

Ancistrogobius, a New Cheek-spine Goby Genus from the West Pacific and Red Sea, with Descriptions of Four New Species (Perciformes: Gobiidae: Gobiinae)

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Abstract A new gobiid fish genus, *Ancistrogobius*, is described based on 4 new species (*A. dipus*, *A. squamiceps*, *A. yanoi*, and *A. yoshigouii*) from the western Pacific and Red Sea. *Ancistrogobius* is unique within the gobiid subfamily Gobiinae in having a short, ventrally directed bony spine-like projection at the posterior margin of the preopercle. Within the genus, *A. dipus* n. sp. (8 type specimens, 31.6–42.4 mm SL) is unique in having a separated pelvic fin with a rudimentary connecting membrane between the innermost rays and no frenum (vs. pelvic fins united medially with a well-developed connecting membrane and frenum in the other species). *Ancistrogobius squamiceps* n. sp. (2 type specimens, 29.8–50.5 mm SL) differs from congeners in having scales on most of the nape and 12 predorsal scales (vs. nape almost naked, typically without scales on predorsal midline) and a scale patch on the dorsal part of the operculum (vs. head naked). Of the remaining 2 new species, *A. yanoi* n. sp. (14 type and 2 non-type specimens, 16.9–36.8 mm SL) is chiefly distinguished from the other, *A. yoshigouii* n. sp. (14 type specimens, 26.1–40.6 mm SL), in having an elongate and filamentous third spine in the first dorsal fin (vs. no filamentous spines in the latter species). Almost all of the examined specimens of this genus were collected from the western Pacific, exclusive of 2 Red Sea specimens, provisionally identified as *A. yanoi*. *Ancistrogobius* is a bottom-dwelling goby genus, found on sandy or sandy-mud bottoms with dead-coral rubble in protected bays (0–50 m depths), and is not commensal with other marine organisms.

Key words: Gobiidae, *Ancistrogobius*, New genus, New species, Indo-West Pacific.

Many perciform fishes have bony serrations and/or spine-like projections along the rear margin of the preopercle, especially in their early life stages. The fishes of the perciform suborder Gobioidae, however, offer few examples. Within gobioids, no larvae and juveniles with preopercular spines are known, although xenisthmid larvae have minute spines at the angle of the lower jaw and along the branchiostegal rays (Leis *et al.*, 1993; Leis and Carson-Ewart, 2000). Only 2 eleotrid genera (*Eleotris* and *Erotelis*) and 3 gobiid genera (*Asterropteryx*, *Gladiogobius*, and

Oplopomus) are known to possess distinct preopercular spines in adults (Böhlke and Chaplin, 1993; Shibukawa and Allen, 2007).

In the present paper, we describe a new marine goby genus bearing a preopercular spine, based on 4 new species collected from the western Pacific and the Red Sea. The new genus belongs to the gobiid subfamily Gobiinae (*sensu* Pezold, 1993), and is readily distinguished from the other 3 cheek-spined genera in having a spur-like preopercular spine directed ventrally (vs. directed posteriorly in the other genera; Fig. 1). The fishes

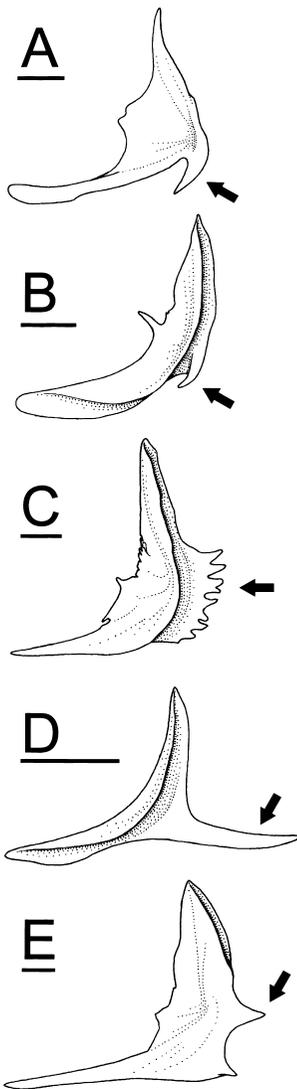


Fig. 1. Lateral view of preopercle of 5 cheek-spine goby and sleeper genera, showing preopercular spines (arrows): A) *Eleotris acanthopoma*, NSMT-P 48.9 mm SL; B) *Ancistrogobius yanoi*, OMNH-P 15712, paratype, 35.4 mm SL; C) *Asteropteryx semipunctata*, 1 of NSMT-P 98975, 45.9 mm SL; D) *Gladiogobius ensifer*, 1 of NSMT-P 76628, 24.3 mm SL; E) *Oplopomus caninoides*, MTUF-P 28085, 60.0 mm SL. Note that the preopercular spines of *Oplopomus* originates from the anterior wall of the bony preopercular canal support, compared with the posterior wall in *Ancistrogobius*, *Asteropteryx* and *Gladiogobius* (the canal support is not developed in *Eleotris*). Bars=1 mm.

of the new genus were previously illustrated in some pictorial books of marine fishes (e.g., Masuda and Kobayashi, 1994; Okamura and Amaoka, 1997; Allen *et al.*, 2003; Senou *et al.*, 2004), but have not yet been described formally.

Materials and Methods

All fish lengths given are standard lengths (SL). Measurements were made point-to-point with calipers under a dissecting microscope to the nearest 0.01 mm. The methods for measurements follow those of Hubbs and Lagler (1958), with exceptions given as follows (the snout tip refers to the mid-anteriormost point of the upper lip); head length is measured between the snout tip and posterior end of the head (including opercular membrane); interorbital width is the least width between the innermost rims of the right and left eyes; jaw length is measured between the snout tip and the posteriormost point of the lip; body depth is measured in at 2 locations, the first at the first dorsal-fin origin, and the second at the anal-fin origin; head depth and width are measured at the preopercular margin; nape width is measured between the dorsalmost margins of the gill openings; preanal and prepelvic lengths are measured from the snout tip to the origin of each fin; pectoral-fin length is measured from the base to the tip of the longest ray; pelvic-fin length is measured between the base of the pelvic-fin spine and the distal tip of the longest segmented ray; each pelvic-fin ray length is greatest length between the base and distal tip of the ray; heights of the pelvic frenum (between spines) and connecting membrane (between innermost rays) are measured between the base and distal margin at the lowest part in each membrane; caudal-fin length is measured from the base to the tip of the middle caudal-fin ray. The methods of counts follow Akihito (1984), except for the following: longitudinal scale count is the number of oblique rows starting from just above the dorsalmost attachment of the opercular membrane and proceeding posteriorly to the mid-base of the caudal fin; 3 different transverse scale count are taken

(see descriptive accounts); the circumpeduncular scale count is the number of zigzag rows along a vertical line around the narrowest point of the caudal peduncle; gill rakers including all rudiments are counted on the outer side of the first arch; the count of pseudobranchial filaments includes all rudiments. Scales (except for predorsal and circumpeduncular scales) and paired-fin rays are counted on both sides, but gill rakers and pseudobranchial filaments are counted on the right side only. In describing meristic counts of each species, the count of the holotype is asterisked, and the number in parentheses after the count indicates the number of specimens with that count. Osteological features are observed from radiographs (for all specimens) and cleared and stained specimens, following the method of Potthoff (1984). The methods of Akihito (1984) are used in describing the pattern of the interdigitation of the dorsal-fin pterygiophores between the neural spines ("P-V"). Cephalic sensory canals and papillae were observed on specimens stained with suminol cyanine, and notations on them follow Akihito (1984) and Miller (1986), respectively. The terminology of scale morphology follows Roberts (1993).

Institutional abbreviations follow Leviton *et al.* (1985), except for HMNH (Hiwa Museum for Natural History, Hiroshima, Japan), IOP (Izu Ocean Park, Izu, Japan), and KPM (Kanagawa Prefectural Museum of Natural History, Odawara, Japan). Species accounts are presented in alphabetical order. To elucidate the relationship of the new genus, we have examined numerous specimens of other gobioid fishes (many of which were radiographed, or cleared and stained). This material includes cleared and stained specimens of the sleepers and gobies bearing preopercular spines as follows: *Eleotris acanthopoma* Bleeker, 1853, NSMT-P 97983 (1 specimen, 48.9 mm SL); *Eleotris fusca* (Forster *in* Bloch and Schneider, 1801), NSMT-P 97984 (1 specimen, 75.5 mm SL); *Asterropteryx bipunctata* Allen and Munday, 1995, NSMT-P 73122 (1 specimen, 23.9 mm SL); *Asterropteryx ovata* Shibukawa and Suzuki, 2007, NSMT-P 61060 (1 of 4 speci-

men, 23.2 mm SL); *Asterropteryx semipunctata* Rüppell, 1830, NSMT-P 97985 (2 specimens, 45.9–46.4 mm SL); *Asterropteryx senoui* Shibukawa and Senou, 2007, NSMT-P 73128 (1 specimen, 23.7 mm SL); *Asterropteryx spinosa* Goren, 1981, NSMT-P 73194 (1 specimen, 26.9 mm SL); *Gladiogobius brevispinis* Shibukawa and Allen, 2007, NSMT-P 55899 (1 of 2 specimens, 26.7 mm SL); *Gladiogobius ensifer* Herre, 1933, NSMT-P 76628 (1 of 3 specimens, 24.3 mm SL); *Gladiogobius rex* Shibukawa and Allen, 2007, NSMT-P 44892 (1 of 6 specimens, 38.4 mm SL); *Oplopomus caninoides* (Bleeker, 1852), MTUF-P 28085 (1 specimen, 60.0 mm SL).

Ancistrogobius gen. nov.

[New Japanese name: Ho'okagi-haze zoku]

Type species. *Ancistrogobius dipus* Shibukawa, Yoshino and Allen sp. nov.

Diagnosis. *Ancistrogobius* belongs to the gobiid subfamily Gobiinae (*sensu* Pezold, 1993), and is unique within the subfamily in having a single short spur-like preopercular spine directed ventrally (Fig. 1B). In addition, it is characterized by the following features: typically VI-I, 10 dorsal-fin rays, I, 9 anal-fin rays; 17–21 pectoral-fin rays; no free pectoral-fin rays; pelvic fins fused medially by well developed frenum (between spines) and connecting membrane (between innermost rays), except for a single species with largely separated pelvic fin lacking frenum (Fig. 2); 24–26 longitudinal scales; 12 circumpeduncular scales; 10+16=26 vertebrae; P-V 3/II II I I 0/9; 2 anal-fin pterygiophores anterior to first haemal spine; 7 distinct, long transverse rows of sensory papillae (=rows 1–7) ventral to eye (although row 7 often comprising only a single sensory papilla), and rows 5 and 6 divided midway by longitudinal sensory papillae row *b* (Fig. 3); pair of short longitudinal rows of sensory papillae (=row *f*) just posterior to chin; cephalic sensory canal pores B', C, D, E, F, G, H', K', L', M', N, and O' (all pores paired, except C and D); no raised cutaneous ridges on head; gill opening relatively wide, extending anteroventrally to, or a

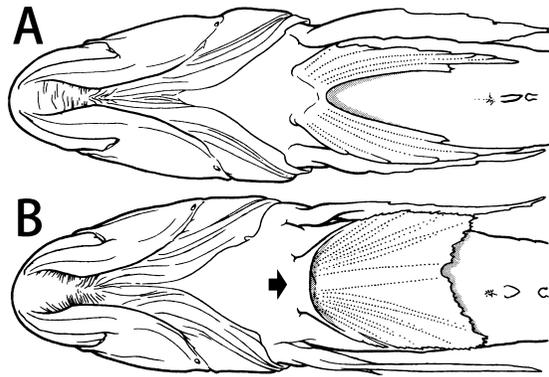


Fig. 2. Ventral view of the head and anterior part of the body of two species of *Ancistrogobius*, showing 2 types of pelvic-fin structures. A) *A. dipus* (NSMT-P 97981, holotype, 34.1 mm SL), and B) *A. squamiceps* (KPM-NI 5723, holotype, 50.5 mm SL). Arrow indicates the well-developed pelvic frenum of *A. squamiceps*. Drawn by K. Shibukawa.

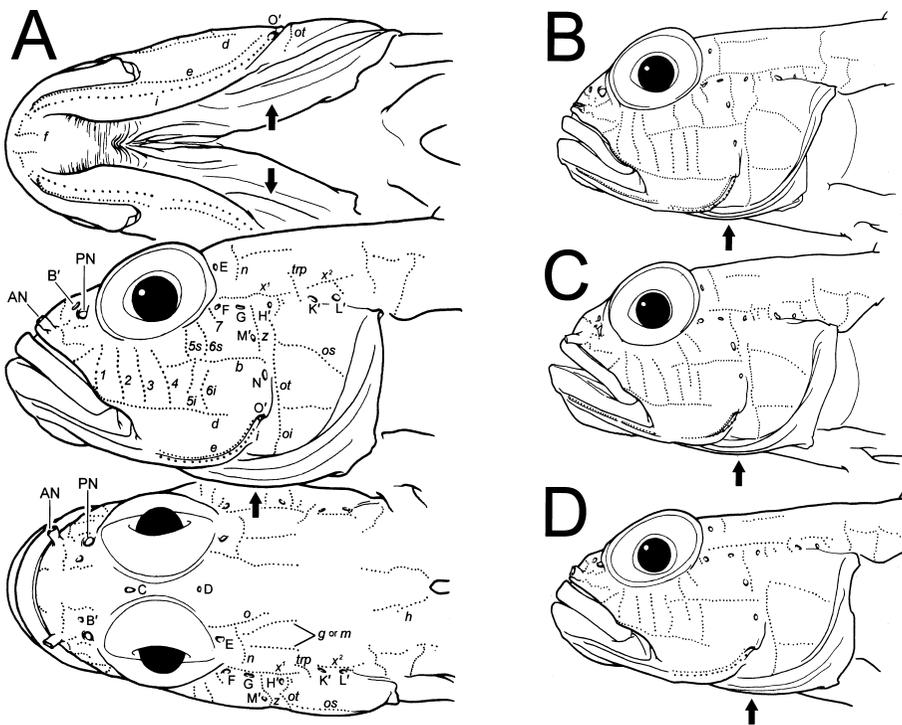


Fig. 3. Head of four species of *Ancistrogobius*, showing sensory-papillae rows (indicated by roman lowercase letters) and sensory-canal pores (indicated by roman uppercase letters, except for AN and PN). A) *A. dipus*, KPM-NI 5722, paratype, 39.3 mm SL; B) *Ancistrogobius squamiceps*, KPM-NI 5723, holotype, 50.0 mm SL; C) *A. yanoi*, paratype, KPM-NI 25199, 33.2 mm SL; D) *A. yoshigoui*, YCM-P 39103, holotype, 38.4 mm SL. AN and PN, anterior and posterior nares, respectively. Arrows show the position where the gill membrane is attached to the isthmus. Note that the pore O' opens just before the preopercular spine, which is largely concealed under the skin. Drawn by K. Shibukawa.

little beyond, a vertical line through posterior margin of preopercle; ventral one-third or one-fourth of first gill slit closed by membrane; gill rakers on outer surface of first gill arch bearing minute accessory spines (confirmed on cleared and stained specimens).

Description. Characters shown in the generic diagnosis (above) are not repeated.

Head subcylindrical or slightly compressed, head width 84.7–99.9% of head depth. Body moderately compressed. Snout slightly shorter than eye diameter. Eye dorsolateral, large, its diameter 28.3–34.5% of head length; interorbital width narrower than pupil diameter. Anterior nasal opening at tip of short tube without skin flap; posterior nasal opening a pore, closer to eye than anterior naris. Jaws subterminal, moderately large, jaw length 42.2–49.2% of head length; lower jaw slightly projecting beyond upper jaw; posterior end of jaws extending below pupil; gape oblique, forming an angle of about 30–40 degrees to body axis. Tongue truncate with straight or slightly concave anterior margin, free from floor of buccal cavity. Mental frenum undeveloped. No free rear margin of gill membranes across isthmus. Gill rakers on outer surface of ventral arm of first gill arch well developed and long, but short and rudimentary in dorsal arm. No fleshy projections on lateral surface of cleithrum. Dorsal fins separate but close together; third spine of first dorsal fin typically elongate and filamentous, except for *A. yoshigoui* lacking elongate spines; all segmented dorsal-fin rays branched; all spines of dorsal and anal fins slender, flexible. Anal fin originates ventral to base of first to third segmented rays of dorsal fin; all segmented anal-fin rays branched (anterior two rays unbranched only in the smallest specimen of *A. squamiceps*, viz. KPM-NI 5721, 29.7 mm SL). Pectoral fin elliptical, almost symmetrical dorsoventrally; pectoral-fin length subequal or slightly longer than pelvic-fin length; tenth, eleventh or twelfth pectoral-fin rays longest (counted from dorsal to ventral); pectoral fin extending beyond a vertical line through anal-fin origin; no free rays in pectoral fin; all pectoral-fin

rays branched except for dorsalmost and ventralmost 1–2 and 0–2 rays respectively. Pelvic fins fused medially by well-developed frenum (between spines) and connecting membrane (between innermost rays), except for a single species, *A. dipus*, having largely separated pelvic fins with no frenum and rudimentary connecting membrane (Fig. 2); pelvic-fin origin slightly in front of, or above, a vertical through origin of first dorsal fin; pelvic fin usually reaching to, or slightly beyond, origin of anal fin when adpressed (except in some small specimens); pelvic frenum (if present) moderately thin, with smooth posterior margin. Caudal fin nearly rounded, symmetrical dorsoventrally; no elongate caudal-fin rays; length of caudal fin subequal or slightly shorter than head length.

Scales ctenoid, with peripheral cteni with only primary spines, except cycloid scales on nape, pectoral-fin base, prepelvic region, and anterior part of belly; only a single species, *A. squamiceps*, with small patches of cycloid scales on dorsal part of cheek and operculum; in *A. squamiceps*, most of nape covered by scales, but scaled area not reaching anteriorly to eye; the other 3 species (*A. dipus*, *A. yanoi* and *A. yoshigoui*) lacking scales on nape excluding posterolateral part (scales almost always absent on predorsal midline), and scaled area not extending anteriorly to a vertical line through middle of operculum.

Teeth on jaws simple, conical; no prominent, enlarged canine-like teeth on jaws; each jaw with 3 or 4 rows of teeth anteriorly, narrowing to single row posteriorly; teeth on outermost row of upper jaw largest; no teeth on vomer and palatine.

Cephalic sensory systems are illustrated in Fig. 3. Anterior oculoscapular canals fused medially at interorbital region just anterior to pores C and D; posterior oculoscapular canal short, well separated from anterior oculoscapular canal. All sensory-papillae rows on cheek and operculum uniserial, no double nor multiple rows; sensory-papillae row *b* long, typically extending from posterior margin of preopercle forward to row 3 or 4; sensory-papillae row *d* long, extending pos-

teriorly to, or beyond, ventral end of row *6i*; sensory-papillae row *z* long, meets or close to posterior end of row *b*; a short transverse line of sensory papillae at anterior parts of row *i*.

Osteology. Frontals not fused medially; frontal crest well developed, contacts posteriorly with supraoccipital crest (not developed in small specimen of *Ancistrogobius squamiceps*, 29.8 mm SL); frontals very narrow at interorbital region, slightly narrower than parasphenoid at interorbital region; oculoscapular canal between pores D and E passing through bony canal formed at postorbital region of frontal. Interorbital part of mesethmoid well ossified, with very narrow cartilaginous margin posteriorly. Anterior margin of vomer rounded in dorsal view, not indented anteriorly; ethmoid cartilage narrow, encircled by pair of well developed dorsal projections of vomer and anterior margin of mesethmoid; dorsal projection of vomer not developed and therefore ethmoid cartilage broad in small specimen of *A. squamiceps* (29.8 mm SL); vomer contacts with median ethmoid, except in small specimen of *A. squamiceps*; no teeth on vomer. Lateral wing of pterotic moderately developed but not directed posteriorly. Epiotic spine (Hoese and Gill, 1993) undeveloped. Baudelot's ligament connects anteriorly to basioccipital. Rostral cartilage well developed, large, attached anteriorly to ascending process of premaxilla. Ascending process of premaxilla high (higher than articular process), well differentiated from articular process; postmaxillary process of premaxilla well developed. Palatine edentate, T-shaped (i.e. ethmoid process of palatine moderately developed). Ectopterygoid moderately long, extending dorsally to about half of palatine shaft and ventrally to dorsoanterior edge of quadrate. Mesopterygoid absent. Metapterygoid narrow, dorsal lamina not or only slightly developed (not expanded anteriorly). Symplectic with dorsoposteriorly directed arm that attaches to hyomandibular; arm creating small gap between dorsal aspect of symplectic and hyomandibular. Symplectic process of preopercle well developed, long, its dorsal tip very close to, or contacting with, ventroposterior edge

of symplectic; posterior wall of bony preopercular canal support of premaxilla slightly expanded ventrolaterally, forming distinct bony spur-like projection (=preopercular spine); bony preopercular canal support of preopercle well developed between dorsal tip and preopercular spine. Basihyal spatulate, with straight or slightly rounded anterior margin. Basibranchial 1 small, cartilaginous, well differentiated from basibranchial 2. Infrapharyngobranchial 1 absent; infrapharyngobranchial 2–4 moderately developed and toothed. Interarcual cartilage well developed, long. Ossified gill rakers on outer surface of ceratobranchial 1 long and spine-like, each with a series of several minute accessory spines at its inner edge (ossified gill rakers not bearing accessory spines except for some rakers each with a single accessory spine in 29.8 mm SL specimen of *A. squamiceps*); ossified gill rakers on hypobranchial 1 short and spine-like, without accessory spines; inner surface of 1st gill arch and both inner and outer surfaces of second to fourth gill arches with stout, very short, dorsally spinulose ossified gill rakers. Five branchiostegal rays, comprising four and one rays in contact with anterior and posterior ceratohyals, respectively. No transverse bony shelf developed along ventral margin of urohyal. Four pectoral radials; scapula well ossified, ossification encircling at least dorsal half of scapula foramen (scapula foramen encircled by ossified area in large specimens); scapula reduced in size, and, thus, uppermost pectoral radial attached to cleithrum. Dorsal postcleithrum absent; short thread-like ventral postcleithrum present. Pelvis articulates with cleithrum via well-developed pelvic intercleithral cartilage. Vertebrae 10+16=26; pleurals well developed on third to tenth precaudal vertebrae; epineurals on first precaudal vertebra to second caudal vertebra; all epineurals not fused with pleurals; anterior dorsal prezygapophysis not developed, except for second to fifth precaudal vertebrae; P–V 3/II II I I 0/9; 2 anal-fin pterygiophores anterior to first haemal spine; anterior 2 pterygiophores of second dorsal fin lack middle radials. Single epural; hypurals 3+4 fused to

urostyle, articulating with hypurals 1+2; parhypural moderately developed, pointed medially; dorsal and ventral procurrent cartilages well developed, long, extending anteriorly to tips of neural and haemal spines of third pleural centrum (PU3), respectively.

Comparisons. Within the Gobioidae, a single ventrally-directed preopercular spine is also found in the eleotrid genera *Eleotris* (Fig. 1A) and *Erotelis*, although, at least in *Eleotris*, the spine differs in size and shape from the spine of *Ancistrogobius* (Fig. 1B). *Ancistrogobius* clearly belongs to the gobiid subfamily Gobiinae (*sensu* Pezold, 1993) in having 5 branchiostegal rays (vs. 6 in eleotrids including *Eleotris*), 17 segmented caudal-fin rays (vs. usually 15), medially fused oculoscapular canals with a single pore C (vs. pore C paired, if oculoscapular canal is present at interorbital area; all head canals are absent in *Eleotris*), and single epural (vs. usually 2). Possession of the “ventrally-directed cheek spine” in the eleotrids and *Ancistrogobius* is thus regarded as a convergent feature.

The preopercular spines of 3 other cheek-spined goby genera (*Asterropteryx*, *Gladiogobius* and *Oplopomus*) are directed posteriorly (Figs. 1C–E), and readily distinguished from the spine of *Ancistrogobius*. Other than the cheek-spine gobies, *Lobulogobius morriganus* Larson, 1983, possesses small, roughly square, bony flanges at the angle of the preopercle (Larson, 1983). *Lobulogobius* is commensal with sponges and gorgonians, and distinguished from *Ancistrogobius* in having the following features: pelvic fins with thickened lobe around each pelvic-fin spine (vs. no such thickened lobe in *Ancistrogobius*); gill membrane fused medially with the rear margin free from the isthmus (vs. gill membranes attached to the isthmus); right and left sides of the oculoscapular canal widely separate at the interorbital region with a paired pore C (vs. oculoscapular canals fused medially at the interorbital region, with an unpaired pore C); posterior oculoscapular canal absent (vs. present); no vertical rows of sensory papillae below the eye (vs. distinct vertical rows below the eye) (Larson and

Hoese, 1980; Larson, 1983; Larson and Murdy, 2001). Also, the bony flanges in *L. morriganus* differs from the preopercular spine of *Ancistrogobius* as follows: a pair of bony flanges developed along the anterior and posterior edges of the preopercular canal support (vs. single spine developed only at the posterior margin of the preopercular canal support in *Ancistrogobius*); bony flange at the posterior margin of the preopercular canal support originates from just below the preopercular canal pore O' (vs. preopercular spine originates from just above the preopercular canal pore O'); 1 to 3 blunt teeth at the distal edge of the bony ridges (vs. simple, stubby spine-like).

Ancistrogobius was previously confused with *Macrodonogobius* in illustrated books of western Pacific marine fishes (Randall *et al.*, 1997; Randall, 2005; Myers, 1999; see also Remarks for *A. dipus* and *A. yoshigouii*). *Macrodonogobius* is a monotypic genus comprising *Macrodonogobius wilburi* Herre, 1936 (Murdy, 1985; Murdy and Hoese, 1984), and is clearly distinguished from *Ancistrogobius* in having: 15–17 pectoral-fin rays (vs. 17–21 in *Ancistrogobius*); first dorsal-fin profile rounded, without elongate spines (vs. third spine elongate and filamentous, except in *A. yoshigouii*); inferior mouth (vs. terminal, with slightly protruding lower jaw); most of cheek and operculum covered by scales (vs. cheek naked and, if present, scales restricted on upper half of operculum); restricted gill opening extending ventrally to a vertical line through middle of operculum (vs. rather wide, extending ventrally to a vertical line through preopercular margin); several short, indistinct transverse rows of sensory papillae below eye (vs. 7 rather long, distinct transverse rows of sensory papillae below eye, although row 7 often comprising only a single sensory papilla); pelvic fin with some alternating pale and dusky bars (vs. entirely pale or brownish).

Remarks. The cheek spine of *Ancistrogobius* is short and relatively blunt, but prominent. Typically, it is largely concealed under skin, and is best revealed when the skin just above preopercular-canal pore O' is slightly pushed dorsally.

However, in the smallest specimen of *A. squamiceps* that we examined (29.8 mm SL), the preopercular spine is not yet developed (appearing as an angular bony lateral expansion).

The members of *Ancistrogobius* are bottom-dwelling, moderately small sized gobies (largest specimen examined is 50.5 mm SL), not commensal with any marine organisms (e.g., alpheid shrimps, soft corals, sponges, or gorgonians).

Etymology. The generic name *Ancistrogobius* is derived from the combination of the Greek

word *agkistros* (meaning “fishhook”) and *Gobius* (a genus name of gobiine fish) in reference to the short, ventrally directed, spur-like preopercular spine. The gender is masculine.

Included species. *Ancistrogobius* comprises 4 species, *A. dipus*, *A. squamiceps*, *A. yanoi* and *A. yoshigoui*, all of which are herein described as new. These 4 are known only from the western Pacific, except for *A. yanoi*, which is also found in the Red Sea (see “Remarks” of *A. yanoi*).

Key to species of *Ancistrogobius*

- 1a. Nape broadly covered by scales including predorsal midline (12 predorsal scales); upper part of operculum scaled; distinct, vertical black bar below eye; filamentous part of third dorsal spine entirely pale when alive or fresh (Fig. 6); anterior tip of sensory-papillae row *b* meets row 3 (Fig. 3B); rows x^1 and x^2 continuous, not interrupted by row *trp* (row *trp* short, restricted under rows x^1+x^2) *A. squamiceps*
- 1b. Nape almost naked and no predorsal scales; head naked; vertical black bar present or absent below eyes (always with single or some faint, dusky blotches around corner of mouth); filamentous part of third dorsal spine, if present, with alternating pale and yellow (and/or dusky) bands when alive or fresh (typically faded and indistinct in preserved specimens); sensory-papillae row *b* well apart from row 3 (Figs. 3A, 3C and 3D); rows x^1 not continuous to x^2 (interrupted by row *trp*) **2**
- 2a. Pelvic fins separated with rudimentary, low connecting membrane and no frenum (Fig. 2A); fifth pelvic-fin segmented ray short, its length 67.9–71.9% of length of preceding ray; black blotch at distal tip of first dorsal fin narrow, not reaching posteriorly to third spine (Fig. 4A); dorsal tip of sensory-papillae row 4 always extending well above a horizontal line through anterior tip of row *b* (Fig. 3A) *A. dipus*
- 2b. Pelvic fins united medially with well-developed connecting membrane and frenum (frenum sometimes rudimentary or absent) (Fig. 2B); fifth pelvic-fin segmented ray moderately long, its length 85.0% or more of length of preceding ray; black blotch at distal tip of first dorsal fin wide, extending posteriorly to third interspinal membrane (Figs. 4B and D); dorsal tip of sensory-papillae row 4 extending to, or slightly above, a horizontal line through anterior tip of row *b* (Figs. 3C–D) ... **3**
- 3a. Third spine of first dorsal fin elongated and filamentous, obviously longer than second spine (Figs. 4B and 7); pectoral-fin rays 17–19, typically 18 or 19; black blotch at distal tip of first dorsal spine extending posteriorly to a little behind third spine (but typically not to middle of third interspinal membrane) (Fig. 4B); small area beneath black blotch on first dorsal fin subtranslucent or pale (rather than yellow) when alive or fresh (Fig. 7) *A. yanoi*
- 3b. Third spine of first dorsal fin not elongate nor filamentous, subequal to second spine in length (Figs. 4D and 8); pectoral-fin rays 19–20, typically 20; black blotch at distal tip of first dorsal fin extending posteriorly to middle of third interspinal membrane or further behind (Fig. 4D); small area beneath black blotch on first dorsal fin yellow when alive or fresh (Fig. 8) *A. yoshigoui*

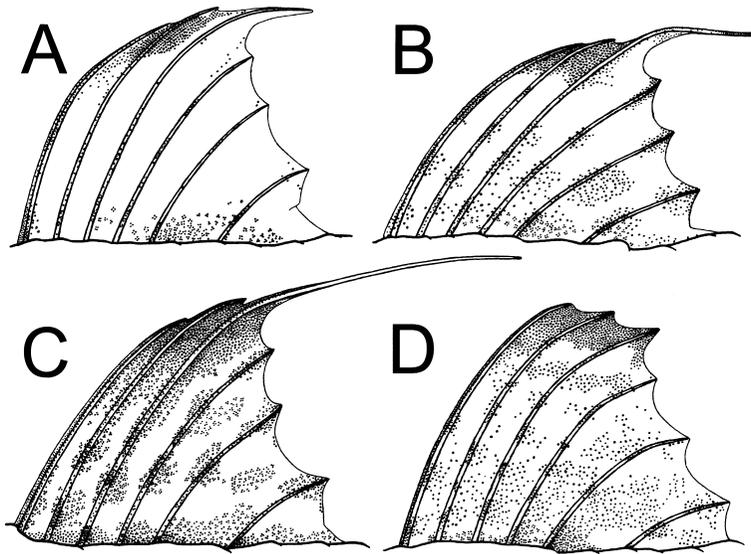


Fig. 4. Dorsal fin of 4 species of *Ancistrogobius*. A) *A. dipus*, NSMT-P 97981, holotype, 34.1 mm SL; B) *A. yanoi*, NSMT-P 97982, holotype, 35.7 mm SL; C) *A. squamiceps*, KPM-NI 5723, paratype, 50.5 mm SL; D) *A. yoshigouii*, OMNH-P 15710, paratype, 38.4 mm SL. Drawn by K. Shibukawa.

***Ancistrogobius dipus* sp. nov.**

[New Japanese name: Futahire ho'okagi-haze]

[New English name: Double-fin cheek-hook goby]

(Figs. 2A, 3A, 4A and 5; Table 1)

Macrodontogobius wilburi (not Herre): Randall *et al.*, 1997: 405 [underwater photograph (description based on true *M. wilburi*)]; Myers, 1999: 172, pl. 162F [underwater photograph (description based on true *M. wilburi*)].

“Orangetip Goby”: Allen *et al.*, 2003: 323 (middle-left photograph only; Papua New Guinea).

Gobiidae, indet. gen. and sp. 4: Senou *et al.*, 2004: 472 (Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan).

Holotype. NSMT-P 97981, male, 34.1 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 35 m depth, 11 May 2002 (collected by K. Yano).

Paratypes. Seven specimens, 31.6–42.4 mm SL: KPM-NI 5722, 1 specimen (female), 39.3 mm SL, mouth of Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 22 m depth, 19 Nov. 1998 (collected by K. Shibukawa); URM-P 4682, 1 specimen (male), 42.4 mm SL, mouth of Amitori Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 9 Sept. 1982 (collected by K. Shimada); WAM-P.30896-002, 1 specimen (male), 39.2 mm SL, Kimbe Island, New Britain,

Papua New Guinea (5°26'S, 150°06'E), 27–28 depths, 10 Dec. 1994 (collected by P. Munday); WAM-P. 31153-002, 1 specimen (male), 31.6 mm SL, Hanging Garden Reef, Kimbe Bay, New Britain, Papua New Guinea (5°26'S, 150°06'E), 23–24 m depths, 20 Dec. 1994 (collected by S. Seeto); WAM-P. 32262-001, 2 specimen (male and female), 34.9–36.2 mm SL, Padoz Reef, off entrance to Nagada Harbour, Madang, Papua New Guinea (5°10'S, 145°49'E), 20–22 m depths, 10 Feb. 1993 (collected by G.R. Allen); WAM-P. 32537-001, 1 specimen (female), 36.0 mm SL, Palunukura Bay, Santa Ysabel, Solomon Islands (7°50.79'S, 158°43.32'E), 15 m depth, 16 May 2004 (collected by G. Allen).

Diagnosis. *Ancistrogobius dipus* is unique within the genus in having: largely separated pelvic fin with rudimentary connecting membrane and no frenum; fifth segmented ray of pelvic fin short, its length 67.9–71.9% of preceding ray; and narrow black blotch on distal tip of first dorsal fin (not reaching posteriorly to third spine). It is also characterized by the following features: pectoral-fin rays 19–21, typically 20; head and most of nape naked and no predorsal scales (except for a single specimen, WAM-P. 32537-001, with one predorsal scale); third spine of first dorsal fin greatly elongated, filamentous, obviously longer than preceding spine, typically

Table 1. Proportional measurements of four species of Ancistrogobius gen. nov.

	<i>A. dipus</i>		<i>A. squamiceps</i>		<i>A. yanoi</i>		<i>A. yoshigouii</i>				
	holotype NSMT-P 97981	5 males* 31.6–42.4	3 females 36.0–39.3	holotype KPM-NI 5723	holotype paratype KPM-NI 5721	holotype NSMT-P 97982	7 males 19.3–36.8	8 females* 20.2–35.7	holotype YCM-P 39103	8 males* 26.1–40.3	6 females 30.0–38.4
Standard length (mm)	34.1	31.6–42.4	36.0–39.3	50.5	29.8	35.7	19.3–36.8	20.2–35.7	28.1	26.1–40.3	30.0–38.4
In % of SL											
Head length	35.2	35.1–37.4	36.7–38.7	33.9	35.3	35.0	32.5–35.7	32.0–36.6	35.2	32.9–35.2	32.2–35.0
Snout length	10.1	9.3–10.3	10.0–10.9	9.1	11.2	10.0	8.0–9.4	7.7–10.0	9.1	7.7–9.4	7.8–9.5
Eye diameter	10.7	10.6–12.4	10.6–11.8	11.7	11.4	9.9	10.5–10.9	9.9–11.7	10.5	10.0–11.3	10.1–11.6
Interorbital width	1.6	1.2–1.7	1.3–1.8	1.4	1.9	1.7	1.5–1.9	1.4–1.7	1.3	1.1–1.7	1.2–1.7
Jaw length	15.5	15.5–16.6	15.8–17.3	14.7	15.0	15.5	14.9–16.3	12.7–15.5	15.4	14.1–15.9	14.0–15.6
Nape width	18.2	14.7–18.2	15.6–16.8	14.7	14.8	15.5	12.9–14.1	11.6–15.6	14.5	12.5–14.8	13.8–16.0
Head width	19.2	19.2–20.6	19.9–21.6	20.7	19.5	21.2	17.2–19.7	16.7–21.2	18.5	17.2–20.4	17.1–19.5
Head depth	19.2	19.2–22.7	21.6–23.9	22.0	20.4	22.1	19.7–23.1	19.0–23.4	20.2	18.3–22.5	19.8–21.3
Body depth (at origin of first dorsal fin)	20.4	20.4–26.3	24.9–27.5	23.0	22.1	26.3	21.1–24.0	19.7–26.3	22.3	19.8–24.2	20.9–22.9
Body depth (at origin of anal fin)	18.5	18.5–20.9	20.6–20.9	20.5	18.8	20.4	18.0–21.6	18.2–21.6	19.3	19.0–20.8	18.9–21.0
Body width	14.2	14.1–16.6	15.6–17.8	16.4	13.6	18.1	11.5–14.5	12.2–18.1	13.4	11.4–14.1	13.1–15.8
Predorsal length	38.4	38.4–40.8	40.0–41.5	38.9	39.0	39.1	37.4–39.6	37.0–39.8	38.5	36.6–39.2	38.1–39.4
Prepelvic length	33.9	33.9–36.5	37.5–38.4	36.5	35.2	35.9	34.5–38.2	34.4–38.1	35.5	34.4–37.9	34.1–37.1
Prealanal length	58.6	58.6–62.3	61.1–64.1	62.5	60.2	60.2	58.3–62.1	58.1–62.3	59.4	57.9–60.2	58.8–62.0
Caudal-peduncle length	24.9	24.1–25.0	23.7–26.3	25.2	26.9	24.5	23.4–25.7	23.9–25.7	26.2	23.4–27.0	22.5–24.9
Caudal-peduncle depth	11.8	11.1–12.9	10.5–12.0	11.7	11.6	12.0	10.3–12.5	10.4–12.0	12.8	11.7–13.1	11.7–12.7
Length of 1st dorsal fin base	19.7	19.4–19.8	19.0–20.1	18.3	18.0	19.8	16.6–19.7	17.3–20.0	19.5	18.6–21.5	19.3–19.9
Length of 2nd dorsal fin base	22.8	18.9–22.8	20.3–22.2	21.2	21.0	22.1	19.5–24.0	20.9–21.7	22.6	21.0–25.1	21.3–22.6
Length of anal fin base	19.1	14.7–19.1	16.6–17.4	15.4	16.6	17.0	17.5–19.7	17.0–17.9	19.1	17.0–20.1	17.6–19.3
Pectoral-fin length	25.8	25.8–29.0	28.2–29.9	27.0	28.4	28.0	26.0–30.6	26.3–29.5	31.5	28.9–32.4	29.0–31.9
Pelvic-fin length	28.8	27.9–30.9	26.9–29.8	22.9	25.7	26.2	22.4–27.3	23.6–26.6	24.7	22.1–26.4	24.3–26.0
Length of 4th pelvic-fin segmented ray	27.1	26.7–29.9	25.8–28.9	20.8	24.1	24.5	20.8–25.5	21.7–25.4	23.4	22.2–24.3	20.8–25.0
Length of 5th pelvic-fin segmented ray	19.2	19.1–22.2	18.5–20.8	19.2	21.4	22.0	19.7–25.5	19.4–22.0	21.8	20.1–23.6	20.4–22.3
Height of pelvic frenum	—	—	—	1.8	2.6	0.8	0.0–1.8	0.8–1.7	2.6	1.5–3.7	2.0–4.6
Height of connecting membrane of pelvic fin	1.2	1.2–1.8	1.2–1.9	15.0	(broken)	17.7	17.9–23.0	15.7–17.7	20.6	17.5–21.7	19.2–20.4
Caudal-fin length	27.7	27.2–29.0	26.7–27.4	27.8	28.1	28.0	27.5–34.8	27.4–29.0	27.2	27.2–32.7	26.7–28.6

*Including holotype.

with alternating pale and dusky (or yellow) bands when alive or fresh; faint, dusky blotches (not forming distinct vertical bar) below eye; sensory papilla rows x^1 and x^2 not continuous, interrupted by row *trp*; sensory papilla rows *trp* long, extending dorsally to well above a longitudinal line through row x^1 ; anterior tip of sensory papilla row *b* meeting row 4; sensory papilla row 4 long, dorsal tip close to eye. In addition, *A. dipus* has a relatively slender and pointed snout compared with other *Ancistrogobius*, but this character is difficult to quantify.

Description. Dorsal-fin rays VI-I, 9 (1) or VI-I, 10* (6); anal-fin rays I, 9* (7); pectoral-fin rays 19 (1), 20* (11) or 21 (2); pelvic-fin rays I, 5 (14); segmented caudal-fin rays 9+8* (4), including 6+6* (4) branched rays; dorsal unsegmented caudal-fin rays 7 (2), 8* (1) or 9 (1); ventral unsegmented caudal-fin rays 5 (1), 6 (1), 7* (1) or 8 (1); longitudinal scales 24* (1), 25* (9) or 26 (6); transverse scales from anal-fin origin upward and forward to dorsal-fin base 8 (1), 9 (6) or 10* (9); transverse scales from anal-fin origin upward and backward to dorsal-fin base 7 (2), 8* (5) or 9* (9); transverse scales from second dorsal-fin base downward and backward to anal-fin base 7 (2) or 8* (14); predorsal scales 0* (8); circumpeduncular scales 12 (8); gill rakers 1+9 (1), 2+8* (1) or 2+9 (2); pseudobranchial filaments 8* (1) or 9 (3).

Color when alive or fresh (based on color photographs, e.g., Fig. 5). Ground color of head and body pale brown or pale gray dorsally, becoming paler ventrally; cheek with at least some dark brown spots smaller than pupil (sometimes tinged with yellow), those at corner of mouth typically largest and most conspicuous; in addition, several faint yellowish small spots sometimes present on cheek; dorsal part of operculum with several faint dusky spots, sometimes tinged with yellow; dorsal surface of eye with several small, irregular (typically elongate) black or dark brown spots; dorsal surface of snout and nape scattered small dark brown spots about size of pupil or slightly smaller; 2 dark brown spots, sometimes tinged with yellow, on pectoral-fin

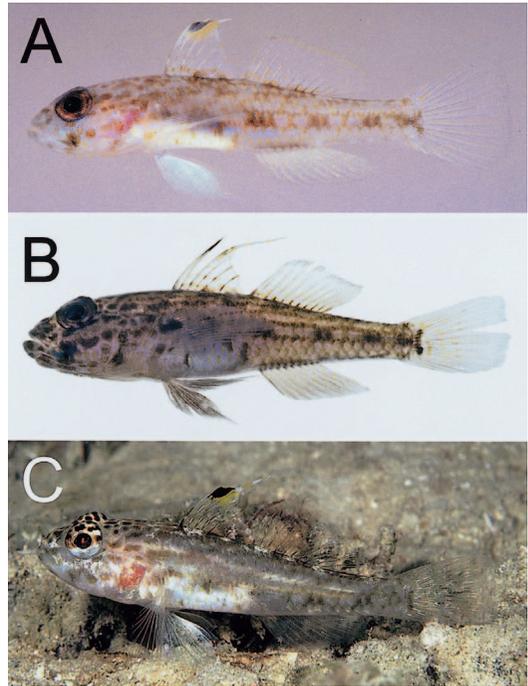


Fig. 5. Freshly collected (A–B) and underwater (C) photographs of *Ancistrogobius dipus* sp. nov. A) NSMT-P 97981, holotype, male, 34.1 mm SL (photographed by T. Suzuki); B) KPM-NI 5722, paratype, female, 39.3 mm SL (photographed by H. Senou); C) non-collected specimen, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 40 m depth (photographed by K. Yano).

base; dorsum of body mottled with dark brown; lateral wall of abdominal cavity bright white; most of scales on body with faint yellow center in larger specimen; about 5 small saddle-like bright white blotches along bases of dorsal fins (obscure in freshly collected specimen); midlateral body with series of alternating large and small dark brown spots, typically enclosed by faint dark brown horizontal lines dorsoventrally; T or Y-shaped, faint dark brown marking at midlateral base of caudal fin; spines of first dorsal fin with alternating dark brown and white bands; a small but distinct black blotch at distal tip of first dorsal fin from first and second interradial membrane, not reaching posteriorly to third spine; black dorsal-fin spot bordered by white an-

terovertrally, orange yellow posteroventrally; a wavy dark brown horizontal line along base of first dorsal fin; dorsal filaments typically with alternating bands of orange and white (filament of holotype short and entirely whitish); second dorsal fin nearly translucent, tinged with narrow gray distally; rays of second dorsal fin sometimes with alternative white and dusky markings; one or two faint, horizontal rows of orange spots near base of second dorsal fin visible in some specimens just after fixation; anal fin subtranslucent, whitish or grayish, with several faint orange spots on posterior part in some specimens; caudal fin subtranslucent, with faint orange spots at middle rays forming some transverse bars in some specimens; pectoral fin translucent; pelvic fin white, dark brown, or grayish.

Color in alcohol. Similar to live or fresh coloration, except as follows: all yellow and orange markings on head, body and fins faded; small saddle-like white spots on body faded; alternate pattern of dorsal filaments almost faded.

Distribution and habitat. Type specimens of *Ancistrogobius dipus* were collected from sandy-mud or silt bottoms with dead-coral rubble at depths of 15–35 m in Japan (Yaeyama Group of Ryukyu Islands), Papua New Guinea, and Solomon Islands. The third author has also photographed this species at Raja Ampat Islands and Fakfat, West Papua (Indonesia), and Pohnpei in the Federated States of Micronesia. Additionally, illustrations of “*Macrodontogobius wilburi*” by Randall *et al.* (1997) and Myers (1999) from the Great Barrier Reef and Micronesia respectively are identified by us as *A. dipus*.

Remarks. Judging from the general physiognomy including, e.g., relatively pointed snout, terminal mouth with slightly protruding lower jaw, short innermost (=fifth) pelvic-fin segmented ray, no distinct black vertical bar below eye, narrow black spot on first dorsal fin, distinct dorsal-fin filament with alternative pale and dusky (or yellow) pattern, and pale pelvic fin, the gobies on the underwater photographs identified as “*Macrodontogobius wilburi*” by Randall *et al.* (1997) and Myers (1999) are probably identical

with *Ancistrogobius dipus* (see also “Comparisons” of the genus, above).

Etymology. The specific name *dipus* is derived from the combination of the Greek words “*dis*” (meaning “two”) and “*pous*” (meaning “foot”) in reference to its largely separated pelvic fins.

Ancistrogobius squamiceps sp. nov.

[New Japanese name: Uroko ho'okagi-haze]

[New English name: Scaly cheek-hook goby]

(Figs. 2B, 3B, 4C, and 6; Tables 1)

Gobiidae, indet. gen. and sp. 7: Senou *et al.*, 2004: 475 (Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan).

Holotype. KPM-NI 5723, 1 specimen, 50.5 mm SL, female, mouth of Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 19 Nov. 1998 (collected by K. Yano).

Paratype. KPM-NI 5721, 1 specimen (cleared, stained, and dissected), male, 29.8 mm SL, mouth of Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 19 Nov. 1998 (collected by H. Senou).

Diagnosis. *Ancistrogobius squamiceps* is unique within the genus in having: nape broadly covered by scales (12 predorsal scales); upper part of operculum with patch of scales; filamentous part of third dorsal spine entirely pale when alive or fresh; anterior tip of sensory papilla row *b* meeting row 3 anteriorly; and sensory papilla rows x^1 and x^2 continuous, not interrupted by row *trp* (sensory papilla rows *trp* short, restricted under rows x^1+x^2). It is also characterized by the following features: third spine of first dorsal fin elongate, filamentous, obviously longer than preceding spine; pectoral-fin rays 20; pelvic fins fused medially with well developed connecting membrane and frenum; fifth segmented ray of pelvic fin 85.0–92.4% of preceding ray in length; a distinct, black vertical bar below eye; black blotch on distal tip of first dorsal fin wide, extending posteriorly to middle of third interspinal membrane; sensory papilla row 4 short, well apart from eye (always restricted below row *b*).

Description. Dorsal-fin rays VI-I, 10* (2); anal-fin rays I, 9* (2); pectoral-fin rays 20* (4); pelvic-fin rays I, 5* (2); segmented caudal-fin rays 9+8* (2), including 6+5 (1) or 6+6* (1) branched rays; dorsal unsegmented caudal-fin rays 8* (1); ventral unsegmented caudal-fin rays 7* (1); longitudinal scales 26* (4); transverse scales from anal-fin origin upward and forward to first dorsal fin base 8 (1) or 9* (3); transverse scales upward and backward to dorsal-fin base 7 (2) or 8* (2); transverse scales from second dorsal-fin origin downward and backward to anal-fin base 7* (1) or 8* (3); predorsal scales 12* (2); circumpeduncular scales 12* (2); gill rakers 2+8* (1) or 3+8 (1); pseudobranchial filaments 8* (2).

Color when alive or fresh (based on color photographs, e.g., Fig. 6). Ground color of head and body pale brown dorsally, becoming paler ventrally; a distinct black vertical bar from eye to corner of mouth (sometimes obscure in underwater photographs); cheek with several yellow spots edged by dark brown; similar spots on dorsal part of operculum; anterior part of operculum tinged with dark brown adjacent to posterior margin of preopercle; dorsal surface of eye with several black or dark brown dots; dorsal surface of snout and nape with scattered small dark brown spots smaller than pupil; 2 yellow spots edged with dark brown on pectoral-fin base, in addition to large horizontally elongate black spot on dorsal part; dorsum of body mottled with dark brown, sometimes forming four or five faint dusky saddles; lateral wall of abdominal cavity bright white; midlateral body with series of alternating large and small dark brown spots, typically enclosed by faint dark brown horizontal lines dorsoventrally; T or Y shaped, faint dark brown marking at midlaterally at caudal-fin base; spines of first dorsal fin with alternate bands of dark brown and white; black blotch (typically tinged with yellow) at distal tip of first dorsal fin relatively broad, reaching middle of third interradial membrane posteriorly; about 2 or 3 irregular rows of yellow spots edged by dark brown on basal half or two-thirds of first dorsal fin; dorsal

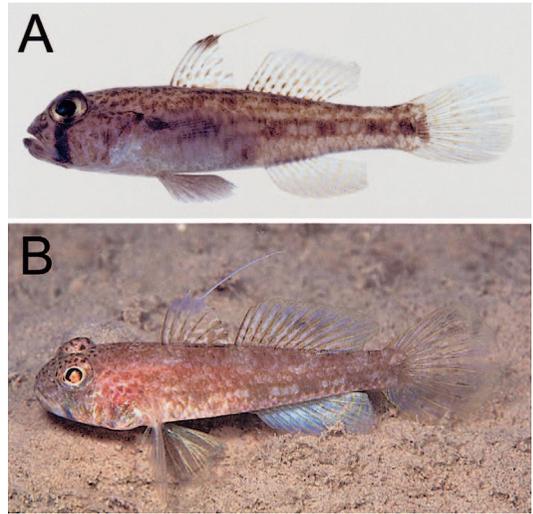


Fig. 6. Freshly collected (A-B) and underwater (C) photographs of *Ancistrogobius squamiceps* sp. nov. A) KPM-NI 5723, holotype, female, 50.5 mm SL (photographed by H. Senou); B) non-collected specimen, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 30 m depth (photographed by K. Yano).

filament pale; second dorsal fin with about four rows of yellow spots edged with dark brown, becoming obscure distally; anal pale, with 5 or 6 narrow, oblique orange lines posteromedially; caudal fin subtranslucent, with faint orange or dusky spots along middle rays forming irregular transverse bars; pectoral fin translucent; pelvic fin white or grayish.

Color in alcohol.—Similar to live or fresh coloration, except all yellow and orange markings on head, body, and fins faded.

Distribution and habitat. *Ancistrogobius squamiceps* is known only from sandy-mud or silt bottoms at depths of 20–30 m in Amitori and Funauki Bays, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan.

Etymology. The specific name *squamiceps* is derived from the combination of the Latin words “*squama*” (meaning “scale”) and “*ceps*” (meaning “head”) in reference to the presence of scales on head (upper part of operculum) and nape in this species.

Ancistrogobius yanoi sp. nov.

[New Japanese name: Asabano ho'okagi-haze]

[New English name: Yano's cheek-hook goby]

(Figs. 1B, 3C, 4C and 7; Table 1)

“Orangetip Goby—Female”: Allen *et al.*, 2003: 323 (Papua New Guinea).

Gobiidae, indet. gen. and sp. 5: Senou *et al.*, 2004: 473 (Ishigaki-jima Island and Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, and Papua New Guinea).

Holotype. NSMT-P 97982, 1 specimen (female), 35.7 mm SL, Tako-zaki Point, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 4 m depth, 7 June 2002 (collected by K. Yano).

Paratypes. Total 13 specimens, 16.9–36.8 mm SL: AMS I.32492018, 1 specimen (female), 30.4 mm SL, Bismark Sea, Madang Province, Papua New Guinea, 0–2 m depth, 29 Nov. 1987 (collected by L. Parenti and G. R. Allen); BPBM 41011, 3 specimens (females), 26.9–30.6 mm SL, wreck of ship at Kerosene Island, Madang Province, Papua New Guinea, 10 m depth, 17 Aug. 1973 (collected by J. E. Randall and R. Steene); CAS 53241, 1 specimen (male), 19.3 mm SL, Koror Island, Palau Islands (7°20.4'N, 134°34.4'E), 0–3 ft depth, 6 Sep. 1957 (collected by Sumang, DeWitt and Fehlman); KPM-NI 25199 (formerly IOP 2715), 1 specimen, 33.2 mm SL, male, off Funaura, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 29 Aug. 1991 (collected by H. Masuda, H. Senou, M. Aizawa and Irikawa); KPM-NI 25200 (formerly IOP 2498), 1 specimen (male), 36.8 mm SL, Amitori Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 25 Aug. 1991 (collected by H. Masuda, H. Senou, M. Aizawa and Irikawa); OMNH-P 15712, 1 specimen (female; cleared, stained, and dissected), 35.4 mm SL, collected with holotype; YCM-P 15058, 1 specimen (male), 16.9 mm SL, off Shukuba-no-hama Beach, Amitori Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 8 Sept. 1985 (collected by M. Hayashi and T. Itoh); YCM-P 15090, 1 specimen (female), 20.2 mm SL, same locality as YCM-P 15058; WAM-P

33156-001, 3 specimens (2 males and 1 female), 27.7–29.6 mm SL, Muaras Island, off north-eastern coast of Kalimantan (1°57.76'N, 118°48.05'E), sand-rubble, 10 m depth, 17 Oct. 2003 (collected by G.R. Allen).

Non-type materials. BPBM 19782, 1 specimen (female), 40.2 mm SL, Suakin Harbor, Sudan, Red Sea, fringing reef and adjacent silt bottom, 12–15 m depth, 15 Oct. 1975 (collected by J. E. Randall and P. Vine); BPBM 30362, 1 specimen (male), 29.6 mm SL, north of Jeddah, Soudi Arabia, Red Sea, silty sand and dead coral rock, 18 May 1984 (collected by J. E. Randall).

Diagnosis. The new species *Ancistrogobius yanoi* differs from the other members of the genus in having the following combination of characters: head and most of nape naked and no predorsal scales; third spine of first dorsal fin elongate and filamentous, obviously longer than preceding spine (at least in specimens >21 mm SL), with alternating pale and dusky pattern when alive or fresh (typically faded and indistinct in preserved specimens, but its distal tip tinged with black); pectoral-fin rays 17–19, typically 18 or 19; pelvic fins fused medially by well developed connecting membrane and frenum (frenum often rudimentary); fifth segmented ray of pelvic fin 89.9–100.0% of preceding ray in length; faint, dusky blotches below eye (not forming a distinct vertical bar); black blotch on distal tip of first dorsal fin relatively wide, extending posteriorly to just behind third spine (but not to middle of third interspinal membrane); sensory papilla rows x^1 and x^2 not continuous, interrupted by row *trp*; sensory papilla rows *trp* extending dorsally to slightly above a longitudinal line through rows x^1+x^2 ; anterior tip of sensory papilla row *b* closed to, or attaching with, row *4* and well apart from row *3*; row *d* typically extending posteriorly to well beyond ventral end of row *6i*.

Description. Dorsal-fin rays VI-I, 10* (14); anal-fin rays I, 9* (14); pectoral-fin rays 17 (2), 18 (14) or 19* (12); pelvic-fin rays I, 5* (28); segmented caudal-fin rays 9+8* (12), including 6+6* (12) branched rays; dorsal unsegmented caudal-fin rays 7 (4) or 8* (8); ventral unseg-

mented caudal-fin rays 5 (1), 6* (3) or 7 (8); longitudinal scales 24 (4), 25* (13) or 26* (11); transverse scales from anal-fin origin upward and forward to dorsal-fin base 8 (1), 9 (1), 10* (15) or 11 (2); transverse scales from anal-fin origin upward and backward to dorsal-fin base 7 (1), 8* (11) or 9* (15); transverse scales from origin of second dorsal fin downward and backward to anal-fin base 7 (1), 8* (23) or 9 (3); predorsal scales 0* (14); circumpeduncular scales 12* (14); gill rakers 2+8* (7), 2+9 (1) or 2+11 (1); pseudobranchial filaments 8* (3), 9 (4) or 10 (1).

Color when live or fresh (based on color photographs, e.g., Fig. 7). Ground color of head and body light gray or pale brown dorsally, becoming paler ventrally; cheek with dark brown or blackish spots smaller than pupil (sometimes tinged with yellow), those at corner of mouth typically largest and most conspicuous; in addition, several faint yellowish small spots sometimes present on cheek especially in male; operculum with several faint dusky spots, sometimes tinged with yellow, dorsally; dorsal surface of eye with several black or dark brown dots; dorsal surface of snout and nape with scattered small dark brown or dark gray spots smaller than pupil; 2 dark brown spots, sometimes tinged with yellow, on pectoral-fin base; dorsum of body mottled with various sized dark gray or dark brown spots; lateral wall of abdominal cavity bright white; most of scales on body with faint yellow center in larger specimen; midlateral body with a series of alternating large and small dark brown spots; Y-shaped, faint dark brown marking midlaterally at caudal-fin base; spines of first dorsal fin with alternate bands of dark gray and white, forming 3 or 4 nearly horizontal rows; dorsal filaments with alternating orange and white bands, and distal tip tinged with black; black blotch at distal tip of first dorsal fin relatively broad, but not extending posteriorly to middle of third interspinous membrane; black dorsal-fin spot faintly bordered by white ventrally; second dorsal fin nearly translucent, with orange or dusky spots along spine and rays; these spots on second dorsal fin not forming distinct rows; anal fin pale, with faint dusky

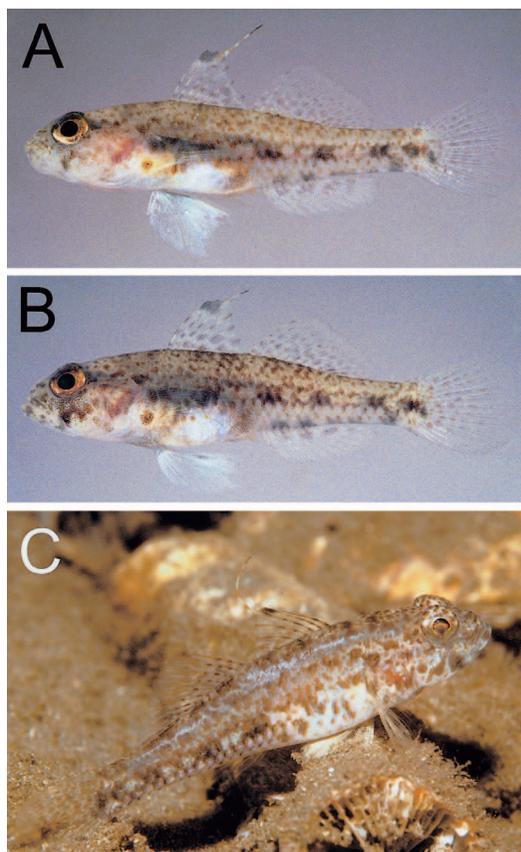


Fig. 7. Freshly collected (A–B) and underwater (C) photographs of *Ancistrogobius yanoi* sp. nov. A) OMNH-P 15711, paratype, female, 35.4 mm SL (photographed by T. Suzuki); B) NSMT-P 97982, holotype, female, 35.7 mm SL (photographed by T. Suzuki); C) non-collected specimen, Gilimanuk, Bali, Indonesia, 12 m depth (photographed by G. Allen).

oblique blotches basally in female, several orange spots on posterior rays in male; caudal fin subtranslucent, with several dusky spots along rays in female, orange spots along basal half of middle rays in male; these spots on caudal fin not forming distinct rows; pectoral fin translucent; pelvic fin white or grayish.

Color in alcohol. Similar to live coloration, except as follows: yellow and orange markings on head, body, and fins faded; alternate pattern of dorsal filaments almost faded, but tip typically tinged with black.

Distribution and habitat. The specimens of *Ancistrogobius yanoi* examined here were collected from sandy-mud bottoms at depths of 0–12 m in Japan (Iriomote-jima Island and Ishigaki-jima Island, Yaeyama Group of Ryukyu Islands), Palau Islands, Kalimantan and Papua New Guinea. A single underwater photograph of this species, taken from the Palau Islands at the depth of 3 m, is registered in the database of fish images in KPM (KPM-NR 28209). Two BPBM specimens, collected from the Red Sea, are provisionally identified as *A. yanoi* (see below “Remarks”). In addition, the third author has photographed this species at the Raja Ampat Islands and Cenderawasih Bay, West Papua (Indonesia), New Ireland (Papua New Guinea), Solomon Islands, Yap and Chuuk (Federated States of Micronesia), and El Nido, Palawan (Philippines)

Remarks. In the initial stages of this study, we considered *Ancistrogobius yanoi* and *A. yoshigoui* as conspecific, representing the male and female of a single species, respectively. However, this conclusion was based on the examination of only 3 specimens, comprising two males of *A. yanoi* (KPM-NI 25199 and 25200) and a single female of *A. yoshigoui* (URM-P 37552). These 2 species are superficially very similar, sharing the fused pelvic fins and naked head and nape. There are minor differences between these 2 species in the extent of the third dorsal spine filament, pectoral-fin ray counts, and coloration (see key to species, above). However, K. Yano (Dive Service Yano, Iriomote-jima Island), informed us that these 2 forms were not found in the same habitat at the Iriomote-jima Island; he stated that one (*A. yoshigoui*) occurred in relatively deep water (at depths of 20 m or more), whereas the other (*A. yanoi*) was only found in shallow areas (ca. 4 m depth) in Funauki Bay of Iriomote-jima Island. He also provided several specimens of these 2 species, with detailed collecting data and excellent underwater photographs. Examination of these and several additional specimens reveal that the 2 species are clearly distinct based on several morphological features.

The third dorsal spine is not elongated and filamentous in 2 small paratypes, YCM-P 15058 (16.9 mm SL) and YCM-P 15090 (20.2 mm SL). However, we are able to confirm their identification as *A. yanoi*, based on other diagnostic features (see diagnosis). All of the larger type specimens of *A. yanoi* have a typically elongate third spine of first dorsal fin, and easily distinguished from *A. yoshigoui*.

Two non-type specimens, collected from the Red Sea, are provisionally identified by us as *A. yanoi*. Although they are not in good condition, we found the following diagnostic features of *A. yanoi*: 19 pectoral-fin rays; united pelvic fins with connecting membrane (between innermost rays) and frenum (between spines); no scales on predorsal midline, cheek and operculum; third spine of first dorsal fin elongate and filamentous (at least in male specimen, BPBM 30362). Additional specimens from the Red Sea are required to confirm our provisional identification. Therefore we did not indicate the Red Sea material in the type series of *A. yanoi*. Interestingly, no records of *Ancistrogobius* have been reported to date from the Indian Ocean.

The unidentified goby referred to as the “Orangetip Goby” by Allen *et al.* (2003) is probably identical with *A. yanoi*, judging from the long filamentous spine of first dorsal fin marked with alternating pale and dusky (or yellow) bands and darkened tip.

Etymology. The new species is named for K. Yano, who provided several type specimens and habitat information for all the new species of *Ancistrogobius*. We are especially grateful for his clarification of the separation between *A. yanoi* and *A. yoshigoui*, as noted above.

***Ancistrogobius yoshigoui* sp. nov.**

[New Japanese name: Itokake Ho'okagi-haze]

[New English name: Threadless cheek-hook goby]

(Figs. 3D, 4D, and 8; Table 1)

Gobiidae sp. 6: Masuda and Kobayashi, 1994: 374 (Kerama Island, Okinawa Group of Ryukyu Islands, Japan).
Gobiidae, gen. & sp. 3: Suzuki and Senou *in* Okamura

and Amaoka, 1997: 624 (Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan).

Gobiidae, indet. Gen. and sp. 6: Senou *et al.*, 2004: 474 (Amami-oshima Island of Amami Group, Okinawa Group, and Iriomote-jima Island of Yaeyama Group of Ryukyu Islands, Japan).

Macrodontogobius wilburi (not of Herre): Randall, 2005: 542 [underwater photograph taken at Papua New Guinea (description based on true *M. wilburi*)].

Holotype. YCM-P 39103, male, 28.1 mm SL, mouth of Atetsu Bay, Setouchi-cho, Amami-oshima Island, Amami Group of Ryukyu Islands, Japan, 2 Nov. 1999 (collected by T. Itoh).

Paratypes. Total 13 specimens, 26.1–40.6 mm SL: AMS-I.40161081, 1 specimen (male), 26.1 mm SL, Mindoro Island, Philippines (13°10.7'N, 120°35' E), 30.0 m depth, 3 June 2000; HMNH-P 4445, 1 specimen (male), 40.3 mm SL, Unten Port, Nakijin, Okinawa-jima Island, Okinawa Group of Ryukyu Islands, Japan, 1 Jan. 2002 (collected by H. Yoshigou); HMNH-P 6234, 1 specimen (female), 30.0 mm SL, same collecting locality as HMNH-P 4445, 4 Jan. 2003 (collected by H. Yoshigou); HMNH-P 7597, 1 specimen (male), 27.8 mm SL, Yagachi-jima Island, Nago, Okinawa-jima Island, Okinawa Group of Ryukyu Archipelago, Japan, 5–10 m depths, 2 Jan. 2004 (collected by H. Yoshigou); HMNH-P 7598, 1 specimen (male), 27.4 mm SL, collected with HMNH-P 7597; HMNH-P 7614, 1 specimen (female), 33.4 mm SL, same collecting locality as HMNH-P 4445, 10 m depth, 3 Jan. 2004 (collected by H. Yoshigou); OMNH-P 15709, 1 specimen (female; cleared, stained, and dissected), 37.3 mm SL, off Yunara, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 20 m depth, 6 June 2002 (collected by K. Yano); OMNH-P 15710, 1 specimen (female), 38.4 mm SL, collected with OMNH-P 15709; URM-P 37552, 1 specimen (female), 38.1 mm SL; YCM-P 39104, 1 specimen (female), 26.4 mm SL, collected with holotype; YCM-P 39135, 1 specimen (male), 40.6 mm SL, same locality with holotype, 3 Nov. 1999 (collected by T. Itoh and K. Hagiwara); YCM-P 39136, 1 specimen (female), 36.8 mm SL, collected with YCM-P 39135; WAM-P.

32262-002, 1 specimen (male), 28.3 mm SL, Padoz Reef, off entrance to Nagada Harbour, Madang, Papua New Guinea (5°10'S, 145°49'E), 20–22 m depths, 10 Feb. 1993 (collected by G.R. Allen).

Diagnosis. *Ancistrogobius yoshigoui* is unique within the genus in lacking a filamentous spine on the first dorsal fin (and the third spine subequal in length to preceding spine). It is also characterized by the following features: pectoral-fin rays 19–20, typically 20; head and most of nape naked and no predorsal scales; pelvic fins fused medially with well developed connecting membrane and frenum; fifth segmented ray of pelvic fin 91.8–94.9% of preceding ray in length; faint, dusky blotches (not forming vertical bar) below eye; black blotch on distal tip of first dorsal fin wide, extending posteriorly to middle or more posterior part of third interspinal membrane; sensory papilla rows x^1 and x^2 not continuous, interrupted by row *trp*; sensory papilla rows *trp* extending dorsally to slightly above a longitudinal line through rows $x^1 + x^2$; anterior tip of sensory papilla row *b* extending or not to row 4 and well apart from row.

Description. Dorsal-fin rays VI-I, 9 (2) or VI-I, 10* (12); anal-fin rays I, 9* (14); pectoral-fin rays 19 (9) or 20* (19); pelvic-fin rays I, 5* (28); segmented caudal-fin rays 9+8* (14), including 6+5 (1), 6+6* (7) or 6+7 (1) branched rays; dorsal unsegmented caudal-fin rays 7 (1), 8* (9) or 9 (3); ventral unsegmented caudal-fin rays 7* (9) or 8 (4); longitudinal scales 25 (10), 26* (15) or 27 (3); transverse scales from anal-fin origin upward and forward to dorsal-fin base 9 (3), 10* (22) or 11 (3); transverse scales from anal-fin origin upward and backward to dorsal-fin base 8 (2) or 9* (26); transverse scale rows from origin of second dorsal fin downward and backward to anal-fin base 8* (23) or 9 (5); predorsal scales 0 (14); circumpeduncular scales 12 (14); gill rakers 1+8 (1), 1+9* (2), 1+10 (1), 2+8 (5), 2+9 (3) or 2+10 (1); pseudobranchial filaments 7* (5), 8 (5) or 9 (3).

Color when alive or fresh (based on color photographs, e.g., Fig. 8). Ground color of head and

body gray brown or pale brown dorsally, becoming paler ventrally; cheek with some dark brown or dark gray spots (sometimes tinged with yellow), those at corner of mouth typically largest and most conspicuous; this black spot sometimes forming a dusky vertical bar below eye; operculum with several faint dusky spots, sometimes tinged with yellow; in addition, several faint small yellowish spots sometimes present on cheek and operculum; dorsal surface of eye with several black or dark brown dots; dorsal surface of snout and nape with scattered small dark brown dots or spots smaller than pupil; 2 dark brown spots (sometimes tinged with yellow) and yellow spots edged with dark brown on pectoral-fin base; dorsum of body mottled with dark brown; lateral wall of abdominal cavity bright white; body with numerous small yellow spots edged with dark brown; midlateral body with a series of alternating large and small dark brown spots, typically enclosed by faint dark brown horizontal lines dorsoventrally; T or Y-shaped, faint dark brown marking at midlaterally at caudal-fin base; faint yellow spots edged by dark brown scattered on dorsal fins; black blotch at distal tip of first dorsal fin broad, extending posteriorly to middle of third interradial membrane; this black blotch bordered by white anteroventrally, yellow ventroposteriorly; posterior part of first dorsal fin with narrow white distal margin; anal fin whitish or grayish, with several faint dusky elongate blotches, sometimes tinged with yellow, basally; caudal fin subtranslucent, with 1 or 2 rows of narrow black spots at middle of fin; pectoral fin translucent; pelvic fin white or grayish.

Color in alcohol. Similar to live coloration, except yellow and orange markings on head, body, and fins faded.

Distribution and habitat. The specimens of *Ancistrogobius yoshigoui* examined here were collected from sandy-mud or silt bottoms at depths of 5–30 m in Japan (Ryukyu Islands from Amami-oshima Island south to Iriomote-jima Island), Philippines and Papua New Guinea. Most of the material was collected at depths of 20–30 m, except for some specimens collected in depths

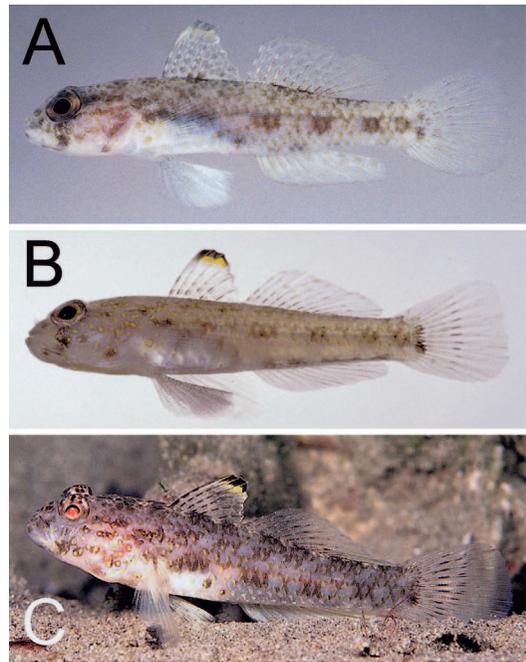


Fig. 8. Freshly collected (A–B) and underwater (C) photographs of *Ancistrogobius yoshigoui* sp. nov. A) OMNH-P 15710, paratype, female, 38.4 mm SL (photographed by T. Suzuki); B) YCM-P 39103, holotype, male, 28.1 mm SL (photographed by K. Hagiwara); C) non-collected specimen, Funauki Bay, Iriomote-jima Island, Yaeyama Group of Ryukyu Islands, Japan, 22 m depth (photographed by K. Yano).

of 5–10 m at Okinawa-jima Island (Okinawa Group of Ryukyu Islands). There are several underwater photographs of this species in the database of fish images in KPM; most of them were taken at Okinawa-jima Island, but one (KPM-NR16339) was taken at Manado, Sulawesi Island, Indonesia. In addition, the third author has photographed this species at the Raja Ampat Islands, West Papua (Indonesia).

Remarks. Judging from its general physiognomy (e.g., terminal mouth with slightly projecting lower jaw, no filamentous dorsal-fin spine, and non-barred pattern of pelvic fin), the goby in the underwater photograph identified as “*Macrodon-togobius wilburi*” by Randall (2005) is probably identical with *Ancistrogobius yoshigoui* (see also “Comparisons” of the genus, above).

Etymology. The new species is named for H. Yoshigou, who provided five paratypes and valuable information about this species.

Discussion

Four species of *Ancistrogobius* are presumed to form a monophyletic group, sharing the unique, apparently specialized, condition of the preopercular spine. *Ancistrogobius dipus* is peculiar within the genus in having largely separated pelvic fins with a rudimentary connecting membrane between the innermost rays and no frenum (Fig. 2A), while the remaining 3 species have complete disc-like pelvic fins united medially (Fig. 2B). Formerly, the degree of development of the pelvic disc was the primary basis for the recognition of families or subfamilies within the Gobioidae (e.g., Jordan and Snyder, 1901; Herre, 1927; Koumans, 1953; Fowler, 1960; Smith, 1959). Judging from the osteological and cephalic sensory-canal features (see “Comparisons” of the genus, above), all four species of *Ancistrogobius* are typical members of the gobiid subfamily Gobiinae (*sensu* Pezold, 1993). Similar intrageneric variation of pelvic-fin structure is also found in several other gobiid genera, e.g., *Amblyeleotris*, *Asterropteryx*, *Callogobius*, *Fusigobius*, *Heteroleotris*, *Periophthalmus*, *Periophthalmodon*, *Trimma* and *Vanderhorstia* (Akihito and Meguro, 1977; Hoese, 1986; Murdy, 1989; Winterbottom, 1984; Akihito *et al.*, 2002; Shibukawa and Suzuki, 2002, 2007; Iwata *et al.*, 2007), and it is not a feature relevant to the monophyly of *Ancistrogobius*.

The phylogenetic position of *Ancistrogobius* within the Gobiinae is not yet clear. Although *Ancistrogobius* shares the preopercular spine(s) with 3 gobiine genera, i.e., *Asterropteryx*, *Gladiogobius* and *Oplopomus*, monophyly of these 4 genera is not hypothesized. The structure of the preopercular spines for these genera is variable and primarily divided into 2 patterns; namely, *Oplopomus* has the spines formed by anterior ridge of the bony preopercular canal support, whereas the other 3 (*Ancistrogobius*, *Aster-*

ropteryx and *Gladiogobius*) have the spine(s) formed by the posterior ridge (Fig. 1). The preopercular spine(s) of *Oplopomus* is, furthermore, distinct from the others in being located below preopercular-canal pore O', whereas the spines of the remaining three are located above pore O' (see, e.g., Akihito *et al.*, 2002; Fig. 3). Also, *Oplopomus* is readily distinguished from the other cheek-spine gobies in having a longitudinal and proliferated pattern of sensory-papillae rows on the cheek (vs. a transverse pattern in the other spine-cheek gobies), and thickened and rigid first spines in both first and second dorsal fins (vs. slender and flexible). The pungent, rigid first spine is rare within the Gobiinae, and only found in 5 nominal genera with a longitudinal and/or proliferated pattern of sensory papillae on the cheek (*Echinogobius*, *Hazeus*, *Oplopomops*, *Oplopomus*, and *Opuia*) (Iwata *et al.*, 1998). The above evidence appears to reject a close relationship between *Oplopomus* and the other 3 genera, and, also, shows that the preopercular spines of the former are non-homologous with that of the latter.

Ancistrogobius might have a close affinity with *Asterropteryx* and/or *Gladiogobius*, although the details of the preopercular spines (i.e., directed ventrally vs. posteriorly) and arrangement of sensory-papillae rows (e.g., numbers of transverse sensory-papillae rows below row *b*) are heterogeneous among these 3 genera. Other than preopercular spine(s), however, we could not detect any distinct apomorphies shared by these 3. The other resemblances listed above are commonly found in many other gobiines, and, thus, we have little evidence to suggest a close relationship between *Ancistrogobius*, *Asterropteryx* and/or *Gladiogobius*. Further studies, including extensive molecular analysis for gobiine genera, are needed to resolve the interrelationships of the cheek-spine goby genera.

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