



A new species of deepwater tilefish (Percoidea: Branchiostegidae) from the Philippines, with a brief discussion of the status of tilefish systematics

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Abstract

A new rare species of deepwater *Branchiostegus* is described from two specimens collected from Bayangas, Laiya, Philippines (13° 38.5' N, 121° 25.6' E). A total of four specimens were caught by hook and line in 2009 and 2011 between 210–220 m over a rocky-sand bottom, only two were preserved. The species may also be endemic to the Philippines and inhabit burrows as do the other known species of this genus. The combination of the following characters distinguish the new species from its congeners: prominent dark predorsal ridge bordered by bright yellow-orange background (only *B. semifasciatus* from West Africa has a more prominent and dark predorsal ridge, but the ridge has no underlying orange-yellow colour), a great body depth (28–29% SL; other species of *Branchiostegus*, usually 27% SL) longer head length (30–31% SL; other species of *Branchiostegus*, usually 28%), greater head depth (26–27% SL; other species of *Branchiostegus*, usually 26% SL); long pre-dorsal length (35% SL; other species of *Branchiostegus*, usually 32% SL), and distinctive body, head and caudal fin colouration; skin over dorsal tips of branchiostegals characteristically bright yellow. A brief discussion of the status of tilefish systematics is included.

Key words: Malacanthidae, *Branchiostegus saitoi*, Bayangas, Philippines, Branchiostegidae

Introduction

A species of *Branchiostegus* was caught by hook and line off Batangas, Laiya, Philippines in 2009 and photographed by Mr. Jiro Saito, an amateur angler. The two initial specimens were eaten. An internet picture was discovered by the junior author and brought to the attention of the then visiting senior author who recognized it as a new species. Contact of Mr. Jiro Saito by the junior author ultimately resulted in two additional specimens (over 1 kg each) caught in April, 2011 off Bayangas, Laiya, Philippines, photographed by Mr. J. Saito, then send frozen to the junior author. These specimens were again photographed, muscle samples taken then examined by the senior author and confirmed as belonging to a new species.

Systematic background. The tilefishes (=Branchiostegidae) are comprised of three genera and 30 nominal species world-wide and are found along the edges of continental and oceanic plates as adults from warm temperate to tropical waters. Dooley (1978 & 1998), Dooley and Paxton (1975), Dooley and Kailola, (1988) and others consider the tilefishes as belonging to two related, but distinct families (Branchiostegidae and Malacanthidae) based on morphological and molecular character differences. Tilefish belong to the deeper water tilefishes Branchiostegidae (generally inhabiting self constructed burrows, at around 200 m depths, species may range from 90–500 m). The shallower water sand tilefishes (=Malacanthidae) consist of two genera and about 16 nominal species. They live in self-constructed mounds or burrows, generally from 5–50 m for *Malacanthus*. Some species of *Hoplostatilus* may be found to 100 m depths. Recent molecular research tends to support a tilefish two-clade hypothesis (Jimenez, 2007; Kelleperuma, 2009). An early paper explored the intrafamilial relationships of the family Branchiostegidae based on comparative head myology (Marino and Dooley, 1982).

Based primarily on a suggested synapomorphic larval character, other authors have consider the tilefishes as belonging to a single family (Malacanthidae) with two subfamilies, Latilinae and Malacanthinae, (see: Johnson, 1984, Nelson, 1984 & 2006; and Eschmeyer and Bailey, 1990). Tilefishes share somewhat similar spinous pelagic

larvae. Comparatively, the anguilliform eels comprising nearly 800 species and 15 families, share a similar leptocephalus larvae (Nelson, 2006). Imamura (2000) combined the Dactylopteridae with the tilefishes belonging to a single family with four subfamilies (including dactylopterids); this hypothesis has not been supported by most authors (Springer and Johnson, 2004).

The genus *Branchiostegus* presently is comprised of 17 nominal species (including three new and two doubtful species). These fishes are found in relatively deepwater usually over a mud-clay bottom (usually 90-200 m, but may reach 600 m depths); they all live in soft bottom in self-constructed burrows as far know (Dooley, 1978). Species of *Branchiostegus* are found from west Africa (1 species), the Red Sea and Indian Ocean (7 species) and through the Indo-West Pacific (12 species). Dooley and Paxton (1975) described a new species from eastern Australia, Dooley (1978) described a new species from the East China Sea, and Sea of Japan, Dooley and Kailola (1988) described four new species from the eastern Indian Ocean (Australia) and reviewed the genus. Dooley (1998) also reviewed the tilefishes from the Indo-West Pacific. A review of the Korean and South China Sea species of *Branchiostegus* using molecular and osteological characters was published by Kim and Ryu (1998) and Ryu, et al. (2009). A review and evolution of the genus is in progress by the present authors.

Five species of the genus (*B. japonicus*, *B. argentatus*, *B. auratus*, *B. sawakinensis* and *B. albus*) are highly valued commercial fish in Japan and in many countries bordering the South and East China Seas (Dooley, 2000). Another species of *Branchiostegus* (possibly an endemic) from Okinawa, Japan previously recognized by Yoshino et al., (1984), is being described by T. Yoshino and W. Hiramatsu of the University of the Ryukyus, Okinawa. The senior author (JKD) examined specimens and skeletal material of this undescribed species while visiting the University of the Ryukyus in Okinawa in 2010 and reviewed the manuscript of the description confirming its validity. Another nominal species is being described from Vietnam (Hiramatsu, personal comm.). The Okinawan and Vietnamese species are quite distinct from the new species being described herein.

The following nine *Branchiostegus* species are known from the South and East China Seas and vicinity: [Herre's 1926 and 1928 two species, *B. vittatus* and *B. ilocanus* respectively, described from the Philippines are doubtful species and are not herein included]; *B. japonicus*, *B. auratus*, *B. albus*, *B. argentatus*, *B. sawakinensis*, *B. wardi* (northern and eastern Australia), *B. sp.* (Okinawa); Hiramatsu and Yoshino [2011, in press], and the present species being described from the Philippines, and a new species being described by Hiramatsu from Vietnam. To further confuse identification of species of this genus, at least three *Branchiostegus* hybrids have also been collected from southwestern Japan (e.g. *B. albus* x *B. japonicus*, *B. albus* x *B. auratus* and *B. japonicus* x *B. argentatus*; see: Yamada, et al., 2007).

Specimens of *Branchiostegus* from the Philippines are very rare. Visits to numerous fish markets in Manila, Philippines (where Herre, 1926, 1928 collected his two nominal species) and other cities during 1995 by the senior author failed to reveal any specimens of *Branchiostegus*. Herre's (1926, 1928) descriptions, drawings, counts and measurements were not distinct from other described species, and no specimens of these two species exist as far known. Both of the holotypes were apparently destroyed during World War II. The two species (*B. vittatus* and *B. ilocanus*) described by Herre (1926, 1928) from the Philippines should both be considered as *nomen dubium*. The only three verifiable Philippine species of *Branchiostegus* are: *B. japonicus*, *B. sawakinensis* and the present new species. *B. argentatus*, *B. albus*, *B. auratus* and *B. argentatus* may also exist, but records have not been verified (Dooley and Rau, 1982).

Materials and methods

Measurements were made with dial calipers to the nearest 0.5 mm and follow those defined by Hubbs and Lagler (1958), and modified by Dooley (1978). Cheek depth was measured from the lower orbital rim to the bottom margin of the preoperculum. Measurements are expressed as percent standard length (SL) or percent head length (HL). Vertebral counts and other internal meristics and characters were taken from radiographs.

Branchiostegus saitoi sp. nov.

Holotype. Deposited at University of Miyazaki, Division of Fisheries Science, Miyazaki, Japan; [MUFS 36081],

male, 329 mm SL; hook and line, Batangas, Laiya, Philippines, 13° 38.4' N, 121° 25.6 E; 14 April 2011; 210 m depth, rocky-sand bottom; photographed fresh, tissue sample taken.

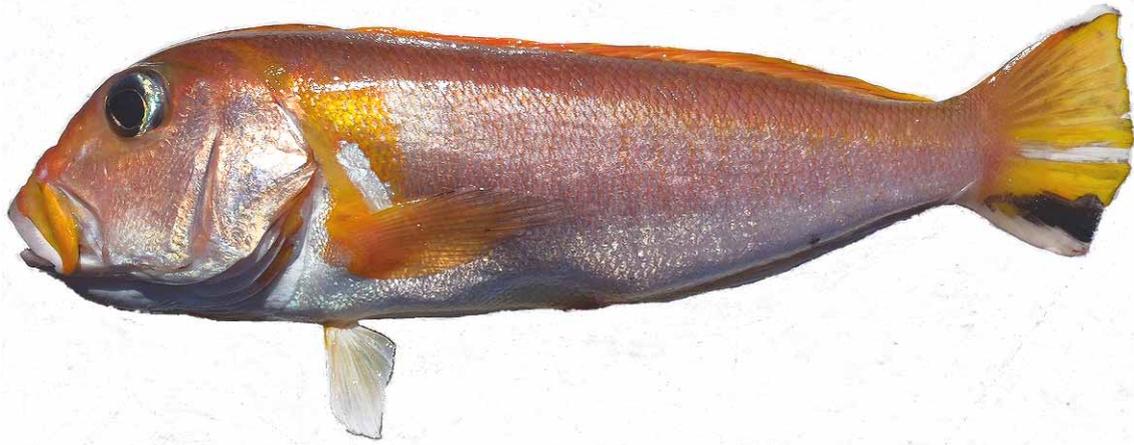


FIGURE 1. Fresh colouration of 329 mm SL (holotype, MUFS 36081) specimen of *B. saitoi* caught by hook and line, 14 May 2011, Batangas, Laiya, Philippines; photo by J. Saito.

Paratype. Deposited at the Division of Fishers, National Museum of Sciences, Tokyo, Japan; [NSMT-P 106562], male, 315.6 mm SL; hook and line, Batangas, Laiya, Philippines, 13° 38.4' N, 121° 25.5' E; 14 April 2011; 220 m depth, rocky-sand bottom; no fresh photograph taken; muscle tissue sample taken.

Diagnosis. This species can easily be distinguished from its congeners by the following combination of characters: a great body depth (28–29% SL; other species usually 27% SL) longer head length (30–31% SL; other species usually 28%), head profile oblique, about 130 degree angle (other species usually 95–130 degrees); head depth (26–27% SL; other species usually 26% SL); eyes high on head (interorbital width 31–34% HL); small orbital diameter 24–25% HL, only *B. sawakinensis* and *B. albus* with small orbital diameters, 23–24% HL) long predorsal length (35% SL; other species usually 30–32% SL, rarely 33–34% SL), deep body (28–29% SL; other species usually 24–27%, rarely, only in *B. japonicus* and *B. semifasciatus*, 28–29% SL); wide body (14–15% SL; other species usually 11–13% SL); number of first arch gill rakers low 18 + 1 rudimentary, most other species 18–24, modally 19–22.

Fresh colouration includes: Upper body rosy red with flecks of pearly-silver scales and pearly pinkish-silver lower body and anterior lower throat regions; dorsal to pectoral to about the lateral line with a large golden yellow area with a silver central patch; lower head region bluish-white from about a horizontal line from lower cheek above the preopercular angle to the pectoral fin base; lateral head metallic golden from anterior orbit to about mid-orbit dorsally (Fig. 1); *B. saitoi* also has distinct head, tail and body fresh colouration: a prominent dark predorsal ridge overlying yellow-orange pigment reaching to a vertical above the anterior orbital rim (Figs. 1–3); (a dark more prominent predorsal ridge found only in *B. semifasciatus* from West Africa, but it lacks underlying yellow-orange colour); upper lip orange-yellow (over maxillary) and white (over premaxillary and mandible) iris golden-green; snout reddish; lateral head from above about mid orbit to top of head red; skin over dorsal tips of branchiostegals characteristically bright yellow (Fig. 3); dorsal fin membrane translucent pink, yellow distally along entire margin of the fin; and anal fin membranes translucent to pinkish white; pelvics white with overlying yellow; dorsal upper pectoral rays dusky, ventral half yellow; caudal characteristically coloured among all congeners (although somewhat similar to *B. wardi*); a central translucent horizontal band, most of the area dorsal to the band bright yellow, upper margin black with outer margin white; below the clear central caudal band also bright yellow for about one third of the ventral caudal area, followed by a little more than third of the caudal black then a little less than a third of the ventral caudal white (Figs. 1, 2 and 5).

Description (parentheses denotes paratype, if different from holotype) Dorsal fin rays VII,15, first dorsal spine 1.4 into second spine, dorsal fin origin over pectoral fin base, dorsal long and continuous, greatest height of dorsal fin 13% SL (11%), base length 58% SL (56% SL), antepenultimate ray elongate 18% SL; anal fin rays II,12, anal fin origin under and between dorsal fin rays 4 and 5, dorsal long and continuous, greatest height 12.6% SL (10% SL), base length 28% SL, penultimate ray elongate, 10% SL ; pectoral fin rays 18, length 26% SL; pelvic fin I,5,

length 14% SL (15%); caudal margin double scalloped; (from radiographs) principal caudal fin rays 17; procurrent caudal rays 10 (upper) + 9 (lower); 1 uroneural and parhypural, 3 epurals, and 2+3 autogenous hypurals; preopercular angle about 90° with fine serrae (about 52) on upper limb, a slight indentation near preopercle angle (like *B. albus*), no serrae on lower limb of preopercle; scales ctenoid (in pockets) over most of body, cycloid in head region; scale rows to orbital rim 11 (12) and with free margins, (not imbedded as in *B. japonicus*); 7 opercular free scale rows, no enlarged spine at opercle angle (only a single blunt spine); 7 (8); scale rows above the lateral line; scale rows below the lateral line 23 (24); interoperculum not scaled; 49 (50) pored lateral line scales to hypural crease plus 1 (2) on tail; first arch gill rakers (upper limb + lower limb) 7 + 11 + 1 rudimentary; total gill rakers on all four arches 49 (51) (incl. rudimentary gill rakers); vertebrae 24 (10+14); predorsal fin support formula 0-0-2-; preopercular length 78% HL; (snout to upper margin of operculum); head profile oblique about 50° angle (Fig.2); well developed supraoccipital crest; jaws terminal and slightly inferior, upper jaw protrusile; maxillary extends posteriorly to below mid-pupil (Figs. 1–3); upper jaw with fine canine teeth in 2–3 rows on each side widening anteriorly to a patch on either side of jaw symphysis; with an enlarged tooth at the rear of jaw; lower jaw similarly with rows of fine canines terminating in a patch on either side of the symphysis; no teeth on palatine, vomer, tongue; pharyngeal canine teeth well developed 5 mandibular pores unilaterally (as with most congeners); first haemal spine over second anal-fin spine with parhypophyses fused medially into an arch for the rear projection of the swimbladder, first haemal spine forming a broad blade ventrally (varies among congeners).



FIGURE 2. Freshly preserved holotype 329 mm SL; photo by the second author.

Distribution. Known only from Bayangas, Laiya, Philippines (13° 38.5' N, 121° 25.6' E) at 210–220 M depths, it is possibly endemic; but as it is very rare, and probably inhabits burrows as do other tilefishes, *B. saitoi* may ultimately be found at other localities.

Etymology. A new species of *Branchiostegus* was first caught off Batangas Laiya, Philippines in 2009, photographed and eaten. Two years passed before two more specimens were caught by J. Saito, an amateur angler from Japan in April, 2011. Without J. Saito's considerable efforts and interest, this species would have remained unknown. The new species is herein named in his honor.



FIGURE 3. Head of the holotype of *B. saitoi* (329 mm SL); photo by J. Saito.

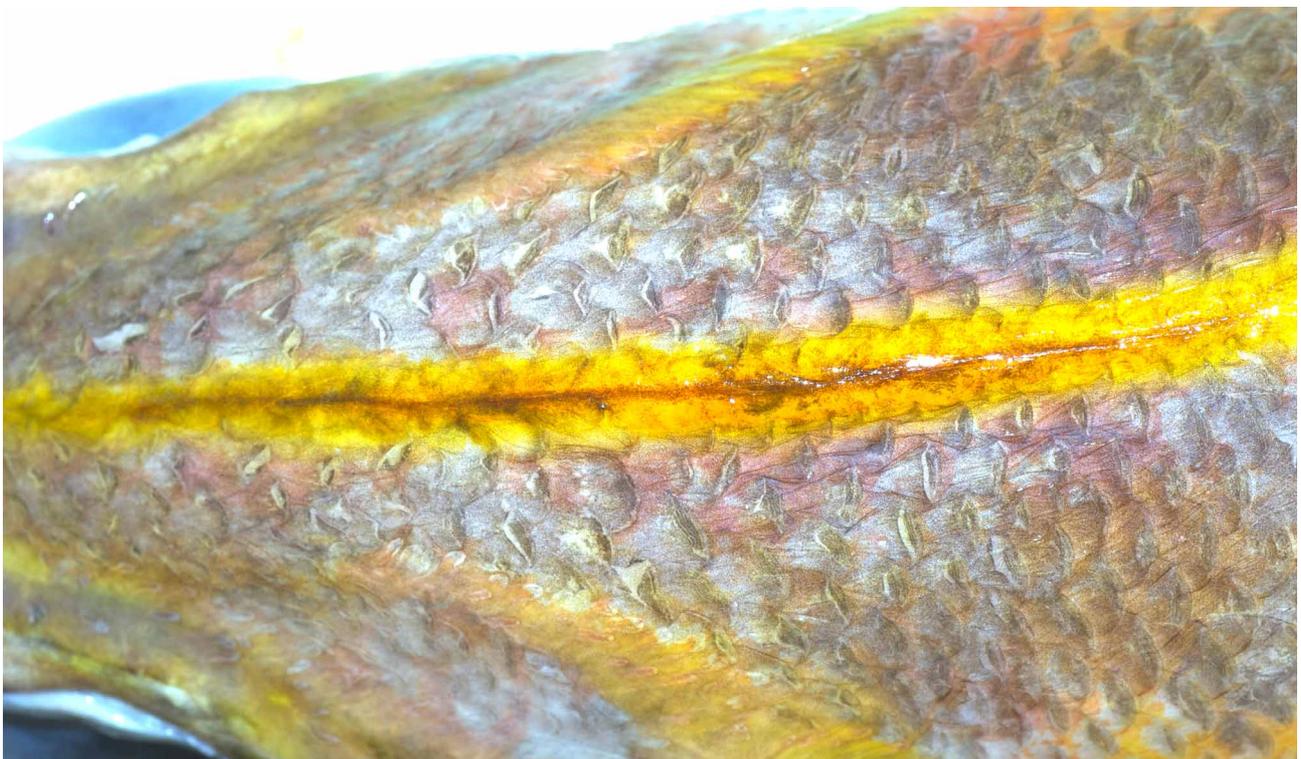


FIGURE 4. Dorsal head view, predorsal ridge of thawed specimen of *B. saitoi* (holotype); photo by first author.

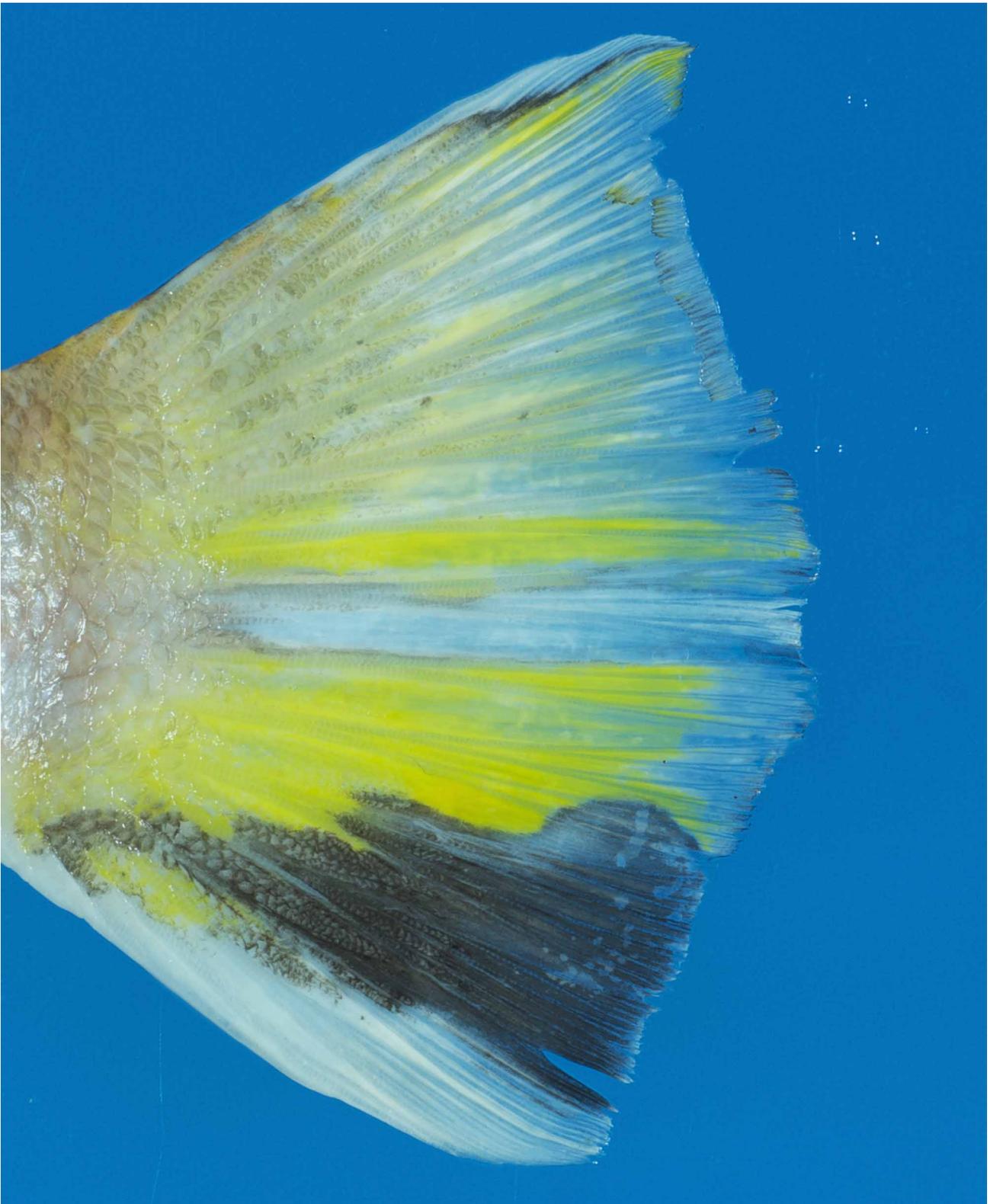


FIGURE 5. Freshly preserved colouration of the tail of *B. saitoi*, 329 mm SL (holotype) photo by the second author.

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TABLE 1. Measurements and counts of the holotype and paratype of *B. saitoi*. Measurements are either actual in mm [brackets], rounded percent standard length (no parentheses), or percent head length (parentheses).

Museum Number	MUFS 36081 (Holotype)	NSMT-P 106562 (Paratype)
Standard length (mm)	[329]	[315.6]
Head length (mm)	[98.6]	[98.4]
Head length % SL	30	31
Head depth % HL	(88)	(87)
Orbit diameter	(25)	(24)
Suborbital depth	(23)	(22)
Interorbital width	(34)	(31)
Snout length	(38)	(39)
Upper jaw length	(44)	(45)
Lower jaw length	(47)	(42)
Opercular length	(28)	(26)
Predorsal length	35	35
Body depth	28	29
Body width	14	15
Dorsal fin base length	58	56
Dorsal fin height	13	11
Anal fin base length	28	28
Anal fin height	13	10
Pectoral fin length	26	26
Pelvic fin length	15	15
Peduncle length	15	16
Peduncle depth	11	11
Dorsal fin ray counts	VII,15	VII,15
Anal fin rays	II,12	II,12
Pectoral fin rays	18	18
Pelvic fin rays	I,5	I,5
Pored lateral line scales	49+1	50+2
Cheek scale rows	11	12
Opercular scale rows	7	7
Scales above lateral line	7	8
Scales below lateral line	23	24
First arch gill rakers	18+1	18+1
Total gill rakers all arches	46	44

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