

**A new species of the genus *Periclimenes* Costa, 1844
(Crustacea: Decapoda: Palaemonidae) from the
Ryukyu Islands, southern Japan**

Junji Okuno and Masako Mitsuhashi

(JO) Coastal Branch of Natural History Museum and Institute, Chiba, 123 Yoshio, Katsuura,
Chiba 299-5242 Japan, e-mail: okuno@chiba-muse.or.jp;

(MM) Department of Biological Sciences, Graduate School of Science, The University of Tokyo;
Department of Zoology, National Science Museum, 3-23-1, Hyakunin-cho, Shinjuku-ku, Tokyo
169-0073 Japan, e-mail: masako@kahaku.go.jp

Abstract.—A new species of pontoniid shrimp, *Periclimenes dolichosternum*, is described and illustrated on the basis of 21 specimens collected from sublittoral zones of the Ryukyu Islands at depths of 1.5–30 m. This new species may be readily distinguished from all previously known species of *Periclimenes* Costa, 1844 by the long third thoracic sternite, and long intermediate segment of the antennular peduncle.

Shrimps of the genus *Periclimenes* Costa, 1844, are widely distributed through tropical to warm-temperate marine and brackish waters worldwide (Chace & Bruce 1993). Most species of the genus are associated with a range of marine invertebrates, although considerable numbers are free-living (Bruce 1994). Chace & Bruce (1993) recognized 165 valid species of *Periclimenes* at the time, and subsequently 17 additional species have been described: four from the Atlantic Ocean (see Heard & Spotte 1991, 1997; d'Udekem d'Acoz 1999; Li 2000), two from the Mediterranean Sea (see d'Udekem d'Acoz 1999, Li 2000), one from the eastern Pacific region (see Vargas 2000) and ten from the Indo-West Pacific region (see Berggren 1994, Bruce & Coombes 1997, Bruce 1998, Li 2000, Hayashi & Otomi 2001, Okuno & Nomura 2002). Bruce (1994) transferred three species, *P. gorgoncola* Bruce, 1969, *P. franklini* Bruce, 1990a, and *P. setirostris* Bruce, 1991 to the newly erected genus *Paraclimenes* Bruce, 1994 on the basis of absence of the antennal spine. *Periclimenes denticulatus* Nobili, 1906 and *P. sibogae* Holthuis, 1952 have been transferred to the ge-

nus Exoclimenella Bruce, 1994, and *P. petitthouarsii* (Audouin, 1826) and *P. spiniferus* De Man, 1902 to the genus *Periclimenella* Bruce, 1994 (see Duris & Bruce 1995). More recently, Wicksten (1995) and Spotte (1999) pointed out that *Periclimenes anthophilus* Holthuis and Eibl-Eibesfeldt, 1964 should be considered as a junior synonym of *P. pedersoni* Chace, 1958. Thus, currently there is a total of 174 valid species of *Periclimenes* known worldwide. On the basis of a bibliographic survey, Li (2000) provided illustrations for 148 of these species.

In 1998, an ovigerous female shrimp of an unfamiliar free-living pontoniid species was found. The specimen was collected from the sublittoral zone (4.0 m depth) of Iriomote Island (southwestern Ryukyu Islands). Subsequently, additional specimens collected from Kume Island and Iriomote Island, the Ryukyu Islands were examined. These specimens clearly belong to an undescribed species of *Periclimenes*, and are here described as a new species.

Illustrations were made with the aid of a camera lucida mounted on both dissecting microscope and compound microscope. For

microstructural observations under the scanning electron microscope (SEM), the telson and appendages of two of the specimens (NSMT-Cr 1988, 1989) were dissected and freeze dried. The postorbital carapace length is abbreviated as CL in the text. The term 'bec ocellaire' is used for the anteromedian process on the ophthalmic somite. 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 Museum of Natural History, Smithsonian Institution, Washington, D.C. (USNM), National Science Museum, Tokyo (NSMT), and the Queensland Museum, South Brisbane (QM).

Family Palaemonidae Rafinesque, 1815

Subfamily Pontoniinae Kingsley, 1878

Genus *Periclimenes* Costa, 1844

Periclimenes dolichosternum, new species

Figs. 1–5

Type series.—Holotype: ♀ CL 2.6 mm, Ou-shima Harbor, Kume Island, Ryukyu Islands, 26°20.1'N, 126°49.2'E, 1.5 m, 19 Dec 2001, coll. J. Okuno and T. Takahashi, CMNH-ZC 00855. Paratypes: Ryukyu Islands. 1 ovig. ♀ CL 2.4 mm, 1 ♀ CL 1.5 mm, same locality as holotype, 12 Jul 2001, coll. T. Kawamoto, CMNH-ZC 00791; 1 ♂ CL 2.1 mm, CMNH-ZC 00802, 1 ♀ CL 2.2 mm, CMNH-ZC 00801, 1 ♂ CL 2.0 mm, 1 ♀ CL 1.9 mm, RMNH-D 49858, same locality as holotype, 19 Oct 2001, coll. T. Kawamoto; 2 ♂ CL 1.6, 2.8 mm, CMNH-ZC 00856, 1 ♀ CL 2.4 mm, QM-W 26570, same data as holotype; 1 ovig. ♀ CL 2.3 mm, Amitori Bay, Iriomote Island, Yaeyama Group, 24°19.6'N, 123°42.2'E, 4 m, 25 May 1998, coll. R. Minemizu, CMNH-ZC 00767; 1 ovig. ♀ CL 3.1 mm, CMNH-ZC 00931, 1 ♂ CL 2.6 mm, 2 ♀ CL 2.1, 2.9 mm, 4 ovig. ♀ CL 2.2–4.1 mm, NSMT-Cr 1981, 1 ovig. ♀ CL 3.6 mm, NSMT-Cr 1988, 1 ovig. ♀ CL 3.7 mm, NSMT-Cr 1989, 1 ♀ CL 3.0 mm, 1 ovig. ♀ CL 4.4

mm, USNM 1006977, Amitori Bay, 25–30 m, 2 Jul 2000, coll. Y. Ikeda and K. Hagiwara.

Diagnosis.—Size small (CL 1.5–4.4 mm), body slender. Carapace usually armed with epigastric spine. Rostrum slender, straight, falling slightly short of distal margin of proximal segment of antennular peduncle, dorsal margin dentate, ventral margin with 0–2 vestigial teeth subapically. Third thoracic sternite about 3 times as long as fourth sternite. Third abdominal somite with median carina posterodorsally produced. Sixth somite distinctly longer than postorbital carapace length. Intermediate segment of antennular peduncle about twice as long as distal segment. Third maxilliped without arthrobranch. First and second pereopods slender, each with carpus considerably longer than chela. Chela of second pereopod with fingers about twice as long as palm, cutting edges armed mesially with numerous recurved fine teeth. Third to fifth pereopods slender, with dactyli biunguiculate. Endopod of male first pleopod without appendix interna.

Description.—Carapace (Fig. 1) smooth, glabrous, lacking supraorbital spine; orbit feebly developed, inferior orbital margin strongly produced, semiquadrate; antennal spine well developed, slender, submarginal, arising distinctly ventral to orbital margin; hepatic spine large, arising slightly ventral to level of antennal spine; epigastric spine usually present, feebly articulated with median carina; pterygostomian margin rounded.

Rostrum (Fig. 2A, B) slender, straight, 0.5–0.6 times as long as carapace, falling short of level of distal margin of proximal segment of antennular peduncle; dorsal blade low, with 5–7 (usually 6) equidistantly spaced, small, acute teeth, interspaced by short setae; ventral blade poorly developed, proximally with row of short setae, with 0–2 vestigial or minute teeth subapically.

Second thoracic sternite (Fig. 2C) with median longitudinal ridge; third sternite

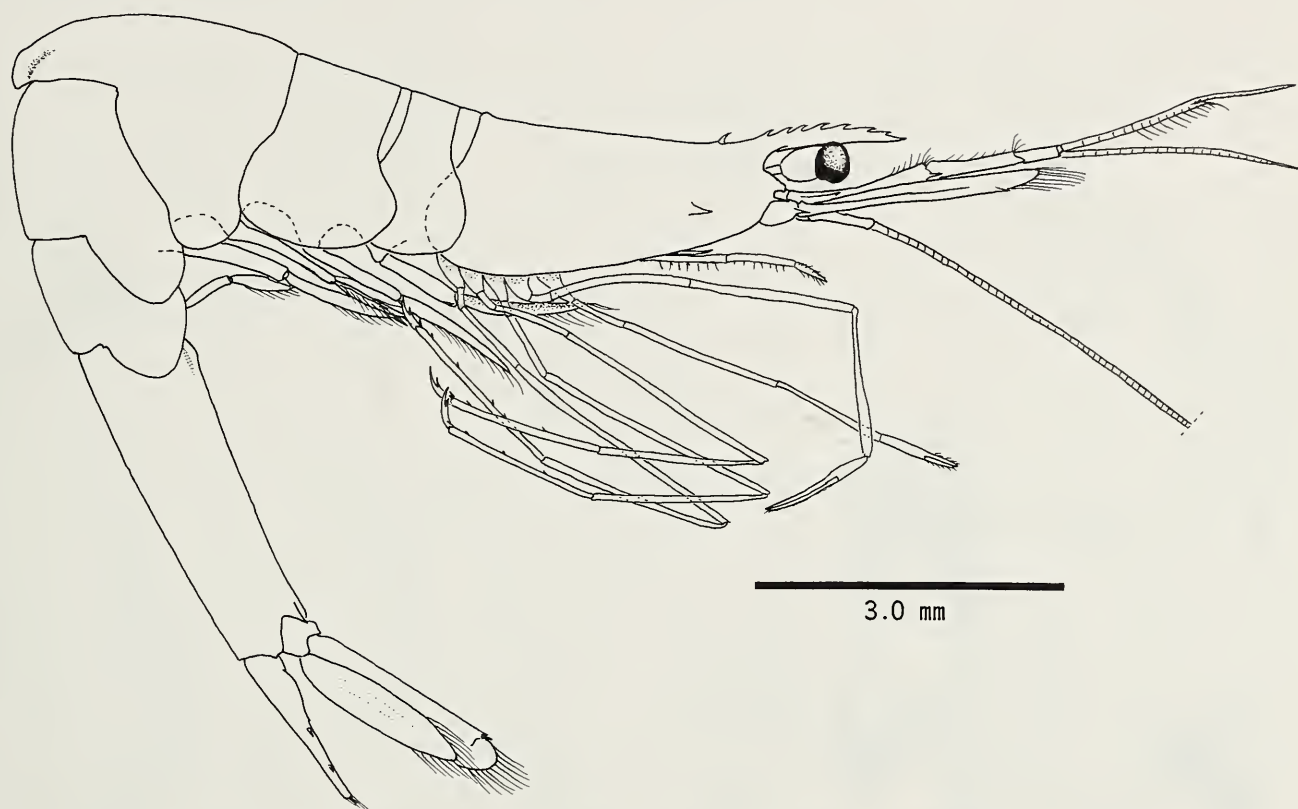


Fig. 1. *Periclimenes dolichosternum*, new species. Holotype female, CMNH-ZC 00855. Entire animal in lateral view.

about 1.5 times as long as second, 3 times as long as fourth; fourth to eighth sternites (Fig. 2D) unarmed, fourth sternite with low transverse ridge, median notch shallow.

Abdomen (Fig. 1) smooth, glabrous; pleura of first to third somites broad, rounded; those of fourth and fifth somites posteriorly produced, but blunt; posterodorsal tergum of third somite produced posteriorly, slightly elevated dorsally, compressed laterally (Fig. 2E); sixth somite slender, elongate, 1.2–1.8 times as long as carapace, posterolateral process blunt, posterolateral margin produced. Telson (Fig. 2F) tapering posteriorly, posterior margin convex, with 3 pairs of spines, intermediate pair longest, mesialmost pair plumose, lateral and intermediate pairs simple (Fig. 5A); 2 pairs of small, subequal dorsolateral spines positioned midlength of telson and midway between these spines and posterior margin of telson.

Ophthalmic somite without 'bec ocellaire'. Eye (Fig. 2A) with large, globular, pigmented cornea, bearing small ocellus; stalk

slightly longer than maximum corneal diameter, maximum width less than maximum corneal diameter.

Antennular peduncle (Fig. 2A) slender, slightly overreaching apex of lamella of scaphocerite; proximal segment with distolateral margin strongly produced, lateral margin straight, terminating distally in large acute tooth, slightly overreaching distolateral margin; ventromesial margin armed with small acute tooth; stylocerite short, slender, acute, reaching level of proximal third of length of proximal segment; statocyst well developed, rounded; intermediate segment about twice as long as distal segment, with distolateral margin strongly produced, lateral lobe well developed, slightly depressed, laterally setose; distal segment short, feebly setose mesially. Upper flagellum biramous, proximal 11 or 12 segments fused, shorter free ramus 3 or 4 segmented; lower flagellum more slender than upper flagellum.

Antenna with stout basicerite armed ventrolaterally with acute tooth, dorsal margin

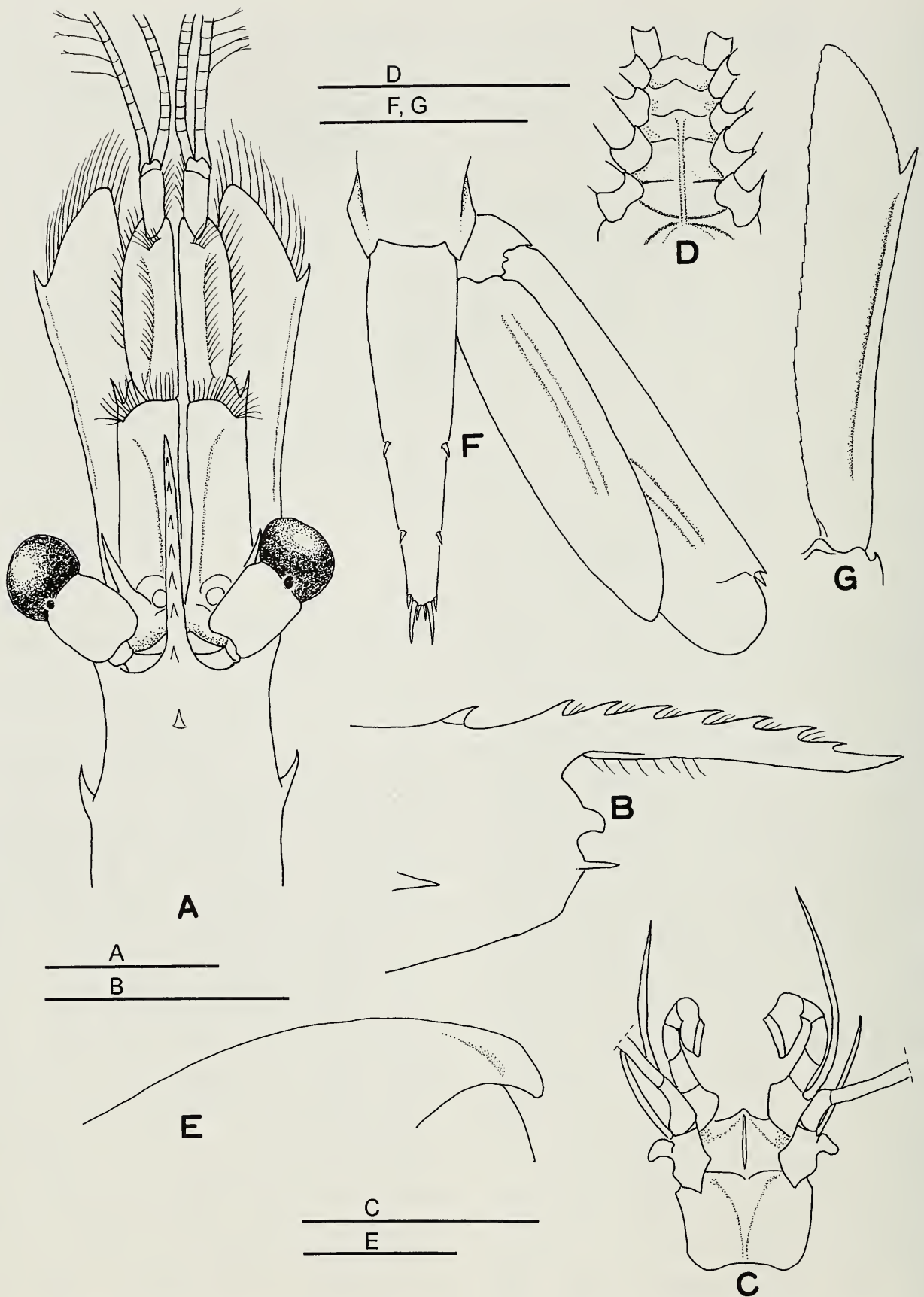


Fig. 2. *Periclimenes dolichosternum*, new species. A, B, F, G, holotype female, CMNH-ZC 00855; D, male paratype, CMNH-ZC 00802; C, E, ovigerous female paratype, CMNH-ZC 00931. A, anterior carapace, rostrum and cephalic appendages, dorsal; B, anterior carapace and rostrum, lateral; C, second and third thoracic sternites, ventral; D, fourth to eighth thoracic sternites, ventral; E, dorsal part of third abdominal somites, lateral; F, telson and right uropod, dorsal; G, right antennal scaphocerite, dorsal. C, D, F, G, setae omitted. Scales: 1.0 mm.

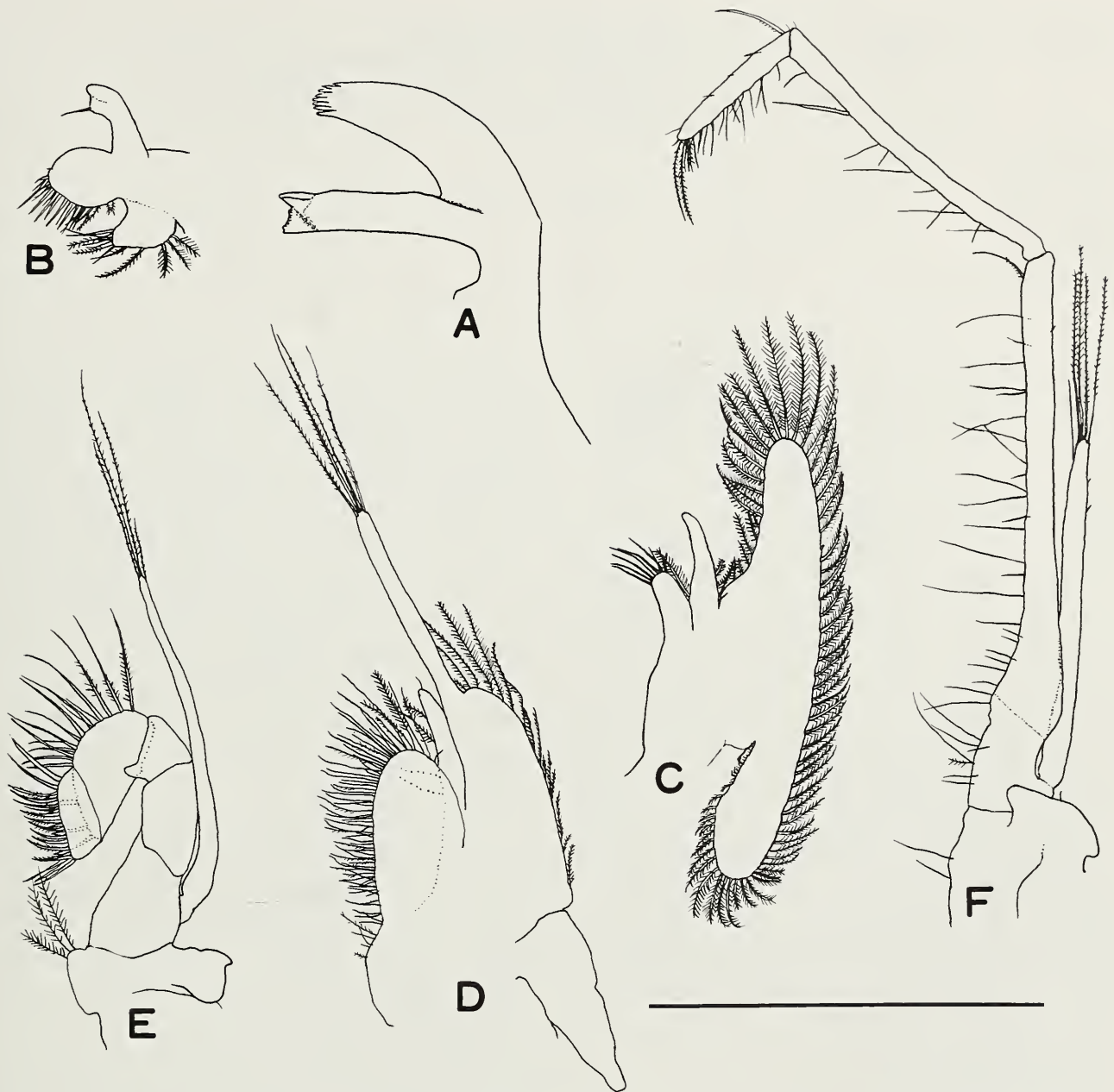


Fig. 3. *Periclimenes dolichosternum*, new species. Female paratype, NSMT-Cr 1988. A, left mandible, external; B, left maxillule, external; C, left maxilla, external; D, left first maxilliped, external; E, left second maxilliped, external; F, left third maxilliped, lateral. Scale: A, 0.5 mm; B-F, 1.0 mm.

with small raised lobe; scaphocerite (Fig. 2G) slender, with lateral margin feebly concave, terminating in strong tooth reaching distal fifth of length of scaphocerite, lamella strongly tapering distomesially in dorsal view, 3.4–5.4 times as long as width at base of lateral tooth; carpocerite reaching proximal fourth of length of scaphocerite.

Epistome unarmed.

Mandible (Fig. 3A) without palp; incisor process well developed, distal margin truncated, armed with 7 or 8 small teeth; molar process truncated distally, with stout teeth.

Maxillule (Fig. 3B) with feebly bilobed palp, inner lobe with long simple seta; upper lacinia broad, distal margin truncated, armed with simple spines and few simple setae; lower lacinia sparsely furnished with plumose setae marginally. Maxilla (Fig. 3C) with slender, tapering palp; distal endite developed, simple, narrow, distally furnished with sparse simple setae; proximal endite obsolete; scaphognathite well developed, marginally furnished with numerous plumose setae, anterior lobe slightly tapering distally. First maxilliped (Fig. 3D) with

Table 1.—*Periclimenes dolichosternum*, new species. Branchial formula.

	Maxillipeds			Pereiopods				
	I	II	III	I	II	III	IV	V
Pleurobranchs	—	—	—	1	1	1	1	1
Arthrobranchs	—	—	—	—	—	—	—	—
Podobranchs	—	—	—	—	—	—	—	—
Epipods	1	1	—	—	—	—	—	—
Exopods	1	1	1	—	—	—	—	—

long, slender, simple palp; distal endite furnished with long, simple and plumose setae; proximal endite developed, rounded; caridean lobe broad, low; exopod with well developed flagellum; epipod large, feebly bilobed. Second maxilliped (Fig. 3E) with normal endopod; ischium and basis fused; exopod with well developed flagellum; coxa inflated mesially; epipod small, subquadrate, without podobranch. Third maxilliped (Fig. 3F) with endopod slender, overreaching distal margin of antennal basiscerite by full length of ultimate segment; ultimate segment tapering distally, ventral surface with 5 transverse rows of simple setae; penultimate segment 1.7–2.3 times as long as ultimate segment, sparsely with simple setae mesially; antepenultimate segment with tufts of long simple setae on ventral surface; coxal plate semiquadrate; arthrobranch absent.

Branchial formula as in Table 1.

First pereiopod (Fig. 4A) slender, falling slightly short of distal end of scaphocerite. Chela (Fig. 5B) 0.2–0.3 times as long as carapace; palm slightly compressed, slightly longer than dactylus, with 3 transverse rows of short serrulate glooming setae proximally, with sparse setae anterior to rows of glooming setae; fingers each terminating in small, hooked unguis, cutting edges situated laterally, entire. Carpus 1.6–2.2 times as long as chela, slightly widened distally, with longitudinal row of serrulate glooming setae distomesially. Merus unarmed, 1.1–1.3 times as long as carpus.

Second pereiopods (Fig. 4B) slender, similar, overreaching distal margin of scaphocerite by length of dactyli. Chela well de-

veloped, small, 0.4–0.6 times as long as carapace; palm slightly swollen; dactylus (Fig. 5C) elongate, 2.2–2.3 times as long as palm, terminating in hooked, acutely pointed unguis, cutting edge with large, acute subterminal tooth and 43–76 laterally situated, recurved, fine teeth; fixed finger (Fig. 5C) similar to dactylus. Carpus elongate, slightly widened distally, unarmed, 1.1–2.0 times as long as chela. Merus elongate, unarmed, 1.05–1.14 times as long as carpus. Ischium slender, unarmed 0.9–1.0 times as long as carpus.

Third pereiopod (Fig. 4C) slender, overreaching distal margin of scaphocerite by distal half of propodus and dactylus. Dactylus (Fig. 5D) slender, ventral margin armed with 1 accessory tooth, unguis not clearly demarcated, about 2.5 times as long as accessory tooth. Propodus (Fig. 4C) 0.8–1.0 times as long as carpus, 4.0 times as long as dactylus, with 2 long distoventral spines and equidistantly spaced set of 3 spines on ventral surface, dorsal surface with few short setae. Carpus unarmed. Merus 1.4–1.5 times as long as carpus. Fourth and fifth pereiopods similar in form to third.

Endopod of male first pleopod (Fig. 4D) short, slender, tapering distally, reaching proximal fifth of exopod, without appendix interna. Endopod of male second pleopod (Fig. 4E) with appendices interna and masculina arising from proximal third of mesial margin; appendix interna slender, slightly overreaching tip of appendix masculina, with few distal cincinnuli; appendix masculina slender, distally with 2 long setae with fine setules.

Uropod (Fig. 2F) with protopodite pos-

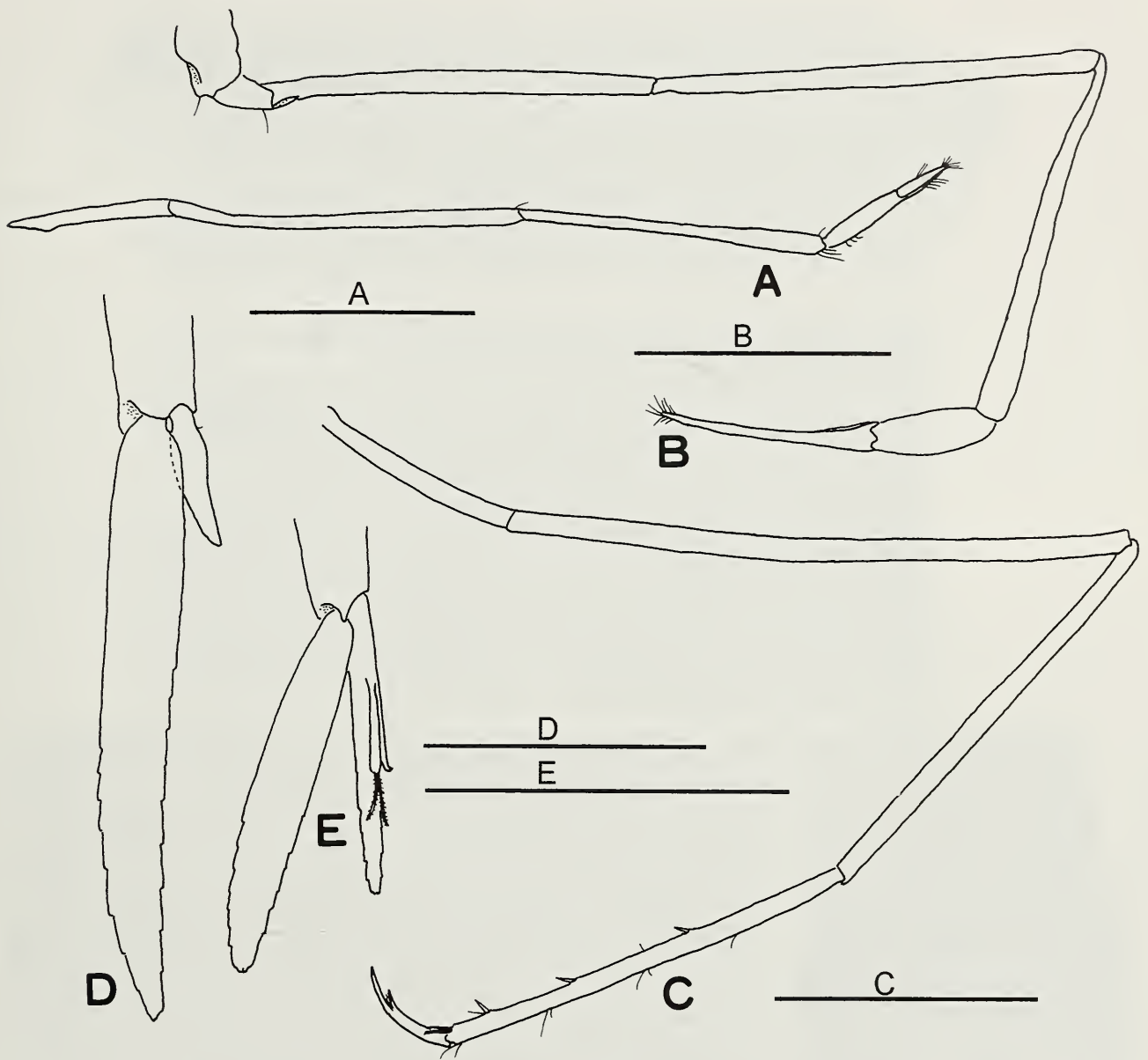


Fig. 4. *Periclimenes dolichosternum*, new species. A–C, holotype female, CMNH-ZC 00855; D, E, male paratype, CMNH-ZC 00802. A, right first pereiopod, lateral; B, right second pereiopod, lateral; C, right third pereiopod, lateral; D, male right first pleopod, dorsal; E, male second pleopod, dorsal. D, E, marginal setae omitted. Scales: A–C, E, 1.0 mm; D, 0.5 mm.

terolaterally produced; exopod broad, distinctly overreaching posterior margin of telson, lateral margin straight, terminating in small acute tooth, with larger mobile spine proximal to distolateral tooth; endopod oval, slightly shorter than exopod.

Color in life.—Body and appendages generally transparent. Lateral part of carapace with oblique white band. Dorsal surface of median carina of third abdominal somite with large, white semiquadrate circle. Posterior margin of sixth abdominal somite white. Antennular peduncle yellowish brown. Scaphocerite whitish yellow,

covered with dark brown spots. Posterior part of uropods white.

Etymology.—From the Greek, *dolichos* meaning long and the Greek *sternon* meaning breast, in reference to the characteristic, long third thoracic sternite of the new species.

Ecological notes.—Field notes taken at Kume Island show the following: the species lives beneath large pieces of coral rubbles (about 20 cm diameter) on a silty bottom at a depth of 1.5 m. Any sessile invertebrates possibly being the host of shrimps do not appear on surface or vicinity of the

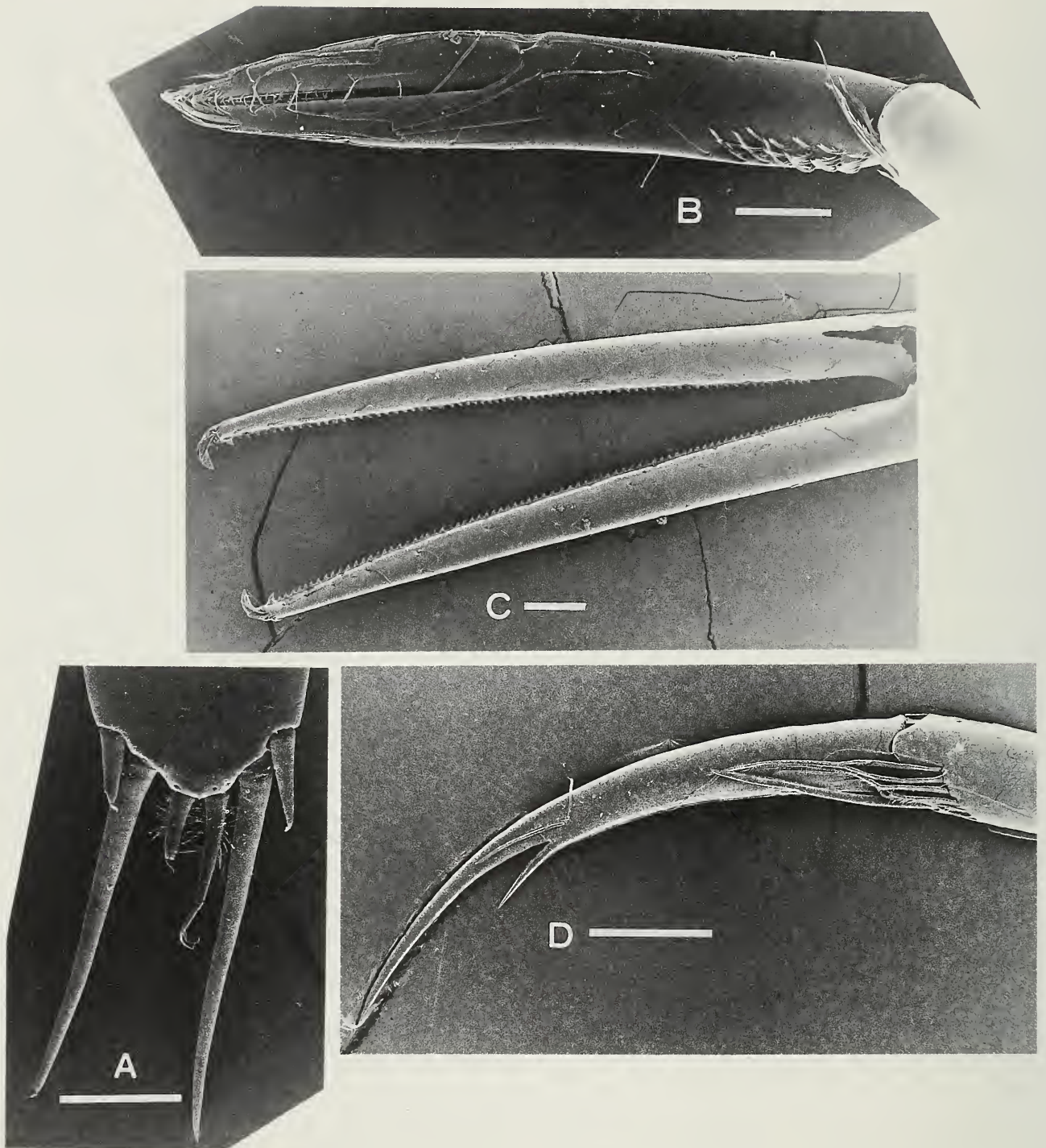


Fig. 5. *Periclimenes dolichosternum*, new species. A, ovigerous female paratype, NSMT-Cr 1989; B–D, ovigerous female paratype, NSMT-Cr 1988. A, tip of telson, dorsal; B, chela of right first pereiopod, mesial; C, fingers of right second pereiopod, mesial; D, dactylus of right third pereiopod, mesial. Scales: 100 μ m.

rubble. One to four individuals were found underneath one piece of rubble. When the rubble was removed, shrimps always clung to the underside. The small and transparent body of the shrimp is almost invisible in muddy water. The specimens collected from Iriomote Island in 2000 lived around the *Halimeda* green algae bed on sandy bottom at depths of 25–30 m.

Distribution.—Known only from the Ryukyu Islands, southern Japan.

Remarks.—Currently, the genus *Periclimenes* is morphologically distinguished from other pontoniinid genera by the following features (see Chace & Bruce 1993, Bruce 1994, Holthuis 1993): body slightly compressed laterally; carapace armed with well developed antennal and fixed hepatic

spines; dorsal and ventral blades of rostrum dentate, with proximal part of rostrum not forming a supraorbital cave; pleura of first five abdominal somites lacking acute posteroventral angles; mandible lacking palp; third maxilliped with 0 or 1 arthrobranch; exopod of third maxilliped well developed; dactyli of third to fifth pereopods lacking hoof-like protuberances.

Periclimenes dolichosternum can be separated from other species of *Periclimenes* by the long third thoracic sternite, and long intermediate segment of the antennular peduncle. The third thoracic sternite is about four times as long as the fourth somite; therefore, in lateral view, the interval between the third maxilliped and first pereopod is wide. Although the length of third thoracic sternite has previously been overlooked, the space between third maxilliped and first pereopod can be used to distinguish *P. dolichosternum* from other congeneric species. The intermediate segment of the antennular peduncle is about twice as long as the distal segment, and the antennular peduncle overreaches the distal margin of the scaphocerite.

The posterior protrusion of the tergum of the third abdominal somite is found in some *Periclimenes* species of the '*P. aesopius* species group' (see Bruce 1990b, Okuno & Nomura 2002). In addition to the features mentioned above, *P. dolichosternum* is readily distinguished from species of '*P. aesopius* species group' by having the longer and slenderer pereopods, numerous recurved teeth on the cutting edges of the second pereopodal fingers, the considerably wider corneal diameter than maximum width of eyestalk, and lacking a reflected inner flange on the inferior orbital angle. Thus, we did not consider *P. dolichosternum* as the member of the '*P. aesopius* species group'.

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