

**TWO NEW SPECIES OF THE PALAEMONID SHRIMP GENUS PERICLIMENES  
FROM THE MALDIVE WATERS (CRUSTACEA, DECAPODA, PALAEMONIDAE)**

Zdeněk ĐURIŠ

Institute of Industrial Landscape Ecology, Czechoslovak Academy of Sciences,  
Chittusiho 10, 710 00 Ostrava 2, Czechoslovakia

**Abstract.** Two new species of commensal shrimps of the palaemonid genus *Periclimenes* Costa were found in waters of North Nilandu Atoll, the Maldive Islands. The new species, *P. brucei* and *P. zeviniae* spp. n., are described and illustrated.

A great majority of palaemonid shrimp species excluding some free-living forms, are obligatory associated with various marine invertebrates. The genus *Periclimenes* COSTA, 1844, represented in the Indo-West Pacific by more than one hundred species, associates with the largest spectrum of hosts from which the dominant position is occupied by scleractinian corals. Our work presents a contribution to the knowledge of shrimps associated with corals of another systematic group — the antipatharian "black corals". Some large branches of *Antipathes* sp. and *A. dichotoma* were lifted by divers during the IX-th cruise of Soviet R/V "Akademik Petrovskii" in Maldive waters, Indian Ocean, from depths about 50 m. Two specimens of the genus *Periclimenes* from the collection are described here as holotype of two new species. The holotypes are deposited in the Zoological Museum of Moscow State University (ZMMSU), Moscow, U.S.S.R.

*Periclimenes brucei* sp. n.

(Figs. 1—2)\*

**Synonymy:** — ? *Periclimenes* sp. — Bruce, 1978: 255, fig. 27.

**Material examined:** 1 ovigerous female (ZMMSU No: Ma 2522); IXth cruise of R/V "Akademik Petrovskii", Station 34, 13.03.1980, Indian Ocean, the Maldive Islands, North Nilandu Atoll, Genego Island, depth 52 m; coll. G. B. Zevina, leg. A. V. Tchesunov.

**Description:** Medium sized, slender palaemonid shrimp (Fig. 1) with carapace and abdomen smooth.

Rostrum (Fig. 2A) slender, straight, subequal to postorbital carapace length; dorsal lamina with 8 anteriorly directed teeth, first tooth placed well behind posterior orbital margin; ventral margin straight, setose, 2 teeth present — one placed under distal dorsal tooth, second very small, inconspicuous, sub-apical; lateral carinae of rostrum feebly developed; epigastric, antennal and hepatic spines present, supraorbital spines absent; inferior orbital angle pro-

\*The figures 1—4 will be found at the end of this issue.

duced into blunt, rounded lobe (Fig. 2A); antennal spine slender, submarginal, situated deeply below level of inferior orbital angle; hepatic spine similar and subequal to antennal spine; anteroventral border of branchiostegite bluntly angular.

Thoracic sternites without special features.

Abdominal pleurae I—V rounded, posterolateral and posteroventral angles of sixth segment produced into sharp points; sixth segment longer than preceding segment and 2.6 times longer than deep (Fig. 1). Telson (Fig. 2E) subequal to length of sixth abdominal segment and 5 times longer than anterior width, lateral borders subparallel anteriorly and convergent distally, posterior margin about 0.4 of anterior width, irregularly convex, with small median process; 2 pairs of small dorsal spines present, anterior pair situated immediately behind middle of telson length, posterior pair placed about midway between anterior pair and posterior margin of telson; posterior margin (Fig. 2F) with 3 pairs of spines: lateral spines similar and subequal to dorsal spines (all of them are about 20 times shorter than telson), intermediate long and slender, subequal to 0.2 telson length, submedian about 3 times shorter than intermediate and bilaterally setulose.

Eyes (Fig. 2B) with globular cornea broader and shorter than eyestalk, small accessory pigment spot present dorsolaterally on eyestalk behind cornea.

Antennular peduncle (Fig. 2C) exceeding rostrum by distal half of third segment; basal segment with feebly sinuate lateral margin and with stylocerite not reaching to middle of the segment, anterior margin deeply sinuate with acute lateral spine not overreaching rounded lobe placed more mesially; second and distal peduncular segments with combined length distinctly shorter than length of basal segment; biramous upper flagellum with 9 groups of aesthetascs and with fused part consisting of 4 articles, short free ramus with 3 articles, longer free ramus filiform consisting of about 37 articles; lower flagellum filiform, shorter than similar ramus of upper flagellum, with about 34 articles.

Antennal carpocerite not reaching to distal margin of basal antennular segment, flagellum filiform, long; scaphocerite (Fig. 2D) slightly overreaching antennular peduncle, outer margin feebly concave ending by strong final tooth not overreaching anterior margin of lamella; lamella about 4 times longer than greatest width, gradually narrowing towards truncate top.

Mandibles without palps. Third maxillipeds narrow, not reaching to distal end of scaphocerite; inner ischio-meral margin with scattered setulose chetae and with 2 small spines placed distally; penultimate segment, about 1.5 times shorter than ischio-merus, with row of long ventral setae; ultimate segment 1.5 times shorter than penultimate, with 4 transverse rows of strong rough setae on ventromesial margin, and with terminal group of similar but longer setae; basis with inner border broadly rounded and with exopodit reaching to 3/4 of ischiomer length; coxa bearing rounded epipodit with small rudimentary arthrobranch consisting of single lamella.

First pereopods slender, symmetrical, extending scaphocerite by length of fingers; fingers (Fig. 2G) slender, simple, with some long setae; palm, slightly longer than fingers, bearing on inner proximal face 5 transverse rows of short setae; carpus 1.3 times longer than chela, merus as long as carpus; coxa with small tubercle on inner face.

Second pereopods slender, similar, but very unequal in size. Major (right) appendage extremely long exceeding scaphocerite by chela, carpus and merus.

(Fig. 1); fingers occupy distal quarter of chela (Fig. 2I). dactylus feebly curved and with cutting edge lying into shallow groove on fixed finger, opposite edges of fingers with 2 low teeth placed proximally; palm subcylindrical, slightly compressed, 7 times longer than deep; carpus 1.5 times longer than chela and distinctly more slender than palm; merus about 0.6 of length of carpus, ischium 1.5 times longer than merus. Minor (left) appendage only slightly longer than half of major second pereopod; chela (Fig. 2H) similar to great chela, however fingers slightly longer than half length of palm and with cutting edges simple: palm 5 times longer than deep, carpus 1.2 times longer than chela, merus about 0.7 of carpal length, ischium 1.5 times longer than merus.

Pereopods III—V slender, similar, subequal (Fig. 1). Third pereopod exceeds carpopereopod by greater part of carpus; dactylus (Fig. 2J) slender and feebly curved, biunguiculate, upper unguis occupying more than 1/3 of distal length of dactylus, lower unguis very small; propodus 5 times longer than dactylus, ventral border armed on its distal quarter by 4 groups of rough spines (Fig. 2J) consisting of 2 (or of 3 — in proximal group) spines; carpus, about 2/3 of propodal length, bearing single dorsodistal tooth over carpo-propodal articulation; merus about 1.5 times longer than carpus, ischium equal to 0.5 of meral length.

Uropods (Fig. 2E) with exopod 4.2 times longer than broad; exopod with lateral border straight bearing longitudinal row of short, ventrally directed setae, distolateral angle produced into short acute tooth and armed by movable spine 2 times longer than distolateral tooth; endopod 4.7 times longer than broad reaching to level of distolateral tooth of exopod.

Eggmass with 36 ova without eye-spots.

Measurements: Lengths (mm): total (without rostrum) — 12.0; post-orbital of carapace — 2.5; rostrum — 2.5; first pereopods — 4.0; major second pereopod — 15.0; minor second pereopod — 8.5; third pereopods — 6.2; length and diameter of eggs —  $0.53 \times 0.39$ .

Habitat: The single specimen of *P. brucei* sp. n. was found on the antipatharian "black coral" *Antipathes dichotoma* (Pallas) in a depth of 52 m. The other palaemonid shrimps that occurred with *P. brucei* were 2 specimens of *P. psamathe* (De Man), 15 specimens of *P. lepidus* Bruce, 62 specimens of *P. nilandensis* Borradaile, and 10 specimens of *Pontonides ? unciger* (Calman). Other symbionts found on the same host were: *Lissoporcellana pectinata* Haig (Porcellanidae), crabs *Quadrella* sp. (*Trapeziidae*), some specimens of spider-crab family Majidae, and ophiuroids (Echinodermata, Ophiuroidea).

Discussion: The new species is remarkable by its long and slender appendages, especially by the major second pereopod which is more than 1.7 times longer than the minor one. Very similar relations between the legs were measured on specimens of *P. psamathe* found on the same animal host too. Moreover, their legs were 6.0 and 3.3—3.5 times longer than postorbital carapace lengths (for major and minor legs, respectively), in *P. brucei* sp. n. — 6.0 and 3.4 times longer. The interesting agreement between the two species is probably result of a convergent origin and caused by living in similar conditions of commensalism on the same or similar invertebrate host. However, *P. psamathe* differs from our new species by some distinct features, particularly by longer rostrum (1.66 and 2.22 times longer than postorbital carapace lengths in our specimens) which is upcurved and bears small number of only

dorsal teeth (4—6 teeth), by presence of fine but distinct granulation on palm and carpus of second pereopods, and by simple dactyli of walking legs (see: Bruce, 1970; 1977).

The presence of unusually long major appendage of second pair of pereopods was previously observed also on large males of *P. agag* Kemp, however, according to descriptions (Kemp, 1922; Ledoyer, 1984), females have the appendage distinctly shorter. The species differs from *P. brucei* sp. n. by following features too: the upcurved rostrum possess two ventral teeth placed at middle of its ventral margin; supraorbital spines present on carapace; fingers of second pereopods occupy distal  $1/3-1/2$  of the chelae; second pereopods with the chelae longer than carpi; dactyli of walking legs simple; anterior pair of dorsal telson spines situated on the anterior third of the telson (see: Kemp, 1922; Ledoyer, 1984).

In his report of pontonine shrimps of Madagascar, Bruce (1978: p. 255) shows two damaged undetermined specimens of the genus *Periclimenes*. The *Periclimenes* sp. in accordance with Bruce's short description and figure of carapace, is very similar to our *P. brucei* sp. n., and it is possible that they are conspecific. Particularly, there are agreements in the length, shape and armament of the rostrum, in the presence of the epigastric spine and in submarginal position of antennal spine, and in the shape of the inferior orbital angle of carapace (see Bruce, 1978: Fig. 27). Second pereopods probably absent on the specimens discussed.

Bruce's material shows, in the author's opinion, a relation to *P. indicus* (Kemp) and *P. obscurus* Kemp. Both the species, according to the data given by Kemp (1922), differ from *P. brucei* sp. n. by shape of rostrum, by characters of second pereopods, and by proportions of dactyli of the pereopods III—V.

**Types:** The only specimen, the ovigerous female, is designated as the holotype and deposited in the collection of the Zoological Museum of Moscow State University, catalogue number Ma 2522.

**Type locality:** Genego Island, North Nilandu Atoll, Maldives, Indian Ocean.

**Distribution:** *P. brucei* sp. n. is known only from the type locality. Bruce's specimens of *Periclimenes* sp. were found off the north-west coast of Madagascar in depth of 23 m, on antipatharian coral too. However, the material needs confirmation of a conspecific or different character with *P. brucei* sp. n.

**Etymology:** This species is named for Alexander J. Bruce, in recognition of his many contributions to the study of pontonine shrimps.

*Periclimenes zeviniae* sp. n.

(Figs. 3—4)

**Material examined:** 1 female (ZMMSU No: Ma 2521); the IX cruise of R/V "Akademik Petrovskii", Station 34, 12.03.1980, Indian Ocean, the Maldivian Islands, North Nilandu Atoll, Genego Island, depth 50 m; coll. G. B. Zevina, leg. A. V. Tchesunov.

**Description:** Small sized palaemonid shrimp (Fig. 3) with carapace and abdomen smooth.

Carapace with well developed rostrum (Fig. 4F); rostral lamina high, apex reaching to middle of second segment of antennular peduncle (Fig. 3); rostral formula 6/1, first dorsal tooth situated over orbits, single ventral tooth placed below distal dorsal tooth, ventral margin convex, with row of setae; lower orbital angle produced, rounded; epibranchial and supraorbital spines absent; antennal and hepatic spines present, subequal and similar, antennal spine submarginal and situated immediately below lower orbital angle, hepatic spine slightly lower; anteroventral border of branchiostegite rounded.

Thoracic sternites without special features, posterior ones flat, broad.

Abdominal pleurae rounded (Fig. 3), sixth segment about twice the length of the fifth one; posterolateral and posteroventral angles of sixth abdominal segment without acute apex.

Telson (Fig. 4I) equal to sixth abdominal segment and more than 3.5 times longer than its greatest width (on its anterior third with subparallel lateral borders); two pairs of dorsal telson spines (about 15 times shorter than telson length) present, anterior pair placed on 0.6 of telson length from anterior margin, second pair — about midway between anterior pair and posterior margin of telson; posterior margin convex, 2.5 times narrower than anterior width, bearing 3 pairs of spines; lateral spines subequal and similar to dorsal telson spines, intermediate spines long (0.2 of telson length), submedian spines 2 times shorter than intermediate, bilaterally setulose.

Eyes great (Fig. 3), cornea globular, small accessory pigment spot present dorsolaterally on stalk behind cornea; eyestalk slightly compressed, broader than cornea in lateral view and narrower — in dorsal view.

Antennular peduncle (Fig. 4G) with basal segment distinctly longer than length of second and third segments combined, its anterolateral border sinuate and produced by rounded lobe and lateral spine of equal sizes; stylocerite narrow, not extending to middle of basal segment; biramous upper flagellum with 4 groups of aesthetascs and with fused part consisting of 4 articles, short free ramus with only single article, free filiform ramus with about 11 articles; lower flagellum filiform and longer than upper flagellum having about 16 articles.

Antenna with carpo-cerite extending beyond middle of basal antennular segment; scaphocerite (Fig. 4H) slightly longer than antennular peduncle and 4 times longer than greatest width, distal margin broadly rounded, lateral margin straight with strong final spine distinctly not extending to distal border of lamina.

Mandibles without palp. Third maxillipeds extend to distal end of carpo-cerite; ischio-merus with one denticle situated distolaterally, inner border with scattered setae; penultimate segment with some long setae on inner and outer margins; ultimate segment short, with 4 transverse rows of short setae on inner margin, with some setae laterally, and with group of 4 strong setae terminally; coxa with small rounded epipodit.

First pereiopods slender, similar, extending to end of antennular peduncle. Chela (Fig. 4A) with fingers occupying 0.6 of its distal length; fingers subcylindrical, opposite surfaces flattened, tips with groups of long setae; dactylus (Fig. 4A,B) with apex flattened, unusually produced and downcurved into transparent "nail-like" structure with tuberculate anterior border; fixed finger without nail-like apex, anterior border with tubercles; palm cylindrical, carpus subequal to chela, narrowed proximally, merus 1.4 times longer than

carpus; ischium 0.5 of carpal length; basis short, higher than ischium, ventral border with longitudinal keel bearing row of mesially directed short setae and with small distal lobe; coxa with larger ventral setose lobe continuing to described structure of basis.

Second pereopods symmetrical, stronger and 1.5 times longer than first pereopods (Fig. 3); chela (Fig. 4C) with fingers slightly shorter than palm; palm subcylindrical; fingers narrow distally and covered by scattered long setae from which longest ones are placed terminally; dactylus with one pair of obtuse teeth on each site near apex, fixed finger with one subapical tooth; carpus slightly shorter than palm, narrowing proximally; merus 1.2 times longer than carpus, ischium slightly longer than merus, basis and coxa short, without special structures.

Walking legs uncomplete on described specimen, both fourth and one fifth pereopods absent; all of present walking legs subequal in size and similar. Third pereopods (Fig. 4D) reach to end of antennular peduncle; dactylus (Fig. 4E) relatively short and high, biungiculate, notch between ungui deep reaching to 1/3 of distal length of dactylus, both ungui with subequal width on their base, lower unguis 2 times shorter than upper unguis, ventral border of dactylus feebly concave bearing 1—3 very minute denticles; propodus long, about 4 times longer than dactylus, dorsal border with some groups of simple and setose chetae, ventral border armed by 3 small single spines and one pair of longer distal spines; carpus 2 times shorter than propodus, dorsal tooth overreaching carpo-propodal articulation; merus slightly longer than propodus; ischium, basis and coxa without special features.

First pleopod with small, feebly developed exopodit, second pleopod with well shaped endopodit and appendix interna.

Uropods with rounded dorsolateral lobe on protopod; both uropodal rami longer than telson (Fig. 4I); exopod 3.5 times longer than broad, distolateral angle formed by small acute tooth with longer movable spine placed more mesially; endopod shorter than exopod, narrower, 4 times longer than broad.

**Measurements:** Lengths (mm): total (without rostrum) — 8.0; post-orbital of carapace — 1.2; rostrum — 0.6; first pereopods — 3.5; second pereopods — 5.0; third pereopods — 4.8.

**Habitat:** The single specimen of *P. zeviniae* sp. n. was collected from antipatharian "black coral" *Antipathes* sp. found in the depth of 50 m. Fauna associated with the same coral host was represented: by other palaemonid shrimps as following — 1 specimen of *Palaemonella rotumana* Borradaile, 16 specimens of *Periclimenes nilandensis* Borradaile, 1 specimen of *Periclimenaeus arabicus* (Calman); by 15 specimens of crabs of the families Xanthidae and Majidae; and by ophiures, bivalves, and colonial ascidians (author's determinations and collector's notes). It is possible that the black coral need not be the true host of described specimen or of some other commensals listed above. For example, *P. arabicus* is known as living on the surface of sponges (Holtuis, 1952; Bruce, 1980); which, according to the collector's notes, encrusted bases of branches of the coral host examined too.

**Discussion:** Although the described specimen is probably not adult, specific features of the new species are distinct. *P. zeviniae* sp. n. distinguishes from all other species of the genus especially by two unique structures: 1 — the produced "nail-like" tips on fingers of first pereopods; 2 — the presence of very minute denticles on ventral dactylar border of walking legs. Both the

features have not been described previously, however, they may be observed with difficulty under low magnifications.

According to the general body shape the new species belongs to the "incertus group" of species of the genus *Periclimenes* (see Bruce, 1969: p. 276). The shape of dactyli of the walking pereopods (excluding the ventral dentition), of the rostrum, and of the armation on basis and coxa of first pereopods are very similar to those reported by Kemp (1922) for *P. incertus*. The species differs from *P. zeviniae* sp. n. having the first rostral teeth behind the posterior orbital margin, and by the presence of the epigastric spine; fingers of the first pair of pereopods of *P. incertus* are subequal to the length of the palm, however, they are distinctly longer on the new species; *P. incertus* distinguishes *P. zeviniae* sp. n. by having the second pereopods unequal in size, and by the shorter free ramus of upper flagellum consisting of more than one article (see: Kemp, 1922; Bruce, 1978; Ledoyer, 1984). *P. incertus* and *P. zeviniae* sp. n. readily differ from all other species of the "incertus group" (sensu Bruce, 1969) by the accessory ventral unguis on dactyli of walking legs being more robust.

**Types:** The only specimen, the female, is designated as the holotype and deposited in the collection of the Zoological Museum of Moscow State University, catalogue number Ma 2521.

**Type locality:** Genego Island, North Nilandu Atoll, Maldives, Indian Ocean.

**Distribution:** Known only from the type locality.

**Etymology:** The new species is named for Galina B. Zevina (Biological Faculty of Moscow State University), the organizer and participant of the cruise where rich and interesting material of coral-associated crustaceans were collected.

#### Acknowledgements

I am very grateful to Galina B. Zevina and A. V. Tchesunov (Biological Faculty, Moscow State University, Moscow, U.S.S.R.) for collecting and providing me with very interesting material. I extend my appreciation to A. J. Bruce (Northern Territory Museum of Arts and Sciences, Darwin, Australia) for valuable consultations and help with literature, to F. A. Pasternak (Institute of Oceanology, Academy of Sciences of the U.S.S.R., Moscow) for determinations of coral hosts, and to B. G. Ivanov (All-Union Research Institute of Sea Fishery and Oceanography, Moscow) and N. A. Zarenkov (Biological Faculty, Moscow State University) for critical reading of the first manuscript.

#### REFERENCES

- Bruce, A. J., 1969: Preliminary descriptions of sixteen new species of the genus *Periclimenes* Costa, 1844 (Crustacea, Decapoda, Natantia, Pontoniinae). *Zool. Med.-ed.*, 43: 253—278
- Bruce, A. J., 1970: Report on some commensal pontoniid shrimps (Crustacea: Palaemonidae) associated with an Indo-Pacific gorgonian host (Coelenterata: Gorgonacea). *J. Zool.*, London, 160: 537—544.
- Bruce, A. J., 1977: Notes on some Indo-Pacific Pontoniinae, XXX. Some *Periclimenes* species from Madagascar (Decapoda Caridea). *Crustaceana*, 33: 265—274.
- Bruce, A. J., 1978: A report on a collection of pontoniine shrimps from Madagascar and adjacent seas. *Zool. J. Linn. Soc.*, 62: 205—290.
- Bruce, A. J., 1978: A report on a collection of pontoniine shrimps from Madagascar Tseng, C. K., (Eds.): The marine flora and fauna of Hong Kong and Southern

- China. Proc. First Int. mar. biol. Workshop, Hong Kong, 1980. Hong Kong Univ. Press: 233—284.
- Holthuis, L. B., 1952: The Decapoda of the Siboga Expedition. Part XI. The Palaemonidae collected by the Siboga and Snellius Expeditions with remarks on other speices. II. Subfamily Pontoniinae. *Siboga Exped. Monogr.*, 39a<sup>10</sup>(143): 1—258.
- Kemp, S., 1922: Notes on Crustacea Decapoda in the Indian Museum. XV. Pontoniinae. *Rec. Indian Mus.*, 24: 113—288, pls. 3—9.
- Ledoyer, M., 1984: Les Caridea (Crustacea: Decapoda) des herbiers de phanérogames marines de Nouvelle-Calédonie (Région de Nouméa). *Zool. Verh.*, 211: 1—58.

Received December 15, 1988; accepted May 18, 1989



Đuriš Z.: Two new species of the palaemonid shrimps genus *Periclimenes*

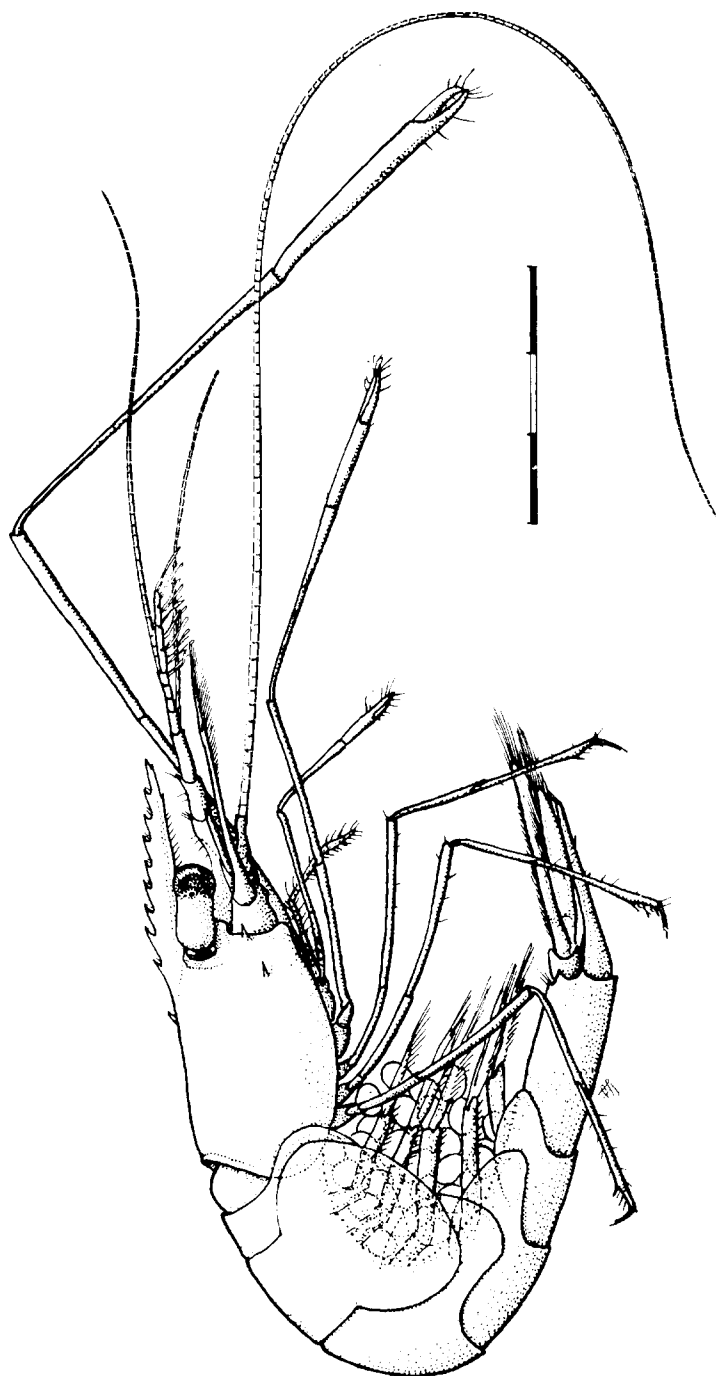


Fig. 1. *Periclimenes brucei* sp.n. Lateral view of ovigerous female, holotype. Scale in mm.

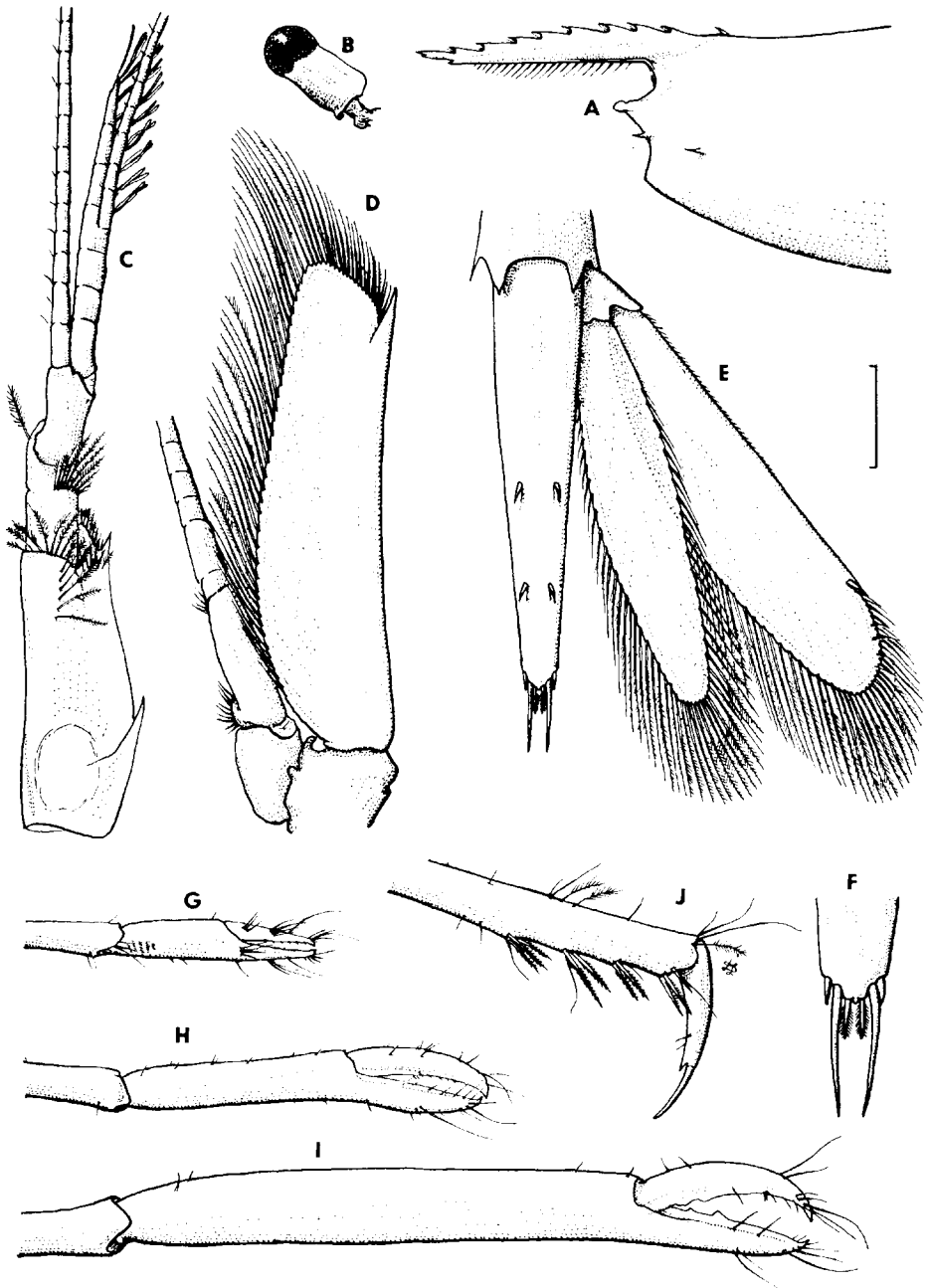


Fig. 2. *Periclimenes brucei* sp. n., female, holotype: A — anterior carapace and rostrum; B — eye (dorsal view); C — antennula; D — antenna; E — telson and uropod; F — posterior part of telson; G — chela of first pereiopod; H — chela of minor second pereiopod; I — chela of major second pereiopod; J — distal part of third pereiopod. Scales: A, B — 1 mm; C, D, E, G, I — 0,5 mm; F — 0,3 mm; J — 0,2 mm.

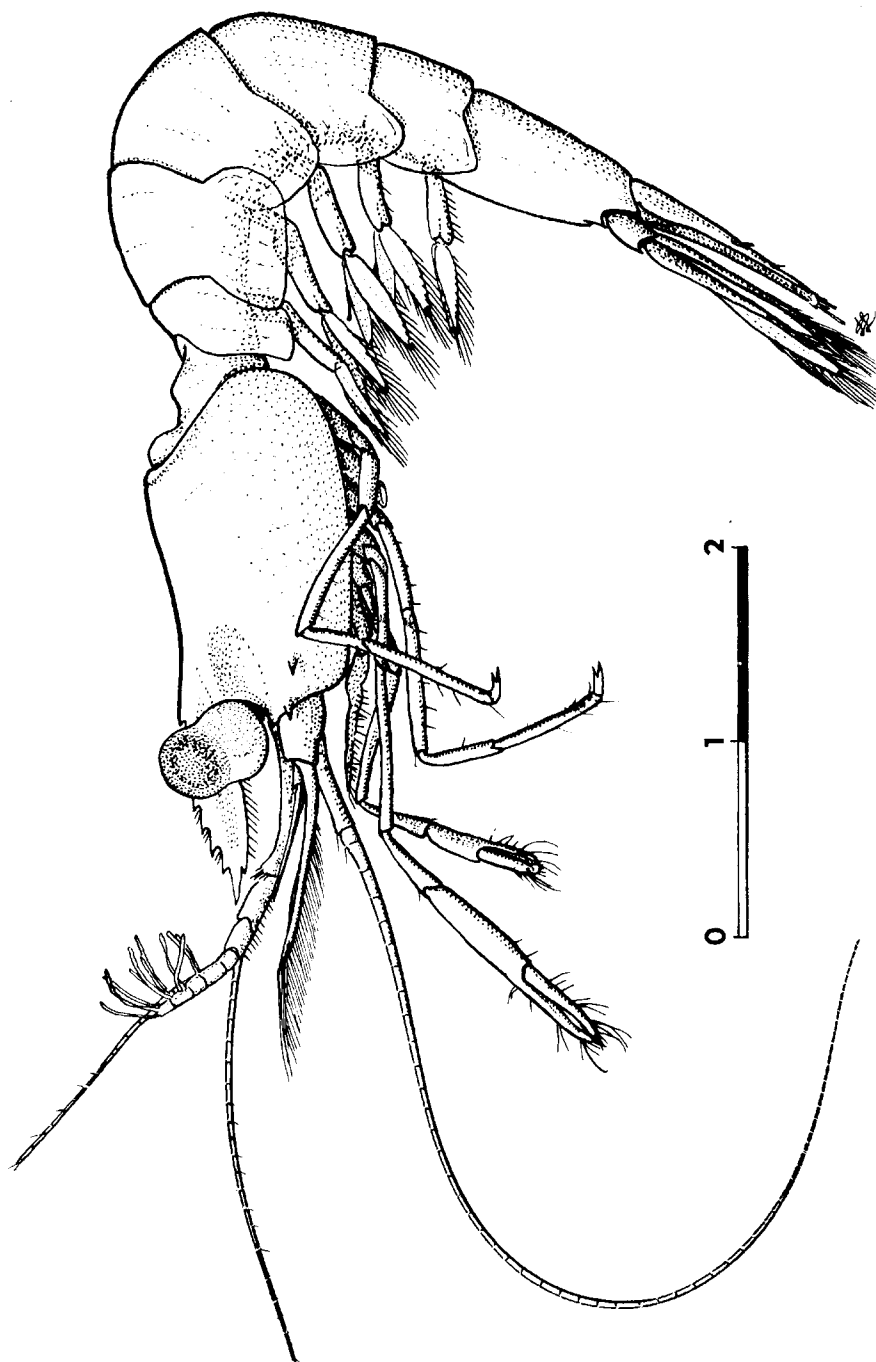


Fig. 3. *Periclimenes zeviniae* sp.n. Lateral view of the holotype female. Scale in mm.

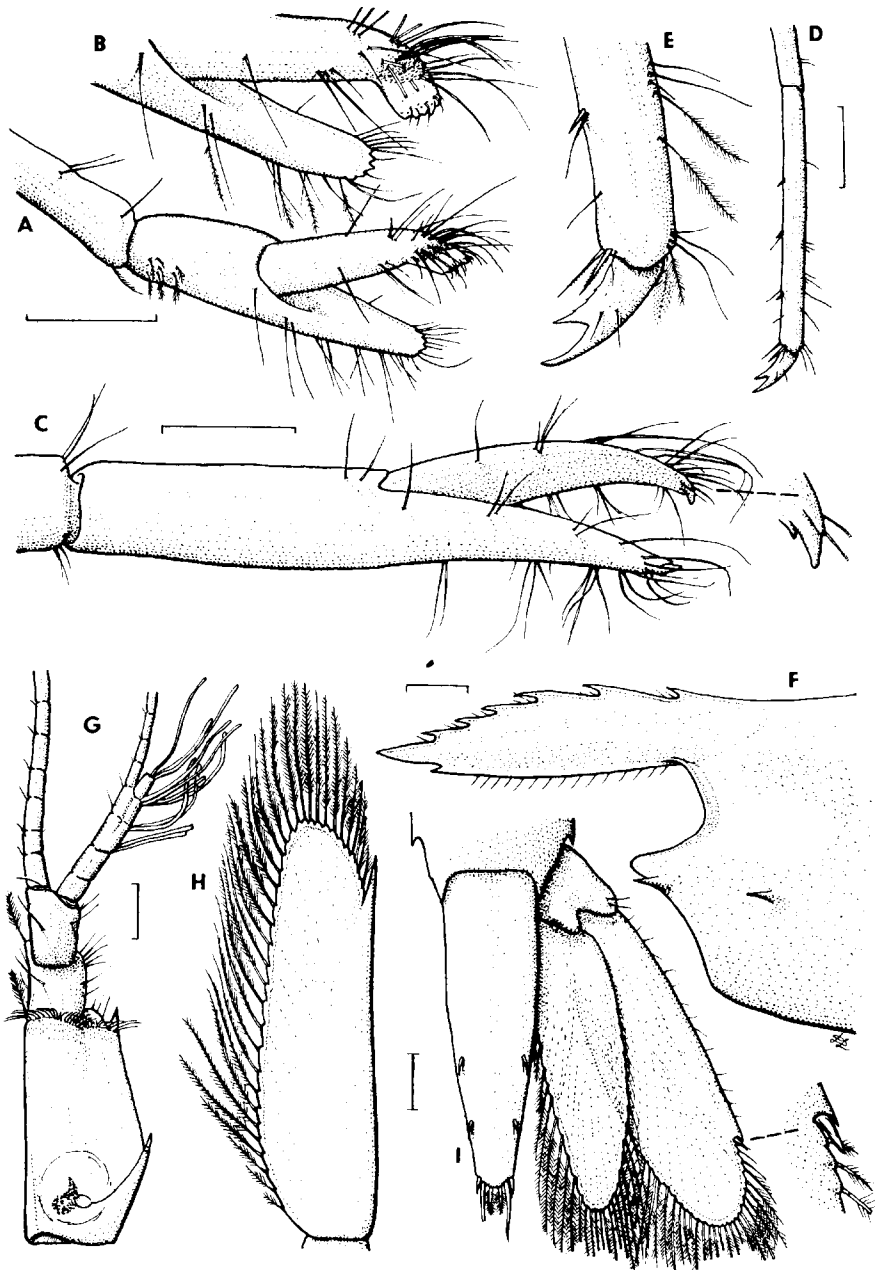


Fig. 4. *Periclimenes zevinæ* sp.n., female, holotype: A — chela of first pereiopod; B — same, fingers; C — chela of second pereiopod; D — distal part of third pereiopod; E — same dactylus; F — anterior carapace and rostrum; G — antennula; H — scaphocerite; I — telson and uropod. Scale: 0,2 mm.