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***Acentrogobius limarius*, a new species of goby (Pisces: Gobiidae) from West Papua Province, Indonesia**

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Abstract

A new species belonging to the gobiid genus *Acentrogobius* is described from mud-bottom habitat in 26 m depth on the island of Batanta in the Raja Ampat Islands of West Papua, Indonesia. *Acentrogobius limarius* is described on the basis of eight specimens, 17.0–33.8 mm SL. Diagnostic features include the combination of 10 segmented dorsal and anal rays, usually 19 pectoral rays, and a live colour pattern featuring a mid-lateral row of four, large black spots, scattered orange to brownish spots on the head and body, a pair of brown stripes across the cheek, and conspicuous dark spotting on the dorsal and caudal fins. The species is particularly unique for the genus in possessing the combination of transverse cheek papillae, a single transverse row of chin papillae, and scales completely covering both the cheek and opercle.

Key words: taxonomy, gobies, mud bottom fishes, Indo-Australian Archipelago, western Pacific Ocean.

Introduction

The Indo-Pacific gobiid genus *Acentrogobius* Bleeker 1874 typically inhabits soft substrata of coastal bays, mangrove streams, and estuaries, sometimes penetrating into fresh water. Allen (2015) discussed the taxonomic problems associated with this group, which Larson & Lim (2005) referred to as a confusing group and a “catch-basket” for many gobies of similar appearance. Jaafar (2008, unpublished PhD thesis) recognized 23 species, which were allocated to four genera including *Acentrogobius* Amoya Herre 1973, *Yongeichthys* Whitley 1932, and an undescribed genus from the northwest Pacific. However, *Acentrogobius sensu lato* is retained for the purpose of this new species description, pending the eventual publication of Jaafar’s investigation. The most important characters for separating the various subgroups (i.e. Jaafar’s genera) include the orientation (longitudinal or transverse) of sensory papillae rows on the cheek and chin, as well as the extent of the gill opening (either restricted to the pectoral-fin base or extending forward to below the opercle or preopercle).

The present paper describes a new species of *Acentrogobius* from Batanta Island off the extreme western tip of New Guinea (Indonesian Province of West Papua). It was collected in 26 m, which is deeper than the usual habitat for this genus, which frequently consists of shallow (< 3-4 m) mangrove-lined channels. Allen (2015) pointed out that deeper mud-bottom areas are frequently overlooked due to poor visibility and relatively impoverished faunal diversity. However, this poorly collected habitat may well represent a largely untapped resource for gobiids, particularly *Acentrogobius*. Indeed, three of the most recent discoveries including *A. cenderawasih* Allen & Erdmann 2012, *A. vanderloosi* Allen 2015, and *A. violarisi* Allen 2015 were collected in this deeper zone.

Materials and Methods

Lengths are given as standard length (SL), measured from the median anterior point of the upper lip to the base of the caudal fin (posterior end of the hypural plate); body depth is measured at both the origin of the pelvic fins and the origin of the anal fin, and body width at the origin of the pectoral fins; head length (HL) is taken from the upper lip to the posterior end of the opercular membrane, and head width over the posterior margin of the preopercle; orbit diameter is the greatest fleshy diameter; snout length is measured from the median anterior point of the upper lip to the nearest fleshy edge of the orbit; upper-jaw length from the same anterior point to the posterior end of the maxilla; cheek depth is the distance between the posteriormost edge of the maxilla and ventral edge of the fleshy orbit; caudal-peduncle depth is the least depth, and caudal-peduncle length the horizontal distance between verticals at the rear base of the anal fin and the caudal-fin base; lengths of spines and rays are measured to their extreme bases; caudal and pectoral-fin lengths are the length of the longest ray; pelvic-fin length is measured from the base of the pelvic spine to the tip of the longest pelvic soft ray.

Specimens were stained with cyanine blue solution, which greatly facilitated examination of cephalic sensory papillae. Terminology and abbreviations for cephalic pores and papilla rows follow those presented by Akihito (1984).

Scales in longitudinal series are counted from the scale above the pectoral-fin base, continuing in a longitudinal row to the posterior edge of the hypural plate; scales in transverse series are counted from the origin of the anal fin anterodorsally to the base of the first dorsal fin; gill rakers are counted on the first gill arch, those on the upper limb listed first; rudiments are included in the counts. Circumpeduncular scales were counted in a vertical “zigzag” row around the caudal peduncle, immediately anterior to the caudal fin base.

Morphometric data presented as percentages of the standard length are included in Table 1. The range of counts and measurements for paratypes is indicated in parentheses if different from the holotype.

Type specimens are deposited at the Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia (MZB) and the Western Australian Museum, Perth (WAM).



Figure 1. *Acentrogobius limarius*, preserved holotype, MZB 22708, female, 33.8 mm SL, Batanta Island, West Papua Province, Indonesia (G.R. Allen).

Acentrogobius limarius Allen, Erdmann & Hadiaty, n. sp.

Batanta Mud Goby

Figures 1–3, Table 1.

Holotype. MZB 22708, female, 33.8 mm SL, bay on southwest coast of Batanta Island, 00° 53.969'S, 130° 30.995'E, Raja Ampat Islands, West Papua Province, Indonesia, 26 m depth, rotenone, M.V. Erdmann, 25 February 2015.

Paratypes. (same data as holotype) MZB 22709, 4 specimens, 17.0–26.9 mm SL; WAM P.34344-010, 3 specimens, 27.4–29.5 mm SL.

Diagnosis. Dorsal-fin rays VI+I,10, dorsal spines thin and flexible, third occasionally with long filamentous tip, reaching as far as sixth or seventh segmented ray of second dorsal fin when adpressed; anal-fin rays I,10; pectoral-fin rays 18–19 (rarely 18); caudal fin lanceolate, about equal to head length or slightly longer; longitudinal scale series 27–28; transverse-scales 9; predorsal-scales 8–9; finely ctenoid scales covering body, becoming cycloid on breast (prepelvic), pectoral-fin base, nape, and head; opercle and cheek fully scaled; anterior extent of gill opening below middle of opercle; transverse pattern of cheek papillae; single transverse row of papillae on chin; colour in life brown, grading to tan ventrally with scattered dark-edged, orange spots midlaterally on side of body, mid-lateral row of four, large squarish black spots from behind pectoral fin to caudal-fin base, pair of orange-brown stripes across cheek, and brown spotting on dorsal and caudal fins.

Description. (counts taken on all specimens, proportional measurements taken on all specimens except 17 mm SL paratype) Dorsal-fin rays VI + I,10; anal-fin rays I,10; pectoral-fin rays 19 (except 18 on one side of 2 paratypes); pelvic-fin rays I, 5; all dorsal, anal, pectoral, and pelvic soft rays branched, except lowermost and uppermost 1–2 pectoral rays; segmented caudal-fin rays 17; branched caudal-fin rays 13 (except 2 paratypes with 14); longitudinal scale series 28 (except 4 paratypes with 27); transverse scales 9; predorsal scales 8 (except 3 paratypes with 9); prepelvic scales 5 (except 2 paratypes with 4); circumpeduncular scales 9 (except 3 paratypes with 10); gill rakers on first branchial arch 1 + 7 (1 + 6–7).

Body elongate and laterally compressed, more strongly posteriorly; body depth at pelvic-fin base 4.6 (4.4–5.2) in SL; body depth at anal-fin origin 5.3 (4.9–5.9) in SL; head width and head depth at level of preopercular margin 2.1 (1.5–2.1) and 1.6 (1.5–1.7) respectively; HL 3.3 (3.3–3.6) in SL; snout short and rounded, length 5.5 (4.7–6.1) in HL; eye diameter 3.0 (2.7–3.0) in HL; eyes of each side in contact with each other on interorbital;



Figure 2. *Acentrogobius limarius*, underwater photograph, holotype, MZB 22708, female, 33.8 mm SL, Batanta Island, West Papua Province, Indonesia (G.R. Allen).

distance between snout and origin of first dorsal fin 2.7 (2.5–2.8) in SL, between snout and origin of second dorsal fin 1.8 (1.7–1.9), between snout and origin of anal fin 1.7 (1.6–1.9), and between snout and origin of pelvic fins 3.4 (3.1–3.4), all in SL.

Mouth terminal, jaws extending to a vertical at anterior edge of pupil; chin relatively smooth, without mental frenum; jaw teeth small and conical, densely packed in several rows, those in outermost row at front of jaws largest, including 3–4 on each side of symphysis of upper jaw and 1–2 enlarged, recurved canines on each side at front corner of lower jaw; tongue broad with bilobed anterior margin, broadly attached anteriorly to floor of mouth; anterior extent of gill opening below middle of opercle; anterior nostril tubular, extending forward to edge of upper lip; posterior nostril adjacent to anterior edge of orbit; transverse papillae pattern on cheek; pattern of papillae rows and sensory pores on head as shown in Fig. 3; anterior oculoscapular pores include snout pore (B'), single anterior (C) and posterior (D) interorbital pores, and three postorbital pores (E, F, and G); remaining pores include three preopercular pores (M', N, and O') and two posterior oculoscapular pores (K' and L'); chin with single row of transverse papillae.

Ctenoid scales covering body, becoming cycloid on nape (including predorsal); cycloid scales also present on breast (prepelvic) and pectoral-fin base; cheek and opercle covered with cycloid scales, about 7 scales on opercle and 3 rows on cheek.

First dorsal fin origin about pupil width or slightly greater posterior to level of pelvic-fin origin, about level with pectoral-fin base; dorsal spines thin and flexible, filaments lacking on dorsal spines of most specimens except short filament on third spine of female holotype (reaching first segmented dorsal ray when adpressed) and long filament on third spine of 28.0 mm SL male paratype (reaching seventh segmented dorsal ray when adpressed); second to fourth dorsal spines more or less subequal in most paratypes, longest spine 1.7–2.2 in HL; spine of second dorsal fin 3.1 (2.3–2.8) in HL; longest (penultimate) ray of second dorsal fin 1.6 (1.4–1.9) in HL, longest ray (penultimate) of anal fin 1.8 (1.3–1.8) in HL, pectoral fin pointed, middle rays longest, 4.2 (3.5–3.9) in SL; pelvic fins completely connected by membrane, with well-developed frenum (posterior edge smooth, without fleshy lobes); pelvic-fin length 4.3 (4.0–4.3) in SL; caudal fin lanceolate, about equal to or slightly longer than HL, 3.2 (3.0–3.7) in SL.

Color of freshly collected female holotype. (Fig 2) Bluish grey dorsally grading to tan on ventral half of head and body; scales of predorsal region and two uppermost longitudinal scale rows below first dorsal fin, and anterior and posterior portions of second dorsal fin with broad brown margins, forming diffuse brown saddles/bars; mid-lateral row of four, large (at least twice pupil size) squarish, black spots from behind pectoral fin to caudal-fin base, more or less enclosed within two rows of small, black-edged, orange spots; similar-sized, but more diffuse,

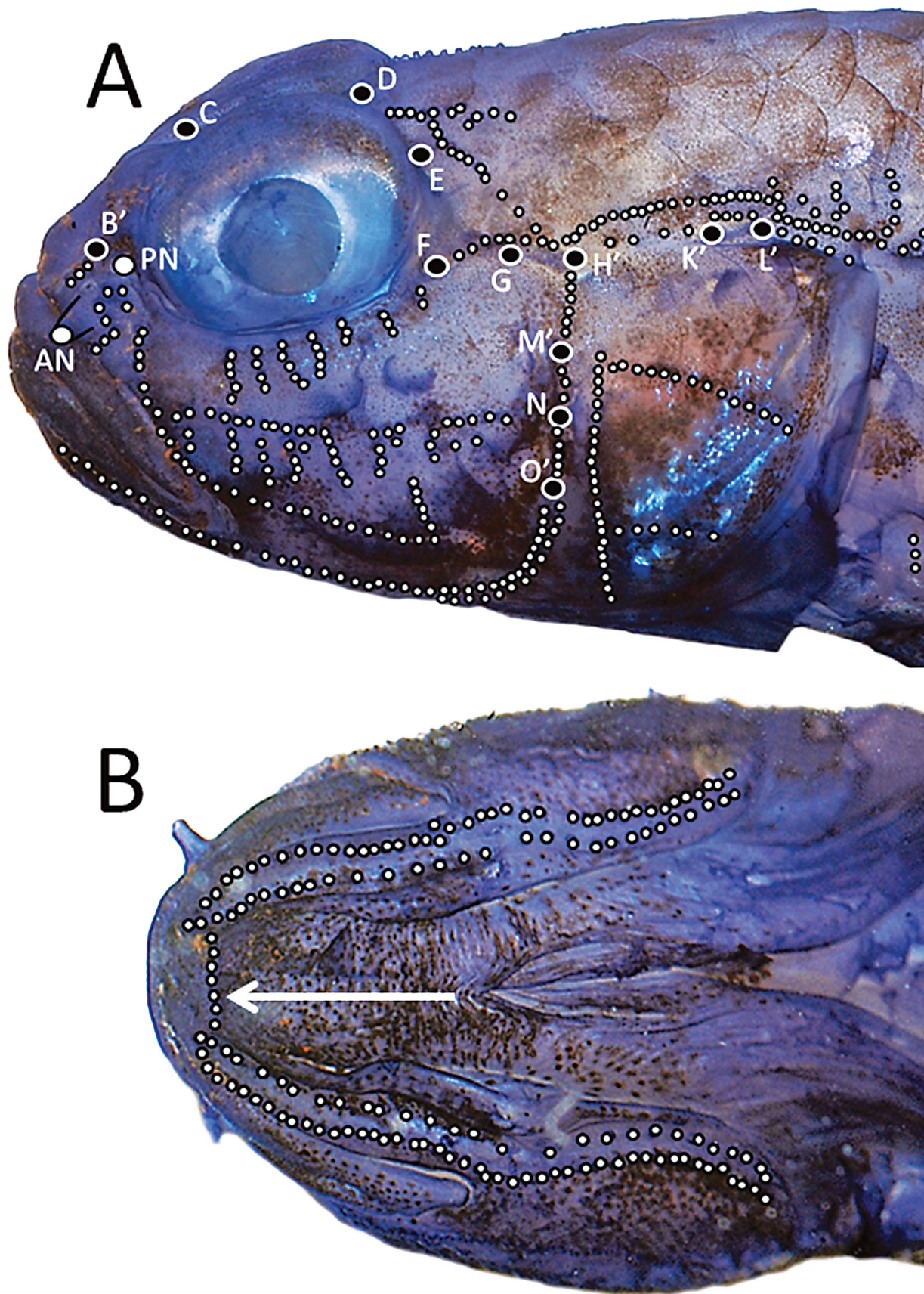


Figure 3. *Acentrogobius limarius*, preserved holotype, MZB 22708, female, 33.8 mm SL: lateral (A) and ventral (B) view of head with sensory pores and papillae rows indicated by white-edged black spots and black-edged white spots respectively (G.R. Allen). AN and PN indicates anterior and posterior nostrils. The transverse row of chin papillae is indicated by the white arrow in B. Specimen is stained with cyanine blue.

TABLE 1

Proportional measurements (as percentage of SL) for selected type specimens of *Acentrogobius limarius*

| | holotype | paratypes | | | | | |
|-------------------------------|--------------|-----------------|-----------------|-----------------|--------------|--------------|--------------|
| | MZB 22708 | WAM P. 34344 | WAM P. 34344 | WAM P. 34344 | MZB 22709 | MZB 22709 | MZB 22709 |
| Sex | female | female | male | male | female | female | female |
| Standard length (mm) | 33.8 | 29.5 | 28.1 | 27.4 | 26.9 | 24.6 | 24.2 |
| Head length | 30.3 | 27.8 | 29.2 | 30.4 | 30.1 | 30.2 | 28.8 |
| Head width | 14.2 | 17.0 | 15.6 | 18.7 | 14.3 | 19.2 | 18.7 |
| Head depth | 19.0 | 17.2 | 19.0 | 17.7 | 19.2 | 17.8 | 17.3 |
| Body depth pelvic origin | 21.7 | 20.5 | 22.4 | 22.5 | 21.0 | 19.4 | 19.6 |
| Body depth anal origin | 18.7 | 18.0 | 19.2 | 20.5 | 18.2 | 17.1 | 17.0 |
| Caudal-peduncle depth | 11.1 | 10.1 | 11.2 | 11.3 | 11.3 | 11.4 | 10.1 |
| Caudal-peduncle length | 18.4 | 20.1 | 18.7 | 21.2 | 17.5 | 19.1 | 23.6 |
| Snout length | 5.5 | 5.9 | 5.8 | 5.6 | 5.7 | 5.0 | 5.3 |
| Eye diameter | 10.1 | 9.9 | 10.4 | 11.1 | 10.1 | 11.1 | 10.4 |
| Cheek depth | 6.4 | 6.8 | 7.1 | 7.0 | 6.3 | 6.6 | 6.2 |
| Upper jaw length | 11.7 | 11.1 | 11.2 | 11.2 | 10.3 | 12.4 | 11.2 |
| Snout to first dorsal origin | 36.8 | 36.5 | 37.3 | 40.8 | 36.2 | 38.3 | 36.7 |
| Snout to second dorsal origin | 54.2 | 54.3 | 53.6 | 58.4 | 54.9 | 54.6 | 56.0 |
| Snout to anal fin origin | 57.7 | 59.4 | 54.0 | 64.1 | 53.5 | 58.3 | 57.6 |
| Snout to pelvic-fin origin | 29.7 | 30.1 | 29.3 | 30.4 | 31.8 | 30.8 | 30.2 |
| Base of dorsal fins | 48.0 | 46.3 | 46.8 | 48.2 | 48.0 | 47.2 | 47.1 |
| First dorsal spine | 13.7 | 13.6 | 15.8 | 15.4 | 14.0 | 13.8 | 14.2 |
| Second dorsal spine | 15.3 | 14.9 | 18.7 | 15.7 | 15.5 | 14.9 | 15.9 |
| Third dorsal spine | 19.8 | 15.4 | 36.1 | 17.9 | 13.8 | 14.4 | 16.8 |
| Second dorsal-fin spine | 9.7 | 10.8 | 11.5 | 11.6 | 10.9 | 11.4 | 12.4 |
| Longest soft dorsal ray | 19.5 | 16.8 | 22.4 | 21.1 | 16.1 | 16.6 | 15.8 |
| Anal-fin spine | 7.3 | 5.0 | 6.3 | 6.8 | 6.4 | 7.0 | 8.6 |
| Longest soft anal ray | 16.4 | 17.8 | 22.4 | 21.1 | 20.9 | 20.5 | 15.7 |
| Pectoral-fin length | 23.8 | 26.5 | 27.5 | 25.4 | 26.9 | 28.2 | 26.1 |
| Pelvic-fin length | 23.0 | 24.2 | 23.1 | 25.2 | 24.1 | 24.7 | 24.1 |
| Pelvic-fin spine | 9.3 | 8.9 | 7.8 | 8.0 | 7.1 | 7.2 | 8.6 |
| Caudal-fin length | 31.7 | 27.4 | 29.4 | 33.8 | 32.7 | 29.8 | 29.6 |

orange to brownish spots and brown-edged scales scattered on opercle and upper half of body; pair of brown stripes across cheek; rear and ventral margins of preopercle brownish and brown spot immediately posterior to maxilla; lips largely dark grey; first dorsal fin pale grey with brown spines, 2–3 rows of diffuse brown spots, and whitish outer margin; second dorsal fin semi-translucent brownish with 2–3 rows of horizontally elongate brown spots and whitish outer margin; caudal fin with translucent rays, dusky brown membranes and orange to brown spots, more or less arranged in 6–7 transverse rows, restricted to upper two-thirds of fin; anal fin with translucent rays, dusky-brown membranes, and whitish outer margin; pelvic fins with translucent rays and dusky-brown membranes; pectoral fins translucent with pair of large brown spots on base. There are no apparent sex-related colour differences in this species.

Color of holotype in alcohol. (Fig. 1) Generally light tan; general pattern of dark markings on head, body, and fins described above for freshly collected specimen still conspicuous, except anterior three large spots along middle of side fragmented and less vivid.

Distribution and habitat. The new species is currently known only from the type locality, but further collecting in similar conditions across the East Indian region will likely extend the range. The type locality is situated near shore in a large (approximately 3 km²) bay subject to considerable freshwater runoff. The habitat consisted of a flat mud bottom in 26 m depth at the base of a gentle slope, which begins close to shore.

Etymology. The new species is named *limarius* (Latin: of mud) with reference to its mud-bottom habitat.

Comparisons. The new species is apparently unique among *Acentrogobius* (*sensu lato*) in having the combination of transverse rows of sensory papillae on the cheek and a single, transverse row of papillae on the chin. Therefore, it does not conform to either the ‘*Acentrogobius*’ or ‘*Yongeichthys*’ species groups as defined by Jaafar (2008), but instead has features that link these two groups. The transverse rows of cheek papillae are typical of nearly all members of the ‘*Acentrogobius*’ group, but the new species differs from this assemblage in having a single row of papillae across the chin (Fig. 3B), instead of having two patches of chin papillae arranged in rows that are slightly oblique in relation to the longitudinal axis of the body. The transverse orientation of chin papillae is typical of the ‘*Yongeichthys*’ group, but, unlike the new species, all of the members of that group have the longitudinal pattern of cheek papillae. The new species also appears to be unique for *Acentrogobius* (*sensu lato*) in having both the cheek and opercle completely scaled. The only other species that approaches this condition is *A. vanderloosi* Allen 2015 (Fig. 4), which was recently described from eastern Papua New Guinea, but was also collected (2 specimens, 44.0–73.7 mm SL) at Batanta with *A. limarius*. *A. vanderloosi* also has scales on the cheek and opercle, but those on the latter area are restricted to the uppermost portion. However, it clearly differs in having a longitudinal pattern of cheek papillae, as well as several other morphological and colour differences.



Figure 4. *Acentrogobius vanderloosi*, underwater photograph of freshly collected specimen, 73.7 mm SL, Batanta Island, West Papua Province, Indonesia (G.R. Allen).

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