

Known distribution includes larger parts of temperate and tropical Indo-Pacific, from the Indian coast of South Africa, Arabian Sea, Sri Lanka, Andaman Sea, Indonesia, South China Sea, East China Sea, Taiwan, and Japan (Kawai 2013, 2014, 2017).

Remarks

Satyrichthys laticeps could be reliably distinguished from its congeners by possessing 4 (rarely 5) lip barbels, the possession of forward-facing spines on the upper lateral row of the bony plates in the caudal peduncle, and asymmetrical parietal size on the midline (Kawai 2013; 2014). Furthermore, apart from species identification purposes, based on the assessment of *S. laticeps* barbels microstructure shows that the lip barbels of *S. laticeps* might be used to assist their foraging, movements, and maintaining balance in the deep sea (Ngamniyom 2020).

laticeps could be distinguished from *S. moluccensis* in the number of lip barbels (4 to 5 in *S. laticeps* vs. 3 in *S. moluccensis*) and chin barbels (2 to 5 in *S. laticeps* vs. 0 to

2 in *S. moluccensis*). *S. laticeps* also has asymmetrical parietal bones in the mid-line compared to *S. moluccensis* (Kawai 2013).

S. welchi is another closely related species to *S. laticeps* that possess antrorse spines on the upper lateral row of the caudal peduncle. It also has 4 lips and 3 chin barbels that fall under the count range of *S. laticeps*. The difference between the two is *S. welchi* possesses dark spots on the spinous dorsal fin, which is absent in *S. laticeps*. *S. welchi* also has symmetrical parietal bones in the midline (Kawai, 2013).

Although they possess a similar number of lip and chin barbels, *S. milleri* could be differentiated apart from *S. laticeps* by the coloration (reddish in *S. laticeps* vs. Dark brown in *S. milleri*) and the possession of the antrorse (forward-facing) spines on the upper lateral side of the bony plates in caudal peduncle in *S. laticeps*, which is absent in *S. milleri* (Kawai 2013; Kannan et al. 2017). In addition, *S. milleri* also possesses blackish fins and barbels, compared to the reddish fins and barbels in *S. laticeps* (Rajeeshkumar et al. 2016).

Table 1. Comparison of measurements and counts of *Satyrichthys laticeps* between the specimen PDD 2211-01 and a recent study by Pogoreutz et al. (2014). Holotype and range measurements and counts are taken from Kawai (2013)

Species	<i>S. laticeps</i>			
Source	PDD 2211-01	Pogoreutz et al. (2014)	Holotype	Range (n=52)
Standard length	341 mm	278.25 mm	230 mm	89 - 550 mm
Measurements (%SL)				
Body depth	24.0	19.9	16.6	15.4-23.7
Body width	19.4	20.2	13.9	12.4-20.3
Head length	40.5	39.5	39.0	37.9-45.8
Head depth	17.0	17.7	16.3	15.9-24.1
Head width	26.4	damaged	28.1	24.4-40.2
Distance from snout to dorsal fin	39.6	38.0	38.5	37.2-43.7
Distance from snout to anal fin	52.8	54.5	54.2	51.8-59.6
Distance from snout to anus	48.4	51.0	48.4	46.2-53.6
Snout length	19.9	20.2	20.6	19.9-23.1
Rostral projection length	8.8	damaged	9.5	6.3-12.4
Longest barbel length	16.1	15.0	19.0	11.4-26.7
Upper jaw length	16.1	15.6	16.0	14.8-17.9
Lower jaw length	15.2	17.0	15.0	14.4-18.1
Orbital diameter	7.3	8.0	8.2	7.0-11.9
Interorbital width	7.3	6.9	7.2	6.8-10.4
Pectoral fin length	17.9	22.0	18.1	14.7-26.2
Length of upper detached pectoral ray	15.2	17.6	14.9	13.2-21.6
Length of lower detached pectoral ray	12.9	13.0	11.4	10.4-17.6
Pelvic fin length	17.3	18.3	20.6	16.8-22.5
Length of first dorsal spine	12.0	10.6	11.1	0.8-14.4
Caudal peduncle length	11.4	13.2	11.1	9.6-13.3
Caudal peduncle depth	2.9	2.9	2.8	2.2-3.4
Counts				
Dorsal fin rays	VII, 17	VII, 15	VII, 17	VI-VII, 13-17
Anal fin rays	15	15	17	14-17
Pectoral fin rays	15	15	15	14-17
Bony plates in dorsal row	24	23	26	23-27
Bony plates in upper lateral row	31	29	32	29-32
Bony plates in lower lateral row	19	18	21	16-22
Bony plates in ventral row	20	19	22	19-22
Bony plates before the anus	2	2	2	2
Lip barbels (left, right)	4,4	4,4	4,4	4 (rarely 5), 4 (rarely 3)
Chin barbels (left, right)	2,2	3,3	3,3	2-5, 2-4

A new species, *Satyrichthys kikingeri*, described by Pogoreutz et al. (2013), bears a close resemblance to *S. laticeps* based on an assessment by Kawai (2014). The holotype of *S. kikingeri* possesses 4 lip barbels on each side and two chin barbels on each side. It also possesses 15 anal fin rays, pectoral fin rays (including detached rays), and soft dorsal fin rays, with VII spine on the dorsal fin. The morphometric measurements and counts of *S. kikingeri* mostly fall under the measurements and counts range of *S. laticeps*; therefore, it is revealed that *S. kikingeri* is considered a synonym of *S. laticeps* (Kawai 2014).

Other previously described species under the *Satyrichthys* genus that were brought into synonymy with *S. laticeps* include *S. adeni* (Lloyd, 1907), described from the Gulf of Aden, which failed to provide any description of any lip or chin barbels, but has a slightly different description on its coloration, which stated that *S. adeni* has a reddish yellow body with gray pectoral fins and dorsal fin tipped with black (Lloyd 1907). Further examination of *S. adeni* by Kawai and Tashiro (2008) from a specimen collected in Suruga Bay, Japan, stated the pectoral fins lose their coloration in alcohol, and it has no black spots on its dorsal fin tip (Kawai and Tashiro 2008). Meristic and morphometric identification of the holotype of *S. adeni* shows that its measurements and counts fall on the measurements and counts of *S. laticeps*. Thus it is now accepted as a synonym of *S. laticeps* (Kawai 2013).

There are seven extant species under the genus *Satyrichthys*, namely *Satyrichthys moluccensis* (Bleeker, 1850), *Satyrichthys laticeps* (Schlegel, 1852), *Satyrichthys clavilapis* Fowler, 1938, *Satyrichthys longiceps* (Fowler, 1943), *Satyrichthys rieffeli* (Kaup, 1859) *Satyrichthys welchi* (Herre, 1925), and *Satyrichthys milleri* Kawai, 2013, where all of them are known to be found in Indonesian Waters (Kawai 2013; White et al. 2013). All species of *Satyrichthys* are found in deep water and sometimes incidentally caught as bycatch, even though it has little to no commercial value (Fischer and Bianchi 1984; Carpenter and Niem 1999). Unfortunately, some reports on the finding of *Satyrichthys* from Puger fishing port, East Java, and Kedonganan fish market, Bali, failed to provide sufficient photographs. Therefore, the exact species remains unknown as no specimen was taken or preserved (Yassin 2022; Anggono 2022, pers. comm.). This study provides a new record of *S. laticeps* from a single specimen collected at Pondokdadap fishing port fish market caught off the southern coast of Malang, Java South Sea, Eastern Indian Ocean.

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