

Two New Species of the Cheek-spine Goby Genus *Asterropteryx* (Perciformes: Gobiidae: Gobiinae) from the Western Pacific

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Abstract Two new species of the cheek-spine gobies of the genus *Asterropteryx*, i.e., *A. ovata* and *A. senoui*, are described; within the genus, these 2 belongs to the “*spinosa* complex,” characterized by having e.g. united pelvic fins, bony spinous projections located just behind preopercular canal between pores M' and O', and no scales on branchiostegal membrane. One of them, *A. ovata* (14 specimens, Indonesia and Ponape), is distinguished from the congeners in having the combination of following features: numerous, vivid reddish orange spots scattered on head and body when alive or fresh; a large horizontally-elongate ovoid black spot (extending anteriorly to third mid-lateral scale before posterior margin of hypural) at caudal fin base; no distinct black spot on first dorsal fin; largest cheek spine obviously longer than others, 2.6–6.3% SL in length (more than 3.3% in specimens of >20 mm SL). The other one, *A. senoui* (6 specimens, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan), is characterized by having the following combination of characters: 6–10 cheek spines; all cheek spines short and similar in size, length of longest spine 1.6–2.2% SL; no filamentous spines on first dorsal fin; a distinct, narrow ventrally-pointed vertical black bar below eye; no distinct black spot on first dorsal fin; small narrow vertically-elongate black spot at midlateral base of caudal fin. *Asterropteryx ovata* appears to be widely distributed in the western Pacific (including the Japanese waters) and, possibly, Indian Ocean, whereas the plausible records of *A. senoui* are currently restricted in the Ryukyu Archipelago, Japan. Key to all 4 described species of the *spinosa* complex is given.

Key words: Gobiidae, *Asterropteryx spinosa* complex, *Asterropteryx ovata* sp. nov., *Asterropteryx senoui* sp. nov., Western Pacific.

The cheek-spine goby genus *Asterropteryx* Rüppell, 1828 belongs to the gobiid subfamily Gobiinae (*sensu* Pezold, 1993), and comprises 6 described species of small marine gobies, found in lagoons or coral/rocky reefs on shallow coastal waters of the Indo-West Pacific (Shibukawa and Suzuki, 2002): *Asterropteryx atripes* Shibukawa and Suzuki, 2002; *Asterropteryx bipunctata* Allen and Munday, 1991; *Asterropteryx ensifera* (Bleeker, 1874); *Asterropteryx semipunctata* (Rüppell, 1830); *Asterropteryx spinosa* (Goren, 1981); *Asterropteryx striata* Allen and Munday, 1991. The genus is distinguished from the other members of the subfamily by having the follow-

ing combination of characters: posterior margin of preopercle with a single to several, essentially posteriorly directed, bony spine-like projections (hereafter refers to “cheek spines”); all dorsal fin spines slender, flexible; cheek, operculum, nape and prepelvic regions covered by scales; no cutaneous ridge along dorsal midline on nape; well-developed transverse pattern of sensory papillae rows on cheek. There are 2 distinct subgroups recognized within the genus (Shibukawa and Suzuki, 2002): the “*semipunctata* complex,” comprising *A. atripes*, *A. ensifera*, *A. semipunctata*, and *A. striata*; the *spinosa* complex, comprising *A. bipunctata* and *A. spinosa*. These 2

subgroups are readily distinguished one another by various morphological features, e.g., pelvic fin structure, squamation pattern of head, cheek spine morphology, and configuration of cephalic sensory papillae rows (see general accounts of the *spinosa* complex, below).

During our recent research on *Asterropteryx*, 4 species of the *spinosa* complex are recognized. Two of them are herein described as new. One of the new species is known from the Ryukyu Archipelago, whereas the other appears to be widely distributed in the western Pacific and, possibly, the Indian Ocean. In this paper, the *spinosa* complex is re-diagnosed, and the key to all described species of the complex is given.

Materials and Methods

Institutional abbreviations follow Leviton *et al.* (1985), except for KPM (Kanagawa Prefectural Museum of Natural History, Japan). Species accounts are presented in alphabetical order.

All fish lengths given are standard lengths (SL). Measurements are made point-to-point with calipers under the dissecting microscope to the nearest 0.1 mm. 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): 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; head width and depth are measured at preopercular margin; body depth is measured at the anal fin origin; nape width is measured between dorsalmost margins 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; each pelvic fin ray length is greatest length between base and distal tip of ray; caudal fin length is measured from the base to distal tip of the middle (longest) caudal fin ray; length of cheek

spine is the least distance between anterior ridge of bony preopercular canal support (clearly visible from external view) and distal tip of the cheek spine. The methods of counts follow Akihito (1984), except for the following: longitudinal scale count is the number of oblique (anterodorsal to posteroventral) rows starting from just above the dorsalmost attachment of the opercular membrane and proceeding posteriorly to the mid-base of caudal fin; 3 methods of transverse scale count are taken (see descriptive accounts); circumpeduncular scale count is the number of zigzag rows along a vertical line around narrowest point of caudal peduncle; counts of cheek and opercular scale rows are the number of vertical or slightly oblique (posterodorsal to anteroventral) rows of scales on cheek and operculum, respectively; gill rakers including all rudiments are counted on the outer side of first arch; 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 right side only. Osteological features are observed from radiographs (for all specimens) and the 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 are observed on specimens stained with cyanine blue, and notations on them follow Akihito (1984) and Miller (1986), respectively.

The *Asterropteryx spinosa* complex

Included species. The *Asterropteryx spinosa* complex comprises 4 species, i.e., *A. bipunctata*, *A. ovata* (new species), *A. senoui* (new species) and *A. spinosa*.

Diagnosis. Species of the *Asterropteryx spinosa* complex (or the *spinosa* complex) is distinguished from the other congeners (all belonging to the *semipunctata* complex) by having: 1)

pelvic fins fused medially, with well developed connecting membrane between innermost rays, and frenum between spines (vs. pelvic fins almost separated, with rudimental connecting membrane and no frenum in the latter); 2) 3–10 cheek spines located just behind preopercular canal between pores M' and O' (vs. 1–10 cheek spines, restricted just behind ventral part of preopercular canal between pores N and O'); 3) ventral surface of gill membrane and throat naked (vs. covered by scales); 4) scales on opercle enlarged, typically single opercular scale rows (vs. moderately small, ca. 4 opercular scale rows); 5) in the species with greatly prolonged spines of first dorsal fin, fourth spine elongate and filamentous (vs. third spine elongate and filamentous); 6) anteriormost (=11th) caudal vertebra bears well developed parapophysis, likewise preceding vertebra (vs. no developed parapophysis on caudal vertebrae); 7) caudal vertebrae with no expanded haemal arches and moderately long haemal spines (vs. greatly expanded haemal arches each with very short haemal spine on anterior single or some caudal vertebrae, the first arch being most expanded, degree of expansion decreasing posteriorly); 8) a pair of sensory papillae at just behind chin (vs. more than one pair of sensory papillae just behind chin, forming 2 parallel, essentially longitudinal rows); 9) row *d* of cephalic sensory papillae continuous (vs. interrupted at midway); 10) no bright blue spots on head, body and fins when live or fresh (vs. present); 11) a distinct black spot at caudal fin base (vs. absent).

Description. Dorsal fin rays VI–I, 9–10 (usually VI–I, 10); anal fin rays I, 8–9 (usually I, 9); pectoral fin rays 15–20 (usually 18–19); pelvic fin rays I, 5; segmented caudal fin rays 9+7–8 (usually 9+8), including 5–7+5–7 (usually 6–7+6–7) branched caudal fin rays; upper unsegmented caudal fin rays 4–6; lower unsegmented caudal fin rays 4–5; longitudinal scale rows 22–25 (usually 23–24); transverse scale rows counted from origin of anal fin upward and forward to base of first dorsal fin 7–10 (usually 8–9); transverse scale rows counted from origin of anal fin upward and backward to base of sec-

ond dorsal fin 7–8; transverse scale rows counted from origin of second dorsal fin downward and backward to anal-fin base 7–8; predorsal scales 4–6; gill rakers on outer surface of first gill arch 2–5+8–11=11–14; pseudobranchial filaments 4–6; P–V 3/II II I I 0/9; vertebrae 10+16=26; anal pterygiophores anterior to first haemal spine 2; epural 1.

Head and body compressed. Eye moderately large, its diameter subequal or slightly larger than snout length. Interorbital space narrow, its width about equal or slightly narrower than pupil diameter. Mouth terminal, oblique, forming an angle of about 30–40 degrees with body axis. Lower jaw slightly projecting beyond upper jaw. Posterior end of jaws extending to below anterior margin or middle of pupil. Anterior naris opening at a short tube; no fleshy flap at tip of anterior naris; posterior naris opening a pore, closer to anterior margin of eye than to anterior naris. Anterior margin of tongue rounded or nearly truncate, free from floor of mouth. Lower lip interrupted at symphysis. Mental flap on chin undeveloped. Gill opening moderate in size, extending anteriorly to a vertical line through middle or anterior part of operculum (and not beyond a vertical line through posterior margin of preopercle); gill membrane attached to isthmus. Three to ten cheek spines located just behind preopercular canal between pores M' and O'. No fleshy papilla-like projection on lateral margin of lateral wing of cleithrum. Pectoral fin rounded or slightly pointed, 10th, 11th, 12th or 13th ray longest, extending posteriorly to a vertical from anterior second or third segmented rays of anal fin; all pectoral fin rays branched, except for uppermost 2–4 and lowermost 1–2 rays. Pelvic fins fused medially, with well-developed connecting membrane between innermost rays, and frenum between spines; all segmented rays of pelvic fin branched; 4th segmented ray longest, its tip extending beyond anal fin origin when adpressed; 5th segmented ray 81.3–104.9% of preceding ray in length. Caudal fin nearly truncated or rounded.

Scales on body ctenoid, except for prepelvic region, anterior part of occipital region, pectoral

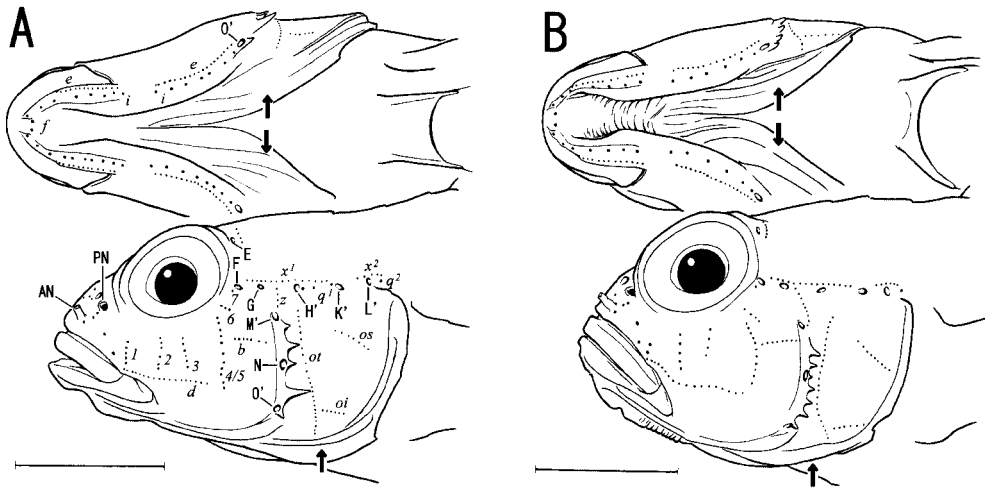


Fig. 1. Ventral (top) and lateral (bottom) views of heads of 2 species of *Asterropteryx*, showing cephalic sensory canal pores (indicated by roman uppercase letters, except for AN and PN) and papillae (indicated by roman lowercase letters and 1–7). A: *Asterropteryx ovata* sp. nov., NSMT-P 61054, paratype, male, 22.4 mm SL; B: *Asterropteryx senoui* sp. nov., NSMT-P 73127, holotype, male, 23.3 mm SL. AN and PN: anterior and posterior nares, respectively. Arrows position where gill membrane attached to isthmus. Bars 3 mm. Drawn by K. Shibukawa.

fin base, prepelvic region (including small area below pectoral fin) and anteroventral part of belly just behind pelvic fin base with cycloid scales (most of cycloid scales, except for those on nape, slightly embedded); cheek and operculum almost entirely covered by large cycloid scales (operculum sometimes with ctenoid scales in *A. spinosa*); snout, chin, lips, ventral surface of lower jaws, gill membrane, and interorbital region naked. Teeth on jaws simple, conical; upper jaw with about 4 rows of teeth anteriorly, narrowing to single row posteriorly; lower jaw with about 4–6 irregular rows of teeth anteriorly, narrowing to single row posteriorly; teeth in outermost row, usually restricted to anterior half of toothed area of jaws, largest in both jaws; teeth in innermost row of lower jaw larger than those in neighboring rows (but slightly smaller than teeth in outermost row); no enlarged, prominent canine-like teeth in jaws; no teeth on vomer and palatine.

Patterns of cephalic sensory systems of 2 new species are illustrated in Fig. 1. Sensory canals well developed on head; oculoscapular canal with pores B', C (S), D (S), E, F, G, H', K' and L'; preopercular canal with M', N and O'; right and left sides of oculoscapular canal fused medially between pores C and D. Apparently 6 short transverse rows of sensory papilla [rows 1, 2, 3, 4/5 (continuous, forming a single row), 6 and 7] below eye; row 7 formed by a single sensory papilla; row *d* not interrupted midway; row *f* comprises a single sensory papilla (namely, a pair of sensory papillae just behind chin).

Sexual dimorphism is found in urogenital papilla: long, narrow and pointed in male, whereas short, broad and rounded in female.

Remarks. Within the Gobiidae, 2 of the characters listed in “Diagnosis” (#2 and #6) appear to be unique and regarded as autapomorphies supporting the monophyly of this complex.

Key to Species of the *Asterropteryx spinosa* complex

- 1a. A large, rounded black spot (subequal or larger than pupil) at midlateral caudal fin base; vivid reddish orange spots, slightly smaller than pupil, scattered on head and body when alive or fresh; no black bar below eye (black spots maybe present below eye, but not forming distinct bar)2
- 1b. A short, narrow vertical black bar or small vertically-elongate ovoid spot (rather than rounded blotch) at midlateral caudal fin base; no vivid orange spots on head and body (excluding minute, dusky orange or yellow dots); distinct black vertical bar below eye.....3
- 2a. A distinct black spot between first and second spine of first dorsal fin; black blotch at caudal-fin base circular, extending anteriorly to second mid-lateral scale before posterior margin of hypural; largest cheek spine subequal or slightly longer than second largest spine, 1.7–2.2% SL in length*A. bipunctata*
- 2b. No distinct black spot on first dorsal fin; black blotch at caudal fin base ovoid and horizontally elongate, extending anteriorly to third mid-lateral scale before posterior margin of hypural; largest cheek spine obviously longer than others, 2.6–6.3% SL in length (more than 3.3% in specimens of >20 mm SL)*A. ovata* sp. nov.
- 3a. Cheek spines 4–6; longest (and usually ventralmost) cheek spine obviously stouter and longer than others, 3.4–6.8% SL in length; fourth spine of first dorsal fin elongated, filamentous at least in adult; a diffuse black spot (about size of pupil) usually present between first and second spines of first dorsal fin; black vertical suborbital bar broadened and rounded ventrally*A. spinosa*
- 3b. Cheek spine 6–10; all cheek spines short and similar each other in size, length of longest spine 1.7–2.2% SL; no filamentous spines on first dorsal fin; no distinct black spot on first dorsal fin; black vertical suborbital bar narrow, pointed ventrally.....*A. senoui* sp. nov.

***Asterropteryx ovata* sp. nov.**

(Figs. 1A, 2B, 3A–B and 4B; Table 1)

?*Asterropteryx* species (=DFH sp. 7). Winterbottom and Emery, 1986: 10, fig. 10 (Peros Banhos and Salomon, Chagos Archipelago; description and black and white photograph); Winterbottom and Anderson, 1997: 19 (revised checklist).

Asterropteryx species. Shibukawa *et al.*, 2003: 178 (Bitung, Sulawesi, Indonesia; brief description and color photograph of freshly collected specimen).

Asterropteryx sp. 1. Senou *et al.*, 2004: 389 (Miyako-jima Island and Iriomote-jima Island, Ryukyu Archipelago, Japan; brief description and underwater photographs).

Holotype. NSMT-P 73125, female, 24.4 mm SL, Tanjung Kusukusu, western coast of Lembah Island, off Bitung, Sulawesi, Indonesia (01°26'N, 125°11'E), 15 m depth, 14 July 2000, collected by K. Matsuura.

Paratypes. Total 13 specimens, 18.3–27.2 mm SL: NSMT-P 61054, 1 specimen, male, 22.4 mm SL, collected with holotype; NSMT-P 61060, 4 specimens, males, 17.0–23.2 mm SL, collected with holotype; USNM 223166, 8 specimens, 7 males and 1 female, 18.3–27.2 mm SL, Car-

oline Islands, Ponape, Tanak Island (06°56'N, 158°06'E), 0–55 ft depth, 11 Sep. 1980, collected by V. G. Springer *et al.*

Diagnosis. The new species *Asterropteryx ovata* differs from the other species of the *spinosa* complex in having the following combination of characters: 3–6 cheek spines; largest cheek spine slender obviously longer than other spines, its length 2.6–6.3% SL; a pupil- or eye-sized ovoid black spot on base of caudal fin (extending anteriorly to third mid-lateral scale before posterior margin of hypural); numerous orange speckles on head, body and dorsal fins when alive or fresh; no distinct black spot on first dorsal fin.

Description. Proportional measurements are given in Table 1. In the following description of meristic counts, the counts of holotype are identified by an asterisk, and the frequency of each value is given in parentheses following relevant value. Dorsal fin rays VI-I, 9 (1) or VI-I, 10*

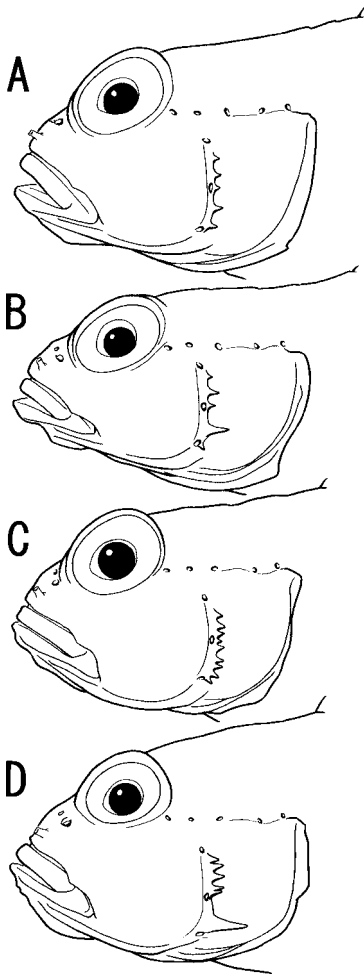


Fig. 2. Lateral views of heads of 4 species of *Asterropteryx spinosa* complex. A: *Asterropteryx bipunctata*, one of NSMT-P 56898, male, 24.5 mm SL; B: *Asterropteryx ovata* sp. nov., NSMT-P 61054, male, 22.4 mm SL; C: *Asterropteryx senoui* sp. nov., NSMT-P 73128, paratype, 23.7 mm SL; D: *Asterropteryx spinosa*, NSMT-P 73130, female, 28.4 mm SL. Drawn by K. Shibukawa

(13); anal fin rays I, 8 (1) or I, 9 (13)*; pectoral fin rays 15 (1), 17 (1), 18 (11) or 19* (13); pelvic fin rays I, 5* (28); segmented caudal fin rays 9+8 (14), including 6+6 (6), 6+7 (5), 7+6 (2) or 7+7* (1) branched rays; upper unsegmented rays 4* (3), 5 (8) or 6 (2); lower unsegmented rays 4* (9) or 5 (4); longitudinal scale rows 22* (3), 23* (16) or 24 (8); transverse scale rows

counted from origin of anal fin upward and forward to base of first dorsal fin 8* (17) or 9 (10); transverse scale rows counted from origin of anal fin upward and backward to base of second dorsal fin 7* (23) or 8* (4); transverse scale rows counted from origin of second dorsal fin downward and backward to anal-fin base 7* (17) or 8* (10); predorsal scales 5* (9) or 6 (4); circumpenduncular scales 12 (14); cheek spines 3 (5), 4* (8), 5 (9) or 6* (6); gill rakers on outer surface of first gill arch 3+8 (2), 3+9 (4), 3+11 (1), 4+9* (4), 4+10 (2) or 5+8 (1); pseudobranchial filaments 5 (3) or 6 (11); P-V 3/II II I I 0/9* (14); vertebrae 10+16=26* (14); anal pterygiophores anterior to first haemal spine 2* (14); epural* 1 (14).

Color when fresh (based on color slides, e.g., Fig. 3A, B). Ground color of head and body pale brown, darkened dorsally; numerous orange spots about size of half to two-thirds of pupil scattered on head and body, except for belly and prepelvic regions; 2 minute brown dots on posterior part of most of each body scales except for those on belly and prepelvic regions; iris bright white with orange or yellow spots/lines encircling pupil; posterior end of caudal peduncle with a distinct, large horizontally elongate ovoid black spot (slightly smaller than eye), extending anteriorly to third mid-lateral scale before posterior margin of hypural; numerous orange dots on first dorsal fin, sometimes forming horizontal rows; 3 to 5 nearly horizontal rows of minute orange dots on second dorsal fin; pectoral fin subtranslucent; pelvic fin pale, a little tinged with black; 7 arc-shaped vertical rows of minute orange dots on upper 2 thirds of caudal fin; no distinct black spot on fins. In matured males, some orange spots at preopercular corner and/or under eye darkened (often blackish), and throat tinged with black.

Color when alive (based on the underwater photographs, e.g., Senou *et al.*, 2004: 389). Similar to color when freshly collected, except as follows: brown dots on scales tinged with bronze; black spot on posterior end of caudal peduncle margined posteriorly with an arc-shaped white

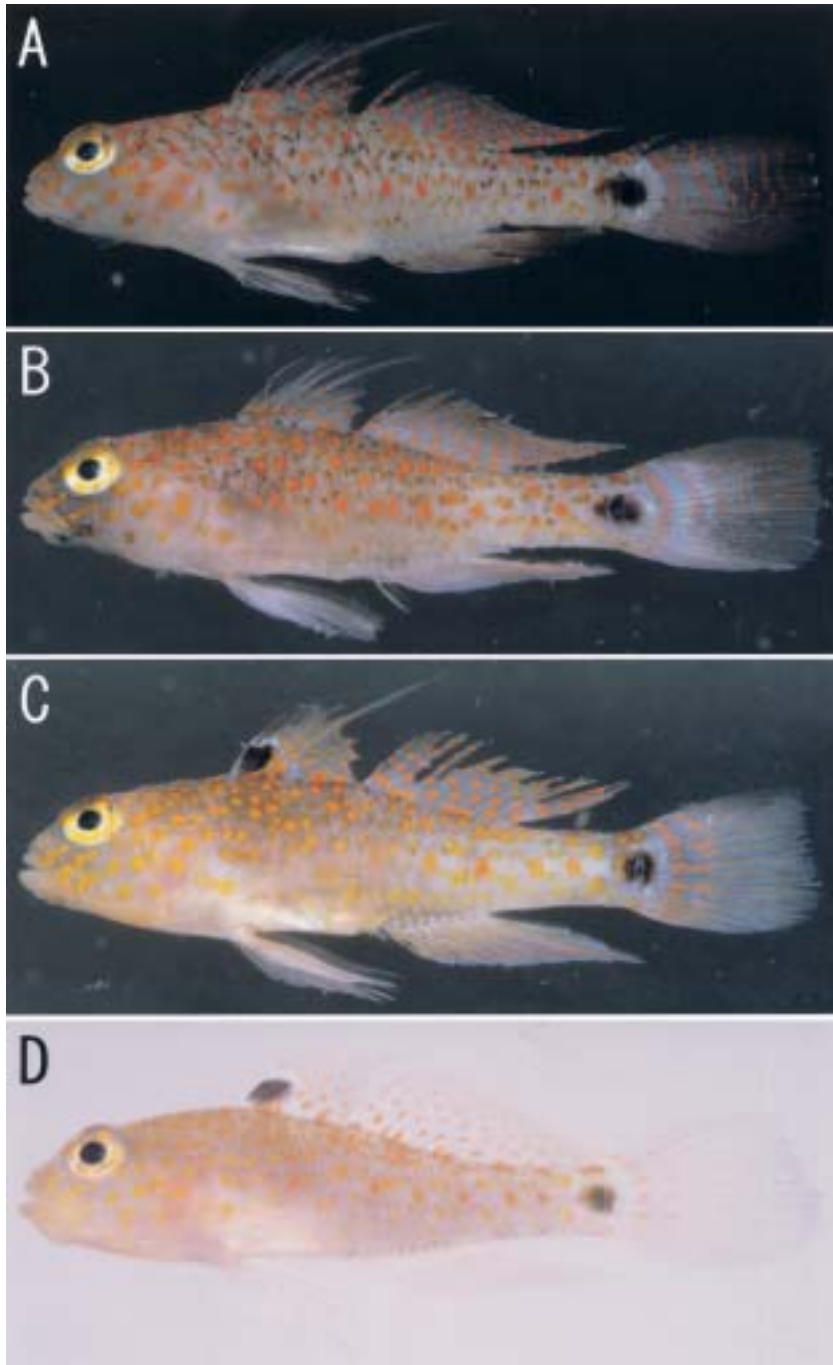


Fig. 3. Freshly collected specimens of 2 species of *Asterropteryx*. A: *Asterropteryx ovata* sp. nov., NSMT-P 73125, holotype, female, 24.4 mm SL, Sulawesi, Indonesia (photographed by K. Matsuura and K. Shibukawa); B: *Asterropteryx ovata* sp. nov., NSMT-P 61054, paratype, male, 22.4 mm SL, collected with NSMT-P 73125 (photographed by K. Matsuura and K. Shibukawa); C: *Asterropteryx bipunctata*, NSMT-P 61053, male, 25.0 mm SL, Sulawesi, Indonesia (photographed by K. Matsuura and K. Shibukawa); D: *Asterropteryx bipunctata*, NSMT-P 73124, male, 20.8 mm SL, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan (photographed by T. Suzuki).

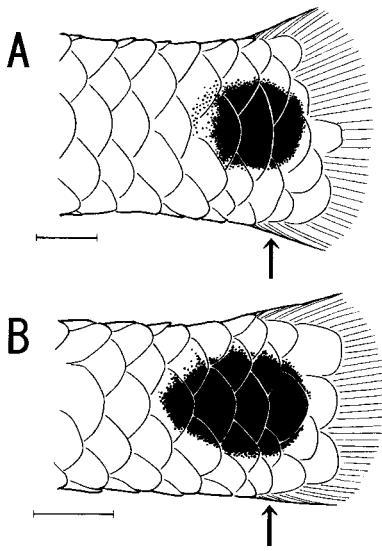


Fig. 4. Lateral views of caudal peduncles of 2 species of *Asterropteryx*, showing shape of black spot on caudal fin base. A: *Asterropteryx bipunctata*, NSMT-P 61053, male, 25.0 mm SL; B: *Asterropteryx ovata*, one of NSMT-P 61060, paratype, male, 19.2 mm SL. Arrows position of posterior vertical margin of hypurals. Bars 1 mm. Drawn by K. Shibukawa.

bar.

Color in alcohol. Similar to color when freshly collected, except for all orange markings on head, body and fins faded.

Distribution and habitat. Type specimens of *Asterropteryx ovata* were collected from the Sulawesi of Indonesia and Ponape, Caroline Islands, but this species appears to be more widely distributed in the western Pacific. The unidentified species reported by Senou *et al.* (2004: 389, as “*Asterropteryx* sp. 1”) from the Ryukyu Archipelago appears to be identical with *A. ovata*, considering its characteristic coloration; although any specimens (vouchers) are not available in this paper, the senior author (KS) have examined the Ryukyus specimens clearly identified as *A. ovata* actually. [Note.—Because of lack of the Japanese specimens, we do not propose the new Japanese name for this species here.] Also, the species reported by Winterbottom and Emery (1986) as “*Asterropteryx* species (=DFH sp. 7)” from the

Chagos Islands, Indian Ocean, is possibly conspecific with *A. ovata*, judging from their account of the species (see below “Remarks”); subsequently Winterbottom and Anderson (1997) reported that this species is distributed in “Indo-Pacific and marginally on Pacific plate (Carolines, Samoa).”

According to Senou *et al.* (2004), their “*Asterropteryx* sp. 1” (= *A. ovata*) inhabits coral-reef slopes in the protected bays at the depths of 15–40 m, and found solitary on muddy or sandy-mud bottoms with dead-coral rubbles under the heavy growth of corals in the Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan. *Asterropteryx ovata* is sometimes found sympatrically with the closely resembled congener, *A. bipunctata*. Actually, both species were mixed within the one-dive collection made by K. Matsuura in the Sulawesi; those specimens are now divided into 5 registration lots, i.e., NSMT-P61054, 61060 and 73125 for *A. ovata*, whereas 61053 and 61059 for *A. bipunctata*.

Etymology. The new specific name, *ovata* (the Latin meaning “egg-shaped”) refers from the large ovoid black spot on the base of caudal fin.

Remarks. The new species *Asterropteryx ovata* is very similar to *A. bipunctata* in the general physiognomy, and, in the early stage of our research, we even suspected the possibility that the former might be the intraspecific color variant lacking the black spot on dorsal fin within the latter. Nevertheless, our investigation reveals that these 2 are clearly distinguished one another in the cheek-spine morphology, as well as the coloration; their sympatric distribution also suggests that these 2 are distinct species.

Winterbottom and Emery (1986) reported an undescribed species of the genus as “*Asterropteryx* species (=DFH sp. 7)”. Their species is probably identical with *A. ovata*, since, according to their description and illustrations, it possesses a large, ovoid black spot at caudal fin base, half-pupil-diameter spots ranging yellow to orange on head and body, no black spot on dorsal fin, and long largest preopercular spine (twice or more in length of second largest spine). However, they

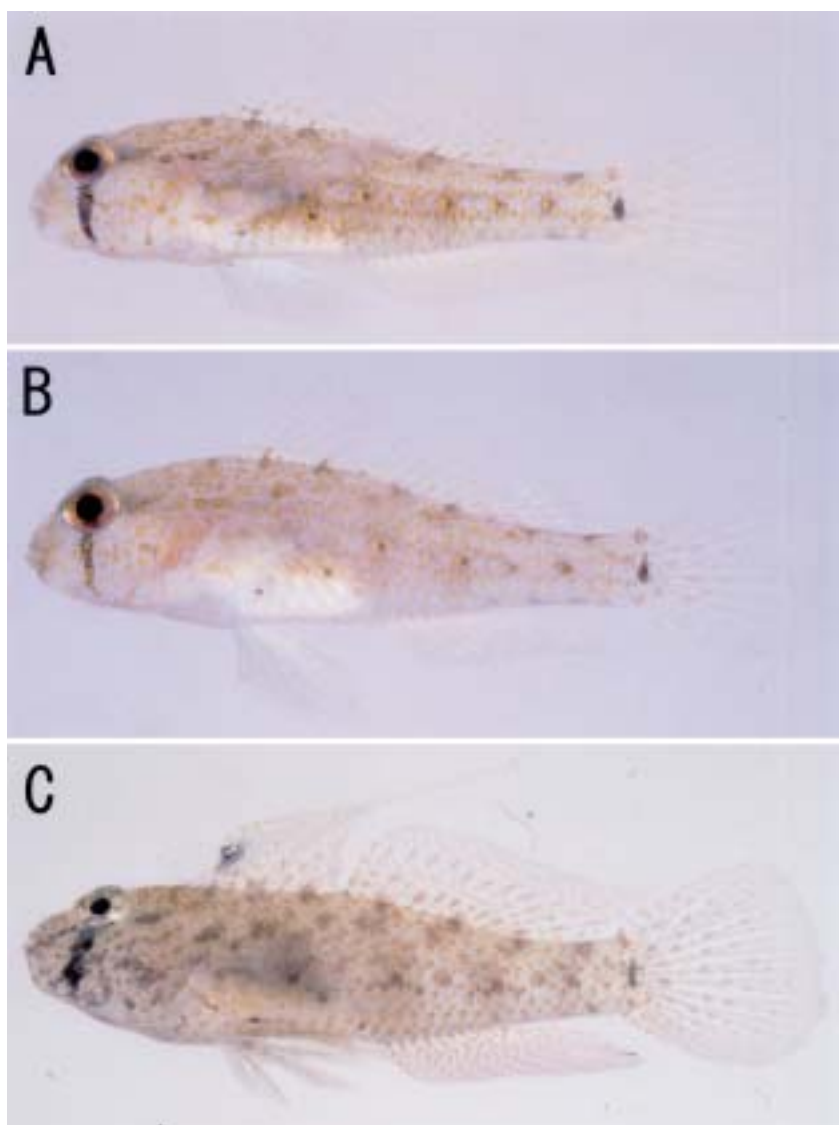


Fig. 5. Freshly collected specimens of 2 species of *Asterropteryx* photographed by T. Suzuki. A: *Asterropteryx senoui* sp. nov., NSMT-P 73127, holotype, male, 23.3 mm SL, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan; B: *Asterropteryx senoui* sp. nov., NSMT-P 73128, paratype, female, 23.7 mm SL, collected with holotype; C: *Asterropteryx spinosa*, NSMT-P 73129, male, 28.9 mm SL, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan.

described that their species had “no frenum” (vs. frenum well developed in *A. ovata*). Further detail comparisons are needed to determine the certain relationships between these 2.

***Asterropteryx senoui* sp. nov.**

(New Japanese name: Nokogiri-hoshihaze)

(Figs. 1B, 2C and 5A–B; Table 1)

Asterropteryx sp. 2. Senou *et al.*, 2004: 390 (Ishigaki-jima Island and Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan; brief description and underwater photographs).

Holotype. NSMT-P 73127, male, 23.3 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan, 17 m depth, 14 June 2001, collected by K. Yano.

Paratypes. Total 5 specimens, 21.0–24.9 mm SL: KPM-NI 5527, 1 specimen, male, 21.0 mm SL, Tako-zaki Point, Funauki Bay, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan, 17 Nov. 1998, collected by H. Senou; KPM-NI 5544, 1 specimen, male, 24.9 mm SL, collecting locality and date same as KPM-NI 5527, collected by K. Yano; KPM-NI 5547, 1 specimen, female, 23.9 mm SL, collecting locality and date same as KPM-NI 5527, collected by K. Yano; AMS I. 43850-001, 1 specimen, female, 22.2 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan, 40 m depth, 27 May 2001, collected by K. Yano; NSMT-P 73128, 1 specimen (cleared and stained), female, 23.7 mm SL, collected with holotype.

Diagnosis. The new species *Asterropteryx senoui* is distinguished from the other members of the *spinosa* complex in having the following combination of characters: 6 to ten cheek spines; all cheek spines short and similar one another in size, length of longest spine 1.6–2.2% SL; no filamentous spines in first dorsal fin; no distinct black spot on first dorsal fin; small vertically-elongate ovoid black spot at caudal fin base; no vivid reddish orange spots on head and body (excluding minute, dusky and slightly faded orange or yellow dots); a distinct, narrow ventrally-pointed vertical black bar below eye.

Description. Proportional measurements are given in Table 1. In the following description of meristic counts, the counts of holotype are identified by an asterisk, and the frequency of each value is given in parentheses followed by relevant value. Dorsal fin rays VI-I, 9 (1) [*Note.*—in this specimen, fourth segmented ray of second dorsal fin missing (but relating pterygiophores present)] or VI-I, 10* (5); anal fin rays I, 9 (6); pectoral fin rays 18 (3) or 19* (9); pelvic fin rays I, 5* (12); segmented caudal fin rays 9+8* (6), including 6+6 (4) or 7+6* (2) branched rays; upper unsegmented caudal fin rays 5 (5) or 6* (1); lower unsegmented caudal fin rays 4 (3), 5 (2) or 6* (1); longitudinal scale rows 23* (7) or 24 (3); transverse scale rows counted from origin of anal fin upward and forward to base of first dorsal fin 7

(1), 8* (8) or 9 (3); transverse scale rows counted from origin of anal fin upward and backward to base of second dorsal fin 7* (10) or 8* (2); transverse scale rows counted from origin of second dorsal fin downward and backward to anal fin base 7* (11) or 8 (1); predorsal scales 4 (1), 5* (4) or 6 (1); cheek spines 6* (1), 7* (2), 8 (6) or 10 (1); gill rakers on outer surface of first gill arch 2+9 (2)* or 3+8 (1); pseudobranchial filaments 4* (1), 5 (1) or 6 (1); P-V 3/II II I I 0/9* (6); vertebrae 10+16=26* (6); anal pterygiophores anterior to first haemal spine 2* (6); epural 1* (6).

Color when freshly collected (based on color slides, e.g., Fig. 4A, B). Ground color of head and body grayish white, a little darkened dorsally, and tinged with brown; numerous minute pale orange-yellow spots about size of smaller than one-third of pupil scattered on head and body, except for ventral part of belly and prepelvic regions; 8 or 9 small grayish brown saddle-like blotches on dorsum from nape to caudal fin base; 8 or 9 small dark grayish brown or black mid-lateral spots on body, the posteriormost one largest and forming a vertically-elongate ovoid spot at caudal fin base; some minute dark grayish brown or black dots on side of belly; iris yellowish brown or grayish brown, with no spotted and/or barred pattern; a distinct, narrow ventrally-pointed black vertical bar below eye; numerous vague brownish dots on dorsal fins and basal half of anal and caudal fins; pectoral fin subtranslucent; pelvic fin pale, a little tinged with black; no distinct black spot on fins.

Color when alive (based on underwater photographs found in Senou *et al.*, 2004: 390). Similar to color when freshly collected, except for black suborbital bar paler and almost entirely tinged with yellow.

Color in alcohol. Similar to color when freshly collected, except as follows: all brownish, yellowish or orange color faded; iris entirely blackish.

Distribution and habitat. Type specimens of the new species *Asterropteryx senoui* were collected only from the Funauki Bay, Iriomote-

Table 1. Proportional measurements of 2 species of *Asterropteryx*.

	<i>Asterropteryx ovata</i> sp. nov.			<i>Asterropteryx senoui</i> sp. nov.		
	Holotype	Males	Females ^a	Holotype	Males ^a	Females
	NSMTP-P 73125	12 specimens	2 specimens	NSMTP-P 73127	3 specimens	3 specimens
Standard length (mm)	24.4	22.5–27.2	19.3–24.4	23.3	21.0–24.9	22.2–23.9
In % of standard length						
Head length	33.4	31.7–36.0	33.1–33.4	31.7	31.5–33.1	32.1–32.3
Snout length	8.8	8.5–10.4	8.8–8.9	9.2	8.6–9.2	8.5–9.0
Length of longest cheek spine	3.5/3.5 ^b	2.6–6.3	3.5–4.5	1.7/1.7 ^b	1.7–2.0	1.8–2.2
Length of second longest cheek spine	1.9/1.9 ^b	1.6–3.4	1.9–2.8	1.7/1.5 ^b	1.5–2.0	1.6–2.1
Eye diameter	9.4	9.4–11.0	9.4–10.6	10.2	10.2–11.1	9.7–10.6
Interorbital width	2.1	1.4–2.4	1.9–2.1	1.6	1.3–1.6	1.2–1.9
Jaw length	11.3	10.7–13.0	11.2–11.3	13.0	12.0–13.0	12.4–12.7
Nape width	13.2	11.9–15.1	13.0–13.2	14.2	13.1–14.2	12.9–14.9
Head width	18.8	17.0–20.2	18.8–19.2	18.3	17.4–18.8	17.9–19.1
Head depth	21.4	18.2–22.1	20.7–21.4	23.7	23.1–23.7	22.7–25.1
Body depth	22.2	19.1–24.3	19.0–22.2	22.7	22.7–24.2	22.9–25.0
Body width	12.5	11.7–14.4	12.5–12.6	13.2	13.0–13.2	14.3–14.5
Predorsal length	38.5	34.9–40.0	38.5–39.6	36.1	36.1–36.9	36.9–37.3
Prepelvic length	35.2	33.6–36.6	35.2	34.5	34.5–35.8	35.2–36.2
Preanal length	60.1	57.3–59.9	59.0–60.1	58.3	57.4–58.6	58.1–58.6
Caudal peduncle length	28.5	26.4–29.3	28.5–30.1	25.5	25.5–28.3	25.3–27.3
Caudal peduncle depth	10.6	9.9–12.2	10.6–10.7	13.2	12.4–13.2	12.7–13.8
Length of D ₁ base	20.7	18.6–20.5	20.2–20.7	21.3	21.3–22.3	21.5–21.7
Length of first spine of D ₁	19.1	14.4–19.6	17.6–19.1	23.7	21.7–23.7	22.1–22.6
Length of second spine of D ₁	20.8	15.1–20.6	17.8–20.8	22.4	18.5–22.4	19.4–20.6
Length of third spine of D ₁	22.2	16.4–24.3	18.3–22.2	22.4	15.4–22.4	18.7–19.7
Length of fourth spine of D ₁	39.4	16.4–49.6	17.8–39.4	21.2	16.1–21.2	16.6–21.8
Length of D ₂ base	23.1	21.7–25.2	21.7–23.1	23.9	23.4–23.9	24.2–25.3
Length of spine of D ₂	14.3	14.0–16.2	14.3–14.9	18.6	15.9–18.6	17.6–18.2
Length of first segmented ray of D ₂	15.0	15.4–17.2	15.0–16.4	19.2	17.4–19.2	17.9–19.1
Length of longest segmented ray of D ₂	23.8	18.2–34.2	18.2–23.8	30.5	21.4–30.5	22.0–22.9
Length of A base	16.0	15.4–18.1	15.7–16.0	18.1	16.4–18.1	16.7–17.8
Length of spine of A	9.2	8.5–10.6	8.8–9.2	9.5	8.4–10.5	8.6–8.8
Length of first segmented ray of A	11.3	10.4–13.0	11.2–11.3	12.4	11.0–13.1	11.0–12.8
Length of longest segmented ray of A	21.8	23.0–31.5	20.1–21.8	33.0	26.1–33.0	26.1–26.9
P ₁ length	35.9	28.4–38.1	32.6–35.9	36.2	32.6–36.2	32.9–35.3
P ₂ length	28.8	23.7–30.4	21.9–28.8	29.8	25.1–29.8	27.6–28.4
Length of spine of P ₂	8.2	7.9–8.9	8.2–8.3	10.6	10.1–10.6	8.6–10.6
Length of fourth segmented ray of P ₂	23.3	22.1–27.0	23.3–23.6	26.6	24.0–26.6	26.1–26.7
Length of fifth segmented ray of P ₂	24.2	21.6–26.8	23.6–24.2	24.3	21.5–24.3	22.7–23.8
C length	32.8	28.9–37.7	32.1–32.8	38.3	32.2–38.3	31.2–32.5

^a Including holotype.^b Values of left and right sides of cheek spines in holotype are separated by a slash, the first value representing the left one.Abbreviations: A, anal fin; C, caudal fin; D₁, first dorsal fin; D₂, second dorsal fin; P₁, pectoral fin; P₂, pelvic fin.

jima Island of Ryukyu Islands, Japan. This species was also reported from the Ishigaki-jima Island, the neighboring island of the Iriomote-jima Island (Senou *et al.*, 2004), and the Yokosuka City Museum (YCM) holds some specimens of this species collected from the Amami-oshima Island, Amami Islands of Ryukyu Archipelago (K. Hagiwara, personal communication). According to Senou *et al.* (2004), *A. senoui* inhabits coral-reef slopes in the protected bays at the depths of 15–50 m, and found solitary on muddy or sandy-mud bottoms with dead-coral rubbles in the Iriomote-jima Island, Yaeyama Islands of Ryukyu Archipelago, Japan. In the habitats, the congener with hovering habit, *A. atripes*, was also found frequently.

Etymology. The new species is named for H. Senou (KPM), who collected some paratypes of new species, in honor of his great contribution to our knowledge of systematics and distribution of fishes of Japan.

Remarks. Although *Asterropteryx senoui* resembles with *A. spinosa* in the general appearance, especially the coloration, the former is readily distinguished from the latter in having characteristic, relatively sharp-edged, ventrally pointed narrow vertical dusky bar below eye (vs. broader and more or less rounded ventrally in the latter), as well as different cheek-spines morphology (Fig. 2). Original figure of the holotype of *Oplopomus spinosus* (= *Asterropteryx spinosa*) given by Goren (1981: 96, fig. 2) looks as if it has narrow black vertical bar, being similar to that of *A. senoui*; actually the holotype has broad and ventrally-rounded dark-brown bar below eye (likewise the specimen found in Fig. 5C), however.

Comparative materials. *Asterropteryx bipunctata*: NSMT-P 56898, 2 specimens, male and female, 24.5–25.8 mm SL, southeast coast of Gili Air Island, Lombok, Indonesia, 3 Feb. 1994, collected by K. Matsuura; NSMT-P 61053, 1 specimen, male, 25.0 mm SL, Tanjung Kusukusu, west coast of Lembah Island, Bitung, Sulawesi, Indonesia, 15 m depth, 14 July 2000, collected by K. Matsuura; NSMT-P 61059, 2 specimens, female and juvenile, 9.0–20.9 mm SL, collected with NSMT-P 61053; NSMT-P

61610, 1 specimen, male, 29.0 mm SL, Tanjung Lampu, west coast of Lembah Island, Bitung, Sulawesi, Indonesia, 20 m depth, 22 Jan. 2000, collected by K. Matsuura; NSMT-P 73122, 1 specimen, male, 23.9 mm SL, north-west coast of Gili Air Island, Lombok, Indonesia, 15 m depth, 3 Feb. 1994, K. Matsuura; NSMT-P 73123, 1 specimen, female, 19.6 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Islands, Ryukyu Archipelago, Japan, 15 m depth, 27 May 2001, collected by K. Yano; NSMT-P 73124, 1 specimen, male, 20.8 mm SL, collected with NSMT-P 73123. *Asterropteryx spinosa*: MNHN 1980-495, holotype of *Oplopomus spinosus* Goren, 1981, male, 32.4 mm SL, New Caledonia, Ile Maitre, north coast, 3–5 m depth, 2 Jan. 1979, collected by Randall, Maugé and Bauchot; KPM-NI 1901, 1 specimen, female, 21.5 mm SL, Mabul I., Sabah, Malaysia, 13 m depth, collected by H. Senou and M. Hayashi; KPM-NI 2346, 1 specimen, female, 16.0 mm SL, Mabul I., Sabah, Malaysia, 17 m depth, 20 Sep. 1995, collected by H. Senou and M. Hayashi; KPM-NI 5740, 1 specimen, female, 15.1 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Islands, Ryukyu Archipelago, Japan, 19 Nov. 1998, collected by K. Shibukawa; NSMT-P 61422, 1 specimen, female, 23.4 mm SL, Tanjung Kusukusu, west coast of Lembah Island, Bitung, Sulawesi, Indonesia, 1 m depth, 14 July 2000, collected by K. Shibukawa; NSMT-P 61497, 2 specimens, males, 20.0 mm SL, collected with NSMT-P 61422; NSMT-P 73129, 1 specimen, male, 28.9 mm SL, Funauki Bay, Iriomote-jima Island, Yaeyama Islands, Ryukyu Archipelago, Japan, 12 m depth, 8 Nov. 2000, collected by K. Yano; NSMT-P 73130, 1 specimen, female, 28.4 mm SL, collected with NSMT-P 73129; NSMT-P 73194, 1 specimen (cleared and stained), 26.9 mm SL, collected with NSMT-P 61422.

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