

# Three New Species of the Deep-dwelling Goby Genus *Obliquogobius* (Perciformes: Gobiidae: Gobiinae) from Japan, with Comments on the Limits of the Genus

Koichi Shibukawa<sup>1</sup> and Yoshimasa Aonuma<sup>2</sup>

<sup>1</sup>Department of Zoology, National Museum of Nature and Science,  
3–23–1 Hyakunin-cho, Shinjuku-ku, Tokyo 169–0073, Japan  
E-mail: shibu@kahaku.go.jp

<sup>2</sup>Seikai National Fisheries Research Institute, Ishigaki Tropical Station,  
148–446 Fukai-ohta, Ishigaki-shi, Okinawa 907–0451, Japan

**Abstract** Three new species of the deep-dwelling goby genus *Obliquogobius*, i.e. *O. cirrifer*, *O. megalops* and *O. yamadai*, are described, based primarily on specimens from Japanese waters. The first 2 species are distinguished from congeners (i.e., *O. yamadai*, *O. cometes* and *O. turkayi*) in having 8 dorsal-fin rays (vs. 9–10 in the latter three species) and lacking pore G of the anterior oculoscapular canal (vs. present). *O. cirrifer* (3 specimens, 23.8–28.8 mm SL, collected at depths of 394–404 m off Okinawa-jima Island, Okinawa Group of Ryukyu Islands, Japan) is readily distinguished from *O. megalops* (single specimen, 25.5 mm SL, collected at a depth of 290 m near Amami-oshima Island, Amami Group of Ryukyu Islands, Japan) in having fused pelvic fins with developed frenum (vs. largely separated pelvic fins with no frenum in *O. megalops*) and moderately wide gill opening, not extending anteriorly to slightly beyond a vertical line through posterior margin of preopercle (vs. gill opening very wide, extending beyond a vertical line through posterior margin of eye). *Obliquogobius yamadai* (14 types and 4 non-type specimens, 14.1–55.2 mm SL, collected at depths of 99–165 m off the Pacific coasts of Shikoku and Kyushu, the southern part of the Sea of Japan, the East China Sea, and the Philippines) differs from *O. cometes* and *O. turkayi* in having the following combination of characters: cheek and base of pectoral fin scaled; first dorsal fin with indistinct horizontal dusky barred pattern, lacking distinct black spots; no distinct alternating black-and-white barred pattern on caudal fin. *Obliquogobius*, comprising 8 species (including 3 species remaining to be described), is redefined and a provisional key to all known species is provided.

**Key words:** *Obliquogobius*, Gobiidae, new species, Japan

Alcock (1890) described the deepwater goby *Gobius cometes* from the central Indian Ocean and Gulf of Aden, and, subsequently, Koumans (1941) established a new genus *Obliquogobius* for Alcock's species. *Obliquogobius* was monotypic until Goren (1992) added a second species, *Obliquogobius turkayi*, from the Red Sea.

During a study on deepwater gobies from Japanese waters, we found 3 unidentified species, trawled at depths of 99–404 m, that could be assigned to the genus *Obliquogobius*. Occurrences of this genus from the Western Pacific were reported by some authors (Hoesé and Winterbot-

tom, 1979; Larson and Murdy, 2001), but voucher specimens or catalogue numbers were not indicated or provided; therefore, this paper represents the first verifiable report on *Obliquogobius* based on specimens from this area. Herein, we describe 3 species as new, comment on the other Western Pacific congeners, and redescribe *Obliquogobius*. A provisional key to all known species is also provided.

## Materials and Methods

Institutional abbreviations follow Leviton *et*

*al.* (1985). All fish lengths given are standard lengths (SL). The methods for measurements follow those of Hubbs and Lagler (1958), with exceptions given below (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 head (including opercular membrane); interorbital width is the least width between innermost rims of right and left eyes; jaw length is measured between the snout tip and the posteriormost point of lip; body depth is measured at the anal-fin origin; head depth and width are measured at preopercular margin; nape width is measured between uppermost ends of 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 pelvic-fin spine and the distal tip of the longest segmented ray; caudal-fin length is measured from the base to the tip of the middle caudal-fin ray. Measurements were made with calipers under a dissecting microscope to the nearest 0.01 mm. Counts follow Akihito (1984), except for the following: longitudinal scale count is the number of oblique (anterodorsal to posteroventral) scale rows and is taken from just dorsal to the upper attachment of the opercular membrane posteriorly to the mid-base of caudal fin; transverse scales are counted in three ways (see descriptive accounts of the species); circumpeduncular scale count is the number of scales along a zigzag vertical line through the narrowest point of the caudal peduncle; scales on side of nape was the number of scales in longitudinal row along dorsal margin of operculum and cheek; gill rakers including all rudiments are counted on the outer side of first arch; counts of pseudobranchial filaments include all rudiments. Pectoral- and branched caudal-fin rays are counted and numbered from dorsal to ventral. Scales (except for predorsal and circumpecuncular scales) and paired-fin rays are counted bilaterally.

Osteological features were observed from radiographs (in all specimens) and a single cleared

and stained specimen of one of the new species (*Obliquogobius yamadai*); clearing and staining followed the methods of Potthoff (1984). The methods of Akihito (1984) were used in describing the pattern of the interdigitation of the dorsal-fin pterygiophores between the neural spines ("P-V"). Cephalic sensory canals and papillae are observed on specimens stained with cyanine blue, and their notations follow Akihito (1984) and Miller (1986), respectively.

### *Obliquogobius* Koumans, 1941

(New Japanese name: Chihiro-haze zoku)

*Obliquogobius* Koumans, 1941: 219 (type species, *Gobius cometes* Alcock, 1890; type by original designation and monotypy)

*Orissagobius* Herre, 1945: 402 (unneded replacement name; type species, *Gobius cometes* Alcock, 1890; type by original designation and monotypy)

**Included species.** *Obliquogobius* comprises 8 species, i.e., *O. cirrifer* sp. nov. (off Okinawajima Island, Okinawa Group of Ryukyu Islands, Japan), *O. cometes* (Alcock, 1890) (central Indian Ocean and Gulf of Aden), *O. megalops* sp. nov. (off Amami-oshima Island, Amami Group of Ryukyu Islands, Japan), *O. turkayi* Goren, 1992 (central Red Sea), *O. yamadai* sp. nov. (temperate areas of the southwestern part of Japan, the East China Sea, and the Philippines), and 3 putative undescribed species from the Gulf of Aden, New Caledonia and Fiji Island [cited below as *O. spp.* 1–3, will be described elsewhere (Shibukawa and Pruvost, in prep.)]. More species are possibly found in the West Pacific (see "Remarks" of *O. cirrifer* and *O. yamadai*).

**Diagnosis.** *Obliquogobius* belongs to the gobiid subfamily Gobiinae (*sensu* Pezold, 1993), and is distinguished from other gobiine genera in having the following combination of characters: VI-I, 8–10 dorsal-fin rays (segmented rays almost always 8 or 9); I, 8–10 anal-fin rays; number of segmented rays of second dorsal fin equal or less than that of anal fin; 20–24 pectoral-fin rays; 22–26 longitudinal scales; cheek covered by large cycloid scales (possibly naked in some

species); nape naked or broadly scaled, but, if scales present, predorsal midline typically naked (some scales on mid-dorsal occipital region just behind eyes in *O. sp. 2*); gill opening relatively wide, extending anteriorly to, or beyond, a vertical line through preopercular margin (extending beyond a vertical line through posterior margin of eye in *O. megalops* and *O. sp. 3*); teeth on outermost row on both jaws slender, larger than inner rows; no enlarged, stout canine-like teeth on jaws; sensory papillae on head well developed, usually modified into bulbous or short barbel-like fleshy flaps (may be indistinct in small species, e.g., *O. cirrifer*); reduced longitudinal pattern of sensory-papillae rows on cheek; sensory-papillae row *a* comprising three widely spaced papillae; anterior part of row *b* close to anterior and posterior terminus of rows *a* and *c*, respectively; row *cp* comprising a single papilla; a pair of sensory papillae just posterior to lower jaw symphysis (=row *f*); sensory canals well developed on head, with pores B', C (unpaired), D (unpaired), E, F, G (absent in some species), H', M', N and O'; posterior oculoscapular canal and associated pores K' and L' always absent; 10+16=26 vertebrae; P-V 3/II II I I 0/9.

**Description.** Dorsal-fin rays VI-I, 8–10 (almost always VI-I, 8–9); anal-fin rays I, 8–10 (almost always I, 8–9); pectoral-fin rays 20–24; pelvic-fin rays I, 5; segmented caudal-fin rays 9+8, including 6–7+6–7=12–14 branched rays (usually 6+6 or 6+7); upper and lower unsegmented caudal-fin rays 7–9 and 7–9, respectively; longitudinal scales 22–26; transverse scales from anal-fin origin dorsoanteriorly to base of first dorsal fin 6–8; transverse scales from anal-fin origin dorsoposteriorly to base of second dorsal fin 6–8; transverse scales from origin of second dorsal fin ventroposteriorly to base of anal fin 6–8; no predorsal scales, except for *O. sp. 2* with some scales on predorsal midline just behind eye; 12 circumpeduncular scales; 2–3+10–13=12–16 gill rakers on outer surface of first gill arch; 7–11 pseudobranchial filaments; 10+16=26 vertebrae; P-V 3/II II I I 0/9; 2 anal-fin pterygiophores anterior to first haemal spine.

Body moderately elongate and compressed. Head subcylindrical or slightly compressed, but rather depressed in some species. Snout short, its length more or less shorter than eye diameter; snout does not protrude beyond upper lip. Eye dorsolateral, large, its diameter 24.8–42.4% of head length. Interorbital space narrow, its width narrower than pupil diameter. Anterior nasal opening a short tube, located at midway between eye and upper jaw or slightly closer to the latter; no fleshy flap at tip of anterior naris; posterior nasal opening a pore, located at midway between eye and base of anterior naris or slightly closer to the former. No raised cutaneous ridges on head and nape. Anterior margin of tongue slightly emarginate or near truncate, free from floor of mouth. Gape oblique, forming angles of about 30°–40° with body axis. Lower jaw subequal or slightly projecting beyond upper jaw; posterior end of jaw reaching to a vertical between anterior and posterior margin of pupil. Posteroventral margin of lower lip interrupted at symphysis. Mental flap on chin not or slightly developed as a low fleshy bump. Both anterior and posterior walls of bony preopercular canal support well developed, distinct in external view without dissection; no spine-like projections along posterior margin of preopercle. Gill opening relatively wide, extending anteriorly to, or beyond, a vertical line through posterior margin of preopercle (reaching to a vertical line beyond posterior margin of eye in *O. megalops* and *O. sp. 3*); gill membranes attach to isthmus; first gill slit well open. No fleshy projections on lateral wing of shoulder girdle. All dorsal- and anal-fin spines slender and flexible (at least distally). No free pectoral-fin rays; almost all pectoral-fin rays branched, except for uppermost 1–3 rays and/or lowermost ray may be unbranched. Pelvic fins fused medially with well developed connecting membrane (between innermost rays) and thin frenum (between spines), except for *O. megalops* and *O. sp. 3* with reduced connecting membrane and no frenum; origin of pelvic fin slightly anterior to a vertical line through origin of first dorsal fin; posterior margin of pelvic frenum, if present,

smooth and only a slightly emarginated; all segmented pelvic-fin rays branched. Caudal fin more or less asymmetrical dorsoventrally, except for *O. turkayi* with symmetrical caudal fin (Goren, 1992); in typical specimen of *Obliquogobius*, single or multiple rays on upper half of caudal fin more or less longer than rays on lower half, forming obliquely pointed caudal fin (although undifferentiated in some species).

Scales on body deciduous (almost all scales already missing in most specimens examined), ctenoid with peripheral cteni, except for scales on cheek, operculum, nape, breast and pectoral-fin base cycloid (pectoral-fin base, cheek, operculum and/or nape naked in some species); if nape scaled, predorsal midline typically naked (except for *O. sp. 2* that has some scales on predorsal midline just behind eye).

Teeth on jaws unicuspid, slender, more or less inwardly curved; 3 or 4 rows of teeth on each jaw; teeth on outermost row on jaws spaced, slender and distinctly larger than teeth on inner rows; teeth on anterior part of outermost row typically largest in both jaws; no enlarged stout canine-like teeth on jaws; no teeth on vomer or palatine.

Patterns of cephalic sensory systems of 3 new species are illustrated in Fig. 1. Sensory papillae on head well developed, usually enlarged and modified into bulbous or short barbel-like fleshy flaps (may be indistinct in small species, e.g., *O. cirrifer*); reduced longitudinal pattern (could be expressed as reduced transverse pattern, following Winterbottom and Burrige, 1993a, b) of sensory-papillae rows on cheek; all sensory-papillae rows on head uniserial or comprising a single papillae; sensory-papillae row *a* comprising 3 well-spaced papillae; row *b* short, closed but not reaching to a vertical line through posterior end of row *c*; row *c*, comprising 3 or 4 papillae, slightly risen posteriorly, and its posterior end closed to anterior ends of rows *a* and *b*; row *cp* comprising a single papilla; row *d* rather short, not or just reaching to a vertical line through row *cp* posteriorly; row *d* simple or bifurcated posteroventrally; a pair of sensory papillae (=row *f*) just behind lower-jaw symphysis.

Cephalic sensory canals moderately developed; anterior oculoscapular canal with pores B', C (unpaired), D (unpaired), E, F, G (absent in *O. cirrifer*, *O. megalops* and *O. sp. 3*) and H'; posterior oculoscapular canal absent; preopercular canal with pores M', N, and O'; ventralmost pore of preopercular canal (=pore O') opening at point slightly or well below a horizontal line through posterior end of sensory-papillae row *d*.

**Comparison.** Based on axial skeletal features, *Obliquogobius* clearly belongs to the "Priolepis Group" of Birdsong *et al.* (1988) because of: 10+16=26 vertebrae; P-V 3/II II I I 0/9 (=3/22110 dorsal pterygiophore pattern of Birdsong *et al.*, 1988); 2 anal-fin pterygiophores anterior to first haemal arch; and single epural. Birdsong *et al.* (1988) placed 55 gobiine genera in the Priolepis Group; as well as *Obliquogobius*, several recently-described gobiine genera (e.g., *Arcygobius* Larson and Wright, 2003, *Echinogobius* Iwata, Hosoya and Niimura, 1998, *Egglestonichthys* Miller and Wongrat, 1979, *Larsonella* Randall and Senou, 2001, *Sueviota* Winterbottom and Hoese, 1988, *Trimmatom* Winterbottom and Emery, 1981, *Tryssogobius* Larson and Hoese, 2001) are also assigned to this group.

Of the genera assigned to the Priolepis Group, there are some genera resembling *Obliquogobius* that have a similar configuration of the sensory-papillae rows on the cheek (e.g., row *a* usually comprises 3 widely-spaced papillae, posterior end of row *c* close to anteriormost papilla of rows *a* and *b*, and row *cp* comprising a single papilla) and relatively wide gill opening (extending anteriorly to, or beyond, a vertical line through posterior margin of preopercle). Examples include: *Tryssogobius*, *Ctenogobiops*, *Vanderhorstia* (including species assigned to the "large-scale group" — see Iwata *et al.*, 2007), *Trimma* and *Priolepis* (including species with "reduced transverse pattern of cheek papillae" sensu Winterbottom and Burrige, 1993a, 1993b). Both *Tryssogobius* and *Obliquogobius* have cheek scales (see Larson and Hoese, 2001), but the former differs from the latter in having: a pair of short longitudinal sensory-papillae rows

just posterior to the chin (vs. a pair of sensory papillae just posterior to the chin in *Obliquogobius*); sensory-canal pore D located along a vertical line through middle of eye and close to pore C when the latter pore present (vs. located at a vertical line through posterior part of eye and well separated from pore C); and no preopercular canal (vs. preopercular canal and associated pores M', N and O present). *Ctenogobiops* and the large-scale group of *Vanderhorstia* typically have 10–12 segmented rays in second dorsal and anal fins (vs. 8–10, usually 8 or 9 in *Obliquogobius*), 26 or more longitudinal scales (vs. 22–26), no scales on head [vs. scales typically present at least on cheek (except for *O. turkayi* and, possibly, *O. cirrifer* — see “Remarks” of *O. cirrifer*, below)], some enlarged, stout canine-like teeth on lower jaw (vs. no enlarged, stout canine-like teeth on lower jaw), more or less symmetrical caudal fin, except for *Ctenogobiops aurocingulus* [vs. rays on upper half of caudal fin usually longer than those of lower half (except for *O. turkayi*)], non-modified sensory papillae on cheek [vs. enlarged and modified into bulbous or short barbel-like flaps (may be indistinct in small species, e.g., *O. cirrifer*)], and posterior oculoscapular canal (vs. absent). Species of *Trimma* and *Priolepis* with reduced transverse pattern of cheek papillae are readily distinguished from all *Obliquogobius* in having no sensory canals and associated pores on head (vs. developed sensory canals and associated pores on head in *Obliquogobius*), symmetrical caudal fin [vs. rays on upper half of caudal fin usually longer than those of lower half (except for *O. turkayi*)], and a pair of short longitudinal sensory-papillae rows just behind chin (vs. a pair of sensory-papillae just behind chin).

In Japanese waters, *Obliquogobius* is possibly sympatric with *Suruga* Jordan and Snyder, 1901. *Suruga*, comprising only *Suruga fundicola* Jordan and Snyder, 1901 and belonging to the gobiid subfamily Gobionellinae (sensu Pezold, 1993), inhabits deep waters (ca. 80–300 m depths) off the Pacific coasts of temperate regions of Japan and the East China Sea, is somewhat similar to

one of new species of *Obliquogobius*, *O. yamadai*, in general physiognomy (e.g., moderately elongated body, large eye, relatively wide gill opening, 20–23 pectoral-fin rays, and absence of posterior oculoscapular canal, dull-colored head and body with several yellow markings when alive or fresh, and no distinct barred pattern on caudal fin). *Suruga* is, however, readily distinguished from *Obliquogobius* in having VIII-I, 16–18 dorsal-fin rays (vs. VI-I, 9 in *O. yamadai*), I, 15–16 anal-fin rays (vs. I, 9), 36–39 longitudinal scales (vs. 22–25), 6–13 predorsal scales (vs. no scales on predorsal midline), 13–14+21–22=35–36 vertebrae (vs. 10+16=26), P-V usually 3/I II II I I I I 0/12 (vs. 3/II II I I 0/9), 2 epurals (vs. single), pelvic frenum with indented posterior margin (vs. smooth margin), right and left sides of anterior oculoscapular canals close together but not fused medially at interorbital region (vs. fused medially, with single median pore C), 2 pores on preopercular canal (vs. three pores), and well developed longitudinal pattern of sensory-papillae rows on cheek (vs. reduced longitudinal/transverse pattern).

**Remarks.** Sensory papillae on cheek in the species of *Obliquogobius* are well developed, usually enlarged and modified into bulbous or short barbel-like fleshy flaps. Such a peculiar condition is distinct especially in the large species, and, thus, may have prompted Koumans (1941) to state that *O. cometes* (i.e., largest species of the genus, exceeding at least 78 mm SL) has “barbels on cheek.”

Within the species assigned to *Obliquogobius*, we did not examine any specimens of *O. turkayi*. Based on the original description (Goren, 1992), *O. turkayi* appears to resemble *O. yamadai* and *O. sp. 2* in having 9 segmented rays each in the second dorsal and anal fins, scales on side of nape, pore G of anterior oculoscapular canal, and no distinct barred pattern on caudal fin [although Goren (1992: 269) described “Dark pigmentation on upper and lower rays of caudal fin”]. The type specimens of *O. turkayi* appear to be in less than good condition; Goren (1992) noted “The fish were damaged in the trawl and lost most of their



scales”, and, judging from the photographs (Goren, 1992, figs. 1–2), the caudal fin is partially damaged at least in the holotype and one of 2 paratypes. In spite of the condition of his specimens, Goren (1992) stated that his new species has a naked pectoral-fin base and a symmetric caudal fin; neither condition is known in the other congeners examined for this study. As the other characteristics of *O. turkayi* agree well with those of the species examined here, its assignment to *Obliquogobius* is not questioned by us. Based on the original description, *Obliquogobius turkayi* can also be distinguished from *O. yamadai* and *O. sp. 2* by having dorsal fin spines that extend to the fourth dorsal segmented ray (vs. base of spine or first or second segmented ray of second dorsal fin in the latter two), a black spot equivalent in size to 1/3 eye diameter on upper 1/3 part of anterior spines of first dorsal fin (vs. no such black spot in *O. yamadai*), predorsal midline naked (vs. some scales present on predorsal midline just behind eye in *O. sp. 2*), and pelvic fins reaching the first anal segmented ray (vs. not reaching to origin of anal fin in *O. sp. 2*).

Three phenetically close-knit groups are recognized within *Obliquogobius*. The first group, named “*cometes* complex,” comprises *O. cometes*, *O. turkayi*, *O. yamadai*, *O. sp. 1* and *O. sp. 2*, and characterized by having large cycloid scales on nape, 9–10 (almost always 9) segmented rays on second dorsal fin, united pelvic fins, moderate-sized gill opening (extending anteriorly to, or a little beyond, a vertical line through posterior margin of preopercle), and sensory-canal

pore G. Although the live or fresh coloration is unknown in the other species of this group, *O. cometes* and *O. yamadai* have characteristic narrow yellow vertical bars on body when fresh, which fade and sometimes become indistinct in specimens after preservation in alcohol). The second group, named “*megalops* complex,” comprises *O. megalops* and *O. sp. 3*, and is unique within the genus in having largely separate pelvic fins (with reduced connecting membrane between innermost rays and no frenum) and a wide gill opening, extending anteriorly beyond a vertical line through posterior margin of eye; species of this group also have 8 segmented rays on second dorsal fin, and lack pore G. Although the live or fresh coloration is unknown, preserved specimens of this group have a pale barred pattern on body, suggesting they have yellow vertical bars when live or freshly collected, as do *O. cometes* and *O. yamadai*. The third group comprises only *O. cirrifer*. *O. cirrifer* resembles the *cometes* complex in having a moderate-sized gill opening and united pelvic fins, but is readily distinguished from the latter in having a naked nape, 8 segmented rays in second dorsal fin, slender body (its body depth 13.5–15.5% of SL vs. 17.2–21.3% of SL in the *cometes* complex), characteristic black spot on midlateral body above anal-fin base, and no pore G. Exploring the interrelationships of species of *Obliquogobius* is beyond the scope of this study, and the above grouping is merely artificial; however, the recognition of these subgroups makes their identification easy.

### Provisional Key to Species of *Obliquogobius*

- 1a. Second dorsal fin with I, 9–10 rays; lateral side of nape scaled; pore G of anterior oculoscapular canal present . . . . . 2
- 1b. Second dorsal fin with I, 8 rays; nape naked; pore G of anterior oculoscapular canal absent . . . 6
- 2a. Head length 36.1–41.5% of SL; eye diameter 25.9–28.7% of head length; second dorsal and caudal fins with distinct, black barred pattern (Central Indian Ocean and Gulf of Aden) . . . . . *O. cometes*
- 2b. Head length 34.4% or less of SL; eye diameter 31.6% or more of head length; black barred pattern on second dorsal and caudal fins absent (except for *O. sp. 1*) . . . . . 3

- 3a. Cheek and pectoral-fin base naked; caudal fin symmetrical dorsoventrally (central Red Sea) . . . . . *O. turkayi*
- 3b. Cheek and pectoral-fin base with cycloid scales; caudal fin asymmetrical dorsoventrally (i.e., upper half of fin longer than lower half) . . . . . 4
- 4a. Caudal fin long, its length 48.1% of SL, with black barred pattern (Gulf of Aden) . . . . . *O. sp. 1*
- 4b. Caudal fin moderate or short, its length 28.2–38.7% of SL, without dusky barred pattern . . . . . 5
- 5a. Large black spot on first dorsal fin; 2 vague broad dusky bands on body; no distinct black spot on midlateral part of caudal-fin base; 2–3 scales on predorsal midline just behind eye (Fiji Island) . . . . . *O. sp. 2*
- 5b. No distinct black spot on first dorsal fin; about 7 indistinct narrow pale vertical bars on body (these bars yellow and relatively distinct when freshly collected); a distinct small black spot on midlateral part of caudal-fin base; no scales on predorsal midline (southern part of Sea of Japan, off Pacific coast of Shikoku and Kyushu of Japan, East China Sea and Philippines). . . . . *O. yamadai* sp. nov.
- 6a. Gill opening relatively narrow, extending a little beyond a vertical line through posterior margin of preopercle (not reaching anteriorly to a vertical line through eye); pelvic fins united medially, with well developed connecting membrane (between innermost rays) and frenum; first spine of first dorsal fin greatly elongate and filamentous in male; some small black spots (obviously smaller than pupil) on first dorsal fin; some black spots at dorsal margin of caudal fin, in addition to blackened posterior margin (off Okinawa-jima Island, Ryukyu Islands, Japan). . . . . *O. cirrifer* sp. nov.
- 6b. Gill opening wide, extending anteriorly beyond a vertical line through posterior margin of eye; pelvic fins almost separated, with rudimentary low connecting membrane (between innermost rays) and no frenum; no elongate spines in first dorsal fin (although the condition in male of *O. megalops* unknown); distinct, large black spot (larger than pupil) on first dorsal fin; caudal fin without distinct black markings . . . . . 7
- 7a. Four or 5 narrow dusky vertical lines on body (New Caledonia) . . . . . *O. sp. 3*
- 7b. No distinct dusky vertical lines on body (off Amami-oshima Island, Ryukyu Islands, Japan) . . . . . *O. megalops* sp. nov.

***Obliquogobius cirrifer* sp. nov.**

(New Japanese name: Ito chihiro-haze)

(Figs. 1B and 2A–B; Table 1)

**Holotype.** NSMT-P 73000, male, 28.8 mm SL, off Nago, Okinawa-jima Island, Okinawa Group of Ryukyu Islands, Japan (26°32.18'N, 127°43.96'E–26°32.64'N, 127°44.29'E), fine-sand bottom, 394–404 m depth, 27 May 2002, R/V *Toyoshio-maru* (collected by H. Komatsu).

**Paratypes.** NSMT-P 73001, 1 specimen (female), 23.8 mm SL, collected with holotype; NTM S.16179-001, 1 specimen (female), 28.5 mm SL, collected with holotype.

**Diagnosis.** *Obliquogobius cirrifer* is distin-

guished from congeners in having the following combination of characters: 8 and 9 segmented dorsal- and anal-fin rays, respectively; body elongate, its depth 13.5–15.5% of SL; first dorsal-fin spine greatly prolonged (extending beyond posterior end of base of second dorsal fin when appressed) and filamentous in male; small black spot(s) (smaller than pupil) may be present on anteroventral and/or distal parts of first dorsal fin; 3–6 small black spots on second dorsal fin; some narrow black markings at dorsal margin of caudal fin, in addition to blackened posterior margin.

**Description.** In the following description, the counts of holotype are asterisked, and the

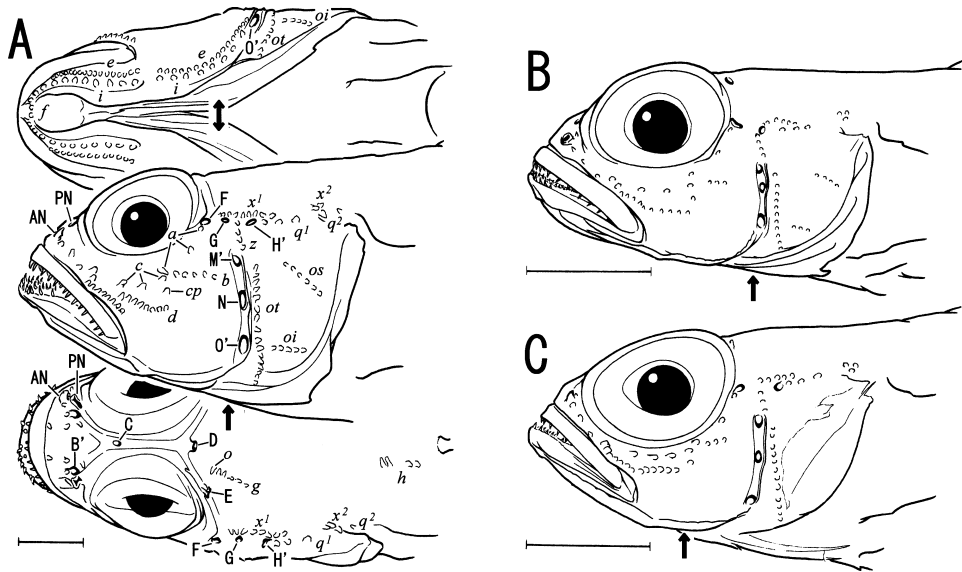


Fig. 1. Heads of 3 new species of *Obliquogobius* from Japan, showing cephalic sensory canal pores (indicated by roman uppercase letters, except for AN and PN) and papillae (indicated by roman lowercase letters). A: *Obliquogobius yamadai*, holotype, NSMT-P 73003, male, 51.6 mm SL; B: *Obliquogobius cirrifer*, holotype, NSMT-P 73000, male, 28.8 mm SL; C: *Obliquogobius megalops*, holotype, NSMT-P 73002, female, 25.5 mm SL. AN and PN, anterior and posterior nares, respectively. Arrows show position where gill membrane attached to isthmus. Posteroventral part of left-side gill cover in the holotype of *O. megalops* is damaged, and the sensory-papillae rows *os* and *oi* are missing. Bars indicate 3 mm. Drawn by K. Shibukawa.

frequency of each count is given in the parentheses following relevant count. Dorsal-fin rays VI-I, 8\* (3); anal-fin rays I, 9\* (3); pectoral-fin rays 22\* (3) or 23\* (3); pelvic-fin rays I, 5\* (6); segmented caudal-fin rays 9+8\* (3), including 6+6\* (3) branched rays; dorsal unsegmented caudal-fin rays 8\* (3); ventral unbranched caudal-fin rays 7\* (2) or 8 (1); longitudinal scales 23 (1), 24\* (3), 25 (1) or 26\* (1); transverse scales from anal-fin origin dorsoanteriorly to base of first dorsal fin 7\* (1) or 8\* (5); transverse scales from anal-fin origin dorsoposteriorly to base of second dorsal fin 7\* (3) or 8\* (3); transverse scales from origin of second dorsal fin ventroposteriorly to base of anal fin 7 (2) or 8\* (4); predorsal scales 0\* (3); circumpeduncular scales 12\* (3); gill rakers 2+11 (1) or 2+12\* (2); pseudo-branchial filaments 7\* (3); vertebrae 10+16=26\* (3); P-V 3/II II I I 0/9\* (3); anal-fin pterygiophores anterior to first haemal spine 2\* (3); epural 1\* (3).

*Color when fresh.* Unknown.

*Color in alcohol.* Ground color of head and body pale; cheek with minute dense melanophores, becoming darkened anteriorly; snout, jaws and throat with minute dense melanophores; cheek margined with black dorsoposteriorly; breast with sparse melanophores; dorsal part of operculum with dense melanophores (melanophores on center and posterodorsal part slightly larger than those elsewhere on the operculum, and form vague dusky blotches in larger 2 specimens); 3 very indistinct saddle-like dusky markings on body (first one on base of first dorsal fin, second one around base of second segmented ray of second dorsal fin, and third one on anterior part of caudal peduncle); midlateral part of trunk lightly pigmented by dense minute melanophores, and, in larger female, an irregular shaped small dusky blotch on midlateral trunk below first dorsal fin; a single characteristic charcoal-brown or black spot (slightly smaller than



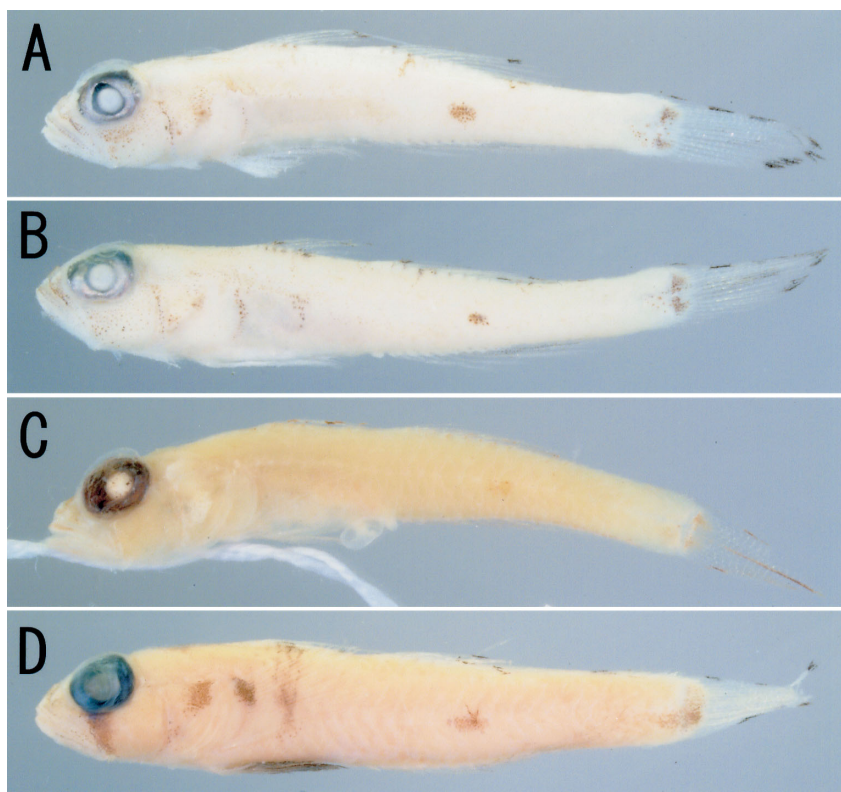


Fig. 2. *Obliquogobius cirrifer* and its morphologically similar (possibly conspecific) congeners. A: holotype of *O. cirrifer*, NSMT-P 73000, male, 28.8 mm SL, off Okinawa-jima Island, Ryukyu Islands, Japan; B: paratype of *O. cirrifer*, NTM S.16179-001, female, 28.5 mm SL, collected with holotype; C: *O. cf. cirrifer*, MNHN 1999-0565, one of four specimens, female, 34.5 mm SL, Manila Bay, the Philippines; D: *O. cf. cirrifer*, MNHN 2002-3091, one of three specimens, male, 43.1 mm SL, Fiji Is. Photographed by K. Shibukawa.

pupil) on midlateral tail above bases of sixth, seventh and/or eighth segmented rays of anal fin; a patch of dense, relatively large melanophores on midlateral (or a little more ventral) part around end of caudal peduncle; 2 hemispheric dusky spots at caudal-fin base; distal part of only first or first, second and fourth spine(s) of first dorsal fins black in females or male, respectively; a series of 2 or 3 minute black spots near base of first dorsal fin; 2 or 3 black spots on margin of second dorsal fin; caudal fin with a series of 2 or 3 short black lines, as well as black posterior margin; membrane around middle caudal-fin rays also lightly pigmented; pectoral fins transparent, with dense melanophores along base (forming crescent-shaped marking) and sparse minute melanophores along rays of ventral half of pec-

toral fin.

**Distribution and habitat.** Type specimens of *Obliquogobius cirrifer* were captured from fine-sand bottom (394–404 m depths) off Nago, Okinawa-jima Island, Okinawa Group of Ryukyu Islands, Japan. See also “Remarks” below.

**Etymology.** The new specific name, *cirrifer*, is the combination of the Latin *cirrus* (meaning “curl” or “tendrill”) and *fero* (meaning “to bear”), refers to the greatly prolonged, filamentous first spine of first dorsal fin of male.

**Remarks.** Other than the type series, we examined 8 specimens possibly identifiable as *Obliquogobius cirrifer* (cited as *Obliquogobius cf. cirrifer* in the “Materials and Methods” section). Of these, 4 Philippine specimens (MNHN 1999-0565, e.g., Fig. 2C) are almost identical

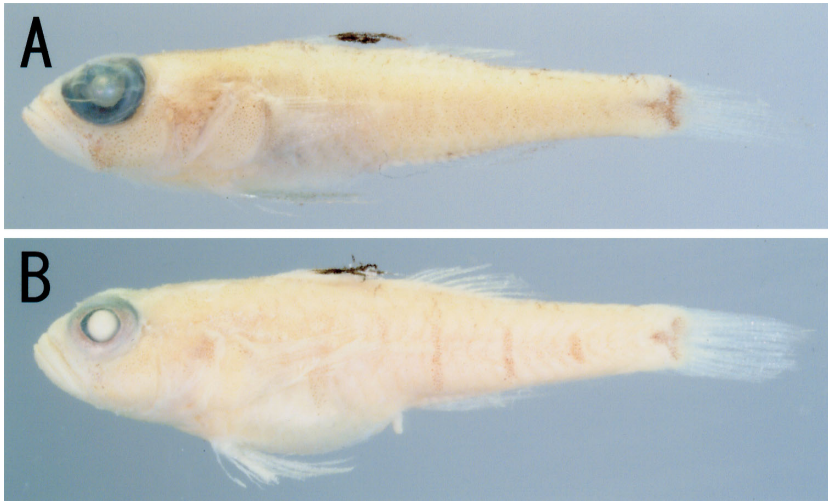


Fig. 3. *Obliquogobius megalops* and its morphologically similar congener. A: holotype of *O. megalops*, NSMT-P 73002, female, 25.5 mm SL, off Amami-oshima Island, Ryukyu Islands, Japan; B: *O. sp. 3*, MNHN 2002-3237, one of four specimens, female, 35.3 mm SL, New Caledonia. Photographed by K. Shibukawa.

with the Japanese specimens of *O. cirrifer*, but differ slightly in the position of dusky spot on tail; in the Philippine specimens, the spot is located dorsal to posterior end of anal-fin base (vs. above bases of sixth, seventh or eighth anal-fin rays in the Japanese specimens of *O. cirrifer*). The remaining 4 specimens (MNHN 2002-3091, e.g., Fig. 2D), collected from Fiji, are also similar, but have 10 segmented rays on anal fin (vs. 9). Since it is hard to determine whether these discrepancies are intra- or inter-specific variations based only on these specimens, we do not include the Philippine/Fiji specimens in the type series of *O. cirrifer*.

In the type specimens of *Obliquogobius cirrifer*, we could not confirm any traces of scales on head. However, further examination using additional specimens is needed to determine the utility of this character, because, in the species of *Obliquogobius*, scale pockets on the cheek are sometimes quite difficult to assess on specimens missing scales even if they are stained with e.g. cyanine blue. On other examined specimens that are possibly conspecific with *O. cirrifer* (noted above), scale pockets are clearly confirmed on the cheek, likewise for congeners except for *O. turkayi*.

***Obliquogobius megalops* sp. nov.**

(New Japanese name: O'ome chihiro-haze)

(Figs. 1C and 3A; Table 1)

**Holotype.** NSMT-P 73002, female, 25.5 mm SL, off Amami-oshima Island, Amami Group of Ryukyu Islands, Japan (28°22.37'N, 129°15.97E–28°22.28'N, 129°15.43'E), 290 m depth, beam trawl, 21 May 2004, R/V *Toyoshio-maru*.

**Diagnosis.** *Obliquogobius megalops* is distinguished from the only other member of the *megalops* complex (see “Remarks” of the generic account), *O. sp. 3*, in having dusky chin and no dusky vertical bars on body.

**Description.** In the following description, the values that were taken bilaterally are separated by a slash, the first value representing the left count. Dorsal-fin rays VI-I, 8; anal-fin rays I, 9; pectoral-fin rays 23/23; pelvic-fin rays I, 5/I, 5; segmented caudal-fin rays 9+8, including 8+7 branched rays; dorsal unsegmented caudal-fin rays 8; ventral unbranched caudal-fin rays 8; 24/24 longitudinal scales; transverse scales from anal-fin origin dorsoanteriorly to base of first dorsal fin 7/7; transverse scales from anal-fin origin dorsoposteriorly to base of second dorsal fin 7/7; transverse scales from origin of second dorsal fin ventroposteriorly to base of anal fin 7/7;

no predorsal scales; no scales on lateral side of nape; preventral scales 4; circumpeduncular scales 12; gill rakers 3+13/3+12; pseudo-branchial filaments 7/7; vertebrae 10+16=26; P-V 3/II II I I 0/9; anal-fin pterygiophores anterior to first haemal spine 2; epural 1.

*Color when fresh.* Unknown.

*Color in alcohol.* Ground color of head and body pale; cheek and operculum lightly pigmented by dense minute melanophores, particularly concentrated at anterior part of cheek just posterior to jaw terminus (appears to form a dusky suborbital bar) and dorsal half of operculum; snout, upper jaw (especially anterodorsal part), anterior part of lower jaw, chin lightly pigmented by dense minute melanophores; anterior naris lacks melanophores; mid-lateral body with a broad longitudinal band of minute melanophores, interrupted by 5 narrow, faint pale vertical bars; nape and occipital regions lightly pigmented by dense and minute melanophores, except for small area at anterolateral part of occipital region lacking melanophores; 2 faint dusky saddles on caudal peduncle; a distinctive, 90 degrees clockwise-turned T-shaped dusky blotch on caudal-fin base; a large black spot about size of pupil at distal half of first dorsal fin between first and fourth spines; second dorsal fin almost transparent, except for small areas pigmented by melanophores around base of segmented rays and submarginal part of anterior 4 segmented rays; anal fin almost transparent, except for small area around bases of segmented rays and distal one-third of fin with dense, minute melanophores; pectoral fin lightly pigmented by minute melanophores, especially concentrated at bases of upper rays; pectoral fin very weakly pigmented by well-spaced minute melanophores along fin rays; pelvic fin dusky with dense melanophores, especially concentrated around second to fourth segmented rays.

**Distribution and habitats.** The new species *Obliquogobius megalops* is known only from the holotype, dredged at the depth of 290 m off Amami-oshima Island, Amami Islands of Ryukyu Archipelago, Japan.

**Etymology.** The new specific name, mega-

lops, is the combination of the Greek *μεγαλε* (meaning “large”) and *ὄψ* (meaning “eye”), and refers to its large eye.

**Remraks.** *Obliquogobius megalops* and *O. sp. 3* (Fig. 3B) differ from congeners in having largely separated pelvic fins and wide gill opening. Nevertheless, we provisionally placed these two species in *Obliquogobius*, owing to similarities in other features, e.g., fin-ray counts, squamation, dentition, and configurations of sensory-canal pores and sensory-papillae rows on head, as well as general physiognomy and axial skeletal features. Similar intrageneric variations in size of gill opening and pelvic-fin appearance are also known from various gobiine genera (e.g., *Amblyeleotris*, *Callogobius*, *Ctenogobius*, *Fusigobius* and *Pleurosicya*).

#### *Obliquogobius yamadai* sp. nov.

(New Japanese name: Kiobi chihiro-haze)

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

**Holotype.** NSMT-P 73003, male, 51.6 mm SL, East China Sea (31°28.8'N, 127°0.9'E), 133 m depth, sandy bottom, sledge net, 29 Oct. 2001.

**Paratypes.** Thirteen specimens, 31.9–53.0 mm SL: BSKU 42563, 1 specimen (male), 47.9 mm SL, Kawaguchi Fishing Port, Okata-cho, Kochi Prefecture, Shikoku, Japan, 7 Mar. 1986; BSKU 58172, 1 specimen (male), 46.6 mm SL, Mimase Fish Market, Kochi City, Kochi Prefecture, Shikoku, Japan, 5 Apr. 2001; BSKU 60836, 1 specimen (male), 51.9 mm SL, Saga Fishing Port, Saga-cho, Kochi Prefecture, Shikoku, Japan, 6 Nov. 2002; BSKU 65081, 1 specimen (male), 46.6 mm SL, Irino Fishing Port, Okata-cho, Kochi Prefecture, Shikoku, Japan, 22 June 2003; BSKU 71225, 1 specimen (female), 53.0 mm SL, Kawaguchi Fishing Port, Okata-cho, Kochi Prefecture, Shikoku, Japan, 17 June 2004; NSMT-P 73004, 1 specimen (male), 43.7 mm SL, East China Sea (30°30.1'N, 127°09.6'E), 107 m depth, sandy bottom, sledge net, 30 Oct. 2001; NSMT-P 73005, 1 specimen (male), 35.6 mm SL, Sea of Japan (35°09.3'N, 131°04.9'E), 130 m depth, sandy bottom, 16 July 2001; NSMT-P 73006, 1 specimen (female), 35.4 mm SL, East China Sea (30°30.0'N, 126°50.2'E), 99 m depth, sandy bottom, sledge net, 4 Nov. 2001; NSMT-P 73007, 1 specimen (male), 32.0 mm SL, Sea of Japan (34°43.2'N, 130°18.8'E), 125 m depth, sandy bottom, sledge net, 17 July 2001; NSMT-P 73008, 1 specimen (female), 31.9 mm SL, off Toi-misaki Point, Miyazaki Prefecture, Kyushu,

Table 1. Proportional measurements of three species of *Obliquogobius*.

	<i>O. cirrifer</i>			<i>O. megalops</i>			<i>O. yamadai</i>		
	Holotype	Paratype	Paratype	Holotype	Holotype	Holotype	10 males*	All type specimens	4 females
	NSMT-P 73000	NTM S.16179-001	NSMT-P 73001	NSMT-P 73002	NSMT-P 73003	NSMT-P 73003			
Standard length (mm)	28.8	28.5	23.8	25.5	51.6	51.6	32.0–52.1	31.9–67.5	
In % of standard length									
Head length	30.5	30.0	31.0	33.2	31.2	31.2	28.3–32.2	29.1–33.5	
Head width	15.6	17.2	16.9	21.9	19.0	19.0	14.3–19.0	16.7–17.5	
Head depth	16.5	16.8	16.9	20.6	20.4	20.4	17.4–20.4	18.2–19.9	
Snout length	7.2	6.9	6.8	6.5	7.2	7.2	5.8–8.2	5.9–7.7	
Eye diameter	11.5	11.6	12.3	14.1	10.2	10.2	9.6–11.6	10.5–12.3	
Interorbital width	0.8	1.1	0.8	1.2	1.6	1.6	0.6–1.6	0.9–1.9	
Nape width	12.1	11.6	12.4	15.9	13.5	13.5	12.2–14.0	12.8–14.8	
Jaw length	12.1	11.7	12.7	12.9	13.0	13.0	12.7–14.2	12.3–13.3	
Body length	15.5	14.4	13.5	18.3	20.2	20.2	17.9–21.0	17.2–18.5	
Body depth	10.4	11.9	10.2	14.9	15.6	15.6	10.8–15.6	11.3–14.0	
Predorsal length	35.7	36.2	37.1	39.8	35.8	35.8	35.1–37.9	36.1–39.5	
Prepelvic length	30.8	30.4	31.4	34.0	30.8	30.8	29.1–32.5	30.2–32.4	
Prenal length	53.4	56.8	57.1	62.9	59.3	59.3	56.1–59.4	58.1–60.9	
Caudal-peduncle length	55.7	52.1	50.2	49.4	57.4	57.4	51.1–57.6	50.6–54.4	
Caudal-peduncle depth	9.4	9.2	8.9	9.7	11.2	11.2	10.1–10.5	10.1–10.5	
Length of D <sub>1</sub> base	15.8	17.1	17.4	13.9	15.5	15.5	15.5–19.7	16.0–19.4	
Length of D <sub>2</sub> base	17.9	17.6	18.6	15.0	19.5	19.5	19.5–22.0	17.7–20.2	
Length of A base	19.7	18.7	18.9	15.3	17.0	17.0	16.4–18.9	15.6–16.3	
Length of first spine of D <sub>1</sub>	45.6	44.0	45.3	44.0	46.0	46.0	43.3–46.8	43.0–44.5	
Length of second spine of D <sub>1</sub>	17.3	14.1	15.3	21.2	16.1	16.1	14.6–17.5	14.7–15.9	
Length of third spine of D <sub>1</sub>	15.3	14.9	14.3	20.1	17.2	17.2	15.9–18.7	16.0–16.4	
Length of fourth spine of D <sub>1</sub>	14.5	13.0	13.8	16.6	16.9	16.9	15.4–18.1	13.0–15.7	
Length of spine of D <sub>2</sub>	14.0	12.0	13.2	10.5	11.8	11.8	11.8–15.0	11.3–12.9	
Length of first segmented ray of D <sub>2</sub>	15.1	13.8	14.8	15.4	16.7	16.7	15.4–19.1	14.7–17.4	
Length of longest segmented ray of D <sub>2</sub>	20.9	17.8	16.2	—	24.7	24.7	20.2–28.4	14.8–19.4	
Length of spine of A	7.7	7.9	—	—	8.8	8.8	8.1–10.8	7.4–10.0	
Length of first segmented ray of A	12.1	11.1	—	12.7	12.1	12.1	12.1–14.7	11.0–12.8	
Length of longest segmented ray of A	23.1	21.3	—	—	26.1	26.1	18.9–26.1	16.2–19.2	
P <sub>1</sub> length	25.0	24.9	27.1	27.3	27.6	27.6	25.3–29.8	24.6–29.2	
P <sub>2</sub> length	22.9	22.0	23.0	25.2	24.2	24.2	21.7–25.8	21.2–23.4	
Length of spine of P <sub>2</sub>	7.1	7.1	7.7	10.1	6.6	6.6	6.5–8.3	6.8–7.6	
Length of first segmented ray of P <sub>2</sub>	9.8	9.5	10.0	14.2	10.0	10.0	8.5–12.5	8.3–11.3	
Length of fourth segmented ray of P <sub>2</sub>	18.6	19.7	19.0	23.6	20.8	20.8	17.8–22.4	16.9–23.0	
Length of fifth segmented ray of P <sub>2</sub>	20.7	21.4	20.6	—	23.6	23.6	20.5–24.8	20.7–22.3	
C length	29.4	27.2	27.1	24.0	35.3	35.3	27.9–38.7	26.7–28.4	

\* Including holotype. Abbreviations: A, anal fin; C, caudal fin; D<sub>1</sub>, first dorsal fin; D<sub>2</sub>, second dorsal fin; P<sub>1</sub>, pectoral fin; P<sub>2</sub>, pelvic fin.





Fig. 4. Freshly collected paratypes of *Obliquogobius yamadai*. A: BSKU 58172, male, 46.6 mm SL, Tosa Bay, Japan; B: BSKU 60836, male, 51.9 mm SL, Tosa Bay, Japan. Photographed by H. Endo.

Japan (31°26.4'N, 131°23.7'E), 129 m depth, dredge, R/V *Toyoshio-maru*, 31 May 2000 (collected by H. Komatsu); NTM S.16180-001, 1 specimen (male), 39.6 mm SL, East China Sea, 31°27.7'N, 127°58.8'E, 143 m depth, sandy bottom, sledge net, 29 Oct. 2001; OMNH-P 31170, 1 specimen (male), 35.1 mm SL, East China Sea (30°31.3'N, 126°31.3'E), 165 m depth, sandy bottom, sledge net, 30 Oct. 2001; YCM-P 40739, 1 specimen (female), 32.3 mm SL, East China Sea (27°58.4'N, 125°19.8'E), 104 m depth, sandy bottom, sledge net, 31 Oct. 2001.

**Non-type materials.** NSMT-P 73009, 3 specimens, 14.1–17.2 mm SL, collected with YCM-P 40739; MNHN 2002-2974, 1 specimen (female), 55.2 mm SL, the Philippines (11°42'05"N, 121°45'15"E), June 1985.

**Diagnosis.** *Obliquogobius yamadai* is distinguished from congeners in having the following combination of characters: I, 9–10 (almost always I, 9) second dorsal-fin rays; I, 9–10 (almost always I, 9) anal-fin rays; cheek and pectoral-fin base scaled; caudal fin asymmetrical, fifth or sixth segmented ray slightly elongate and longest; head length 28.8–33.5% of SL; eye diameter 32.7–37.3% of head length, 9.6–12.3% of SL; body grayish with about 7 narrow, transverse

yellow bars (pale in preservation); no distinct black-and-white barred pattern on caudal fin.

**Description.** In the following description, the counts of holotype are asterisked, and the frequency of each count is given in the parentheses following relevant count. Dorsal-fin rays VI-I, 9\* (14); anal-fin rays I, 9\* (14); pectoral-fin rays 21 (1), 22\* (16) or 23 (11); pelvic fin rays I, 5\* (28); longitudinal scale rows 22 (1), 23\* (14) or 24 (13); transverse scale rows from anal-fin origin dorsoanterior to dorsal-fin base 6 (2), 7 (8) or 8\* (15); transverse scale rows from anal-fin origin dorsoposterior to dorsal-fin base 6 (11), 7\* (13) or 8 (1); transverse scale rows from origin of second dorsal-fin ventroposterior to anal-fin base 6 (5), 7\* (18) or 8 (1); predorsal scales 0\* (12); circumpeduncular scales 12\* (12); gill-rakers on outer surface of first gill arch 2+10 (2), 2+11 (3), 2+12\* (1) or 3+10 (1); pseudobranchial filaments 7 (3) or 8\* (3); vertebrae 10+16=26\* (13); P-V 3/II II I I 0/9\* (13); anal pterygiophores anterior to first haemal spine 2\* (13); epural 1\* (13).

**Color when fresh.** Ground color of head and



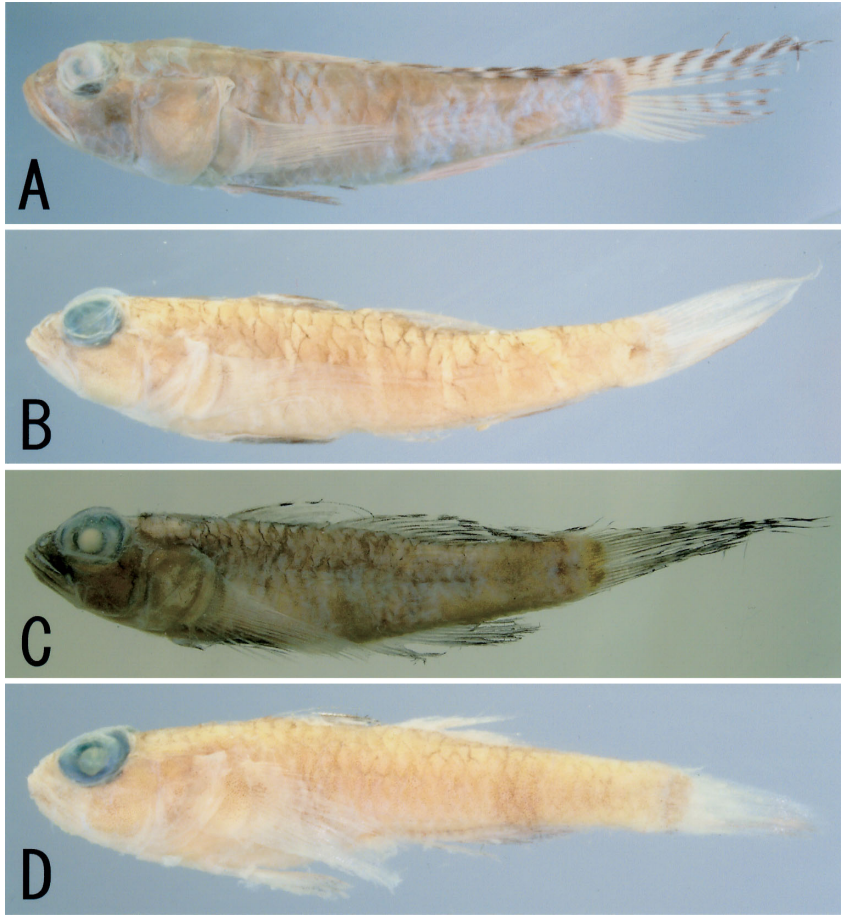


Fig. 5. *Obliquogobius yamadai* and its morphologically similar congeners. A: *O. cometes*, BMNH 1890.11.28.13–17, one of syntypes of *Gobius cometes*, male, 75.4 mm SL, Bay of Bengal; B: *O. yamadai*, holotype, male, 51.6 mm SL, East China Sea; C: *O. sp.* 1, RMNH 16526, male, 70.5 mm SL, Gulf of Aden; D: *O. sp.* 2, MNHN 2004-0915, one of eight specimens, male, 33.9 mm SL, Fiji Is. Photographed by K. Shibukawa.

body light gray; ca. 8 narrow yellow bars on head and body, anterior 2 of which on nape; small yellow spots on cheek and middle of jaws; belly and breast pale; small black spot (slightly smaller than pupil) on middle of caudal-fin base (=basicaudal spot); first dorsal fin tinged with black, with a translucent band at middle and a small yellow or black spot at just behind fifth spine; second dorsal fin with irregular yellow markings; middle of anal fin yellow; pelvic fin pale, slightly tinged with black, with a yellow area around innermost ray; pectoral fin translucent; caudal fin with three radiating yellow lines along dorsal,

middle and ventral segmented rays; 2 indistinct dusky semi-circular blotches on base of caudal fin just posterior to basicaudal spot.

**Color in alcohol.** Similar to live coloration, except for all yellow markings faded.

**Distribution and habitat.** Type specimens of the new species, *Obliquogobius yamadai*, were trawled from southwestern part of temperate areas of Japan [Tosa Bay (Kochi Prefecture, Shikoku), off Toi-misaki Point (Miyazaki Prefecture, Kyushu), and southern part of Sea of Japan] and East China Sea; also, a single specimen, most probably identical with *O. yamadai*, was

also collected from the Philippines. Type specimens from the East China Sea were captured from the sandy bottom at depths of 99–165 m. Other paratypes housed in the BSKU were procured at fish markets or fishing ports and, therefore, accurate collecting data are uncertain; these BSKU paratypes were possibly captured from sandy or sandy-mud bottoms in the center and/or western parts of Tosa Bay at the depths of 30–100 m (H. Endo, personal communication).

**Etymology.** The new species is named for Umeyoshi Yamada in recognition of his great contribution to our knowledge of fishes in the East China Sea.

**Remarks.** A single MNHN specimen of *Obliquogobius* (MNHN 2002-2974), collected from the Philippines, is most probably identical with *O. yamadai*. Nevertheless, since the specimen is heavily damaged, we do not include it within the type series, as well as 3 juvenile specimens from the East China Sea (NSMT-P 73009).

Gloerfelt-Trap and Kailola (1984) provided a color photograph and brief description of the goby, collected from the waters between southern Indonesia and northwestern Australia, labelled “Gobiidae gen. and spec. nov.” The specimen, reported as “40 mm SL,” is very similar to *Obliquogobius yamadai* in general appearance (e.g., large eye, united pelvic fins with frenum joining pelvic spines, upper half of caudal fin longer than lower half, light gray body with several narrow yellow bars, first dorsal fin tinged with black distally but lacking distinct black spots, caudal fin with some yellow lines, and no distinct dusky barred pattern on caudal fin), but differs in having ventrally bifurcated yellow bar below base of first dorsal fin (vs. simple oblique yellow bar below base of first dorsal fin in *O. yamadai*). Detail comparison based on the voucher specimens is needed between these two species.

**Comparative materials.** *Obliquogobius* cf. *cirrifer* (see comment in “Remarks” of *O. cirrifer*): MNHN 1999-0565, 4 specimens (1 male and 3 females), 29.2–35.1 mm SL, Manila Bay, Luzon, the Philippines (14°07′00″N, 120°15′00″E), 215–230 m depth, beam trawl, 29 Nov. 1980; MNHN 2000-5222, 1 specimen (female), 30.0 mm

SL, Fiji Is. (18°40′00″S, 178°28′00″E), 300–307 m depth, 12 Mar. 1999; MNHN 2002-3091, 3 specimens (1 male and 2 females), 32.3–42.9 mm SL, Fiji Is. (16°05′00″S, 178°28′00″E), 400–407 m depth, 26 Feb. 1999. *Obliquogobius cometes*: BMNH 1890.11.28.13–17, syntypes of *Gobius cometes*, 5 specimens (5 males), 73.6–78.8 mm SL, Ganjam coast, Bay of Bengal (18°30.0′N, 84°46.0′E), 98–102 fathoms (=ca. 179–187 m) depths; MNHN 1890-327-334, syntypes of *Gobius cometes*, 8 specimens (5 males and 3 females), 58.0–74.7 mm SL; RMNH 16964, 1 specimen, male, 62.2 mm SL, off Ganjam coast. *Obliquogobius* sp. 1: RMNH 16526, 1 specimen (male), 70.5 mm SL, Gulf of Aden, 102 fm (=ca. 186.7 m) depth, 10 Jan. 1938, Murray Expedition, Y.R. Norman. *Obliquogobius* sp. 2: MNHN 2004-0915, 8 specimens (5 males and 3 females), 28.5–35.5 mm SL, Fiji I. (18°00′00″S, 178°53′0″), Aug. 1998; MNHN 2004-0992, 1 specimen (male), 31.5 mm SL, Fiji Is. (18°00′S, 178°53.0′), Aug. 1998. *Obliquogobius* sp. 3: MNHN 2002-3237, 4 specimens (2 males and 2 females), 29.3–34.0 mm SL, New Caledonia (19°4′33″S, 163°21′33″E), 235 m depth, 14 Sep. 1985; MNHN 2002-3491, 1 specimen (male), 31.6 mm SL, New Caledonia (19°01′00″S, 163°16′00″E), 275–330 m depth, 17 Sept. 1985.

### Acknowledgments

We express our sincere thanks to the following persons and institutions for specimen loans and/or registrations, assistance during the visit to their institutions, and help in field collection: H. Endo (BSKU); J. Maclaine (BMNH); G. Duhamel, P. Pruvost and R. Causse (MNHN); K. Matsuura, G. Shinohara and H. Komatsu (NSMT); H.K. Larson (NTM); K. Hatooka (OMNH); M.J.P. van Oijen (RMNH); H. Horikawa (Seikai National Fisheries Research Institute); M. Ito (Tohoku National Fisheries Research Institute); K. Hagiwara and M. Hayashi (YCM); Captain A. Gou and all officers and crew of the R/V *Toyoshio-maru* (Hiroshima University). E.O. Murdy (National Science Foundation, U.S.A) read the manuscript and offered helpful comments. This study was partly supported by a research project entitled “Deep-sea Fauna and Pollutants in Nansei Islands” (National Museum of Nature and Science, 2001–2004).

### Literature Cited

Akihito, Prince. 1984. Suborder Gobioidi. Pages 236–

- 238 in H. Masuda, K. Amaoka, C. Araga, T. Uyeno and T. Yoshino, eds. *The Fishes of the Japanese Archipelago*. English text. Tokai Univ. Press, Tokyo.
- Alcock, A. W. 1890. Natural history notes from H. M. Indian marine survey steamer "Investigator". No. 16. On the bathybial fishes collected in the bay of Bengal during the season of 1889–1890. *Annals and Magazine of Natural History, including Zoology, Botany and Geology, Sixth Series*, 6: 197–222, pls. 8–9.
- Gloerfelt-Tarp, Y. and P. J. Kailola. 1984. Trawled Fishes of Southern Indonesia and Northwestern Australia. Australian Development Assistance Bureau (ADAB), Directorate General of Fisheries, Indonesia (DGF) and German Agency for Technical Cooperation (GTZ). xvi+3 pls. +406 pp.
- Goren, M. 1992. *Obliquogobius turkayi*, a new species of gobiid fish from the deep water of the central Red Sea. *Senckenbergiana Maritima*, 22(3): 265–270.
- Herre, A. W. C. T. 1945. Notes on fishes in the Zoological Museum of Stanford University. XX. New fishes from China and India, a new genus, and a new Indian Record. *Journal of the Washington Academy of Sciences*, 35(12): 399–404.
- Hoesel, D. F. and R. Winterbottom. 1979. A new species of *Lioteres* (Pisces, Gobiidae) from Kwazulu, with a revised checklist of South African gobies and comments on the generic relationships and endemism of western Indian Ocean gobioids. *Royal Ontario Museum, Life Science Occasional Paper*, (31): 1–13.
- Hubbs C.L. and K. F. Lagler. 1958. *Fishes of the Great Lakes Region*. Cranbrook Institute of Science, Bloomfield Hills, Michigan. vii+213 pp., 44 pls.
- Iwata, A., S. Hosoya and Y. Niimura. 1998. *Echinogobius hayashii*, a new genus and species of Gobiidae. *Ichthyological Research*, 45(2): 113–119.
- Iwata, A., K. Shibukawa and N. Ohnishi. 2007. Three new species of the shrimp-associated goby genus *Vanderhorstia* (Perciformes, Gobiidae, Gobiinae) from Japan, with re-descriptions of three related congeners. *Bulletin of the National Museum of Nature and Science*, Ser. A, Suppl. 1: 185–205.
- Koumans, F. P. 1941. Gobioid fishes of India. *Memoirs of the Indian Museum*, 13(3): 205–329.
- Larson, H. K. and D. F. Hoesel. 2001. A new genus of small gobiid fish (Teleostei, Gobiidae) from the Indo-west Pacific, with description of two new species. *The Beagle, Records of the Museums and Art Galleries of the Northern Territory*, 17: 27–36.
- Larson, H. K. and E. O. Murdy. 2001. Gobiidae. Pages 3578–3603 in K. E. Carpenter and V. H. Niem, eds. *FAO Species Identification Guide for Fisheries Purposes. The Living Marine Resources of the Western Central Pacific. Volume 6. Bony Fishes Part 4 (Labridae to Latimeriidae), Estuarine Crocodiles, Sea Turtles, Sea Snakes and Marine Mammals*. FAO, Rome.
- Larson, H. K. and J. Wright. 2003. A new genus for the Indo-Pacific goby species *Gobius baliurus* Valenciennes (Teleostei, Gobiidae, Gobiinae). *The Beagle, Records of the Museums and Art Galleries of the Northern Territory*, (19): 127–135.
- Leviton, A. E., R. H. Gibbs, Jr., E. Heal and C. E. Dawson. 1985. Standards in herpetology and ichthyology: Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia*, 1985(3): 802–832.
- Miller, P. J. 1986. Gobiidae. Pages 1019–1085 in P. J. P. Whitehead, M.-L. Bauchot, J.-C. Hureau, J. Nielsen & E. Tortonese, eds. *Fishes of the North-eastern Atlantic and the Mediterranean*. UNESCO, Paris.
- Miller, P. J. and P. Wongrat. 1979. A new goby (Teleostei: Gobiidae) from the South China Sea and its significance for gobioid classification. *Zoological Journal of the Linnean Society*, 67(3): 239–257.
- Pezold, F. 1993. Evidence for a monophyletic Gobiinae. *Copeia*, 1993(3): 634–643.
- Potthoff, T. 1984. Clearing and staining techniques. Pages 35–37 in H. G. Moser, W. J. Richards, D. M. Cohen, M. P. Fahay, A. W. Kendall Jr. and S. L. Richardson, eds. *Ontogeny and Systematics of Fishes*. American Society of Ichthyologists and Herpetologists Special Publication 1.
- Randall, J. E. and H. Senou. 2001. Review of the Indo-Pacific gobiid fish genus *Lubricogobius*, with description of a new species and a new genus for *L. pumilus*. *Ichthyological Research*, 48(1): 3–12.
- Winterbottom, R. and M. Burrige. 1993a. Revision of the species of *Priolepis* possessing a reduced transverse pattern of cheek papillae and no predorsal scales (Teleostei; Gobiidae). *Canadian Journal of Zoology*, 71: 494–514.
- Winterbottom, R. and M. Burrige. 1993b. Revision of Indo-Pacific *Priolepis* species possessing a reduced transverse pattern of cheek papillae and predorsal scales (Teleostei; Gobiidae). *Canadian Journal of Zoology*, 71: 2056–2076.
- Winterbottom, R. and A. R. Emery. 1981. A new genus and two new species of gobiid fishes (Perciformes) from the Chagos Archipelago, central Indian Ocean. *Environmental Biology of Fishes*, 6(2): 139–149.
- Winterbottom, R. and D. F. Hoesel. 1988. A new genus and four new species of fishes from the Indo-Pacific (Pisces; Perciformes; Gobiidae), with comments on relationships. *Royal Ontario Museum, Life Science Occasional Paper*, (37): 1–17.

Manuscript received 20 March 2006; revised 6 January 2007; accepted 16 January 2007.

Associate editor: K. Matsuura.