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Periclimenes speciosus, a New Species of Anthozoan Associated Shrimp (Crustacea: Decapoda: Palaemonidae) from Southern Japan

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ABSTRACT—A new species of palaemonid shrimp, *Periclimenes speciosus* sp. nov., is described and illustrated on the basis of 20 specimens collected from warm-temperate and subtropical waters of southern Japan. *Periclimenes speciosus* belongs to the “*P. aesopius* species group”, and is associated with sea anemones and a scleractinian coral as well as behaving as a fish cleaner. Morphologically, the new species appears closest to *P. holthuisi* Bruce, 1969, but can be distinguished from *P. holthuisi* by the form and armature of the cutting edges of dactylus and fixed finger of the second pereopod. The coloration in life of both species clearly discriminates one species from the other. The taxonomic status of some specimens previously reported as *P. holthuisi* is briefly discussed.

Key words: taxonomy, Decapoda, *Periclimenes*, new species

INTRODUCTION

The pontoniid shrimp associated with anthozoan and scyphozoan cnidarians, *Periclimenes holthuisi*, was originally described by Bruce (1969) on the basis of the two male specimens collected from Hong Kong. This species has since been reported from various localities of the Indo-West Pacific throughout Red Sea and eastern Africa to the Marshall Islands (Chace and Bruce, 1993). In the Japanese popular publication, Miyake (1975) first recorded a pontoniid shrimp species under the name of *Periclimenes holthuisi* with beautiful color photograph. Subsequently, this species has been reported several times in the Japanese publications (Suzuki and Hayashi, 1977; Miyake, 1982; Kamesaki *et al.*, 1988; Hayashi, 1995; Kobayashi, 2000). *Periclimenes holthuisi* belongs to the ‘*P. aesopius* species group’, one of the distinct species groups within the genus *Periclimenes* Costa, 1844, and recent taxonomic studies dealing with this species group reveal that the coloration in life is species-specific and most useful in their identification (Bruce, 1990; Okuno and Nomura, 2002; Okuno, 2002). For the color patterns, initial comparison between *P. holthuisi* represented by the original author (Bruce, 1977, 1979, 1990) and the Japanese individuals shows that the latter is recognized to differ from *P. holthuisi* at specific level. Follow-

ing this recognition, the recently published Japanese popular guidebooks of decapod crustaceans (Masuda, 1999; Minemizu, 2000; Kato and Okuno, 2001; Kawamoto and Okuno, 2003) have treated the species in question as an undescribed species of *Periclimenes*. As the result of the direct comparison the Japanese specimens with the holotype and topotypic material of *P. holthuisi*, I found that the Japanese species differs from *P. holthuisi* not only by the coloration in life but also by its morphological features. Therefore, I describe here the Japanese species as new to science under the name of *P. speciosus*.

MATERIALS AND METHODS

The specimens were recently collected from the sublittoral zone in southern Japan with SCUBA equipment. The illustrations were made with the aid of a drawing tube mounted on a LEICA MZ12 stereomicroscope. The postorbital carapace length is abbreviated as CL in the text. The term ‘interocular beak’ is used for the anteromedian process on the ophthalmic somite, and is equivalent to the ‘bec ocellaire’ in the previous articles on the ‘*Periclimenes aesopius* species group’ (Bruce, 1979, 1990, 1991; Okuno and Nomura, 2002; Okuno, 2002). The identification of host cnidarians followed Fautin and Allen (1992), Uchida (2001) and Veron (1986).

The specimens examined in this study are deposited in the Coastal Branch of Natural History Museum and Institute, Chiba (CMNH), Nationaal Natuurhistorisch Museum, Leiden (RMNH), National Fisheries University, Shimonoeki (NFU), National Science Museum, Tokyo (NSMT), Natural History Museum, London (NHM), Natural History Museum and Institute, Chiba (CBM) and Queensland Museum, South Brisbane (QM).

For comparative purpose, the following specimens were exam-

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ined:

Periclimenes holthuisi Bruce, 1969. 1♂ (2.3 mm CL, holotype of *Periclimenes holthuisi*, RMNH-D 33226), Lung Ha Wan, New Territories, Hong Kong, 22°18.5'N, 114°18.2'E, 3.7 m, 25 Aug 1965, coll. J. D. Bromhall; 1 ovig. ♀ (4.6 mm CL, NHM 1981. 43), 1 ♂ (3.9 mm CL, NHM 1981. 45a), 1 ovig. ♀ (4.7 mm CL, NHM 1981. 45b), Long Ke Wan, Hong Kong, 8 m, 27 Apr 1980; 1 ovig. ♀ (5.0 mm CL, NHM 1981. 44), Kat O Chan, Hong Kong, 3–4 m, 26 Apr 1980.

TAXONOMIC ACCOUNT

Periclimenes speciosus sp. nov. (Figs. 1–6A, B)

Periclimenes holthuisi — Miyake, 1975: 103, unnumbered fig.; Suzuki and Hayashi, 1977: 197 (in part, see Discussion), figs. 1d, 2d; Catala, 1979: 196, figs. 59, 60; Kamesaki *et al.*, 1988: 171, 215, unnumbered figs.; Coleman, 1991: 98, unnumbered fig.; Jones and Morgan, 1994: 67, unnumbered fig.; Hayashi, 1995: 307, pl. 85, fig. 8; Kobayashi, 2000: 173, unnumbered fig. Not *Periclimenes holthuisi* Bruce, 1969.

Periclimenes (Periclimenes) holthuisi — Miyake, 1982: 35, pl. 12, fig. 5. Not *Periclimenes holthuisi* Bruce, 1969.

Periclimenes sp. — Steene, 1990: 167, 321, unnumbered fig.; Masuda, 1999: 45, unnumbered fig.

Periclimenes sp. 2 — Minemizu, 2000: 52, unnumbered figs.

Periclimenes sp. A — Kato and Okuno, 2001: 40, unnumbered fig.

bered fig.

Periclimenes venustus — Coleman, 2002: 51, unnumbered figs. Not *Periclimenes venustus* Bruce, 1990.

Periclimenes sp. C — Kawamoto and Okuno, 2003: 43, unnumbered fig.

Material examined. — Holotype: ♂ (CMNH-ZC 01666, 4.0 mm CL), Hira-ne, Hasama, Tateyama, Boso Peninsula, Honshu, Japan, 34°58.6'N, 139°47.1'E, 18 m, 19 Jul 2002, coll. J. Okuno.

Paratypes: **Pacific coast of Honshu.** Boso Peninsula. 1 ♀ (5.0 mm CL, CMNH-ZC 01641), same locality as holotype, 29 Jun 2000, coll. N. Kikuchi; 1 ♀ (4.4 mm CL, CMNH-ZC 01639), Karou-ne, off Banda, Tateyama, 34°58.6'N, 139°46.5'E, 21 m, 19 Dec 1996, coll. J. Okuno; 1 ♂ (3.8 mm CL, QM W 26996), 1 ovig. ♀ (6.2 mm CL, CMNH-ZC 01667), Tsubo-iwa, off Banda, Tateyama, 34°58.6'N, 139°46.5'E, 18 m, 4 Jul 2001, coll. J. Okuno. 1 ♀ (2.6 mm CL, RMNH-D 50659), Matsu-ne, off Banda, Tateyama, 34°58.6'N, 139°46.5'E, 16 m, 31 Oct 2001, coll. J. Okuno. Izu Peninsula. 1 ♀ (6.7 mm CL, CMNH-ZC 01555), Yokobama, Futo, Ito, 34°53.8'N, 139°08.1'E, 25 m, 15 Dec 1995, coll. J. Okuno. Kii Peninsula. 1 ♂ (3.9 mm CL, CBM-ZC 7850), off Andono-hana, Kushimoto, 33°27.5'N, 135°45.7'E, 15 m, 20 Mar 1992, coll. K. Nomura.

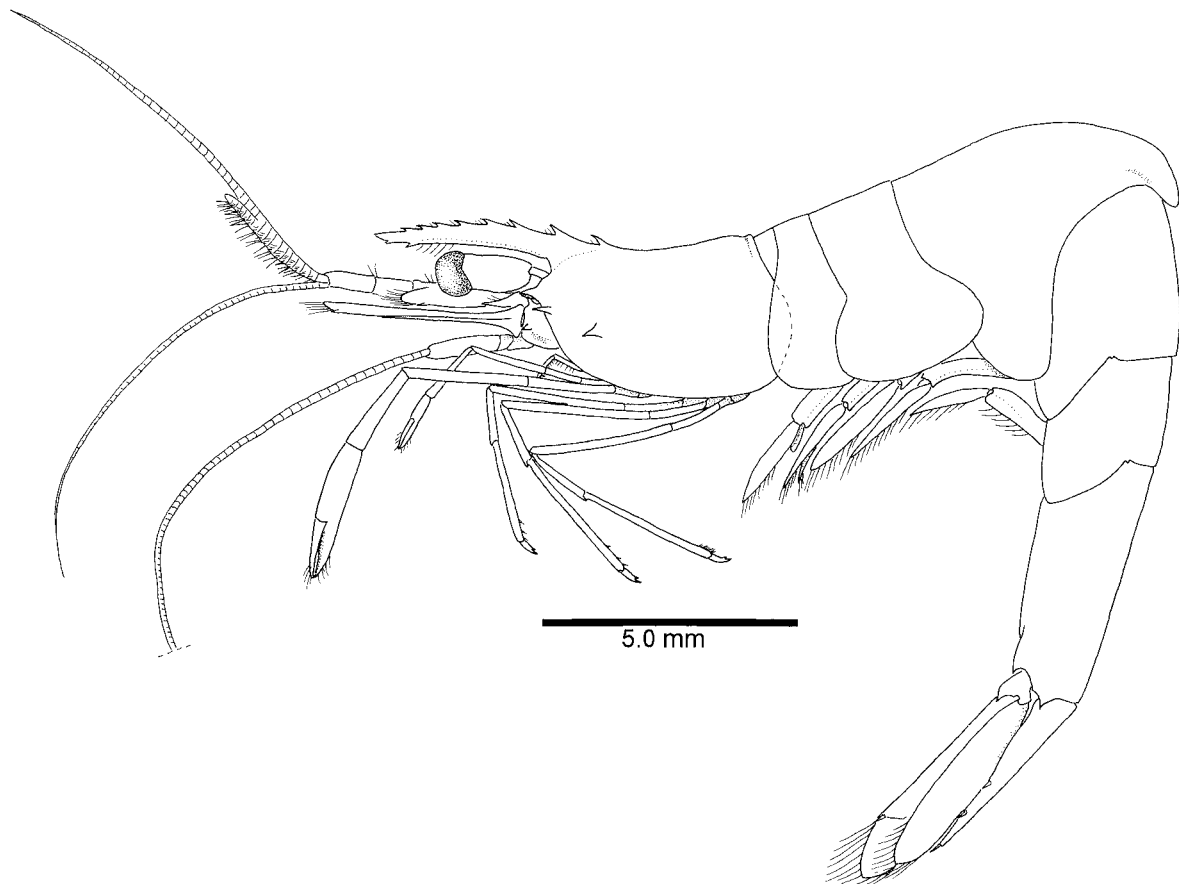


Fig. 1. *Periclimenes speciosus* sp. nov. Holotype male (CMNH-ZC 01666). Entire animal in lateral view.

Izu Islands. Izu-ohshima Island. 1♂, 1♀ (2.7, 4.0 mm CL, NSMT-Cr 15184), Akino-hama, 34°47.2'N, 139°24.5'E, 20 m, 6 Apr 1997, coll. I. Soyama. Hachijo-jima Island. 1♂ (2.4 mm CL, CMNH-ZC 01567), Nakano-mama, 33°08.6'N, 139°46.8'E, 20 m, 29 Aug 1996, coll. J. Okuno; 1♀ (4.3 mm CL, CMNH-ZC 01668), Kyokuchō-hama, 33°09.3'N, 139°46.7'E, 35 m, 6 Oct 2002, coll. J. Okuno and K. Tanaka.

East China Sea coast of Kyushu. Nagasaki. 1♀ (3.0 mm CL, CMNH-ZC 01700), 1 ovig. ♀ (5.7 mm CL, RMNH-D 50660), Tatsunokuchi, Koyagi, 32°41.7'N, 129°47.4'E, 15 m, 13 Sep 2003, coll. J. Okuno.

Ogasawara Islands. 1♀ (3.8 mm CL, CMNH-ZC 01640), Susaki, Chichi-jima Island, 27°04.3'N, 142°10.7'E, 25 Sep 1994, coll. H. Tachikawa.

Ryukyu Islands. 1 ovig. ♀ (4.6 mm CL, CBM-ZC 7851), Sunabe, Chatan, Okinawa-jima Island, 26°20.1'N, 127°44.5'E, 10 m, 28 Mar 1998, coll. Abe.

Other specimens: 1♂ (2.4 mm CL, NFU-530-2-2517), 1♂, 2♀ (2.4–2.8 mm CL, NFU-530-2-2518), Uchiura, Suruga Bay, Honshu, Japan, 35°01.5'N, 138°49.3'E, Nov 1974, coll. K. Suzuki.

Diagnosis.— A medium sized pontoninid shrimp with subcylindrical body form. Carapace with single epigastric spine. Rostrum slender, feebly arched, dentate. Posterior half of third abdominal somite strongly elevated, feebly subcarinate. Ophthalmic somite with distinct interocular beak. Antepenultimate segment of third maxilliped nearly always with 1 distolateral spine. Dactylus and fixed finger of second pereopod shorter than palm, with cutting edges usually dentate proximomesially, without proximal concavity on edges. Carpus of second pereopod distinctly shorter than chela. Ambulatory pereopods with dactyli slender, distinctly biunguiculate, propodi with set of short spines on ventral surface. In life, tergum of third abdominal somite with rounded large patch, ground color orange, anteriorly covered with numerous red spots, posterodorsally white.

Description. — Carapace (Fig. 1) smooth, glabrous, lacking supraorbital spine; orbit (Fig. 2B) feebly developed, inferior orbital angle strongly produced, acute, with inner ventral flange; antennal spine well developed, slender, submarginal, arising distinctly ventral to orbital angle; hepatic spine large, arising slightly ventral to level of antennal spine; epigastric spine present; pterygostomian margin rounded.

Rostrum (Fig. 2B) slender, feebly arched, 0.9–1.0 times as long as carapace, reaching or slightly overreaching level of midlength of distal segment of antennular peduncle; dorsal margin usually with 7–8 (rarely 9) equidistant, small, acute teeth, interspaced by short setae; ventral margin with poorly developed blade, with row of long setae, subterminally with 1–2 (rarely 3) small, acute teeth.

Fourth thoracic sternite without finger-like median process; fifth sternite with pair of semiquadrate lobes posteriorly; posterior sternites unarmed.

Abdomen (Fig. 1) smooth, glabrous; pleura of first to third somites broad, rounded, those of fourth and fifth pos-

teriorly produced, blunt; posterodorsal margin of third somite produced posteriorly, posterior half of tergum with strongly elevated, feebly compressed median carina; sixth somite 1.2–1.4 times as long as carapace, 1.3–1.4 times as long as telson in male, 0.9–1.1 times as long as carapace, 1.1–1.3 times as long as telson in mature female, posterolateral process acute, posteroventral margin produced, acute. Telson (Fig. 2D) tapering posteriorly, posterior margin (Fig. 2E) bluntly produced centrally, with 3 pairs of spines (lateral and intermediate spines simple, intermediate spines longest, submedian spines setulose); 2 pairs of small, subequal dorsolateral spines at midlength and posterior third length respectively.

Ophthalmic somite with distinct, short interocular beak (Fig. 2C). Eye (Fig. 2A) with large, globular cornea, without ocellus; stalk distinctly longer than corneal diameter, becoming slightly narrower distally, maximum width subequal to maximum corneal diameter.

Antennular peduncle (Fig. 2F) with proximal segment distinctly longer than distal two segments combined; distolateral margin strongly produced, reaching level of midlength of intermediate segment, with row of setae, lateral margin straight, terminating distally in small acute tooth reaching level of proximal one-fourth of distolateral lobe; ventromesial margin armed with small acute tooth; stylocerite short, slender, acute, reaching level of proximal one-third of proximal segment (distolateral lobe excluded); statocyst well developed, rounded; intermediate segment slender, distinctly less than half of proximal segment in length, slightly obliquely articulated with distal segment; distal segment subequal to intermediate segment in length, slender, non-setose. Upper flagellum biramous, proximal 11 segments fused, shorter free ramus 5–7 segmented; lower flagellum more slender than upper flagellum.

Antenna with stout basicerite (Fig. 2C) armed ventrolaterally with acute tooth, dorsal margin with distinctly raised lobe; scaphocerite (Fig. 2G) reaching distal end of antennular peduncle, 3.1–3.2 times as long as width, lateral margin almost straight, terminating in strong tooth falling short of distal margin of strongly produced lamella; carpocerite falling slightly short of midlength of scaphocerite.

Epistome unarmed.

Mandible (Fig. 3A) robust, without palp; incisor process obliquely truncated distally, with 3 large, acute teeth; molar process stout, distally oblique. Maxillule (Fig. 3B) with feebly bilobed palp, internal lobe with small distal protuberance; upper lacinia broad, curved, distal margin truncated, with about 6 simple spines, interspaced by long setae, ventral margin with 3 short spiniform setae; lower lacinia tapering distally, with some serrulate setae distally. Maxilla (Fig. 3C) with palp slender, tapering distally; distal endite developed, narrow, deeply bilobed, with sparse, simple setae distally; proximal endite obsolete, mesial margin feebly sinuous; scaphognathite well developed, posterior lobe short, distal half of anterior lobe narrow. First maxilliped (Fig. 3D) with long, slender, simple palp; distal endite with mesial margin

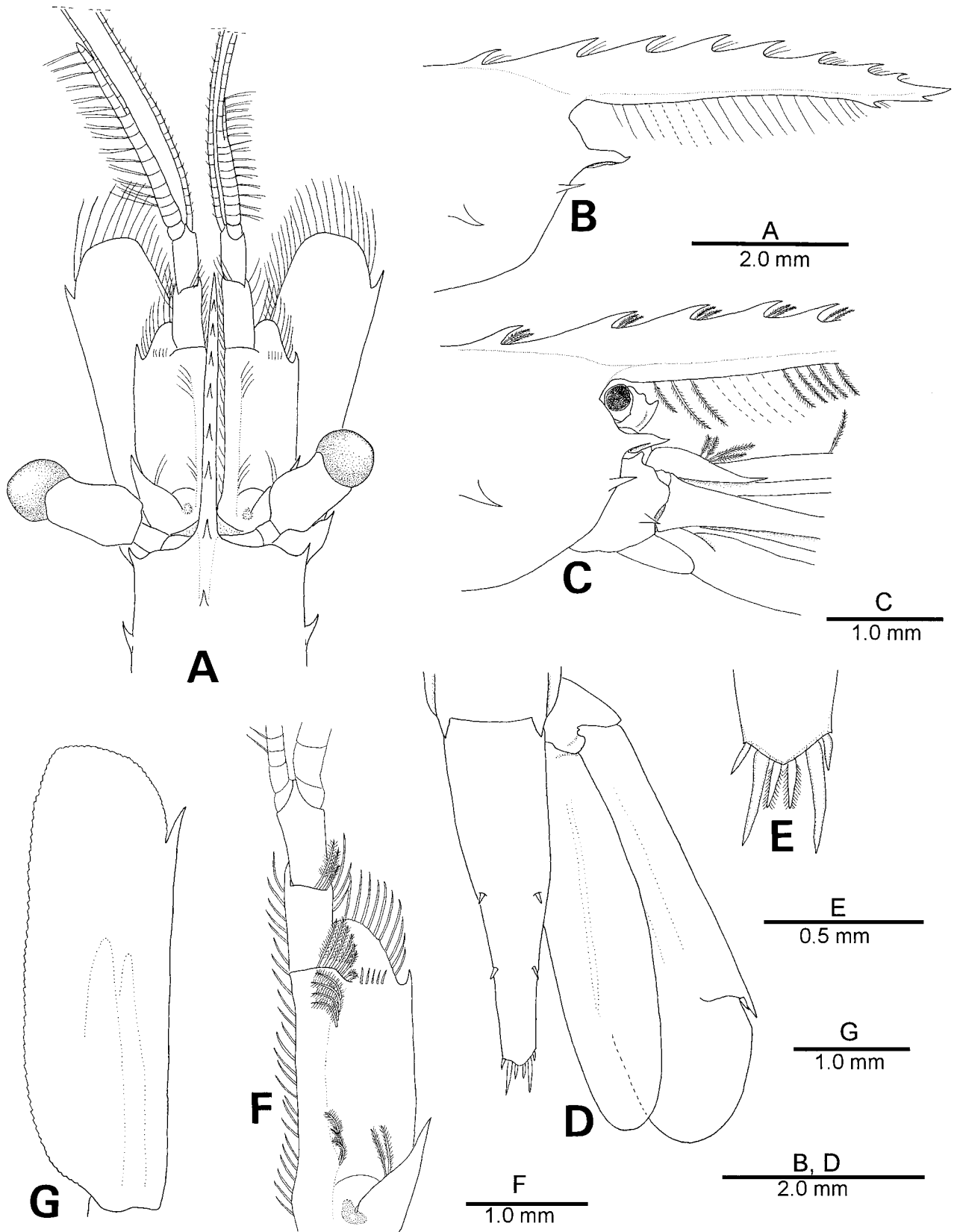


Fig. 2. *Periclimenes speciosus* sp. nov. Holotype male (CMNH-ZC 01666). A, anterior part of carapace, rostrum and cephalic appendages, dorsal view; B, anterior part of carapace and rostrum, lateral view; C, orbital region of carapace, ophthalmic somite and proximal parts of right antennular peduncle and antenna, lateral view; D, telson and right uropod, dorsal view; E, posterior part of telson, dorsal view; F, right antennular peduncle, dorsal view; G, right scaphocerite, dorsal view. D, G, marginal setae omitted.

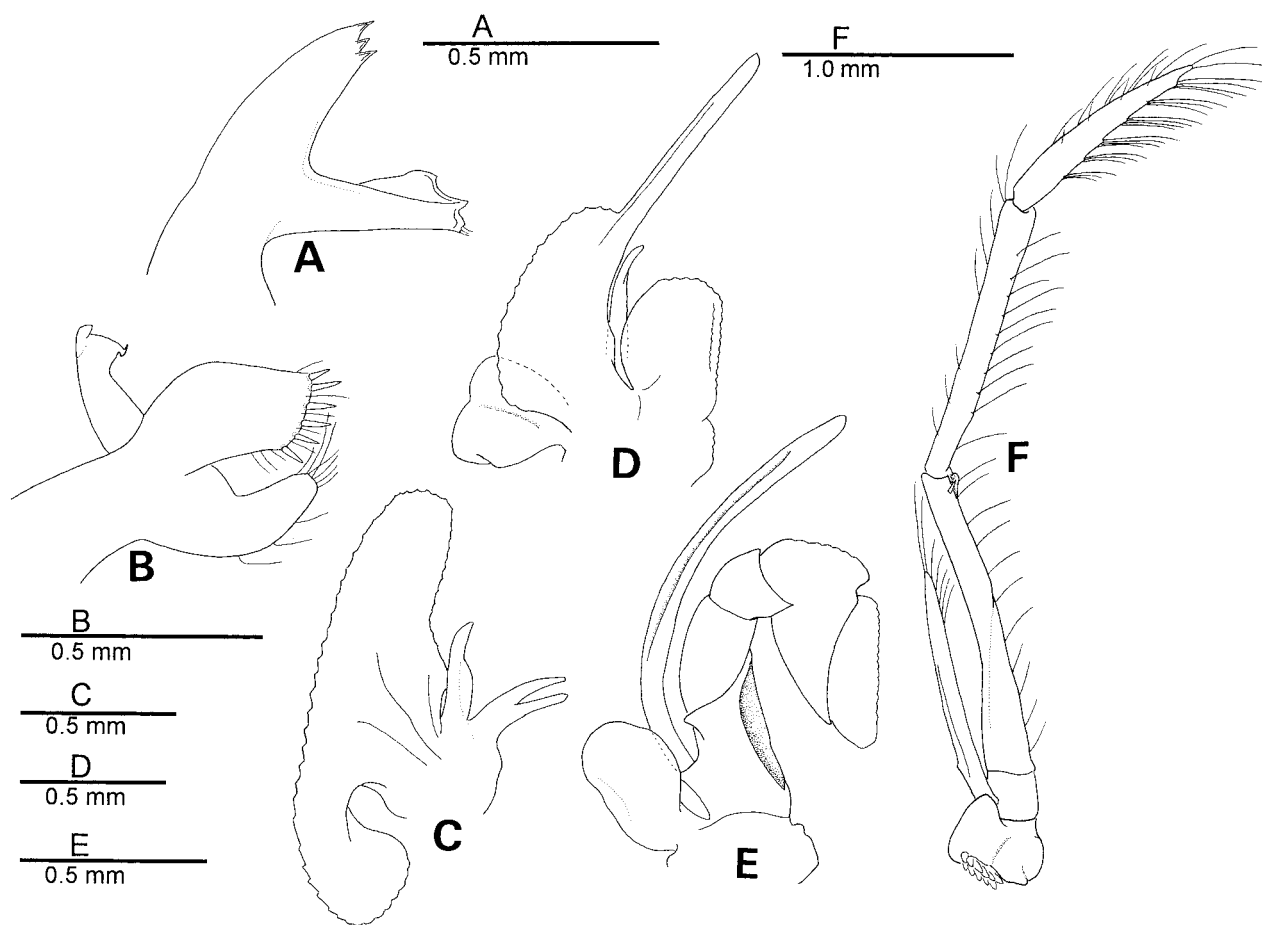


Fig. 3. *Periclimenes speciosus* sp. nov. Holotype male (CMNH-ZC 01666). A, right mandible, ventral view; B, right maxillule, ventral view; C, right maxilla, ventral view; D, right first maxilliped, ventral view; E, right second maxilliped, ventral view; F, right third maxilliped, lateral view. C–E, setae omitted.

bearing 2 rows of sparse setae, rounded distally; proximal endite small, rounded, separated from distal endite by shallow notch; caridean lobe broad; exopod with well-developed flagellum; epipod large, subquadrate, feebly bilobed. Second maxilliped (Fig. 3E) with normal endopod; dactylus broad, mesial margin almost straight; propodus with anteromesial margin bluntly produced; carpus with distinct ventromesial process; merus about twice as long as carpus; ischium and basis completely fused, mesial surface distinctly concave; exopod with well developed flagellum; coxa inflated mesially; epipod oval, without podobranch. Third maxilliped (Fig. 3F) with endopod slender, falling slightly short of midlength of scaphocerite, ischiomerus and basis feebly articulated; ultimate segment tapering distally, ventrally with about 6 transverse rows of short setae, dorsally with sparse setae; penultimate segment 1.2–1.4 times as long as ultimate segment, with sparse long setae ventrally, sparse short setae dorsoproximally, long simple setae dorsodistally; antepenultimate segment nearly always with 1 small distolateral spine, ventral margin sparsely setose; exopod with well developed flagellum, distally with long plumose setae; coxal plate subquadrate; small arthrobranch present.

Branchial formula agrees quite with those of *Periclimenes kobayashii* and *P. sarasvati* (see Okuno and Nomura, 2002; Okuno, 2002).

First pereiopod (Fig. 4A) moderately slender, overreaching distal margin of scaphocerite by length of dactylus. Chela (Fig. 4B) 0.4–0.5 times as long as carapace, 0.9–1.3 times as long as carpus; palm subcylindrical, slightly compressed, with 4 transverse rows of short serrulate grooming setae proximally; fingers 1.0–1.2 times as long as palm, each terminating in small, hooked unguis, cutting edges situated laterally, unarmed. Carpus 0.4–0.5 times as long as carapace, 1.7–2.6 times as long as palm, slightly widened distally, with longitudinal row of serrulate grooming setae distally. Merus unarmed, 1.1–1.2 times as long as carpus. Coxa with small, setose ventral process.

Second pereiopods (Fig. 4C) well developed, similar, overreaching distal margin of scaphocerite by length of chelae. Chela slightly bowed, 0.8–1.5 times as long as carapace, 1.7–2.7 times as long as carpus; palm 1.1–1.6 times as long as dactylus, slightly compressed; dactylus (Fig. 6A, B) terminating in hooked, acutely pointed unguis, cutting edge situated laterally, armed proximally with 0–4 (usually 2–3) small, acute, recurved teeth, remaining part entire,

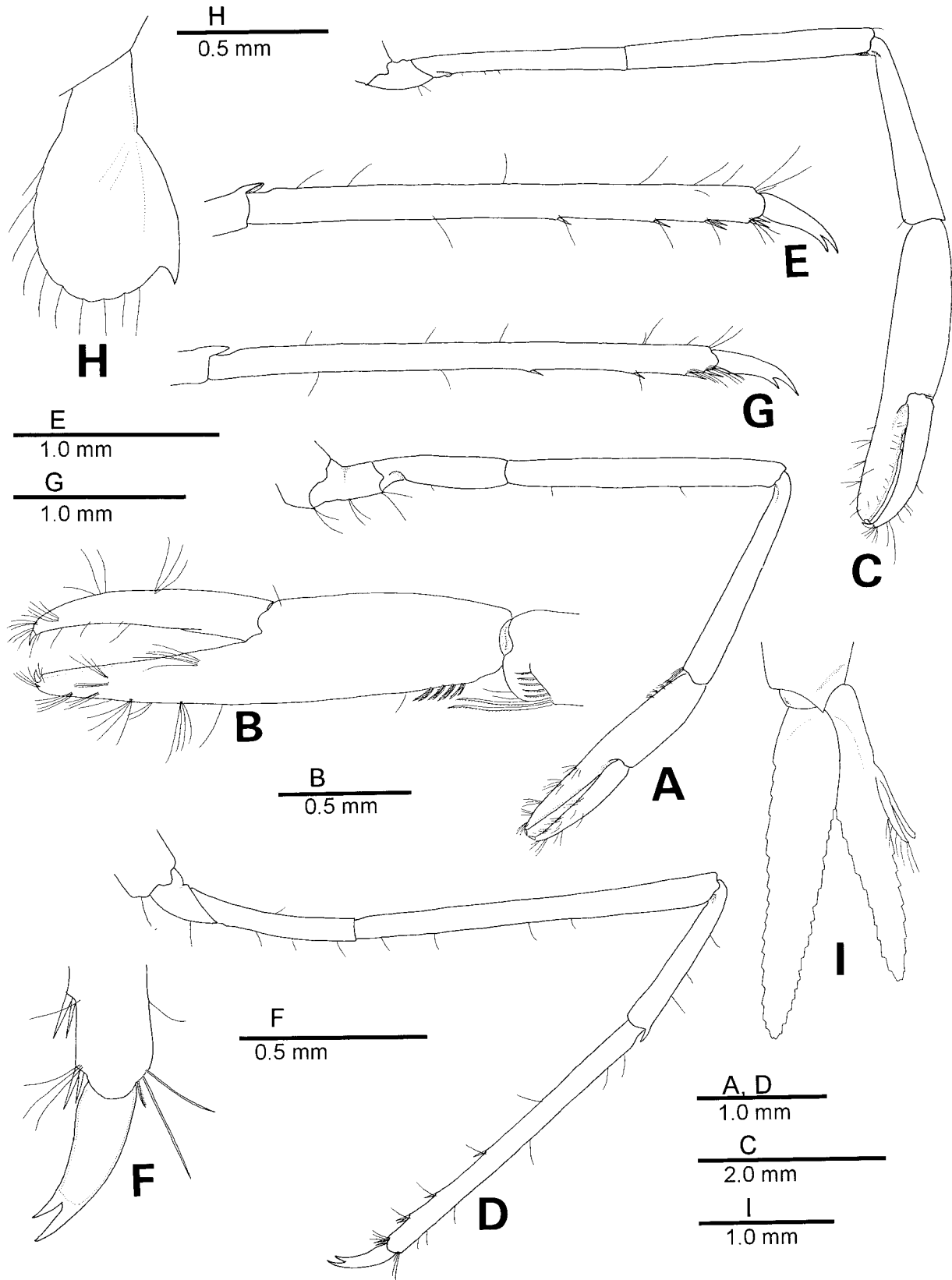


Fig. 4. *Periclimenes speciosus* sp. nov. Holotype male (CMNH-ZC 01666). A, right first pereiopod, lateral view; B, same, chela and posterior part of carpus, mesial view; C, right second pereiopod, lateral view; D, right third pereiopod, lateral view; E, same, propodus and dactylus, lateral view; F, same, dactylus and posterior part of propodus, lateral view; G, propodus and dactylus of right fifth pereiopod, lateral view; H, endopod of right first pleopod, dorsal view; I, right second pleopod, dorsal view, marginal setae omitted.

sharply edged; fixed finger (Fig. 6A, B) generally similar to dactylus, armed proximally with 0–5 (usually 2–5) small, acute, recurved teeth. Carpus slender, unarmed, slightly widened distally. Merus slender, unarmed, 1.3–1.4 times as long as carpus. Ischium slender, unarmed, 1.1 times as long as carpus.

Third pereopod (Fig. 4D) slender, overreaching distal margin of scaphocerite by length of dactylus. Merus 1.7–2.6 times as long as carpus, unarmed. Carpus unarmed. Propo-

dus (Fig. 4E) 2.0–2.1 times as long as carpus, with 2 long distoventral and 2 subterminal spines and spaced set of 2 spines on ventral surface, dorsal surface with few short setae. Dactylus (Fig. 4F) about 0.2 of length of propodus, length about 3.6 times as long as basal width, compressed laterally, dorsal margin convex, ventral margin with 1 subdistal accessory tooth, unguis not clearly demarcated. Fourth pereopod similar to third. Fifth pereopod with propodus (Fig. 4G) bearing 1 distoventral and 1 subterminal

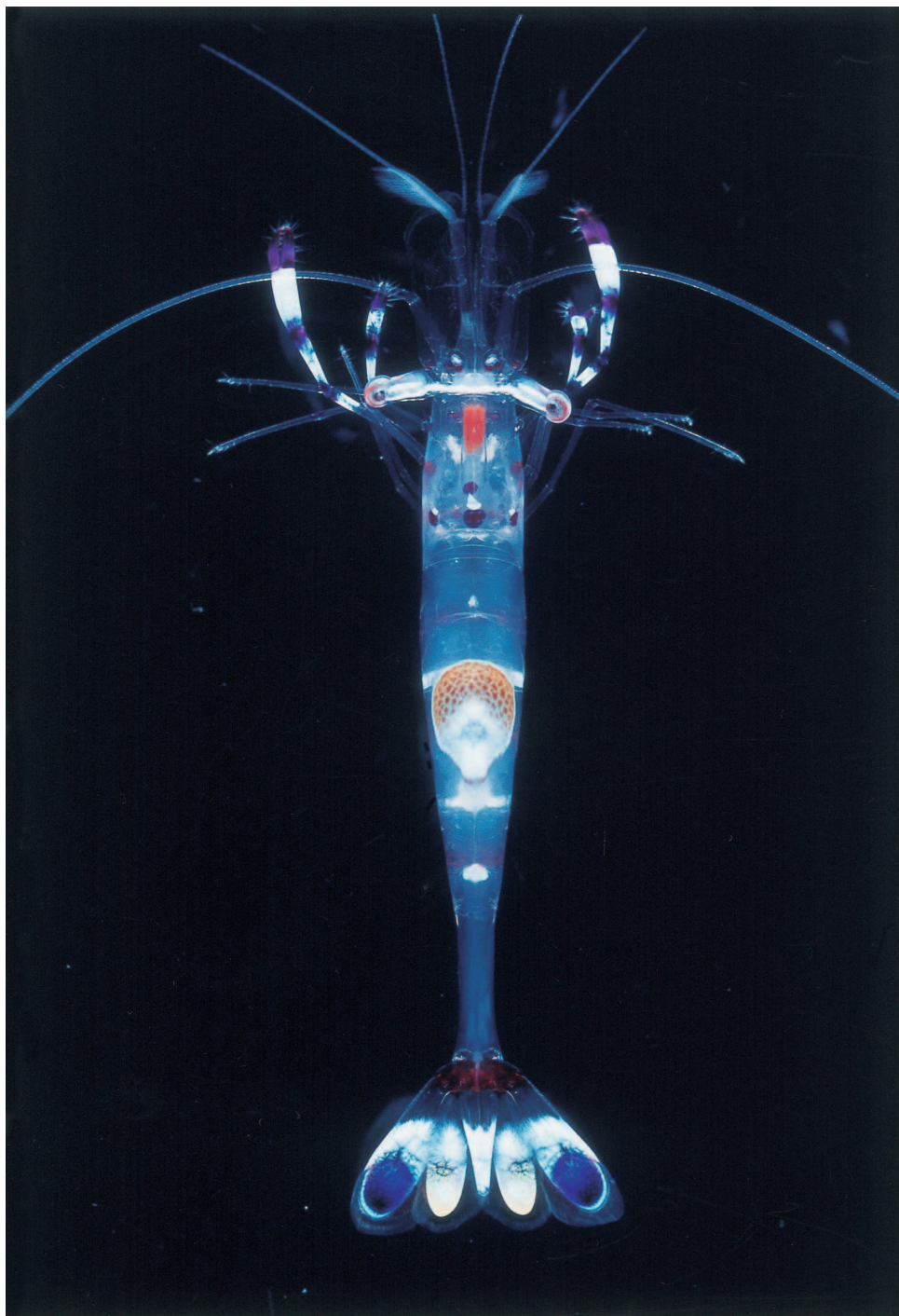


Fig. 5. *Periclimenes speciosus* sp. nov. Holotype male (CMNH-ZC 01666). Fresh specimen, dorsal view.

spines on ventral surface and tufts of setae, and widely spaced set of 2 spines posterior to distal series of spines.

Endopod of male first pleopod (Fig. 4H) short, generally oval, distally expanded, with small, distally acute appendix interna. Endopod of male second pleopod (Fig. 4I) with appendices interna and masculina arising from proximal one-third of mesial margin; appendix interna slender, subequal to appendix masculina in length, with few distal cincinnuli; appendix masculina slender, with 6 long spiniform setae distally.

Uropod (Fig. 2D) with protopodite posterolaterally produced, but blunt; exopod broad, overreaching posterior margin of telson, broadly rounded distally, lateral margin nearly straight, terminating in small acute tooth, with smaller or subequal mobile spine just mesial to distolateral tooth; endopod oblong, falling slightly short of posterior margin of exopod.

Coloration (Fig. 5). — Body and appendages generally transparent. Carapace with rostrum transparent, posterodorsal and anterolateral regions with scattered purplish red and white spots. Pleura of first to fourth abdominal somites without spots in male, with purplish red and white oval patches at first to fourth pleura in female; third somite with large dorsal round patch over posterior two thirds, narrower posteriorly than anteriorly, background white, with many red spots on anterior half (the white background being reduced to a network of pale orange irregular lines between the spots), posterior margin pinkish; posterior sixth abdominal somite and proximal telson and protopodite of uropod purplish red; distal three-fourth of telson white. Eyestalk white, with pale purple stripe anteriorly, ophthalmic somite with white longi-

tudinal stripe anterodorsally. Chelae and carpi of anterior two pereopods largely white, with hinge regions and tips of fingers purple. Proximal parts of pleopods with purplish red spots. Intermediate regions of uropodal exopod and endopod white, posterior third of endopod lemon yellow, posterior third of exopod with deep purple oval patch.

Sexual dimorphism. — The mature females are larger and more robust than males. The known maximum postorbital carapace length is 6.7 mm in females instead of 4.0 mm in males. The length of sixth abdominal somite of mature females is shorter than that of males (0.9–1.1 times as long as postorbital carapace length vs 1.2–1.4 times as long). In life, the females show white patches on the pleura of first to fourth abdominal somites which are lacking in males.

Derivation of name. — The specific name is derived from the Latin *speciosus*, meaning brilliant, in reference to the strikingly beautiful coloration in life of the species. The name is an adjective.

Distribution. — Known from warm-temperate and subtropical waters of Japan, and possibly from Australia and New Caledonia (see Discussion).

Ecological notes. — *Periclimenes speciosus* is associated with various taxa of actinarian and madreporarian anthozoans. The identifiable host species of the present material are summarized as Table 1.

Moreover, the underwater photograph shown by Mine-mizu (2000) and observation at Tateyama, Boso Peninsula, Japan by myself indicate that *P. speciosus* is a fish-cleaner. The process of the cleaning behavior between the shrimp and fishes is generally similar as in the case of *P. kobayashii* reported by Okuno and Nomura (2002).

Table 1. Hosts of *Periclimenes speciosus* sp. nov.

Specimens	Hosts	Localities
CMNH-ZC 01666 (holotype)	<i>Entacmaea quadricolor</i> (Rüppell and Leuckart, 1828) (Actiniaria, Actiniidae)	Boso Peninsula, Honshu
QM W 26996, CMNH-ZC 01667, RMNH-D 50659	<i>Entacmaea quadricolor</i> (Rüppell and Leuckart, 1828) (Actiniaria, Actiniidae)	Boso Peninsula, Honshu
CMNH-ZC 01641	<i>Antheopsis maculata</i> (Klunzinger, 1877) sensu Uchida (2001) (Actiniaria, Stychodactylidae)	Boso Peninsula, Honshu
CMNH-ZC 01555	<i>Stychodactyla tapetum</i> (Ehrenberg, 1834) (Actiniaria, Stychodactylidae)	Izu Peninsula, Honshu
NFU-530-2-2517, 530-2-2518	<i>Entacmaea quadricolor</i> (Rüppell and Leuckart, 1828) (Actiniaria, Actiniidae)	Suruga Bay, Honshu
CBM-ZC 7850	<i>Megalactis hemprichii</i> Ehrenberg, 1834 (Actiniaria, Actinodendronidae)	Kii Peninsula, Honshu
CMNH-ZC 01567	<i>Euphyllia ancora</i> Veron and Pichon, 1980 (Madreporaria, Caryophyllidae)	Hachijo-jima Island, Izu Islands
CMNH-ZC 01668	<i>Antheopsis maculata</i> (Klunzinger, 1877) sensu Uchida (2001) (Actiniaria, Stychodactylidae)	Hachijo-jima Island, Izu Islands
CMNH-ZC 01700, RMNH-D 50660	<i>Antheopsis maculata</i> (Klunzinger, 1877) sensu Uchida (2001) (Actiniaria, Stychodactylidae)	Nagasaki, Kyushu
CBM-ZC 7851	<i>Euphyllia ancora</i> Veron and Pichon, 1980 (Madreporaria, Caryophyllidae)	Okinawa-jima Island, Ryukyu Islands

DISCUSSION

Up to now, the genus *Periclimenes* Costa, 1844 contains over 170 species over the world (Okuno and Mitsuhashi, 2003), and is subdivided into several distinct species groups (Kemp, 1922; Bruce, 1987, 1989; Okuno, 2002). One of them, the '*Periclimenes aesopius* species group' is characterized by having similar second pereiopods with unarmed meri and carpi, the strongly produced inferior orbital margin with a reflected inner flange, the ophthalmic somite usually with an interocular beak, and the tergum of third abdominal somite posterodorsally produced (Bruce, 1991; Okuno and Nomura, 2002; Okuno, 2002). Currently, 10 Indo-West Pacific species are assigned to the species group (Bruce, 2003): *P. adularans* Bruce, 2003; *P. aesopius* (Bate, 1863); *P. holthuisi* Bruce, 1969; *P. kobayashii* Okuno and Nomura, 2002; *P. longicarpus* Bruce and Svoboda, 1983; *P. magnificus* Bruce, 1979; *P. sarasvati* Okuno, 2002; *P. tenuirostris* Bruce, 1991; *P. tosaensis* Kubo, 1951 and *P. venustus* Bruce, 1990.

The present new species closely follows the definition of the species group mentioned above. Morphologically, *P. speciosus* appears closest to *P. holthuisi* on account of the following features: 1) the dorsal carina of carapace is armed with the single epigastric spine; 2) the interocular beak of the ophthalmic somite is short but distinct; 3) the median carina of third abdominal tergum is posteriorly produced, but not strongly compressed and markedly carinate; 4) carpus of the second pereiopod is distinctly shorter than chela; 5) the propodi of the ambulatory pereiopods possess more than 2 sets of ventral spines posterior to terminal spines; 6) the dactyli of the ambulatory pereiopods are short and distinctly biunguiculate. For comparative purpose, I have reexamined the holotype of *P. holthuisi* and four topotypic specimens reported by Bruce (1982). *Periclimenes speciosus* can be readily distinguished from *P. holthuisi* by the differences of the form and armature of the cutting edges of the second pereiopodal fingers. In *P. speciosus*, the cutting edges are straight and the closed fingers do not appear to gape throughout the length (Fig. 6A, B). Fifteen specimens of *P. speciosus* examined possess the cutting edges armed proximally with more than 2 recurved teeth on the dactylus and fixed finger (Fig. 6A, B). In contrast, the cutting edges of *P. holthuisi* show distinct proximal concavities, thus, the closed fingers appear to gape proximally (Fig. 6C, D). The cutting edges are armed each with the single tooth at the anterior end of the concavities in *P. holthuisi* (Fig. 6C, D). From the illustration provided by Bruce (1979: Fig. 6b), the ovigerous female from Queensland, Australia agrees quite with the holotype and topotypic material of *P. holthuisi* in the morphological aspect of the cutting edges. It is noteworthy that the color in life of the individual is also reported (Bruce, 1979: pl. 1D). The life-coloration is particularly distinctive in the separation of these two species, and especially, the tergum of the third abdominal somite shows the striking feature in the coloration in life. The patch on the tergum of *P. spe-*

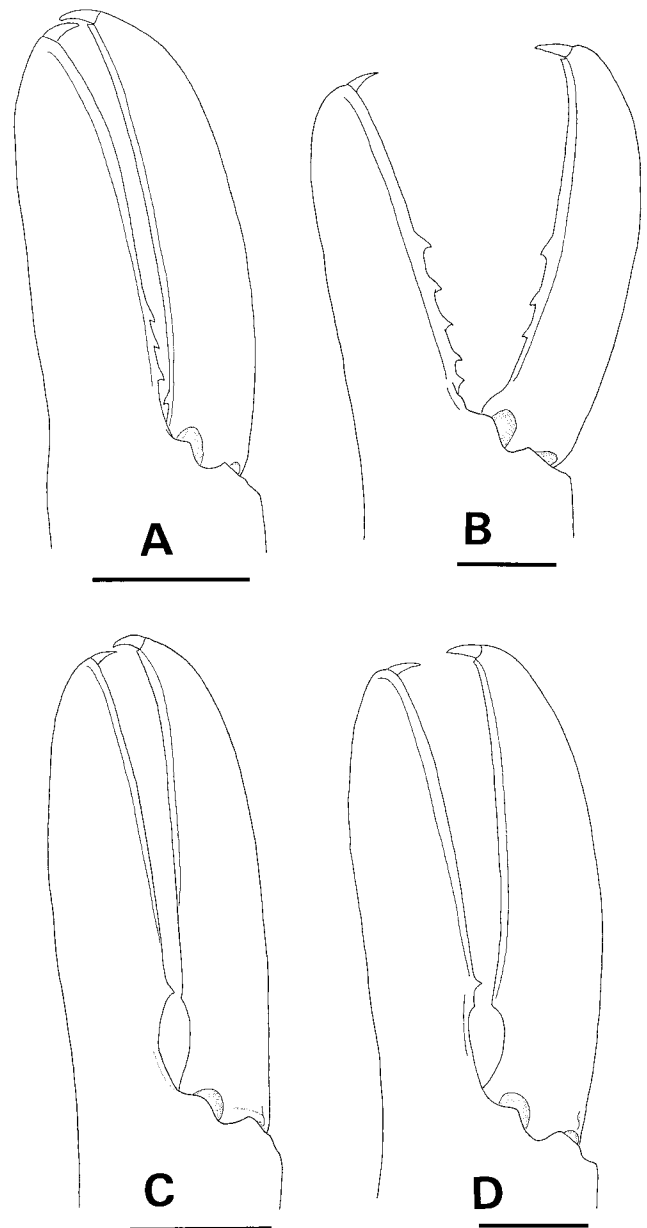


Fig. 6. Comparison of fingers of right second pereiopod, mesial view. A, *Periclimenes speciosus* sp. nov., male holotype (CMNH-ZC 01666); B, *P. speciosus*, female paratype (CMNH-ZC 01668); C, *Periclimenes holthuisi* Bruce, 1969, male (NHM 1981. 45a); D, *P. holthuisi*, ovigerous female (NHM 1981. 45b). Setae omitted. Scales indicate 0.5 mm.

ciosus is oval, and the ground color of anterior half is orange, covered with numerous red spots (Fig. 5). Conversely, *P. holthuisi* has a white V-shaped patch in dorsal view, and its anterior and posterior margins are fringed with red lines (see Bruce, 1977, 1979, 1990).

Most previous records of *P. holthuisi* are based on preserved specimens which have faded or lost their coloration in life, therefore, Bruce (1990) suggests that some related species will be probably confused in these records. Although previous authors have not indicated the presence of a proximal gap on the closed fingers as the distinguishing

feature of *P. holthuisi* (e. g. Bruce, 1979, 1990, 1991, 1998, 2003; Chace and Bruce, 1993; Okuno, 2002), I regard the form of the fingers as the most useful morphological character in separating *P. holthuisi* from the related species. From the standpoint of this character, some species previously reported as *P. holthuisi* can be clarified taxonomically. As pointed out by De Grave (1998), some of the specimens reported as *P. holthuisi* from Indonesia (Fransen, 1989: figs. 6a, b, g, h) are identifiable with *P. venustus* by the armature of the chelae. While the Indonesian specimens in figures 6c-f and 7d provided by Fransen (1989) are referred to *P. holthuisi* with little hesitation. Against, the specimen reported as *P. holthuisi* from the Red Sea (Bruce and Svoboda, 1983: fig. 3) is inconsistent with that species in having the larger number of recurved teeth and the lacking the proximal concavity on the cutting edges of the second pereopodal chela. Reexamination of the Red Sea specimen is required to determine its taxonomic status.

The possession of recurved teeth on the cutting edges of the second pereopodal fingers links *P. speciosus* to *P. sarasvati* and *P. venustus*. From two latter species, *P. speciosus* is readily distinguished by having a spaced set of ventral spines on the propodi of the ambulatory pereopods. The ambulatory propodi of *P. sarasvati* and *P. venustus* are armed only with the single ventral spine posterior to distoventral spine (Okuno, 2002). In coloration in life, *P. speciosus* has purplish red spots on carapace and abdominal somites instead of right purple or indigo spots in *P. sarasvati* and *P. venustus*.

Suzuki and Hayashi (1977) reported *P. holthuisi* on the basis of 3 males and 3 females from Suruga Bay, Honshu, Japan. These specimens were associated with three species of sea anemones, *Entacmaea quadricolor* (Rüppell and Leuckart, 1828) [as *Parascyponis actinostroides* (Wassilieff, 1908)], *Antheopsis maculata* (Klunzinger, 1877) (as *Radianthus maculata*), and *Dofleinia armata* Wassilieff, 1908. Okuno and Nomura (2002) suggested that the Suzuki and Hayashi's (1977) specimen associated with *D. armata* might be conspecific with *Periclimenes kobayashii*, nevertheless the available specimen from *D. armata* was not found at that time. Fortunately, the female specimen (6.9 mm CL) associated with *D. armata* and the male (2.9 mm CL) with *A. maculata* have been kept in the collection of the National Fisheries University, Shimonoseki, transferred from the Marine Science Museum, Tokai University, Shimizu, and I reconfirmed that they were identified with little doubts as *P. kobayashii*. The reexamination of four remaining specimens associated with *Entacmaea quadricolor* (see 'Other specimens' part) shows that they are referred to *P. speciosus* in morphological aspect and host specificity.

The species reported as *P. holthuisi* by Catala (1979), Coleman (1991) and Jones and Morgan (1994), and as *P. venustus* by Coleman (2002) will be conspecific with *P. speciosus* without hesitation on account of the characteristic color in life mentioned above. Coleman's (2002) report reveals that the host specificity of *P. speciosus* will be

extended to the soft corals of the genera *Sarcophyton* Lesson, 1834 and *Dendronephthya* Kükenthal, 1905. Steene (1990) recorded *Periclimenes* sp. taken at the Abrolhos Islands, Western Australia, and this object is same individual to be reported as *P. holthuisi* by Jones and Morgan (1994). These records suggest, therefore, that *P. speciosus* is also distributed in Australian and New Caledonian waters.

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