6 April 2000
PROC. BIOL. SOC. WASH.
113(1) 2000

A NEW SPECIES OF THE GENUS *NEOSTYLODACTYLUS* HAYASHI & MIYAKE, 1968(CRUSTACEA: DECAPODA: STYLODACTYLIDAE) FROM SOUTHERN JAPAN

JUNJI OKUNO AND HIROYUKI TACHIKAWA

11 April 2000

PROCEEDINGS OF THE BIOLOGICAL SOCIETY OF WASHINGTON
113(1):39–47. 2000.

A new species of the genus *Neostylodactylus* Hayashi & Miyake, 1968 (Crustacea: Decapoda: Stylodactylidae) from southern Japan

Junji Okuno and Hiroyuki Tachikawa

Coastal Branch of Natural History Museum and Institute, Chiba, 123 Yoshio, Katsuura, Chiba 299-5242, Japan

Abstract.—A new species of stylodactylid shrimp, *Neostylodactylus litoralis,* is described and illustrated on the basis of four ovigerous females collected from sublittoral zones on the Ogasawara and Ryukyu Islands at depths of 3–10.5 m. This new species is readily distinguished from the five described species of *Neostylodactylus* Hayashi & Miyake in having a non-produced posterior margin of the telson, the noticeably elongate mesialmost pair of posterior spines on the posterior margin of the telson, and unarmed meri of the third to fifth pereiopods.

Members of the caridean shrimp family Stylodactylidae are classified in five genera (Hanamura & Takeda 1996), with species known to occur in deep waters exceeding 100 m (Chace 1983; Cleva 1990, 1994, 1997). Only one stylodactylid, *Neostylodactylus amarynthis* (De Man, 1902), has been recorded in shallow waters less than 100 m (Kemp 1925, Chace 1983, Cleva 1990).

While sampling the sublittoral zone (3.0–10.5 m) of the Ogasawara and Ryukyu Islands, southern Japan, we obtained four stylodactylid specimens referable to the genus *Neostylodactylus* Hayashi & Miyake, 1968. Morphologically, our specimens differed from the five previously described species of *Neostylodactylus,* and clearly represent a new species described here.

Specimens were collected by using a hand net, and are deposited in the Coastal Branch of Natural History Museum and Institute, Chiba (CMNH). The method of measurements follows Cleva (1990). The abbreviation CL indicates postorbital carapace length.

Family Stylodactylidae
Genus *Neostylodactylus* Hayashi & Miyake, 1968
Neostylodactylus litoralis, new species
Figs. 1–4

Type series.—Holotype: ovig. ♀ CL 2.9 mm (CMNH-ZC 00071), 27°11.5′N, 142°07.0′E, Takinoura, Ani-jima Island, Ogasawara Islands, 5 m, Aug 1996, coll. Y. Morita. Paratypes: 1 ovig. ♀ CL 2.8 mm (CMNH-ZC 00103), 27°04.6′N, 142°07.1′E, Hyotan-jima Islet, NW of Chichi-jima Island, Ogasawara Islands, 8 m, May 1996, coll. T. Gomi. 1 ovig. ♀ CL 2.4 mm (CMNH-ZC 00119), 26°13.7′N, 127°27.4′E, Gahi-jima Islet, Kerama Group, Ryukyu Islands, 3 m, 3 Sep 1998, coll. A. Ono.

Non-type material.—1 ♀ CL~2.2 mm (molting) (CMNH-ZC 00137), 26°42.0′N, 127°27.4′E, Ie-shima Island, Ryukyu Islands, 10.5 m, 14 Jun 1996, coll. T. Nomura.

Diagnosis.—Small sized stylodactylid species (known specimens CL 2.4–2.9 mm). Carapace armed with supraorbital spine. Rostrum well developed, falling short of distal end of scaphocerite, armed with movable spines on both dorsal and ventral margins. Pleuron of third to fifth abdominal somite each armed with posterolateral spine. Telson armed with 2 pairs of dorsal and dorsolateral spines, posterior margin ending roundly, armed usually with 3 pairs of spines, mesialmost pair longest, with 4 plumose setae between spines. Scaphocerite armed laterally with 5 or 6 movable spines. Third to fifth pereiopods with

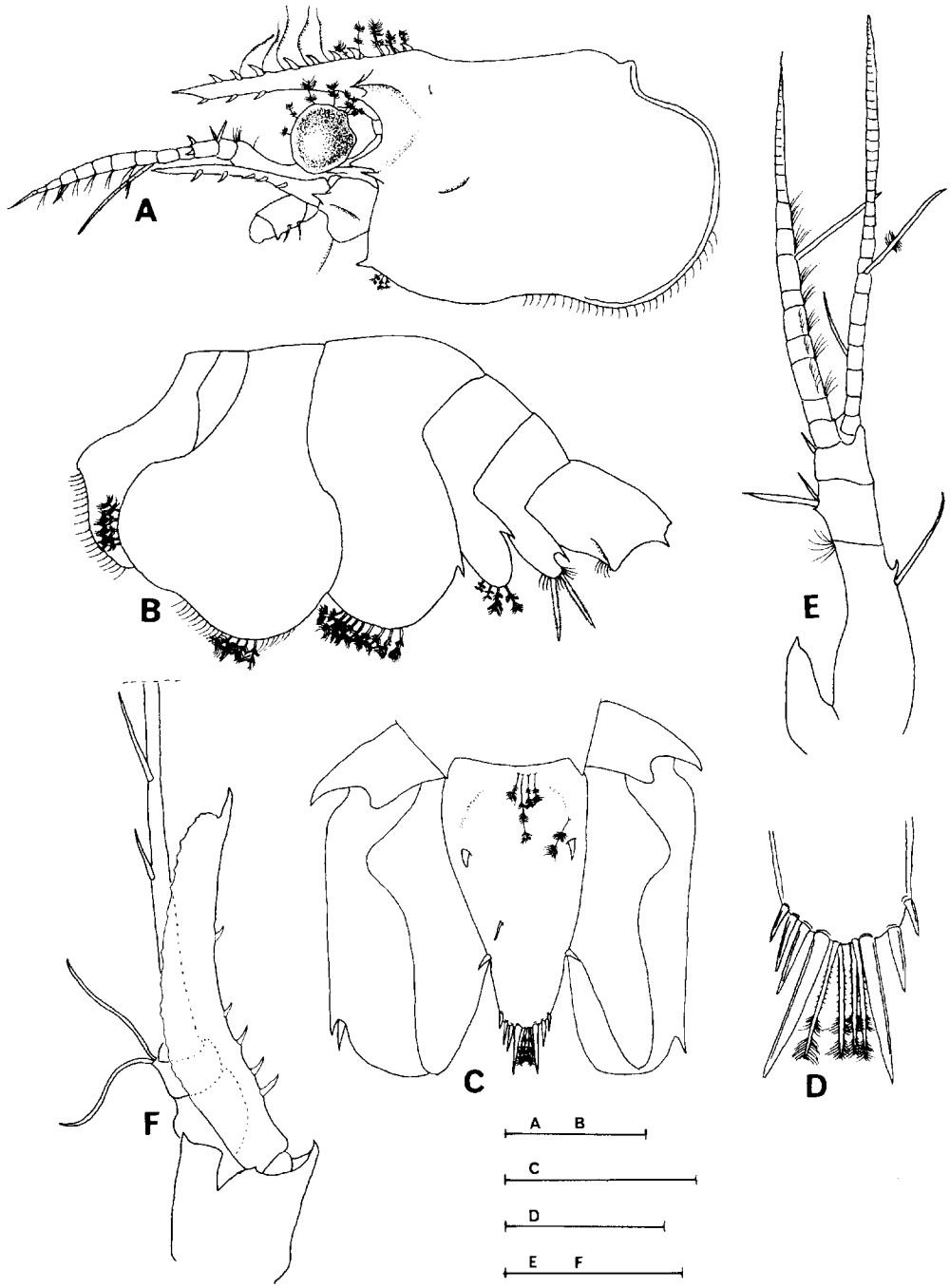

Fig. 1. *Neostylodactylus litoralis*, new species. Holotype (CMNH-ZC 00071). A, left carapace with cephalic appendages, in lateral view. B, right first to sixth abdominal somites, in lateral view. C, telson and uropods, in dorsal view. D, tip of telson, in dorsal view. E, right antennular peduncle, in ventral view. F, right antenna, in dorsal view. Scales equal 1.5 mm (A, B), 1 mm (C, E, F), 0.5 mm (D).

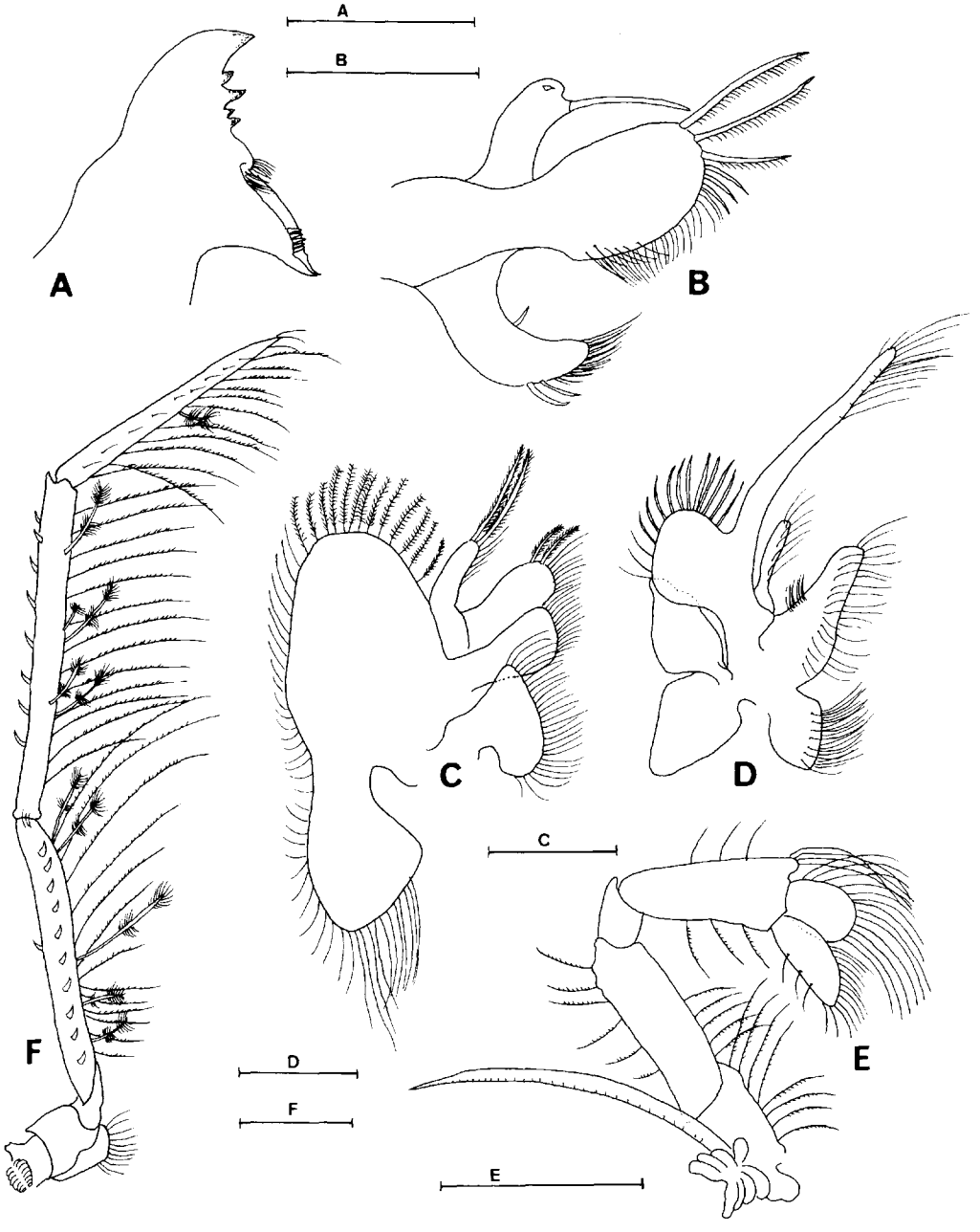

Fig. 2. *Neostylodactylus litoralis*, new species. Holotype (CMNH-ZC 00071). A, right mandible. B, right maxillule. C, right maxilla. D, right first maxilliped. E, right second maxilliped. F, right third maxilliped. Scales equal 0.5 mm (A, B, C, D), 1 mm (E, F).

uniunguiculate dactyli, armed posteriorly with 3 movable spines; meri unarmed.

Description.—Carapace (Fig. 1A) smooth, glabrous; supraorbital spine acute, continuous with feeble postorbital ridge; postorbital region slightly concave; infraorbital margin anteriorly produced in triangular process, distinctly overreaching tip of antennal spine; hepatic depression indistinct; antennal spine submarginal, directed

Table 1.—Branchial formula of *Neostylodactylus litoralis*, new species (female only).

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

anteriorly; pterygostomian angle armed with spine. Rostrum (Fig. 1A) straight, slightly descending, 0.71–0.79 times as long as carapace; dorsal margin armed with 6–12 articulated teeth, 3–9 teeth anterior to level of postorbital margin, more or less equidistant, interspace with simple long plumose setae, 1 tooth just above level of postorbital margin; dorsal carina with 2 teeth posterior to level of postorbital margin, and with 2 or 3 robust plumose setae; ventral margin armed with 1-3 articulated teeth.

Abdominal somites (Fig. 1B) smooth, glabrous; first somite with pleuron sparsely fringed with simple setae; pleuron of second somite fringed with robust plumose setae along anterolateral and ventromesial margins, with simple setae ventrally; pleuron of third somite armed with small acute tooth posterolaterally, densely fringed with robust plumose setae ventrally; pleuron of fourth somite armed with acute tooth posterolaterally, sparsely fringed with robust plumose setae marginally; pleuron of fifth somite armed with acute tooth posterolaterally, with plus 2 or 3 elongate stout setae bearing setules, and simple setae ventrally; sixth somites 0.33–0.46 times as long as carapace, unarmed posteroventrally.

Telson (Fig. 1C) 0.52–0.68 times as long as carapace, dorsal surface armed with 2 pairs of spines, posterior pair situated more laterally than anterior pair, midline with transverse row of long plumose setae proximally; posterior margin (Fig. 1D) feebly rounded, not produced in acute median process, armed with 3 pairs of spines (an extra spine on left side in holotype), mesialmost pair noticeably elongate, flanking 4 stout plumose setae.

Eye with lightly pigmented cornea, and plumose setae, without ocellus; corneal diameter 0.21–0.29 times as long as carapace; stalk slender.

Antennular peduncle (Fig. 1E) slender, slightly overreaching or falling slightly short of rostral apex; proximal segment armed with ventromesial spine and long spiniform seta posterior to spine, dorsodistal margin fringed with short simple setae; stylocerite reaching midlength of proximal segment, tapering distally in acute point; intermediate segment armed dorsolaterally with 2 spiniform setae; distal segment short, about half length of intermediate segment. Upper flagellum ventrally with short setae, seventh article with long spiniform seta distolaterally; seventh article of lower flagellum with long, plumose seta.

Antenna (Fig. 1F) with scaphocerite with lateral margin distinctly concave, slightly overreaching rostral apex, 0.69–0.75 times as long as carapace, lateral margin armed with 5 or 6 acute movable spines, distolateral tooth distinctly overreaching rounded distal blade; carpocerite fringed with long simple setae distomesially; basicerite armed with spine distolaterally; antennal flagellum armed with long spiniform setae, articulations much indistinct.

Mandible (Fig. 2A) without palp; incisor process well developed, slightly rounded, distal margin armed with 5 blunt teeth; molar process truncated distally, with short sparse setae.

Maxillule (Fig. 2B) with feebly bilobed palp, inner lobe with long simple seta, armed dorsally with small spine proximal to outer lobe; upper lacinia fringed with numerous setae, distal 3 setae considerably longer, plumose; lower lacinia distally with numerous simple setae, midlength of mesial margin with single short seta.

Maxilla (Fig. 2C) with palp distally fringed with long plumose setae; basal endite bilobed, with numerous setae on mesial

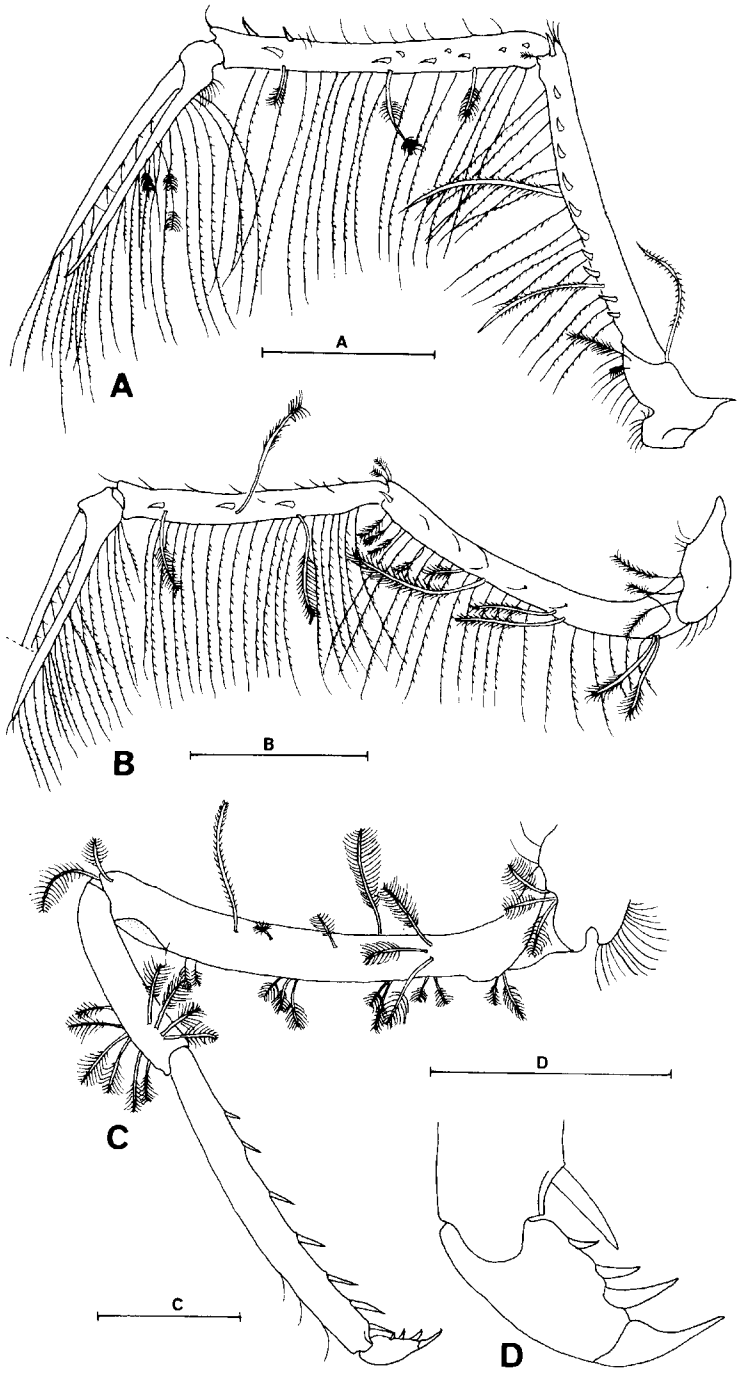

Fig. 3. *Neostylodactylus litoralis*, new species. Holotype (CMNH-ZC 00071). A, left first perciopod. B, left second pereiopod. C, left third pereiopod. D, same, dactylus. Scales equal 1.5 mm (A, B), 1 mm (C), 0.5 mm (D).

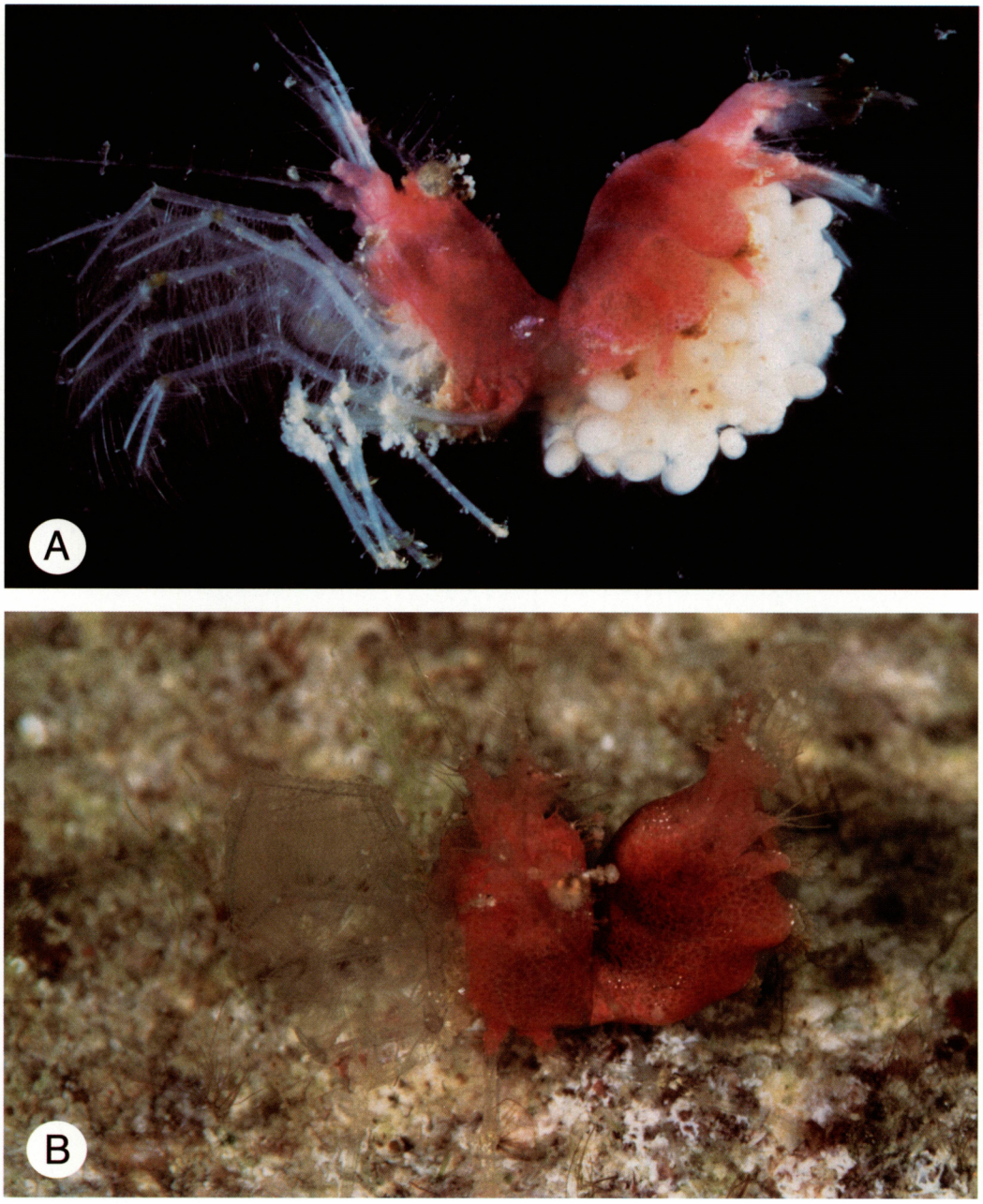

Fig. 4. *Neostylodactylus litoralis,* new species. A, holotype (CMNH-ZC 00071), fresh specimen, lateral view (photo by H. Tachikawa); B, paratype (CMNH-ZC 00119), alive in aquarium (photo by A. Ono).

margin, upper lobe slightly overreaching level of distal margin of lower lobe; coxal endite feebly rounded, with numerous setae. Scaphognathite broad, rounded, marginally with numerous setae.

First maxilliped (Fig. 2D) with well developed exopod; caridean lobe well developed, rounded, palp slender, setose; basal endite distally truncate, with 3 rows of numerous setae; coxal endite distinct, with 2

rows of numerous setae mesially. Epipod bilobed.

Second maxilliped (Fig. 2E) with well developed exopod; terminal 2 segments implanted side by side at distal end of antepenultimate segment, flexor segment slightly longer and narrower than extensor segment, distally fringed with numerous simple setae, flexor margin with 3 simple setae, extensor segment rounded, marginally with numerous long simple setae; antepenultimate segment protruded dorsodistally, with long simple setae, external and mesial margins with long simple setae; carpal segment short, naked; ischiomeral segment with dorsal margin sparsely with setae with setules, mesially with similar setae. Epipod oblong, with well developed podobranch.

Third maxilliped (Fig. 2F) slender, overreaching distal margin of scaphocerite by full length of ultimate segment, without exopod; flexor margins of distal 3 segments densely fringed with long setae with numerous setules and sparsely with short plumose setae; penultimate segment 1.21–1.22 times as long as ultimate segment, armed with row of 5–8 articulated spines; antepenultimate segment with lateral row of 9–12 articulated spines, and 1 spine on dorsal surface. Small arthrobranch present.

Branchial formula as indicated in Table 1.

First pereiopod (Fig. 3A) overreaching distal end of scaphocerite by distal margin of carpus; chela with reduced palm about one-fifth of movable and fixed fingers, proximally convex, cutting edges of both fingers entire, without tooth, movable finger with flexor margin fringed with long setae with numerous setules, fixed finger fringed ventrally with similar setae; carpus 0.83–0.93 times as long as carapace, dorsal margin armed with row of spiniform setae, lateral surface armed with row of spines, ventral margin fringed with long setae with numerous setules and with a few plumose setae; ischiomerus armed laterally with row of spines, with short simple setae distolaterally, ventral margin fringed with long setae with numerous setules and with a few plumose setae.

Second pereiopod (Fig. 3B) overreaching distal end of scaphocerite by proximal margin of movable finger; chela with reduced palm about 0.20 times as long as fingers, proximally convex, cutting edges of both fingers entire, without tooth, movable finger with flexor margin fringed with long setae with numerous setules, fixed finger fringed ventrally with similar setae; carpus 0.67–0.79 times as long as carapace, dorsal margin armed with row of spiniform setae, lateral surface armed with row of spines, ventral margin densely fringed with long setae with numerous setules and with a few plumose setae; ischiomerus armed laterally with row of spiniform setae, distolaterally with spine and short plumose setae, ventral margin densely fringed with long setae with numerous setules and sparsely with long plumose setae.

Third pereiopod (Fig. 3C) slightly overreaching midlength of scaphocerite; dactylus (Fig. 3D) uniunguiculate, armed with 3 movable spines posteriorly; propodus 0.75–0.76 times as long as carapace, 2.20–2.25 times as long as carpus, distomesial margin concave, ventrally armed with short spines; carpus unarmed, with robust plumose setae distolaterally; ischiomerus unarmed, 0.76–0.83 times as long as carapace, 2.20–2.50 times as long as carpus, laterally with long robust plumose setae, dorsodistal margin with short plumose setae, ventrally with short plumose setae. Fourth and fifth pereiopods similar to third pereiopod. Fourth pereiopod falling slightly short of midlength of scaphocerite. Fifth pereiopod overreaching basicerite by full length of dactylus.

Uropod (Fig. 1C) slightly overreaching distal margin of telson. Protopodite armed with strong lateral spine; exopod armed with acute fixed tooth distolaterally, mesially with stout movable tooth; endopod with prominent lateral lobe proximally.

Color in life (Fig. 4).—Carapace and abdominal somites reddish-violet, posterolat-

eral part of carapace and dorsolateral parts of the first to fourth somites darker than other parts, covered with numerous fine red spots. Antennular peduncle transparent-reddish, flagella transparent-whitish. Scaphocerite transparent, antennal basicerite reddish-violet. Telson, third maxilliped, anterior two pereipopods and uropods transparent. Ambulatory pereiopods with coxae and basis reddish-violet with numerous red spots; meri, carpi, propodi and dactyli transparent. Pleopods transparent.

Etymology.—*litoralis,* from Latin *litus,* the shore, in allusion to the habitat in a remarkably shallow depth in the vertical distributional range of Stylodactylidae.

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

Remarks.—Based on the distally acute stylocerite, the prominent supraorbital spine, and the absence of the mandibular palp and arthrobranchs on all pereiopods, the specimens clearly belong in the genus *Neostylodactylus.*

The rostral armature does show marked intraspecific variations. The holotype is armed dorsally with six teeth anterior to the level of the postorbital margin. The dorsal margin anterior to the orbital margin has nine teeth in the paratype from the Ogasawara Islands (CMNH-ZC 00103), and three teeth in that from the Ryukyu Islands (CMNH-ZC 00119).

The non-type material (CMNH-ZC 00137) was molting when captured.

Collectors of the present specimens observed that *N. litoralis* appeared to face upwards. The carapace was bent strongly backwards towards the abdominal somites, with the dorsal surface of the carapace almost in contact with the somites (see Fig. 4B).

In recent taxonomic studies dealing with this genus (Chace 1983; Cleva 1990, 1994, 1997; Komai 1997), five *Neostylodactylus* species were recognized: *N. affinis* Hayashi & Miyake, 1968; *N. amarynthis* (De Man, 1902); *N. hayashii* Komai, 1997; *N. investigatoris* (Kemp, 1925); and *N. sibogae* (De Man, 1918).

The non-produced posterior margin of the telson and the unarmed meri of the ambulatory pereiopods readily distinguish *N. litoralis* from all other congenerics. In other congeneric species, the posterior margin of the telson is acutely produced mesially, and the meri of ambulatory pereiopods are each armed with one or more lateral spines (see De Man 1918, 1920; Kemp 1925, Hayashi & Miyake 1968, Chace 1983, Komai 1997). Moreover, Dr. R. Cleva (in litt.) kindly informed us that the long mesialmost pair of spines on the posterior margin of the telson is also a characteristic of this new species. Furthermore, *N. litoralis* differs from *N. amarynthis,* the type species of the genus, and *N. affinis,* in having the rostrum falling short of the distal end of the scaphocerite, and the telson armed with two pairs of spines instead of five and three respectively. The smooth pleura of the first and second abdominal somites and the lack of the spine on the lateral surface of the sixth abdominal somite also separate the present new species from *N. amarynthis.* The rostral formula separate *N. litoralis* from *N. affinis.* From *N. investigatoris* and *N. sibogae,* the present new species is readily distinguished by having an armed ventral margin of the rostrum, and the presence of marginal spines on the third to fifth abdominal somites. *Neostylodactylus litoralis* differs from *N. hayashii* by having a much shorter rostrum, which falls short of the distal end of the scaphocerite; the rostral armature; the lateral margin of the scaphocerite armed with spines; and the number of spines on the dorsal surface of the telson.

Acknowledgements

We thank the Japanese skillful divers, Messrs. T. Gomi, Y. Morita, T. Nomura, and A. Ono, for making the material available for this study. Mr. A. Ono kindly permitted us to use his color photograph. Drs. A. J. Bruce and R. Cleva kindly read an early

draft, and provided valuable comments. The manuscript was benefited from reviews by Drs. T. Komai and R. Lemaitre.

Literature Cited

Chace, F. A., Jr. 1983. The caridean shrimps (Crustacea: Decapoda) of the Albatross Philippine Expedition, 1907–1910, part 1: Family Stylodactylidae.—Smithsonian Contributions to Zoology 381:1–21.

Cleva, R. 1990. Crustacea Decapoda: Les genres et les espéces indo-ouest pacifiques de Stylodactylidae. Pp. 71–136 *in* A. Crosnier, ed., Résultats des Campagnes MUSORSTOM, 6.—Mémoires du Muséum National d'Histoire Naturelle, Paris (A) 145.

———. 1994. Some Australian Stylodactylidae (Crustacea: Decapoda), with descriptions of two new species.—The Beagle, Records of the Museums and Art Galleries of the Northern Territory 11: 53–64.

———. 1997. Crustacea Decapoda: Stylodactylidae récoltés en Indonésie, aux îles Wallis et Futuna et au Vanuatu (Campagnes KARUBAR, MUSORSTOM 7 et 8). Données complémentaires sur les Stylodactylidae de Nouvelle-Calédonie. Pp. 385–407 *in* A. Crosnier & P. Bouchet, eds., Résultats des Campagnes MUSORSTOM, 16.—Mémoires du Muséum National d'Histoire Naturelle, Paris 172.

De Man, J. G. 1902. Die von Herrn Professor Kükenthal im Indischen Archipel gesammelten Dekapoden und Stomatopoden. *In* W. Kükenthal, Ergebnisse einer zoologischen Forschungsreise in den Molukken und Borneo.—Abhandlungen Herausgegeben von der Senckenbergischen Naturforschenden Gesellschaft 25:467–929 pls. 19–27.

———. 1918. Diagnoses of new species of macrurous decapod crustacea from the Siboga-Expedition.—Zoologische Mededelingen, Leiden 4: 159–166.

———. 1920. The Decapoda of the Siboga Expedition, part IV. Families Pasiphaeidae, Stylodactylidae, Hoplophoridae, Nematocarcinidae, Thalassocaridae, Pandalidae, Psalidopodidae, Gnathophyllidae, Processidae, Glyphocrangonidae, and Crangonidae.—Siboga-Expeditie 39a3:1–318, pls. 1–25.

Hanamura, Y., & M. Takeda. 1996. Establishment of a new genus *Bathystylodactylus* (Crustacea: Decapoda: Stylodactylidae), with description of a new species from northwestern Pacific.—Zoological Science 13:929–934.

Hayashi, K.-I., & S. Miyake. 1968. Notes on the family Stylodactylidae with the description of a new genus *Neostylodactylus*.—Journal of the Faculty of Agriculture, Kyushu University 14: 583–611.

Kemp, S. 1925. Notes on Crustacea Decapoda in the Indian Museum, XVII: On various Caridea.—Records of the Indian Museum 27:249–343.

Komai, T. 1997. A new species of the shrimp genus *Neostylodactylus* Hayashi and Miyake (Crustacea: Decapoda: Stylodactylidae) from Japan.—Natural History Research 4:125–133.