

A New Shrimp Goby of the Genus *Amblyeleotris* (Perciformes: Gobiidae) from the Ogasawara Islands, Japan

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Abstract A new shrimp-associated goby, *Amblyeleotris morishitai*, is described on the basis of 2 specimens from Ototo-jima Island, the Ogasawara Islands, Japan. The species is distinguished from other members of the genus by the following combination of characters: second dorsal-fin rays I, 13; anal-fin rays I, 14; pectoral-fin rays 20; pelvic frenum present; pelvic fins joined by membrane to tips of fifth rays (relative length of connecting membrane to fourth pelvic-fin ray 0.52–0.56); head length 25.7–26.8% in standard length; caudal peduncle length 14.9–15.5% in standard length; a yellowish orange stripe coursing from eye to orange vertical bar on opercle; a yellowish orange slightly curved bar with blue border just behind the base of caudal fin.

Key words: New species, Gobiidae, *Amblyeleotris morishitai*, Ogasawara Islands, Japan.

The fishes of the Indo-Pacific genus *Amblyeleotris* Bleeker, 1874 are colorful gobiids, living symbiotically with snapping shrimps of the genus *Alpheus*. In this genus, 34 species (out of 38 nominal species) are currently considered as valid (Randall, 1995; Aonuma and Yoshino, 1996; Chen *et al.*, 1998; Mohlmann and Munday, 1999; Aonuma *et al.*, 2000; Mohlmann and Randall, 2002; Randall, 2004; Hoese and Larson, 2004; Randall and Earle, 2006). Although new species nearly equal to a third of total were added since 2000 by several authors, many undescribed species are still found in coastal waters such as bays and coral reefs (for example, see underwater photographs of this genus in Kuitert and Tonozuka, 2001 and Suzuki and Shibukawa, 2004). In the present paper, we describe a new species of the genus collected from the Ogasawara Islands in 1997.

Methods of measurements followed Hubbs and Lagler (1964), being expressed as percentage of standard length (SL) or head length (HL). Length of caudal peduncle was also measured as the horizontal distance from the terminus of anal-fin

base to the base of caudal fin. Length of caudal fin was measured from the midpoint of caudal base to the distal tip of the fin. The measuring methods of “length of dorsal or of anal base” and “predorsal length” by Hubbs and Lagler (1964) were applied for “length of first and second dorsal bases,” and “pre-first dorsal, pre-second dorsal, pre-anal and prepelvic lengths,” respectively. Counting methods followed Prince Akihito *et al.* (1984). The length of the interradiation membrane between the pelvic fins relative to the longest pelvic-fin ray is expressed as CM-value (=UM-value of Yanagisawa, 1976). Vertebrae were counted from soft X-ray negatives. Notation for the cephalic sensory canal pores, sensory papillae and relationship between pterygiophores of the dorsal fin and vertebrae (P-V) followed Prince Akihito *et al.* (1984), Miller (1986) and Birdsong *et al.* (1988), respectively. Cephalic sensory systems were observed based on the specimens stained with cyanine blue, following a method of Akihito *et al.* (2002). Type specimens are deposited in the Kanagawa Prefectural Museum of Natural History (KPM-NI) and the Nation-

al Science Museum, Tokyo (NSMT-P). Images were deposited at the Image Database of Fishes in the Kanagawa Prefectural Museum of Natural History (KPM-NR).

Amblyeleotris morishitai sp. nov.

(New Japanese name: Morishita-datehaze)

(Figs. 1–3)

Amblyeleotris sp. 1: Suzuki in Suzuki and Shibukawa, 2004: 339 (an underwater photograph, Ototo-jima Island, Ogasawara Islands, 55 m depth, photo by O. Morishita).

Holotype: KPM-NI 4166, 94.4 mm SL, female, Ototo-jima Island, Ogasawara Islands, 52 m depth, 11 Sep. 1997.

Paratype: NSMT-P 73061 (formerly KPM-NI 4167), 80.7 mm SL, female, same collection data as holotype.

Diagnosis. Distinguished from other species of *Amblyeleotris* by having the following combi-

nation of characters: second dorsal-fin rays I, 13; anal-fin rays I, 14; pectoral-fin rays 20; pelvic frenum present; pelvic fins joined by membrane to tips of fifth rays (CM-value 0.52–0.56); head length 26.1–28.1% in SL; caudal peduncle length 14.9–15.5% in SL; a yellowish orange stripe coursing from eye to first bar on opercle; a yellowish orange slightly curved bar with blue border just posterior to the base of caudal fin.

Description. Counts and proportional measurements are shown in Table 1. Data in parentheses are for paratype. Dorsal-fin rays VI–I, 13; anal-fin rays I, 14; pectoral-fin rays 20; branched caudal-fin rays $7+7=14$; longitudinal scales 99–101; transverse scales 32; predorsal scales absent; P–V 3–22/10; vertebrae (abdominal+caudal) $10+16=26$.

Body moderately elongate and compressed. Mouth rather large, gape oblique. Maxilla extending slightly posterior to the vertical at center

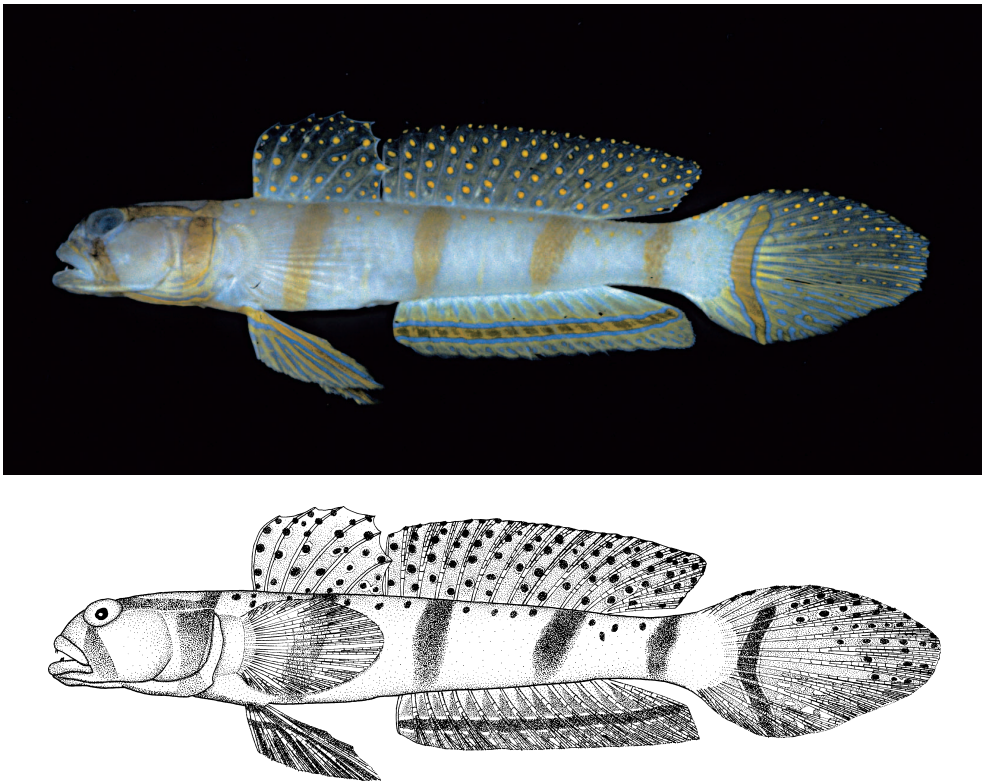


Fig. 1. *Amblyeleotris morishitai* sp. nov., KPM-NI 4166, holotype, female, 94.4 mm SL. Top: photographed by H. Senou; bottom: drawn by Y. Aonuma.

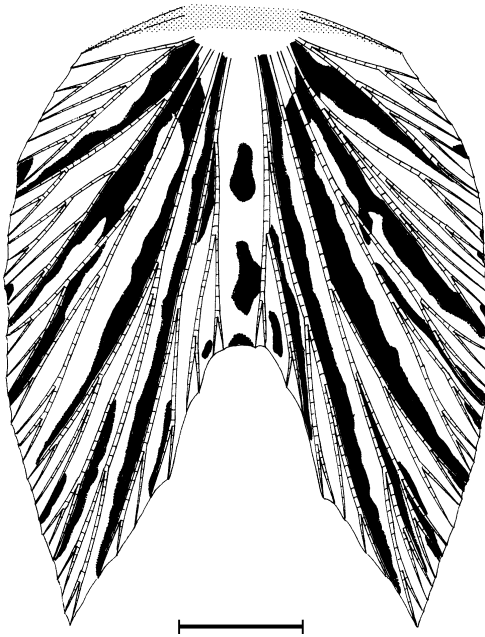


Fig. 2. Ventral view of pelvic fin of *Amblyeleotris morishitai* sp. nov., NSMT-P 73061, paratype, female, 80.7 mm SL. Shadow indicates pelvic frenum. Bar indicates 5 mm. Drawn by Y. Aonuma.

of pupil. Lower jaw slightly projecting beyond upper jaw. Upper jaw with 2 or 3 irregular rows of small subconical teeth; outer teeth larger, more spaced and strongly curved compared with inner ones; inner teeth inwardly curved. Lower jaw with 3 or 4 irregular rows of subconical teeth in anterior part, reduced posteriorly to 1 row; anterior outer teeth slightly larger and more spaced than inner ones. Two large canine-like teeth on each side of lower jaw. Snout rather pointed, shorter than eye diameter. Gill opening extending just ventral to oculoscapular canal pore F. Nares separated; anterior naris with a short nasal tube dorsal to upper lip, posterior one with simple pore close to anterior margin of eye. Opercular and preopercular edges smooth. Dorsal fin divided in 2 parts, not united by membrane one to another. Third spine longest in first dorsal fin. Second dorsal and anal fins with a single spine and branched soft rays. Origin of anal fin ventral to first soft ray of second dorsal fin; last anal fin ray

just below or slightly posterior to the vertical at last second dorsal-fin ray. Posterior margin of second dorsal and anal fins angular. Penultimate soft ray longest in second dorsal fin, much longer than longest anal-fin ray. Pectoral fin rounded, shorter than head length, reaching to just ventral to second dorsal-fin origin when adpressed or not. Caudal fin rounded, longer than head. Pelvic fins joined by membrane to tips of fifth rays, CM-value 0.52 (0.56); fourth ray longest, reaching to base of second soft ray of anal fin when adpressed; pelvic frenum present (Fig. 2). Scales on side of body cycloid anteriorly, ctenoid posteriorly; ctenoid scale area reaching anteriorly to a vertical through third or fourth soft ray of second dorsal fin. Ventral surface of body except isthmus covered with small cycloid scales. Dorsal midline of head naked. Remainder of head naked except a part with small scales on side of nape extending forward above midpoint between preopercle and opercle, or just reaching dorsal to dorsoposterior corner of opercle. Scales absent on pectoral-fin base. Cephalic sensory system as shown in Fig. 3. Anterior oculoscapular canal with pores B', C(S), D(S), E, F, G and H'; posterior oculoscapular canal with pores K' and L'; preopercular canal with pores M', N and O'. Sensory papillae moderately developed (Fig. 3); 3 pairs of large sensory papillae on dorsal surface of snout; a large sensory papilla just anterior to pore B' (2 on left side of holotype, but one of them much smaller than the other); a large sensory papilla just dorsal to anterior naris; 2 large sensory papillae between anterior and posterior nares (1 on right side of paratype); 3 large sensory papillae on preorbital region, anteriormost one just ventral to anterior naris; 6 transverse sensory papillae rows (rows 1–4, 5s, 6s; row 1 interrupted on left side of holotype) and a sensory papilla (equivalent to row 7; forming a short sensory-papillae row in right side of paratype) present on suborbital region; row 1 continuous with a longitudinal row (row d) above maxilla, not interrupted; 1 transverse sensory papillae row (row 6i) behind row d; another transverse sensory papillae row (row 5i) behind row 5s; a longitudinal senso-

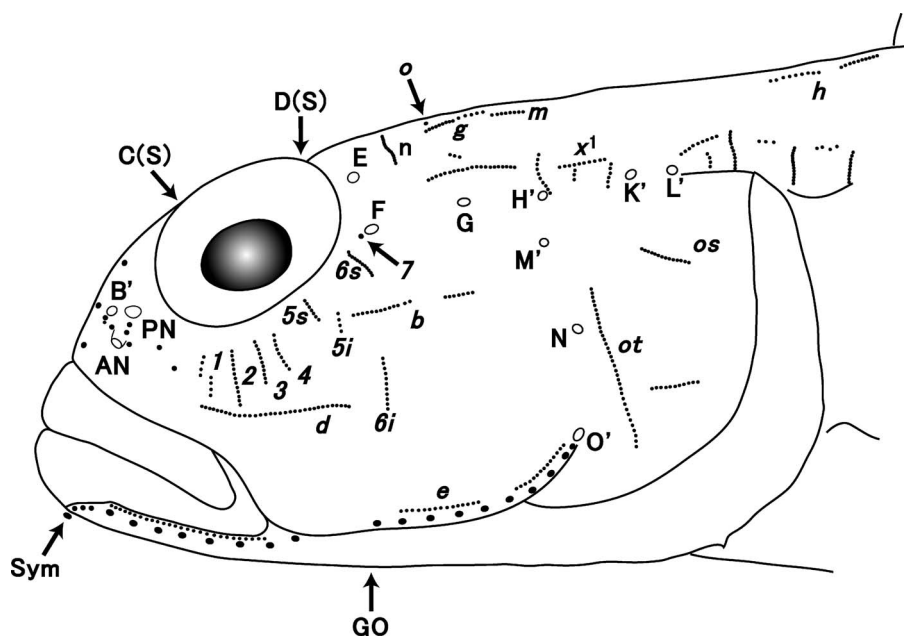


Fig. 3. Head of *Amblyeleotris morishitai* sp. nov., KPM-NI 4166, holotype, female, 94.4 mm SL, showing the arrangement of sensory canal pores and papillae. AN: anterior nostril; B' to O': sensory canal pores; GO: anterior end of gill opening; PN: posterior nostril; S: single pore; Sym: a pair of sensory papillae on symphysis; 1 to 4, 5i, 5s, 6i, 6s, 7, b, d, e, g, h, m, o, os, ot and x1: papilla rows. Drawn by H. Senou.

ry papillae row (row *b*) behind row *5i*, divided into 2 parts; a transverse sensory papillae row (row *n*) just behind sensory canal pore E; a pair of pit organs (equivalent to row *o*) and 2 pairs of longitudinal sensory papillae rows (rows *g* and *m*) behind row *n* in occipital region; a longitudinal sensory papillae row (row *x1*) coursing from the vertical through pore G to posterior to the vertical through pore L, but interrupted just dorsal to pore H' and posterior oculoscapular canal; longitudinal sensory papillae row (row *h*) present on nape, divided into 2 parts; a transverse sensory papillae row (row *ot*) and 2 longitudinal sensory papillae rows (row *os*) present on opercle; 2 sensory papillae rows (row *e*) coursing ventrally along the mandible and extending along the free edge of preopercle to pore O' with only a short interruption near the posterior corner of lower jaw, sensory papillae nearer to the ventral midline larger than those of the row that is distal to the ventral midline; a pair of large sensory papillae on symphysis just posterior to mental frenum.

Coloration when fresh (Fig. 1). Head and

body grayish white with 5 yellowish orange bars in total; first bar vertical on head, the other ones slightly oblique on body; each bar edged with pale blue (distinct when alive) narrower than eye diameter; first from nape across opercle and branchiostegal membranes, second ventral to fifth and sixth dorsal spines, third ventral to third and fourth dorsal soft rays, fourth ventral to eleventh dorsal soft ray, and fifth on caudal peduncle; each interspace between neighboring bars with 3 to 4 vivid yellow spots with dark edge dorsally, and indistinct pale yellow network or a few vertical lines. Head with a yellowish orange horizontal stripe, edged with pale blue, coursing from eye to first bar on opercle; stripe wider than pupil diameter, but narrower than eye diameter; a short, yellowish orange bar edged with pale blue obliquely posterior from ventral margin of eye, extending to just posterior to corner of mouth; a pale blue stripe on branchiostegal membranes; blue edges and stripes on head more distinct when alive; ventral side of head yellowish orange. Dorsal fins pale yellow with numer-

Table 1. Counts and proportional measurements of *Amblyeleotris morishitai* sp. nov.

	Holotype	Paratype
	KPM-NI 4166	NSMT-P 73061
Standard length (mm)	94.4	80.7
Total length (mm)	127.2	110.3
Sex	female	female
Dorsal fin rays	VI-I, 13	VI-I, 13
Anal fin rays	I, 14	I, 14
Pectoral fin rays	20	20
Pelvic fin rays	I, 5	I, 5
Branched caudal fin rays	7+7=14	7+7=14
Longitudinal scale rows	101	99
Transverse scale rows	32	32
Vertebrae	10+16=26	10+16=26
Percentage of standard length		
Head length	28.0	26.1
Body depth	16.9	15.5
Depth of caudal peduncle	11.0	11.0
Length of caudal peduncle	14.9	15.5
Length of caudal peduncle (horizontal distance)	14.2	13.5
Length of first spine of first dorsal fin	13.5	14.7
Length of second spine of first dorsal fin	15.9	16.2
Length of third spine of first dorsal fin	18.9	22.3
Length of fourth spine of first dorsal fin	18.4	18.7
Length of fifth spine of first dorsal fin	15.9	15.7
Length of longest ray of second dorsal fin	21.1	19.2
Length of longest ray of anal fin	20.1	19.1
Length of pectoral fin	23.1	23.3
Length of pelvic fin	24.9	26.0
Length of caudal fin	37.1	34.6
Length of first dorsal base	19.5	20.2
Length of second dorsal base	35.9	33.9
Length of anal base	33.5	33.3
Pre-first dorsal length	31.7	30.4
Pre-second dorsal length	50.6	50.6
Pre-anal length	53.0	54.9
Pre-pelvic length	31.7	32.2
Percentage of head length		
Snout length	22.7	24.2
Eye diameter	24.6	23.7
Interorbital width	4.5	4.7

ous, vivid yellow spots; each spot smaller on outer side of fins, with dark edge, surrounded by a pale blue margin. Anal fin yellow with a dark yellowish orange stripe with blue edge on three-fifths from base; basal half of anal fin with a pale blue streak along each fin ray; submarginal portion of anal fin with a pale blue spot on each fin membrane, forming a row of spots. Caudal fin yellow with numerous vivid yellow spots on dorso-posterior part (also on ventro-posterior part in paratype); each yellow spot surrounded by pale

blue margin; a yellowish orange curved bar edged with blue on basal part of fin. Pelvic fin yellow with a yellowish orange streak in inner part (Fig. 1) and blue streaks or markings like branches along fin rays (Fig. 2). Pectoral fin hyaline.

Coloration in preserved specimens. Head and body pale to dull yellow with 5 faint dark vertical bars in total; edges of first bar visible as brown line; yellow spots faded, but visible as pale ones. Dorsal portion of eye and interorbital

space dark brown. Bar ventral to eye changing to brown. Longitudinal stripe between eye and bar on opercle absent, but edges visible as parallel brown stripes. Symphysis of lower jaw and chin brown. Stripe on branchiostegal membranes visible as brown one. Coloration of all fins faded, but blue edges of a stripe on anal fin and a bar of caudal fin visible as parallel brown streaks in each. Streaks and spots on pelvic fin visible as brown ones.

Distribution. Ototo-jima Island, Ogasawara Islands, Japan. Underwater photographs (KPM-NR 88474, 88476-88480) of this new species were taken at depths of 40–43 m in Izu-oshima Island of the Izu Islands from November to December in 2004 by A. Ito.

Remarks. *Amblyeleotris morishitai* sp. nov. can be easily distinguished in life from other members of the genus by having a stripe between eye and first bar on opercle, and a curved bar on caudal fin.

The genus *Amblyeleotris* is divided into 2 groups, according to the presence or absence of a pelvic frenum (Aonuma *et al.*, 2000: as ventral frenum). Furthermore, the species group with a pelvic frenum is subdivided into 3 groups based on degree of development of the interradial membrane uniting the pelvic fins: the first group has very short membrane joining fins basally (see fig. 2A of Aonuma and Yoshino, 1996); the second group has deeply notched or concave pelvic fins, joined by short membrane extending to tips of fifth rays (Fig. 2); the third has a complete disc-like pelvic fin, joined by well-developed interradial membrane (see description of *A. fontanesii* (Bleeker, 1852) in Iwata *et al.*, 1996). The new species belongs to the second group. The other members of this group are as follows: *A. biguttata* Randall, 2004; *A. masuii* Aonuma and Yoshino, 1996; *A. melanocephala* Aonuma, Iwata and Yoshino, 2000; *A. triguttata* Randall, 1994 (Randall, 1994; Aonuma and Yoshino, 1996; Aonuma *et al.*, 2000; Randall, 2004). Of these 5 species, the new species and *A. triguttata* have more than 13 anal soft rays (13 in the other 3 species). The new species can be easily distin-

guished from *A. triguttata* by having smaller head (26.1–28.0% vs. 29.0–30.6% in SL) and longer caudal peduncle (13.5–14.2% vs. 12.3–13.5% in SL) (data for *A. triguttata* from the original description by Randall, 1994).

In the members of the group with a pelvic frenum, the new species shares 14 soft anal rays with *Amblyeleotris japonica* Takagi, 1957, *A. rubrimarginata* Mohlmann and Randall, 2002 and *A. triguttata*. Except for *A. triguttata* mentioned above, however, *A. japonica* and *A. rubrimarginata* are distinguishable from the new species in having very short interradial membrane uniting the pelvic fins (the first group mentioned above) and lower counts of longitudinal scale rows (74–87 in *A. japonica* and 81–86 in *A. rubrimarginata* vs. 99–101). See Yanagisawa (1978) and Mohlmann and Randall (2000) for data about *A. japonica* and *A. rubrimarginata*.

Etymology. *Amblyeleotris morishitai* is named in honor of Osamu Morishita, who first discovered this species.

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Literature Cited

- Akihito, K. Sakamoto, Y. Ikeda and K. Sugiyama. 2002. Gobioidae. Pages 1139–1310, 1596–1619 in T. Nakabo, ed. Fishes of Japan with Pictorial Keys to the Species, English edition. Tokai University Press, Tokyo.
- Akihito, Prince, M. Hayashi, T. Yoshino, K. Shimada, H. Senou and T. Yamamoto, 1984. Suborder Gobioidae. Pages 236–289, pls. 235–258, 353–355 in H. Masuda, K. Amaoka, C. Araga, T. Uyeno and T. Yoshino, eds. The Fishes of the Japanese Archipelago, English edition. Tokai University Press, Tokyo.
- Aonuma, Y., A. Iwata and T. Yoshino, 2000. A new

- species of the genus *Amblyeleotris* (Pisces: Gobiidae) from Japan. *Ichthyological Research*, 47(2): 113–117.
- Aonuma, Y. and T. Yoshino. 1996. Two new species of the genus *Amblyeleotris* (Pisces: Gobiidae) from the Ryukyu Islands, Japan. *Ichthyological Research*, 43(2): 161–168.
- Birdsong, R. S., E. O. Murdy and F. L. Pezold. 1988. A study of the vertebral column and median fin osteology in gobioid fishes with comments on gobioid relationships. *Bulletin of Marine Science*, 42(2): 174–214.
- Chen, J.-P., I.-S. Chen and K.-T. Shao. 1998. Review of the marine gobioid genus, *Amblyeleotris* (Pisces: Gobiidae) with seven new records from Taiwan. *Zoological Studies*, 37(2): 111–118.
- Hoese, D. F. and H. K. Larson. 2004. Description of a new species of *Cryptocentrus* (Teleostei: Gobiidae) from northern Australia, with comments on the genus. *The Beagle, Record of the Museum and Art Galleries of the Northern Territory*, 20: 167–174.
- Hubbs, C. L. and K. F. Lagler. 1964. Fishes of the Great Lakes Region. University of Michigan Press, Ann Arbor, xv+213 pp., 44 col. pls.
- Iwata, A., T. Suzuki, H. Senou, S. Hosoya, K. Yano and T. Yoshino. 1996. Redescription of *Amblyeleotris fontanesii* (Gobiidae: Perciformes) with the first record from Japan. *Ichthyological Research*, 43(1): 101–109.
- Kuiter, R. H. and T. Tono-zuka. 2001. Indonesian Reef Fishes, Part 3. ZONETICS, Seaford, VIC, iv+623–893 pp.
- Miller, P. J. 1986. Gobiidae. Pages 1019–1085 in P. J. P. Whitehead, M. L. Bauchot, J. C. Hureau, J. Nielsen and E. Tortonese, eds. Fishes of the North-eastern Atlantic and the Mediterranean, Vol. 3. UNESCO, Paris.
- Mohlmann, M. S. and P. L. Munday. 1999. *Amblyeleotris arcuipinna*, a new species of shrimp goby from Papua New Guinea. *Revue Française d'Aquariologie Herpétologie*, 26(1/2): 59–62.
- Mohlmann, M. S. and J. E. Randall. 2002. Three new species of gobioid fishes of the genus *Amblyeleotris* from the central and western Pacific. *The Raffles Bulletin of Zoology*, 50(1): 215–226.
- Randall, J. E. 1994. A new genus and six new gobioid fishes (Perciformes: Gobiidae) from Arabian waters. *Fauna of Saudi Arabia*, 14: 317–340.
- Randall, J. E. 1995. Coastal Fishes of Oman. Crawford House Publishing, Bathurst, Australia, xiii+439 pp.
- Randall, J. E. 2004. Five new shrimp gobies of the genus *Amblyeleotris* from islands of Oceania. *Aqua, Journal of Ichthyology and Aquatic Biology*, 8(2): 61–78.
- Randall, J. E. and J. L. Earle. 2006. *Amblyeleotris neumanni*, a new species of shrimp goby from New Britain. *Aqua, Journal of Ichthyology and Aquatic Biology*, 11(1): 19–24.
- Suzuki, T. and K. Shibukawa. 2004. Genus *Amblyeleotris*. Pages 326–340 in H. Senou, ed. A Photographic Guide to the Gobioid Fishes of Japan, Heibonsha, Tokyo. (In Japanese.)
- Yanagisawa, Y. 1976. Genus *Amblyeleotris* (Gobiidae) of Japan and geographical variations of *A. japonica* Takagi. *Publications of the Seto Marine Biological Laboratory*, 23(1/2): 145–168.
- Yanagisawa, Y. 1978. Studies on the interspecific relationship between gobioid fish and snapping shrimp. I. Gobioid fishes associated with snapping shrimps in Japan. *Publications of the Seto Marine Biological Laboratory*, 24(4/6): 269–325, pls. 1–3.

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