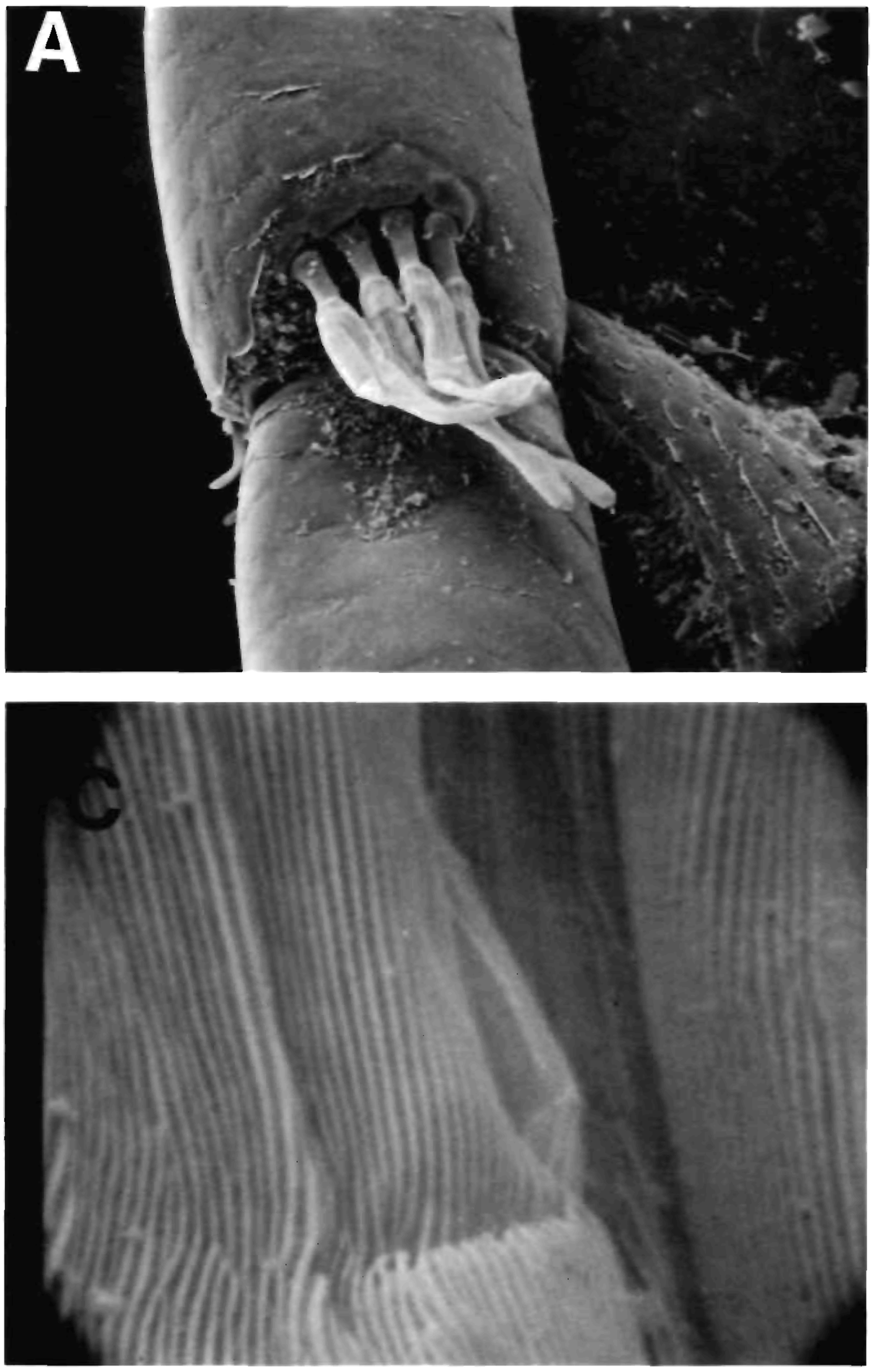



Figure 52. *Excirolana mayana*, scanning electron micrographs: A, antennule aethetascs, 740×. B, antennule aethetascs, 1480×. C, aethestasc surface, 14,800×. D, three setal types on antennal peduncle, 1332×.

posteriorly narrowed: clypeus wider than long, with ventrally projecting median triangular blade; labrum about as wide (or slightly narrower) but longer than clypeus. Antennule short, never extending beyond pereonite I; peduncle 3-articulate; article 2 not articulating at right angle to article 1; peduncular article 2 or 3 longest; flagellum reduced, basal articles longer than broad. Antennal peduncle 5-articulate; article 5 longest, proximal two articles may be partially fused. Mandible with broad tridentate incisor and an additional small accessory tooth on medial (inner) margin of right mandible; middle lobe of left mandible usually low and bladelike; palp 3-articulate, extending beyond incisor; spine row a well-developed rounded lobe with long stout spines. Maxillule's medial lobe with 3 or 4 circumplumose spines, sometimes with reduced setulation, also occasionally with 1 or 2 short simple spines; lateral lobe with large stout spines, often barbed. Maxilla's medial lobe somewhat reduced (but more developed than in *Cirolana* and *Anopsilana*) and truncate, with bifurcate lateral lobe often reduced. Maxilliped slender; palp 5-articulate; palp article 3 much wider and longer than article 4; endite with 1 or 2 coupling spines and plumose setae.

Pereonite I usually short (subequal in length to pereonite II). All percopods ambulatory, less spinose and setose than those of most other genera of the Cirolanidae. Pereopods I–III short; distal superior angle of ischium and merus not produced; carpus short, often triangular. Pereopods IV–VII slender, longer than pereopods I–III, with articles not markedly flattened. Penes flattened lobes, small to moderate in size.

Pleon with 5 free pleonites; lateral margins of pleonite 5 not overlapped or barely overlapped by pleonite 4. Pleopods 1 and 2 similar; peduncles subrectangular and broader than long, without lateral accessory lobes; appendix masculina inserted (about one-third distance from base) on endopod of male's pleopod 2. Exopods of posterior pleopods completely or nearly divided by medial transverse incision. Pleopod 5's endopod without PMS, with or without lobe on proximomedial angle, and without plumose setae or coupling spines on peduncle. Pleotelson and uropods with or without marginal spines. Pleotelson apex rounded, truncate or subtriangular, never indented. Uropodal peduncle inner angle acutely produced.

*Remarks.—Metacirolana* contains 28 species. The genus was resurrected by Bruce (1981a) to house a group of reasonably distinctive cirolanid species, including *Metacirolana joannae* (Schultz, 1966) of California waters and *M. sphaeromiformis* (Hansen, 1890), a species reported from the Caribbean (Menzies and Glynn 1968) and the Indian Ocean and western Pacific (Nordenstam 1946). Menzies and Glynn (1968) and Bruce (1981a) suggested that the latter species is circumtropical, but we have not found it in the eastern Pacific.

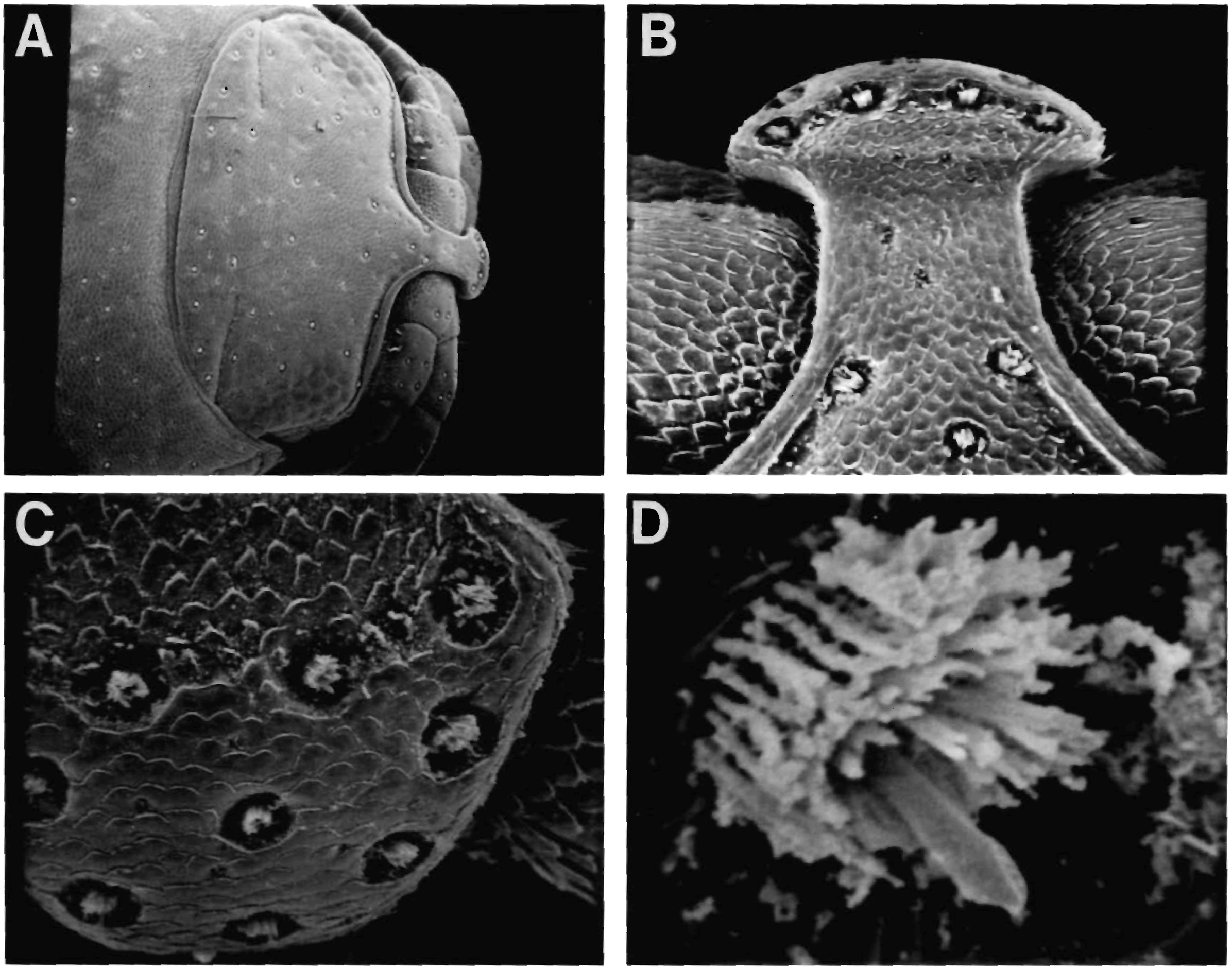



Figure 53. *Excirolana mayana*, scanning electron micrographs: A, cephalon, 74×. B, rostrum, 370×. C, anterior view of rostrum, 700×. D, rostral setae, 192×.

Bruce (1986a) noted that *Metacirolana* can be identified by the projecting clypeus, anteriorly dilated frontal lamina (often visible in dorsal view), pleonal and mouthpart morphology, and the long second article of the antennular peduncle. While in many species the second peduncular article is long, in *M. costaricensis*, *M. calypso* n. sp., and *M. joanneae* (and possibly others) the third peduncular article is the longest. However, none of these characters is unique to the genus. A possibly unique feature of *Metacirolana* is the small accessory tooth on the medial (inner) side of the right mandibular incisor, giving the incisor a four-pronged appearance. This condition occurs in at least *M. calypso* n. sp., *M. costaricensis* Brusca and Iverson, 1985, *M. basteni* Bruce, 1980, *M. bicornis* (Kensley, 1978), and *M. japonica* (Hansen, 1890) (see Bruce 1986a). Many published drawings of *Metacirolana* mandibles show this accessory tooth, but most authors have not indicated whether the figured mandible is the left or right. Bruce (1980, 1986a) apparantly confused the left and right mandibles in his figures and descriptions.

Nierstrasz (1931) created the name *Metacirolana* for *Cirolana japonica* Hansen, 1890, and *Cirolana hanseni* Bonnier, 1896. However, he did not designate a type species, thus rendering his name invalid (ICZN Article 13b). Kussakin (1979) was the first to designate a type species and thus stands as the valid author of the genus.

*World list of species.*—

1. *M. agaricicola* Kensley, 1984. Belize.
2. *M. agujae* Müller, 1991. Atlantic Colombia.
3. *M. anatola* Bruce, 1986. Queensland, Australia.
4. *M. anocula* (Kensley, 1984). South Africa.
5. *M. arnaudi* Kensley, 1989. St. Paul and Amsterdam islands, southern Indian Ocean.
6. *M. basteni* (Bruce, 1980). Australia.
7. *M. bicornis* (Kensley, 1978). South Africa.
8. *M. calypso* n. sp. Galapagos Islands, Ecuador.
9. *M. convexissima* (Kensley, 1984). South Africa.
10. *M. costaricensis* Brusca and Iverson, 1985. Pacific Costa Rica.
11. *M. fishelsoni* (Bruce and Jones, 1978). Red Sea.
12. *M. halia* Kensley, 1984. Cozumel (Mexico), Belize, and throughout Caribbean.
13. *M. hanseni* (Bonnier, 1896). Europe.
14. *M. japonica* (Hansen, 1890). Japan, Australia, Tasmania, and New Guinea.
15. *M. joanneae* (Schultz, 1966). California.
16. *M. mbudya* Bruce, 1981. Tanzania.

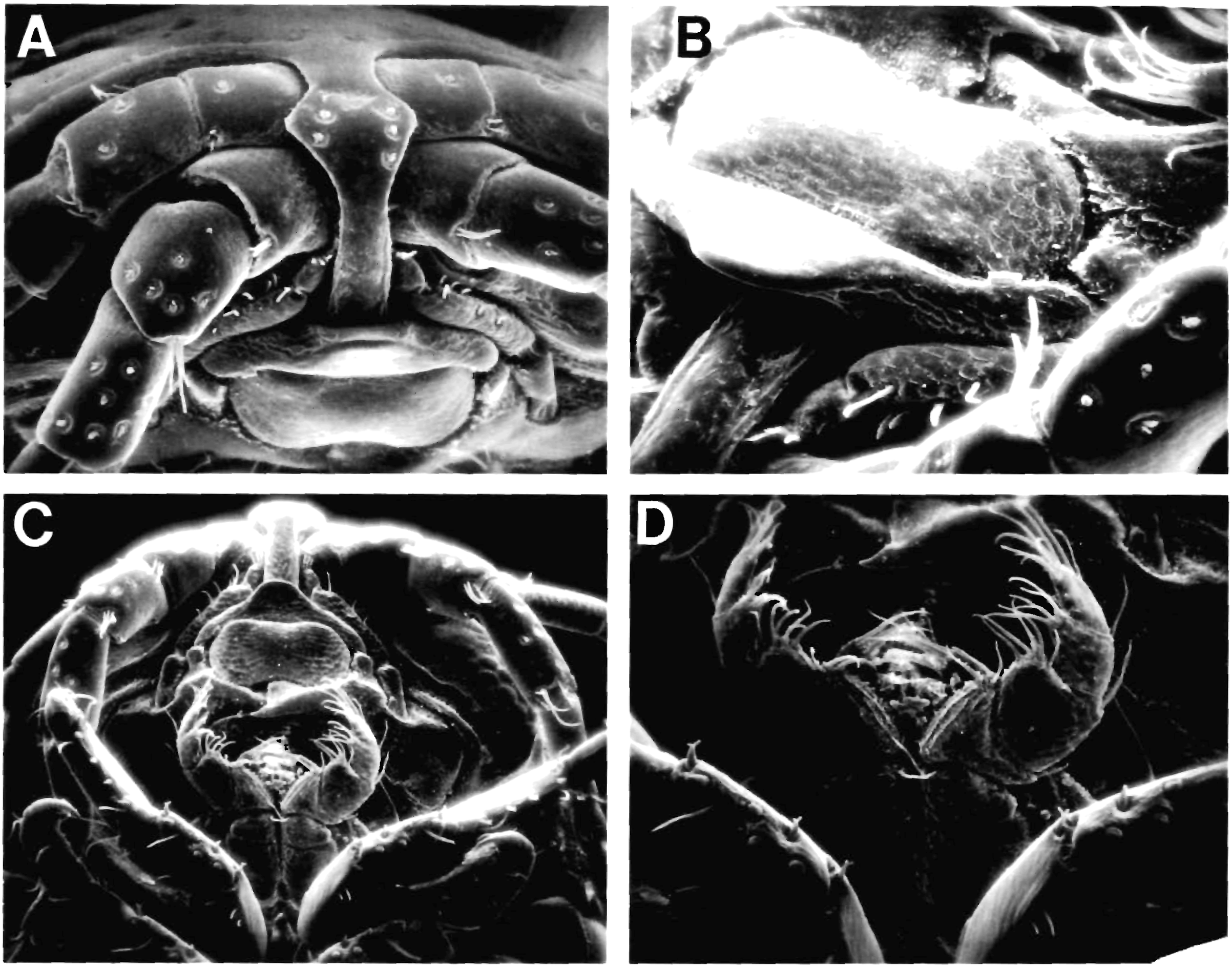



Figure 54. *Excirolana mayana*, scanning electron micrographs: A, rostrum and frontal lamina, 178×. B, clypeus and labrum, 285×. C, buccal field, 96×. D, maxillipeds, 192×.

17. *M. menziesi* Kensley, 1984. Belize.
18. *M. miyamotoi* Nunomura, 1991. Japan.
19. *M. monodi* (Jones, 1976). Aldabra.
20. *M. moortgati* Müller and Salvat, 1993. French Polynesia.
21. *M. nana* (Bruce, 1980). Australia.
22. *M. pigmentata* Müller and Salvat, 1993. French Polynesia.
23. *M. ponsi* Jaume and Garcia, 1992. Balearic Islands, Mediterranean Sea.
24. *M. riobaldoi* (Lemos de Castro and Lima, 1976). Brazil.
25. *M. rotunda* (Bruce and Jones, 1978). Red Sea to Tanzania.
26. *M. rugosa* (Bruce, 1980). Great Barrier Reef, Australia.
27. *M. serrata* (Bruce, 1980). Lizard Island, Australia.
28. *M. sphaeromiformis* (Hansen, 1890). Florida, Caribbean Sea, Indian Ocean, and possibly central/west Pacific Ocean.
29. *M. spinosa* (Bruce, 1980). Lizard Island, Australia.

Key to Tropical Eastern Pacific *Metacirolana* Species

1. Pleotelson of male without dorsal tubercles or carinae; posterior margin of pleotelson broad, convex, and strongly serrate; pereopod I's merus with long acute spines on inferior margin; uropodal endopod shorter than pleotelson .....*M. calypso* n. sp.
— Pleotelson of male with dorsal tubercles or carinae; posterior margin of pleotelson narrow, subtruncate, and not serrate; pereopod I's merus with squamate molariform spines on inferior margin; uropodal endopod extends to pleotelson apex .....*M. costaricensis*

*Metacirolana calypso* n. sp.
Figs. 60C, 61, 62

*Type material examined.*—Male holotype (LACM 84-287.1): Ecuador, Galapagos Islands, near Wolf Island (approx. 1° 18' N, 91° 45' W), neuston tow, 0545–0610 hrs.; 12 May 1984; coll. R. J. Lavenberg et al.; bottom depth not recorded by collectors but estimated (R. Lavenberg, in litt.) as approximately 2000 m.

*Description of male.*—Entire dorsum with striking ornate chromatophore pattern (Fig. 60C). Cephalon length, from rostrum to posterior margin, 1.5 times length of pereonite I; lateral margins evenly convex, not forming subacute angles. Cephalon devoid of dorsal tubercles or carinae; rostrum very short, rounded anteriorly (Fig. 60C). Antennule not quite reaching posterior margin of pereonite I; flagellum of 6 articles (Fig. 61A). Antenna extends to posterior margin of pereonite VII; flagellum of 14 articles (Fig. 61B). Frontal lamina narrow, almost quadrate posteriorly, expanded anteriorly to partly overlap proximal antennular article (Fig. 61C).

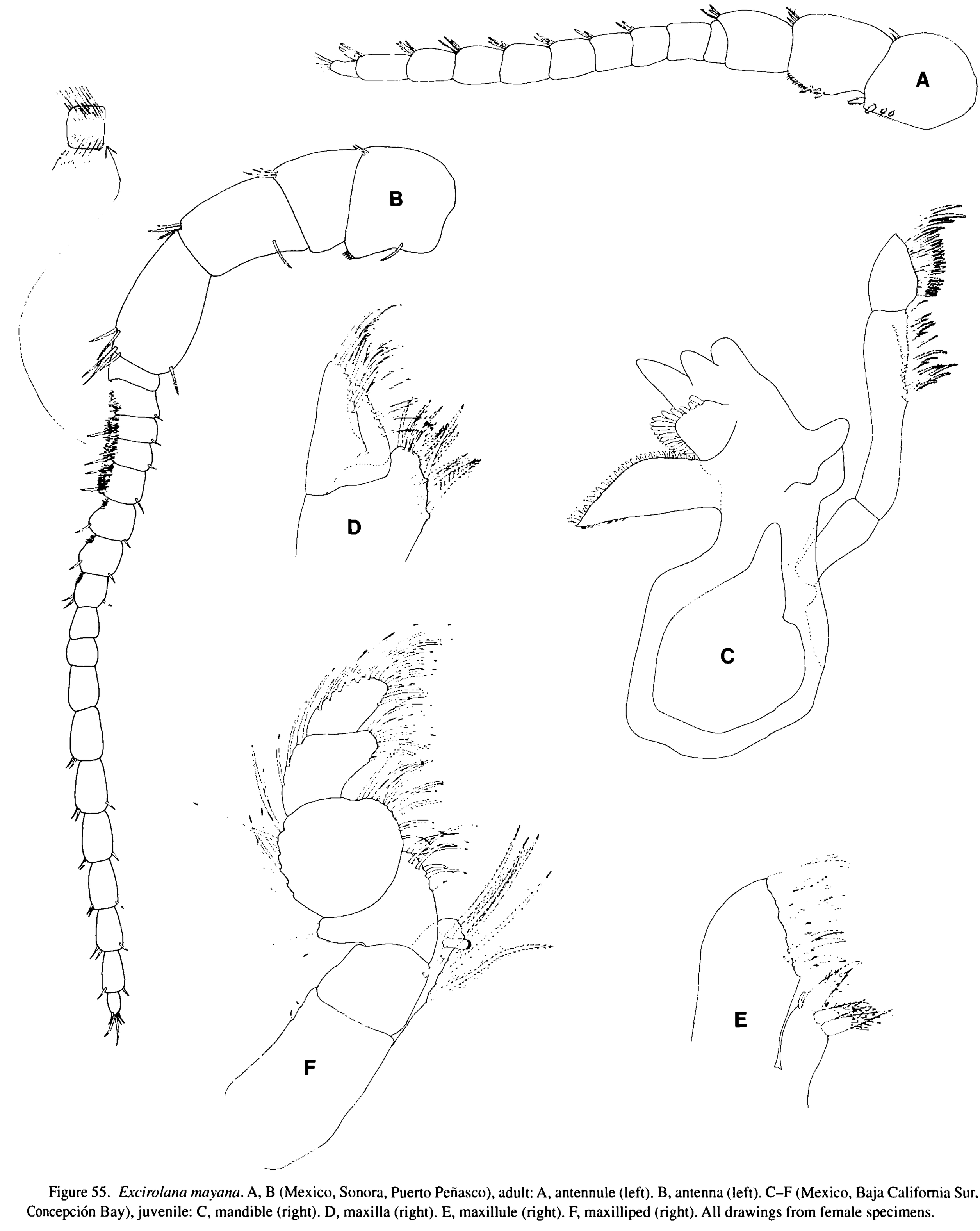



Figure 55. *Excirolana mayana*. A, B (Mexico, Sonora, Puerto Peñasco), adult: A, antennule (left). B, antenna (left). C–F (Mexico, Baja California Sur, Concepción Bay), juvenile: C, mandible (right). D, maxilla (right). E, maxillule (right). F, maxilliped (right). All drawings from female specimens.

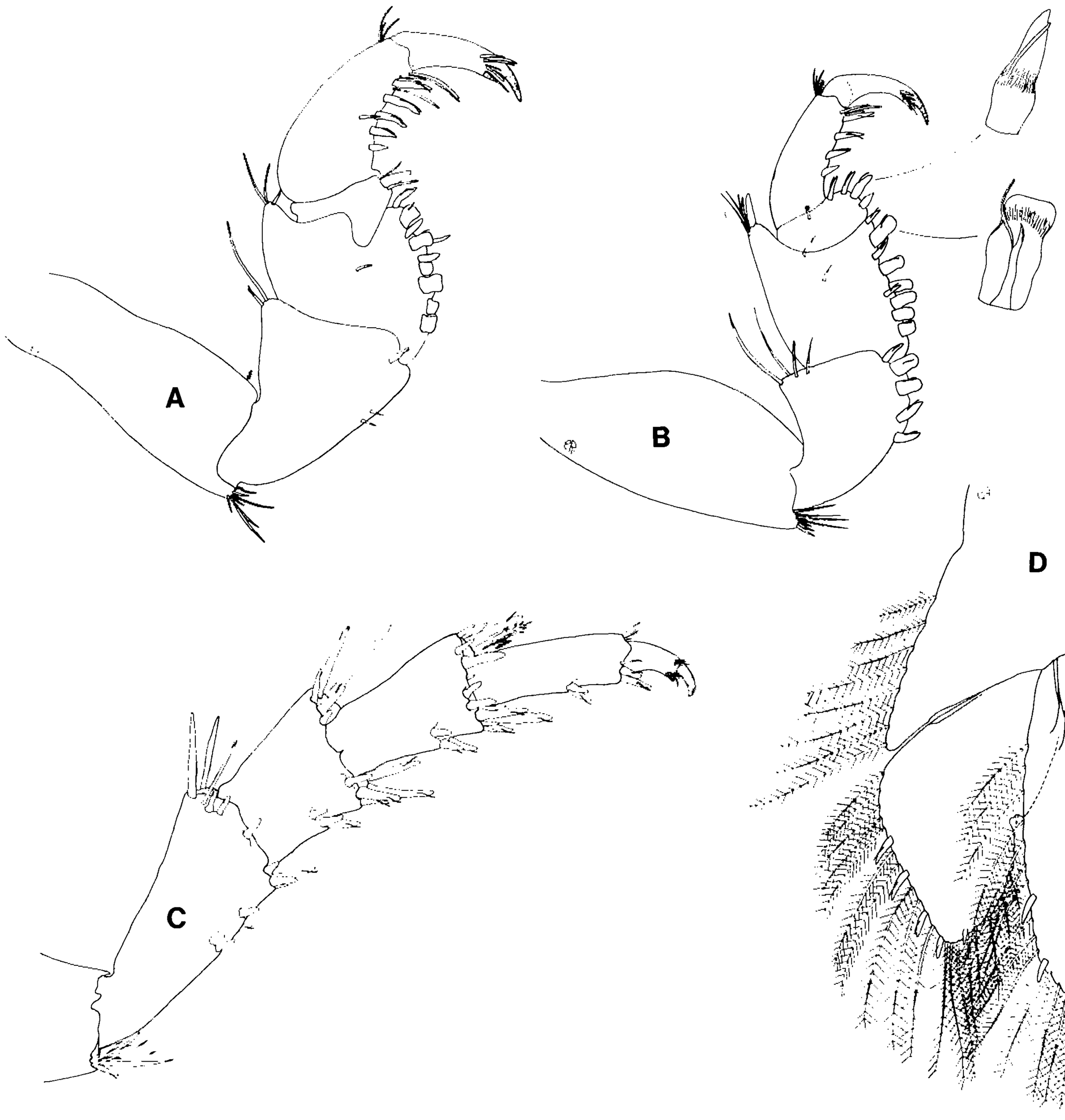



Figure 56. *Excirolana mayana* (Mexico, Sonora, Puerto Peñasco, 17 June 1972), adult: A, pereopod I (left). B, pereopod III (left). C, pereopod VII (left). D, uropod (left).

Mandibular spine row with 19 long thin spines; molar process with about 20 small marginal spines; terminal article of palp with simple setae and 1 comb seta; middle article longest, with simple and comb setae (Fig. 61D). Maxillule's lateral lobe with 12 stout spines, largest spines armed with barbs; medial lobe with 1 small apical seta in addition to the 3 circumplumose spines (Fig. 61E). Maxilla's lateral lobes with 3 and 5 plumose setae, respectively; medial lobe with 1 simple and 7 plumose setae (Fig. 61F). Maxillipedal palp articles 4 and 5 are margined with plumose setae, other articles with simple setae; left and right endites small, each with 1 coupling spine and 4 plumose setae (Fig. 61G).

Pereonites unequal in length, pereonite I longest; pereon widest at pereonites IV and V, devoid of dorsal tubercles or carinae. Coxae usually visible dorsally, extending beyond posterior margins of their respective segments; coxa VII extends almost to posterior margin of pleonite 2 (Fig. 60C). Pereopod I short, stout; superior distal angles of ischium and merus each with 1 long seta; inferior margins of merus, carpus, and propodus with acute spines as figured; inferior margin of propodus also with 1 serrate spine; carpus short; dactylus without small spine at base of unguis (Fig. 62A). Pereopod IV longer than pereopod I, ambulatory, with simple and serrate spines and setae as figured; dactylus without small spine(s) at base of unguis (Fig. 62B). Pereopod VII quite long, ambulatory, with simple and serrate spines and setae as figured (Fig. 62C). Penes large, about 6 times longer than wide, extended roughly 0.66 length of sternite.

Pleon broadest at pleonite 2, devoid of dorsal tubercles or carinae. Pereonite VII's coxae overlap lateral margins of pleonite 1; pleonites 2–4 expanded laterally (Fig. 60C). Pleopod rami with PMS as figured (Figs. 62F-J). Pleopod 1: peduncle's medial margin with 4 coupling spines, lateral margin with 2 simple spines;

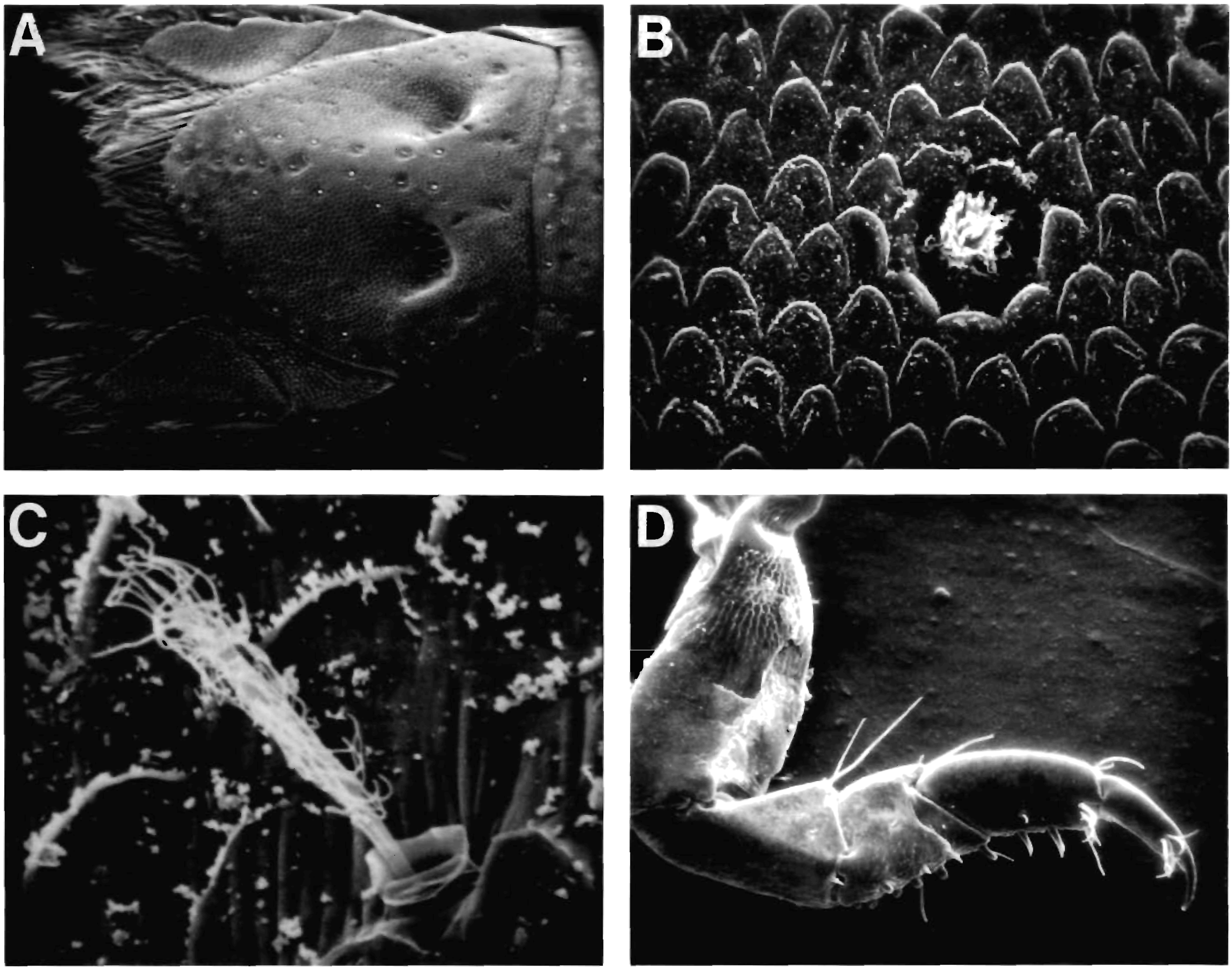



Figure 57. *Excirolana mayana*, scanning electron micrographs: A, pleotelson, 74×. B, seta next to right depression on pleotelson, 462×. C, seta in right depression on pleotelson, 3330×. D, pereopod, 96×.

endopod width 0.68 times width of exopod (Fig. 62F). Pleopod 2: peduncle's medial margin with 2 coupling spines, 2 plumose setae, and many short simple setae; lateral margin with 1 simple spine; endopod width 0.85 times width of exopod; appendix masculina widest basally, tapering to serrate medial margin near pointed apex, medial margin with many small setae, length 0.95 times endopod length (Fig. 62G). Pleopod 3: peduncle's medial margin with 3 coupling spines and 1 plumose seta, lateral margin with 1 simple spine; endopod width 0.72 times exopod width, exopod with short marginal incisions (Fig. 62H). Pleopod 4: peduncle's medial margin with 3 coupling spines and 1 plumose seta, lateral margin with 1 simple spine and many short setae; endopod 0.73 times width of exopod, exopod with complete medial incision (Fig. 62I). Pleopod 5: peduncle smaller than peduncles of pleopods 1–4, with 1 simple spine and many short setae on lateral margin; endopod width 0.80 times exopod width; exopod with complete medial incision (Fig. 62J).

Pleotelson with straight lateral margins, apex widely rounded with sharply crenulate (saw-toothed) margin; without apical spines but with PMS; dorsum without longitudinal carinae (Fig. 60C). Uropods shorter than pleotelson, with small terminal notch on each ramus, 5–7 simple setae arising from each notch. Uropodal exopod 0.70 times as wide as endopod, shorter than endopod, medial margin with 1 short spine and many PMS, lateral margin with 3 short spines and setae. Uropodal endopod's medial margin with 2 short spines and many PMS, lateral margin with 1 short spine and many PMS. Uropodal peduncle with short apical spine, medial margin with PMS (Fig. 60C).

*Female*.—Not known.

*Size*.—Small, holotype 5.2 mm long.

*Distribution*.—So far known from only the type locality, near Wolf Island, the Galapagos Islands, Ecuador.

*Remarks*.—This species is immediately distinguished from the only other known eastern Pacific *Metacirolana* (*M. costaricensis*) by features noted in the key. It is known from only a single specimen collected in a neuston (surface) plankton tow near Wolf Island in the Galapagos Islands. However, the distinct morphology of the specimen warrants formal species recognition.

*Etymology*. — This species is named after Calypso, daughter of Oceanus in Greek mythology. Just as this beautiful island isopod charmed its describers, the charms of the island nymph Calypso were so powerful they detained Odysseus seven years on his journey home from Troy.

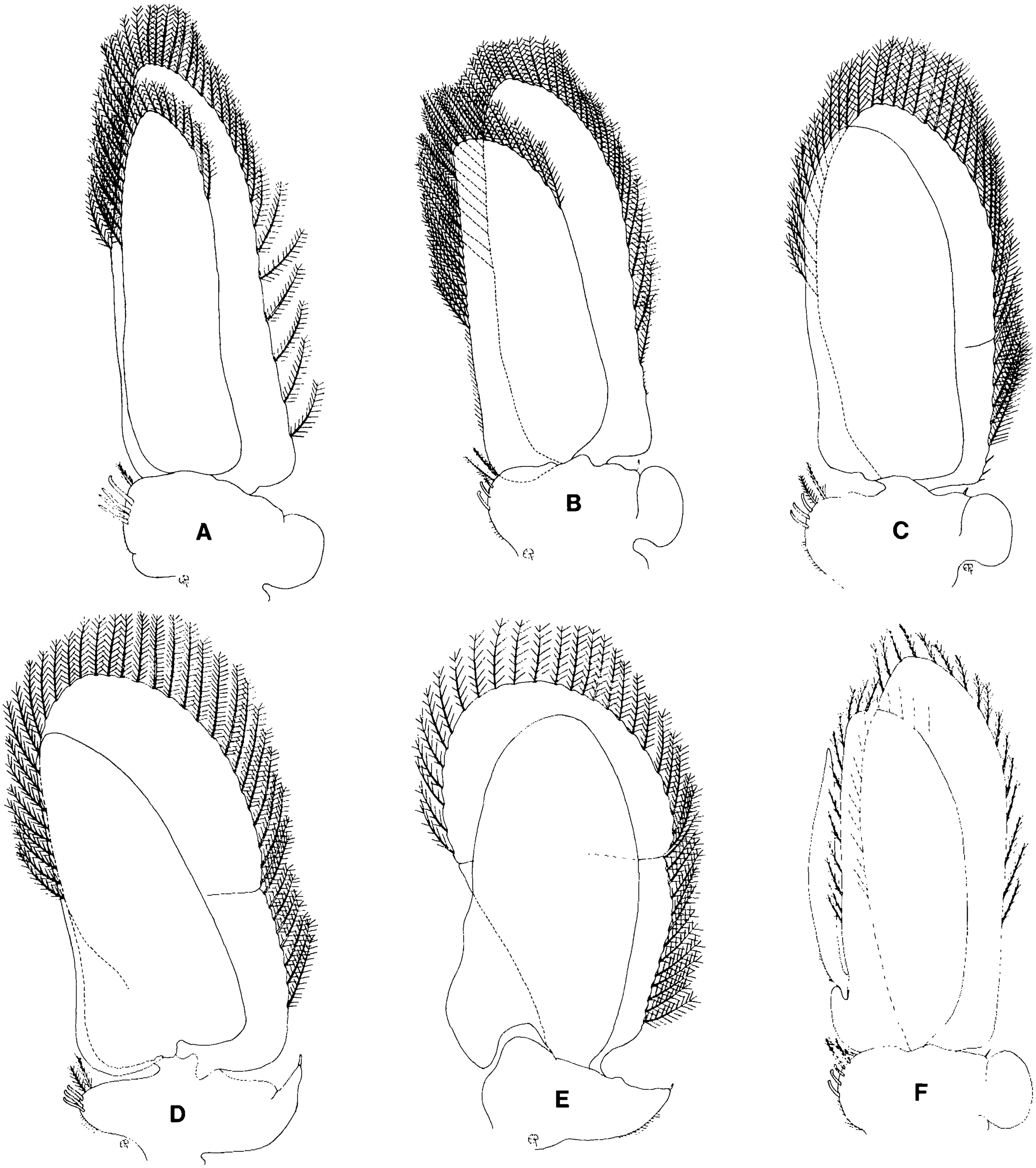



Figure 58. *Excirolana mayana*. A–E (Mexico, Sonora, Puerto Peñasco), pleopods of adult female: A, pleopod 1 (left). B, pleopod 2 (left). C, pleopod 3 (left). D, pleopod 4 (left). E, pleopod 5 (left). F (Mexico, Gulf of California, Cerralvo Island), adult male, pleopod 2 (left).

*Metacirolana costaricensis* Brusca and Iverson, 1985
Figs. 60A, B, 63, 64

*Metacirolana costaricensis* Brusca and Iverson 1985: 36, Fig. 11D. Bruce 1986a: 222.

*Type material examined.*—Holotype (LACM 80-60.1, AHF Type No. 8011) and 15 paratypes (LACM 80-60.2): Costa Rica, Guanacaste Province, Parque Nacional Santa Rosa, rocky littoral approximately 1 km from mouth of mangrove estuary, ca. 10° 48' N, 86° 57' W, formalin washes of rocks and turf algae, water temperature 26° C, large surf; 26 Apr. 1980; coll. R. C. Brusca, A. M. Mackey, M. Murillo, A. Dittle.

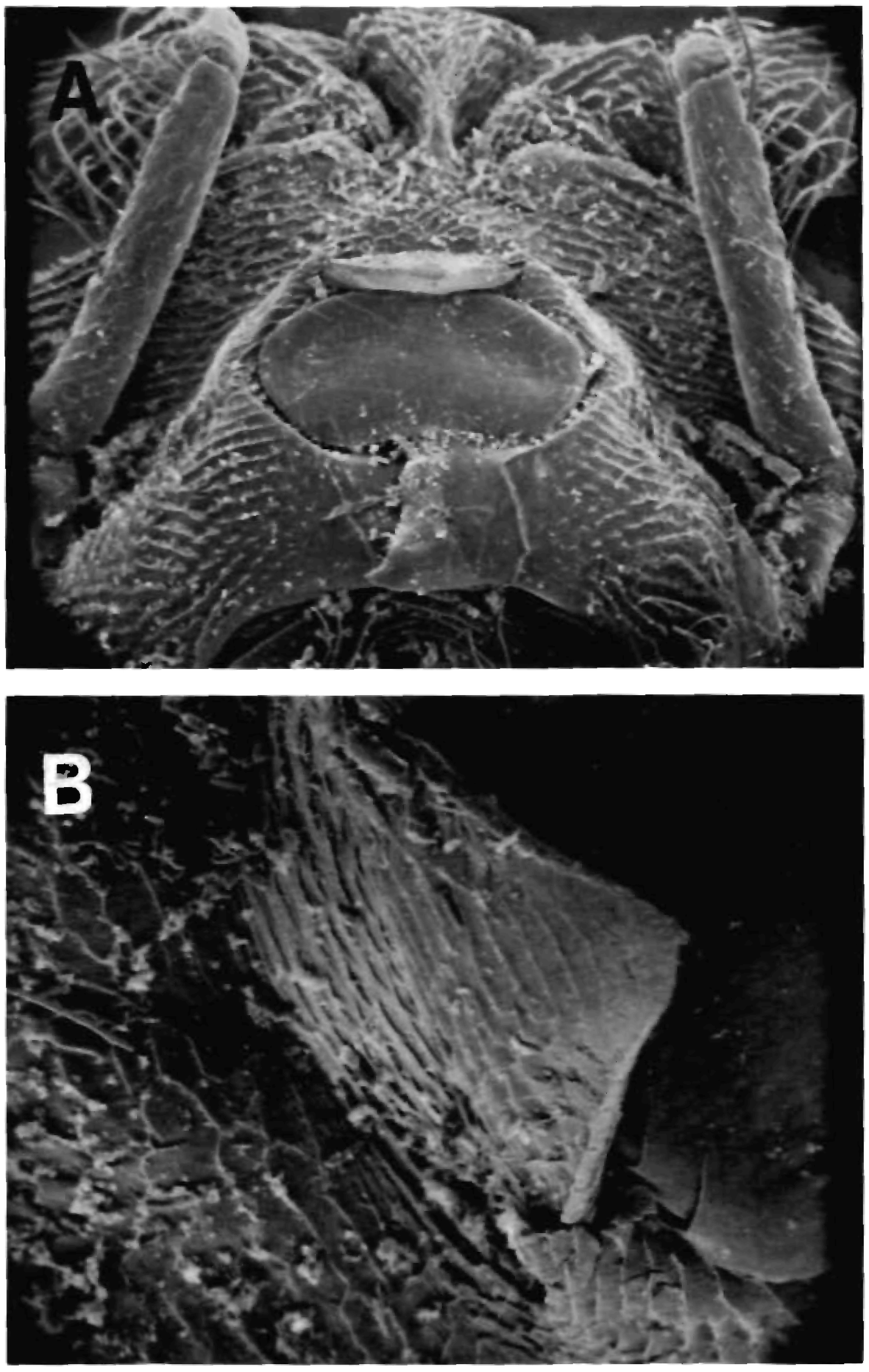



Figure 59. *Metacirolana joannae* (AHF 2250-1), scanning electron micrographs: A, ventral view of frontal lamina, clypeus, and labrum, 118×. B, ventrally projecting clypeus, 370×.

*Other material examined.*—Central American specimens: (1) Costa Rica, Puntarenas Province, just outside mouth of Gulf of Nicoya, Playa Tárcoles, 9° 45' N, 84° 50' W, dark sand with scattered rocky points, formalin washes of rocks and associated sediment, onuphid polychaete tubes abundant, water temperature 29° C; SDNHM; 22 Feb. 1980; coll. R. C. Brusca; 29 specimens. (2) Costa Rica, Puntarenas Province, Panama Bay, "infauna, 2 meters marea alto, transect #2 (Vallejo), station #2"; SDNHM; 3 Feb. 1977; 2 specimens (gift of M. M. Murillo). (3) Panama, Culebra Island; PWG-67, SDNHM; 23 Jan. 1967; coll. P. W. Glynn; 1 female.

Galapagos specimens: (4) Just west of Isabela Island, 0° 15' 43" S, 91° 26' 38" W, taken by hand; R/V *Anton Bruun* Cruise 16; 25 May 1966; SEPBOP program; 9 specimens (Sta. ST66142); 3 males and 1 female (Sta. ST66141) (precise coordinates questionable). (5) Wolf Island, on shore with green algae; Sta. 144, USNM Acc. No. 128938; 11 Jan. 1934; 1 male. (6) South side of Pinta Island, near Ibbetson Point, 0° 32' 25" N, 90° 43.5' W, near national park marker on shore, noon, low tide, large shallow tidepool, fixed lava rock with loose lava stones and some sand, 0–1 ft. standing water, from under loose rocks; LACM; 20 May 1984; coll. A. Cohen; 6 specimens. (7) Tower Island, tidepool on north side of Darwin Bay, 0° 18' 58" N, 90° 57' 23" W, lava rock in large pool 3 m deep with deeper crevices, low tide, under loose rubble (rock and dead coral) in exposed (low tide) channel at entrance to pool; AC-GAL-27, LACM; 21 May 1984; coll. A. Cohen; 2 specimens. (9) no precise locality; AC-GAL-8-A, LACM; 1984; coll. A. Cohen; 1 specimen.

*Description of male.*—Cephalon devoid of tubercles and carinae; length from posterior margin to rostrum subequal to length of pereonite I, rostrum moderate in size; lateral margins forming subacute angles (Fig. 60A). Antennule short, reaching posterior margin of cephalon; flagellum of 3–6 articles, distal flagellar articles compressed and short (Fig. 63A). Antenna reaching pereonite II; peduncular articles 1 and 2 partially fused; flagellum of 8–12 articles (Fig. 63B). Frontal lamina narrow posteriorly, expanded and rounded anteriorly; anterior expansion overlaps basal articles of antennules (Fig. 63C). Both mandibular incisors tridentate; right incisor with accessory tooth; left incisor indistinctly tridentate, somewhat bladelike and without accessory tooth; spine row with 14 long thin spines; palp 3-articulate, terminal article with comb setae, middle article longest and with simple and comb setae (Fig. 63D). Maxillule's medial lobe with 1 small apical spine, in addition to the 3 circumplumose spines; lateral lobe with 10 stout spines, many strongly barbed (Fig. 63E). Maxilla's medial lobe with 6 plumose, 1 large circumplumose, and 2 small simple setae; lateral lobes with 3 comb and 4 plumose setae, respectively (Fig. 63F). Maxillipedal palp articles subrectangular, margins with many long simple and comb setae; endite small, with 2 plumose setae and 1 simple seta, with 1 or 2 coupling spines (usually 2) on both left and right endites; small epipod present in both sexes (Fig. 63G).

Pereon widest at pereonites V and VI, devoid of dorsal tubercles or carinae. Pereonite VII with short rounded process on posterolateral margins. Coxae III–VI carinate, visible in dorsal view and extending beyond posterior margins of their respective pereonites; coxa VII large, extending to posterior margin of pleonite 5 (Fig. 60A). Pereopod I short and stout; distal margins of articles not produced; inferior margin of merus with 3 very short blunt squamate spines, 2 simple setae, and 1 small serrate spine; carpus very short, inferior margin with 1 squamate spine, 1 serrate spine, and 3 simple setae; inferior margin of propodus with 3 large basally serrate spines and simple setae; dactylus with 1 small simple spine at base of unguis (Fig. 64A). Pereopod IV short, stout, ambulatory, with simple spines and setae as figured (Fig. 64B). Pereopod VII ambulatory with simple and serrate spines and setae as figured (Fig. 64C). Penes about 3 times longer than wide.

Pleon broadest at pleonites 3 and 4. Pleonite 1 overlapped laterally by pereonite VII, visible medially. Pleonite 5 with large median tubercle on posterior margin (Fig. 60A). Pleopodal rami with PMS as figured (Figs. 64F-J). Pleopod 1: peduncle's medial margin with 4 coupling spines, lateral margin with 1 seta; endopod width 0.6 times width of exopod (Fig. 64F). Pleopod 2: peduncle's medial margin with 4 coupling spines and 2 plumose setae, lateral margin with 1 long and many short setae; endopod width 0.7 times width of exopod; appendix masculina widest basally, tapering medially and widening again near apex, length 0.8 times endopod length (Fig. 64G). Pleopod 3: peduncle's medial margin with 4 coupling spines and 2 plumose setae; endopod width 0.74 times exopod width (Fig. 64H). Pleopod 4: peduncle's medial margin with 4 coupling spines and 2 plumose setae, lateral margin with 1 large spine and 1 short spine; endopod width 0.80 times exopod width (Fig. 64I). Pleopod 5: peduncle's lateral margin with 1 simple spine; endopod width 0.82 times exopod width (Fig. 64J). Pleopodal exopods 3–5 with complete or nearly complete medial transverse incision.

Pleotelson subtriangular, lateral margins slightly concave near truncate apex; dorsum with median longitudinal carina, flanked by

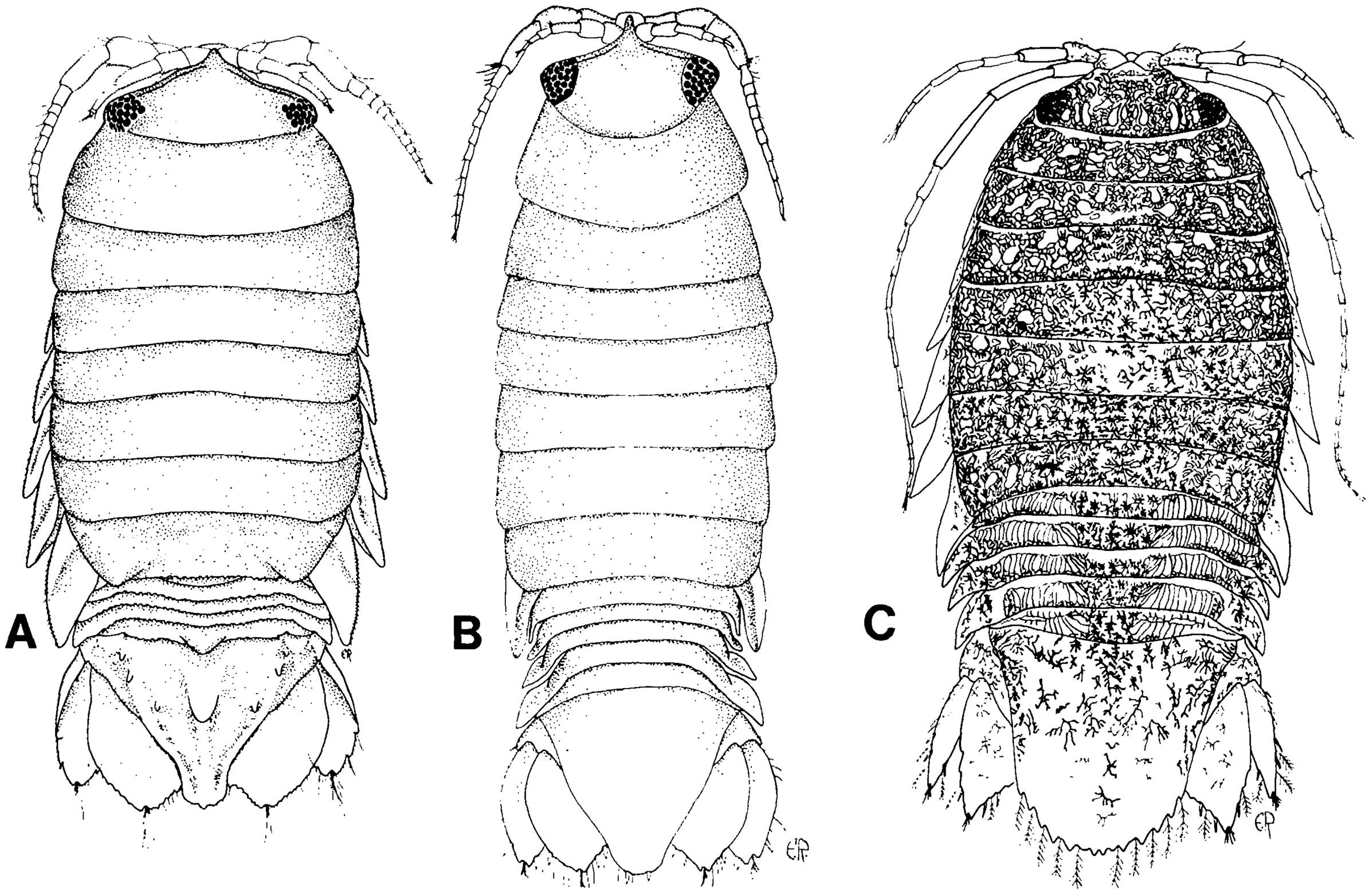



Figure 60. *Metacirolana* of the tropical eastern Pacific, dorsal views: A, *M. costaricensis* (LACM 80-60.1), holotype, male. B, *M. costaricensis* (LACM 80-60.2), paratype, female. C, *M. calypso* n. sp. (LACM 84-287.1, GAL 84-10), holotype, male.

submedian longitudinal carinae, carinae usually with tubercles; pleotelson apex with 2 marginal spines and several simple setae (Fig. 60A). Uropods with small apical notch on each ramus, 6 or 7 PMS arising from each notch. Uropodal exopod does not extend to pleotelson apex, 0.66 width of endopod, medial margin with 2 large spines interspersed with PMS, lateral margin with 2 small spines, simple setae, and PMS. Uropodal endopod extends to pleotelson apex; medial margin with 3 spines interspersed with PMS and some simple setae; lateral margin with 1 spine and PMS (Fig. 64E).

*Female*.—Similar to male, except dorsal tuberculation on the pleon and pleotelson is reduced or absent, the pleotelson's lateral margins are straighter and not as concave as in males, coxal plates II–VI are less visible in dorsal view, and pleonite 1 is not necessarily hidden by pereonite VII (Fig. 60B).

*Size*.—Small, to maximum length of 4.0 mm.

*Distribution*.—Thus far recorded from Pacific Costa Rica, Panama, and the Galapagos Islands. Material examined is, with the exception of the two *Anton Bruun* lots, all littoral. The *Anton Bruun* Galapagos records suggest that the specimens were taken in deep water, but the station numbers on label data do not occur in the station lists of Chin et al. (1972).

*Remarks*.—An intertidal and shallow subtidal species, found in rocky littoral areas with turf-algae and in dark sandy/rocky habitats. Brusca and Iverson (1985) did not adequately figure this species, so we illustrate it completely here.

## *Natatolana* Bruce, 1981

*Type species*.—*Cirolana hirtipes* Milne Edwards, 1840, by subsequent designation (Bruce 1981a). Type specimens at the Muséum National d'Histoire Naturelle, Paris.

*Synonymy*.—Emended and subsequent to Bruce (1986a:52).

*Natatolana*. Bruce 1985: 708. Brusca and Iverson 1985: 37. Botosaneanu et al. 1986: 412. Kensley and Schotte 1989: 139.

*Description*.—Body length approximately 2.5–3.0 times width; dorsum smooth, without ornamentation. Eyes usually well developed, but absent or with reduced ommatidia in some species. Rostral process minute or absent. Frontal lamina elongate, narrow, flat, not projecting, length 3–4 times width; clypeus broad, wider than long, flat (sessile); labrum narrower than clypeus. Antennular peduncle and flagellum short, flagellum does not extend beyond anterior region of pereonite I; second article not articulated at right angle to first article (as in *Eurydice*); peduncular article 3 longest; flagellar articles compressed, basal articles often fused. Antennae much longer than antennules; peduncular articles 1–2 short, 3–4 subequal, 5 longest. Mandible with broad tridentate incisor, medial cusp often reduced on left mandible; spine row well developed as a rounded lobe with stout spines. Maxillule's medial lobe with 3 or 4 stout circumplumose spines and often a few small simple spines; lateral lobe with 9–12 stout apical spines, often with minute subapical lateral spines or barbs. Maxilla with medial lobe short and broad. Maxillipedal palp 5-articulate; endite short, with 1–3 coupling spines.

Pereonite I longest. Posterior angles of coxae II–VII become more acute posteriorly. Pereopodal dactyli often with small spine at base of ungui; superior margins of ischium and merus of pereopods I–III strongly produced; pereopods IV–VII longer than pereopods

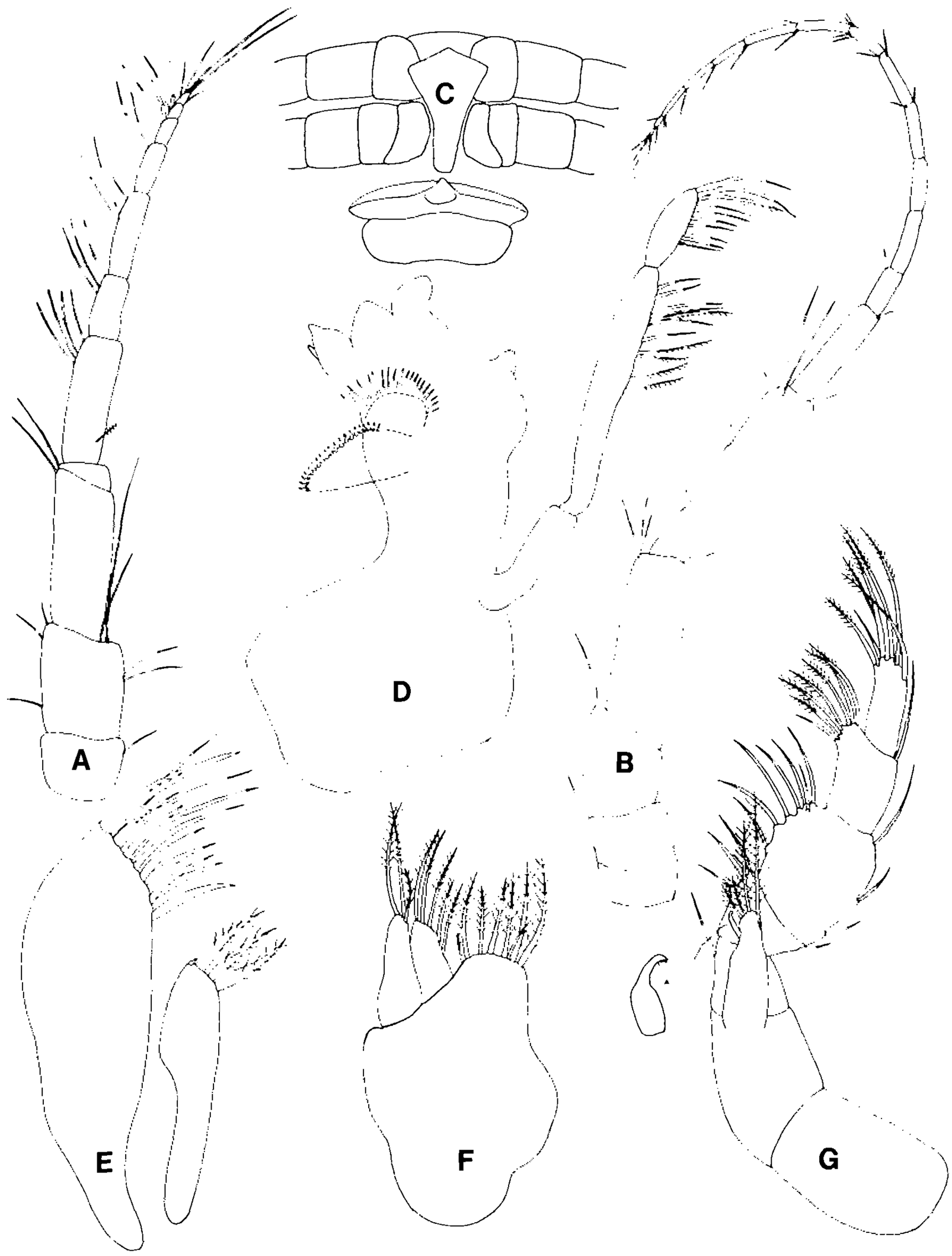



Figure 61. *Metacirolana calypso* n. sp. (LACM 84-287.1, GAL 84-10), holotype, male: A, antennule (left). B, antenna (left). C, frontal lamina, clypeus, and labrum. D, mandible (right). E, maxillule (right). F, maxilla (right). G, maxilliped (right).

I–III and with abundant long setae; pereopods VI–VII with ischium–propodus flattened and provided with long setae; pereopod VII with dense medial row of long setae along flat anterior surface. Penes indistinct or represented by small flattened lobes.

Pleon of 5 free pleonites; pleonite 1 often partially concealed by pereonite VII; pleonite 5 completely encompassed by lateral margins of pleonite 4. Pleopod 1's exopod almost twice as wide as endopod; pleopodal peduncles broader than long, lateral margins without lobes or with weak lobes; rami similar; all pleopodal rami with PMS, except endopod of pleopod 5, which has reduced or no PMS; appendix masculina inserted basally or subbasally on endopod of male's pleopod 2. Pleopod 5: peduncle's medial margin without coupling spines or plumose setae; endopod with proximomedial lobe. Pleotelson usually with abundant marginal setae and spines. Uropodal peduncle's inner angle produced and subacute; rami with PMS and usually spines; endopod usually without notch on distal medial angle, except in *Natatolana variguberna*.

*Remarks.*—Bruce (1981a) split *Cirolana* into seven different genera, erecting three new genera, including *Natatolana*. He did not describe or figure *Cirolana hirtipes* Milne Edwards, 1840, the type species. Characters diagnostic of *Natatolana* include the glabrous appearance and absence of sculpturing of the dorsum, short antennules, flattened articles on the posterior pereopods, and the medial row of long setae on the flat anterior surface of pereopod VII. Similar-appearing genera are *Dolicholana* and *Politolana*. *Dolicholana* has similar pereopods but differs in the form of the frontal lamina, which has the ventral surface excavated and the posterior margin produced into a ventrally projecting lobe (the ventral surface of the frontal lamina is flat in *Natatolana*), and in the lack of PMS on pleopodal endopods (only the endopod of pleopod 5 is naked in *Natatolana*). *Politolana* differs from *Natatolana* in the following ways: the bases of the posterior pereopods are less expanded; the appendix masculina arise subbasally, rather than basally as in *Natatolana* (although in some species of *Natatolana* the appendix masculina arises slightly above the basal position—see *N.*

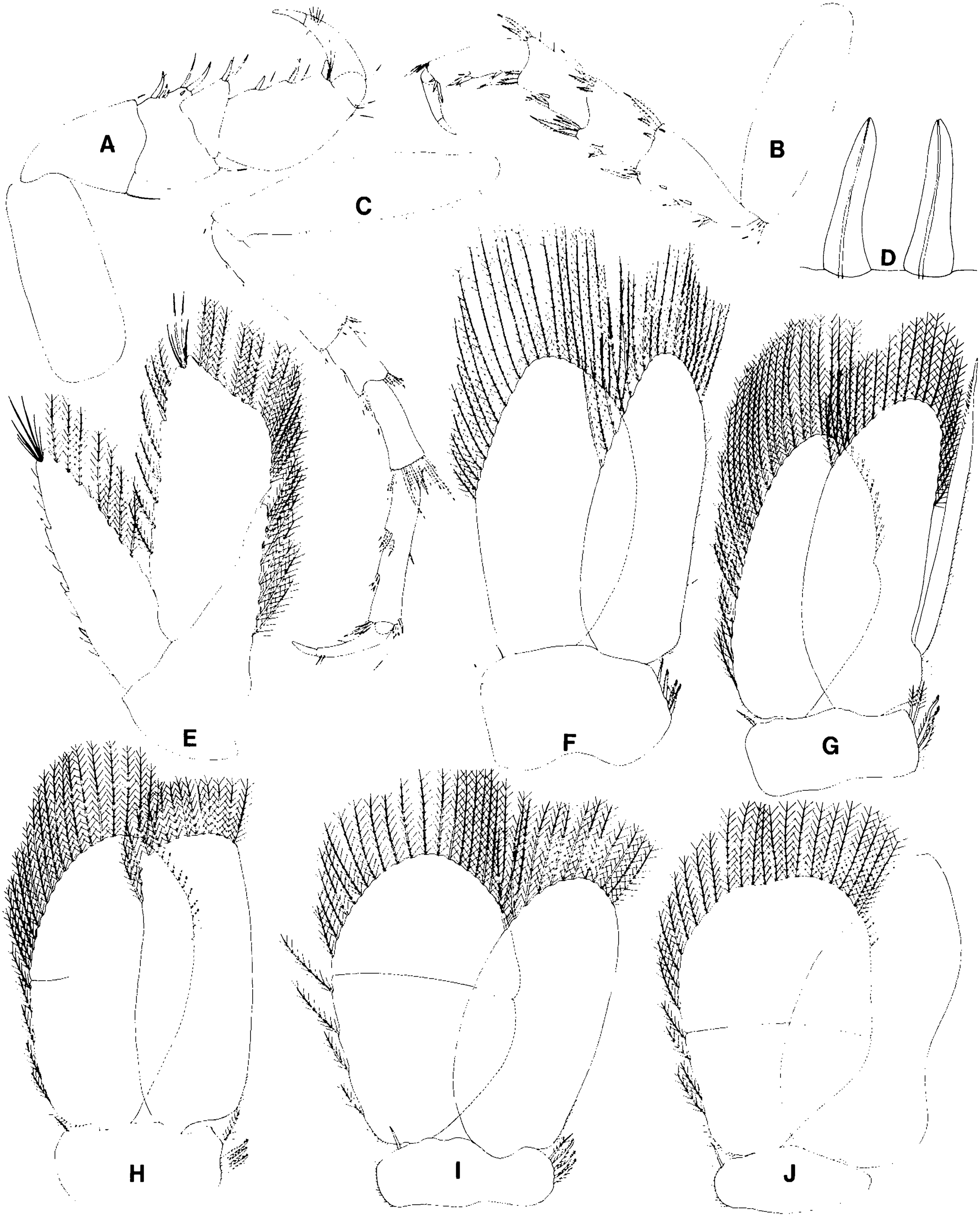



Figure 62. *Metacirolana calypso* n. sp. (LACM 84-287.1, GAL 84-10), holotype, male: A, pereopod I (right). B, pereopod IV (right). C, pereopod VII (right). D, penes. E, dorsal view of uropod (right). F, pleopod 1 (right). G, pleopod 2 (right). H, pleopod 3 (right). I, pleopod 4 (right). J, pleopod 5 (right).

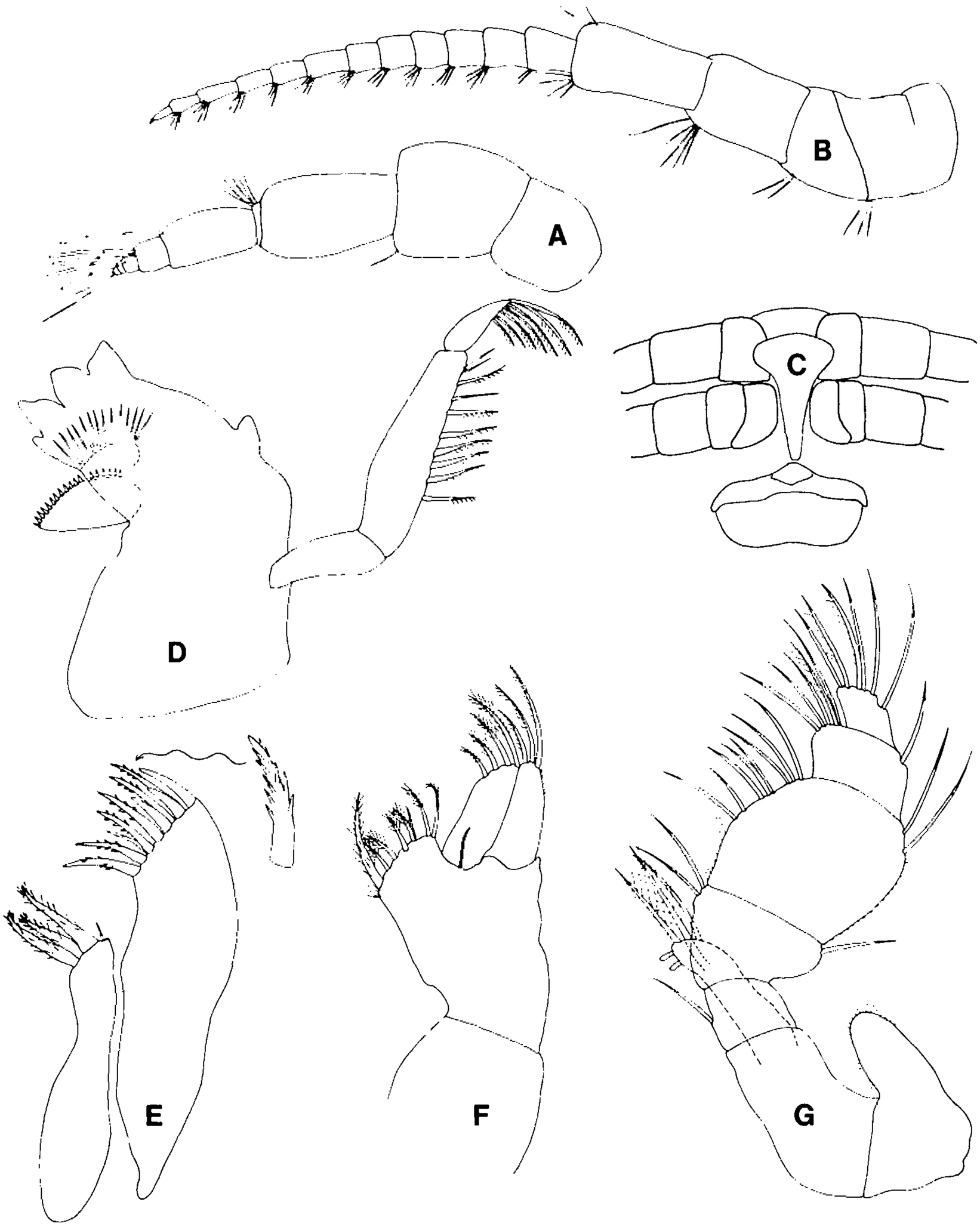



Figure 63. *Metacirolana costaricensis* (LACM 80-60.1), holotype, male: A, antennule (left). B, antenna (left). C, frontal lamina, clypeus, and labrum. D, mandible (right). E, maxillule (right). F, maxilla (right). G, maxilliped (right).

*bowmani* Bruce, 1986); pleopod 1's peduncle is subquadrate (it is wider than long in *Natatolana*); and the uropodal endopod has a distolateral notch (absent in *Natatolana*, except in *N. variguberna*). *Natatolana*, *Politolana*, and *Dolicholana* are part of Bruce's (1986a) "*Conilera* genus-group," along with *Conilera*, *Orphelana*, and *Conilorpheus*. Wetzer et al. (1987) discussed this group, provided a key to the genera, and removed *Oncilorpheus* from it.

*Natatolana*, with 58 described species, is the second largest genus in the family, and it has the widest distribution of any cirolanid genus, with more species known from temperate and cold waters than in any other genus. *Natatolana* is primarily a shelf and slope taxon, ranging from the shallow subtidal to about 2000 m, although occasional specimens have been collected intertidally. Bruce (1986a) divided the genus into four "species-groups," the *N. pellucida* group, the *N. valida* group, the *N. albicaudata* group, and the *N. woodjonesi* group. The groups are distinguished from one another by the basis of pereopod VII, the posterolateral margin of pleonite 4, the pleotelson dorsum, and the posterior margin of the pleotelson.

In all the species we have examined, it appears that the medial lobe of the maxillule in species with the 3-spine configuration also possesses a moderately to well developed protuberance on the lateral margin, whereas species with the 4-spine configuration lack this protuberance.

There are four *Natatolana* species in the eastern Pacific: *N. chilensis* (Menzies, 1962a), *N. natalis* (Menzies and George, 1972), *N. californiensis* (Schultz, 1966), and *N. carlenae* n. sp. Only the last two are tropical.

*World list of species.*—


Figure 64. *Metacirolana costaricensis* (LACM 80-60.1), holotype, male: A, pereopod I (left). B, pereopod IV (left). C, pereopod VII (left). D, penes. E, ventral view of uropod (right). F, pleopod 1. G, pleopod 2. H, pleopod 3. I, pleopod 4. J, pleopod 5.

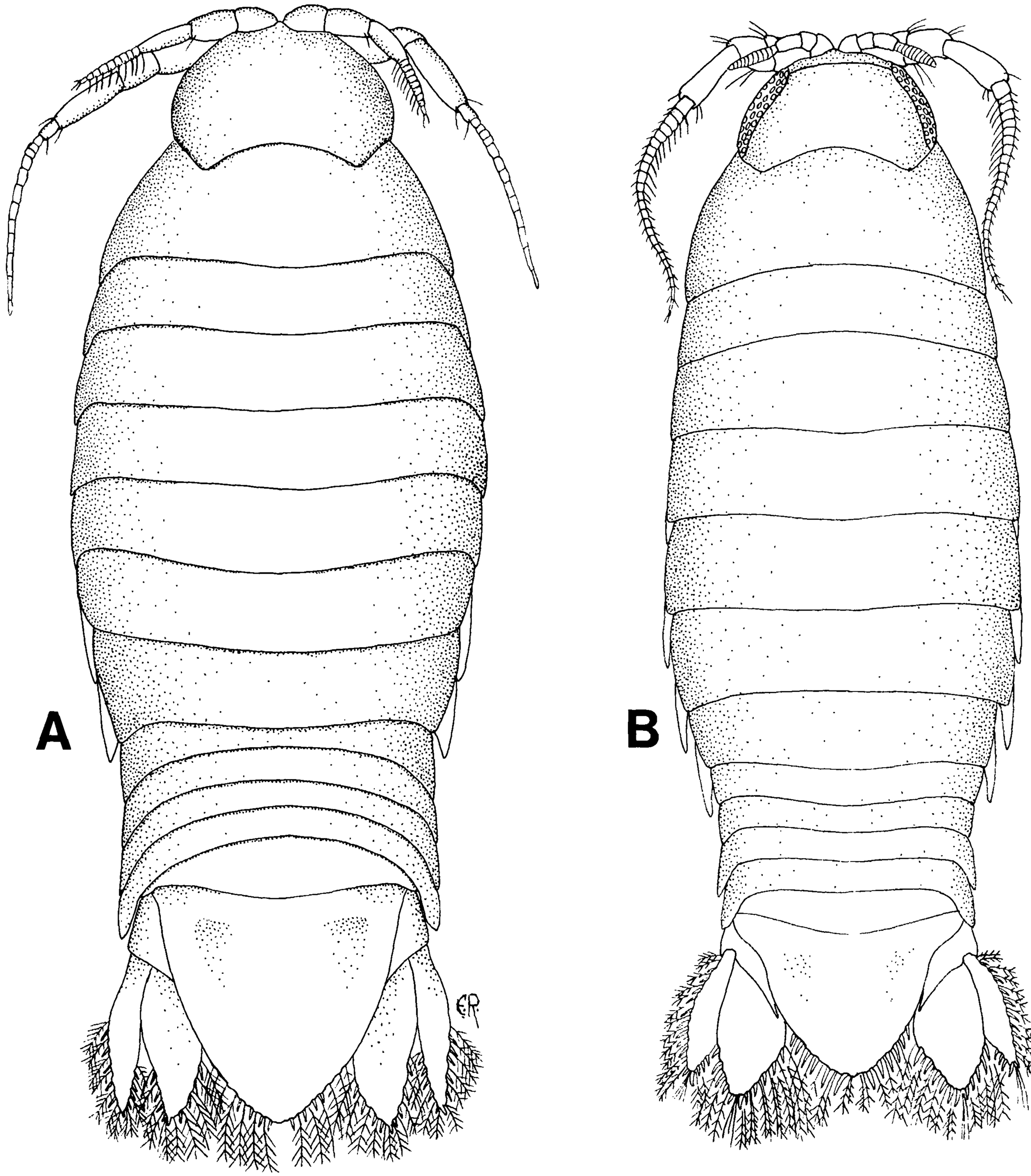



Figure 65. *Natatolana* of the tropical eastern Pacific, dorsal views: A, *N. californiensis* (AHF 6048), holotype, male. B, *N. carlenae* n. sp. (USNM 252731), holotype, male.

1. *N. albicaudata* (Stebbing, 1900). Australia, Philippines, and Japan.
2. *N. amplocula* Bruce, 1986. Kai Islands and the Arafura Sea, Indonesia.
3. *N. angula* Bruce, 1986. Queensland, Australia.
4. *N. anopthalma* (Kussakin and Vasina, 1982). Kerguelen Islands, Indian Ocean.
5. *N. arcicauda* (Holdich, Harrison, and Bruce, 1981). Queensland, Australia.
6. *N. arrama* Bruce, 1986. Victoria, Australia.
7. *N. boko* Bruce, 1986. Queensland, Australia.
8. *N. borealis* (Lilljeborg, 1851). Europe and South Africa.

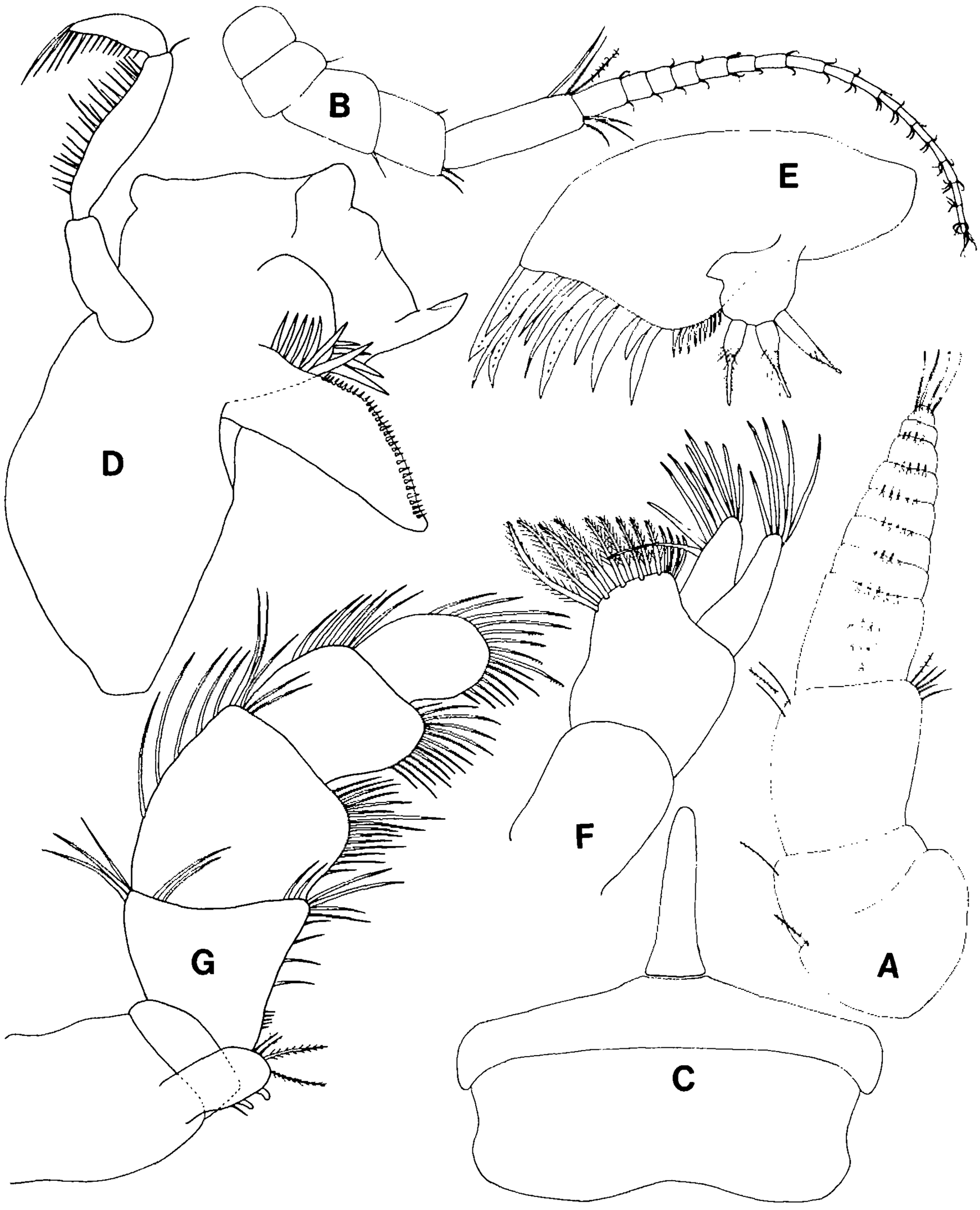



Figure 66. *Natatolana californiensis* (AHF 6048), holotype, male: A, antennule (left), only proximal region of aethetases shown. B, antenna (left). C, frontal lamina, clypeus, and labrum. D, mandible (left). E, maxillule (left). F, maxilla (left). G, maxilliped (left).

9. *N. bowmani* Bruce, 1986. New South Wales, Australia.
10. *N. bulba* Bruce, 1986. Queensland, Australia.
11. *N. caeca* (Dollfus, 1903). Europe.
12. *N. californiensis* (Schultz, 1966). California to Gulf of California.
13. *N. carlenae* n. sp. Pacific Mexico to Panama.
14. *N. chilensis* (Menzies, 1962). Chile.
15. *N. corpulenta* (Hale, 1925). South Australia.
16. *N. curta* (Richardson, 1910). Philippines.
17. *N. endota* Bruce, 1986. New South Wales, Australia.
18. *N. galathea* Bruce, 1986. Gulf of Carpenteria, Australia.
19. *N. gallica* (Hansen, 1905). Atlantic coast of Europe.
20. *N. gorung* Bruce, 1986. Victoria, Australia.
21. *N. gracilis* (Hansen, 1890). West Indies to Brazil.
22. *N. hirtipes* (Milne Edwards, 1840). South Africa.
23. *N. insignis* Hobbins and Jones, 1993. Red Sea.
24. *N. intermedia* (Vanhöffen, 1914). Antarctica.
25. *N. japonensis* (Richardson, 1904). Japan.
26. *N. kahiba* Bruce, 1986. New South Wales, Australia.
27. *N. karkarook* Bruce, 1986. Queensland, Australia.
28. *N. laewilla* Bruce, 1986. New South Wales, Australia.
29. *N. longispina* Bruce, 1986. Victoria, Australia.
30. *N. lurur* Bruce, 1986. Western Australia.
31. *N. luticola* (Holdich, Harrison, and Bruce, 1981). Queensland, Australia.
32. *N. matong* Bruce, 1986. Tasmania, Australia.
33. *N. meridionalis* (Hodgson, 1910). Antarctica. [Bruce (1986a) synonymized *N. albinota* (Vanhöffen, 1914) with *N. meridionalis*; Brandt (1988) apparently was unaware of this synonymy].

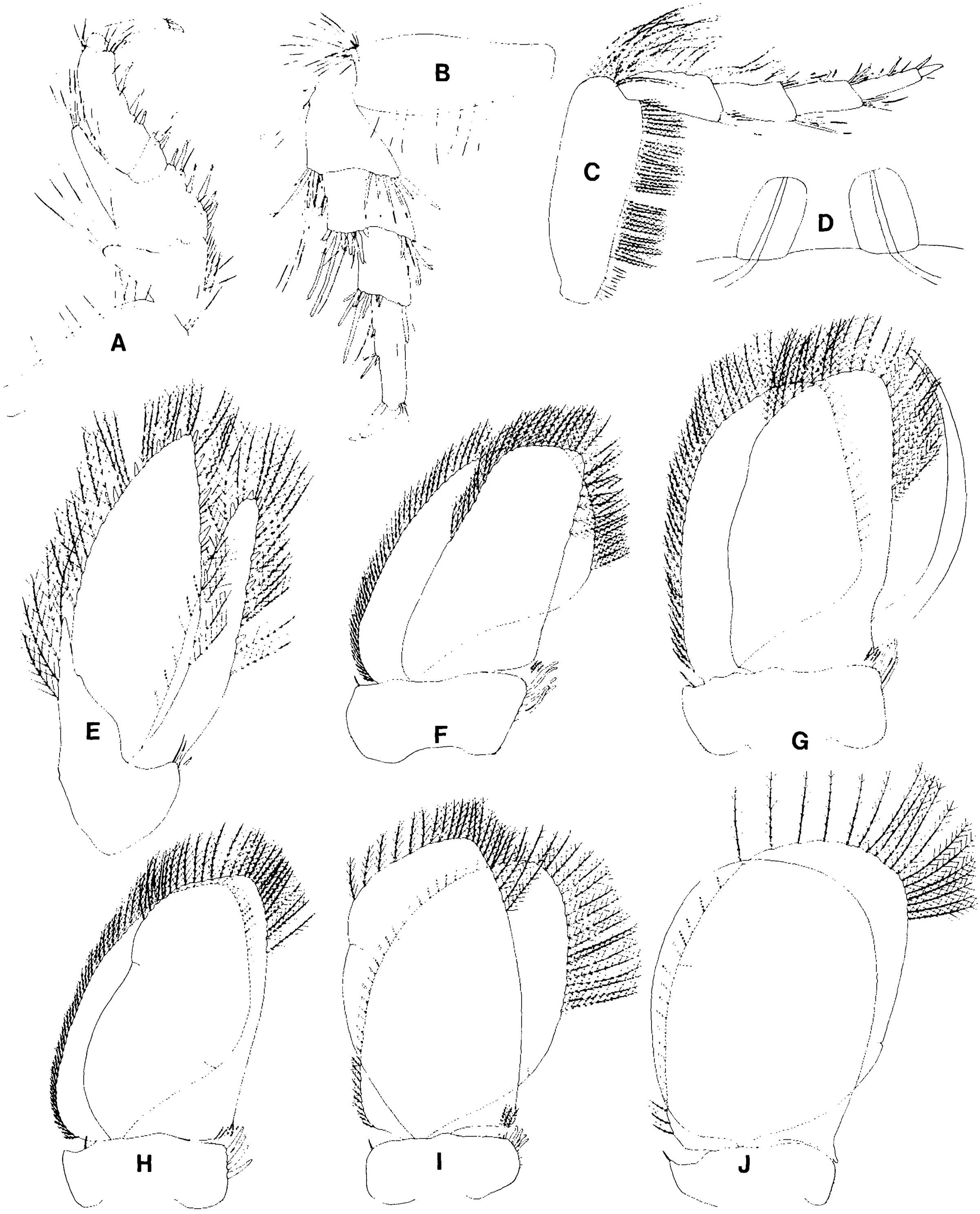



Figure 67. *Natatolana californiensis* (AHF 6048), holotype, male: A, pereopod I (left). B, pereopod IV (left). C, pereopod VII (left). D, penes. E, dorsal view of uropod (left). F, pleopod 1 (left). G, pleopod 2 (left). H, pleopod 3 (left). I, pleopod 4 (left). J, pleopod 5 (left).

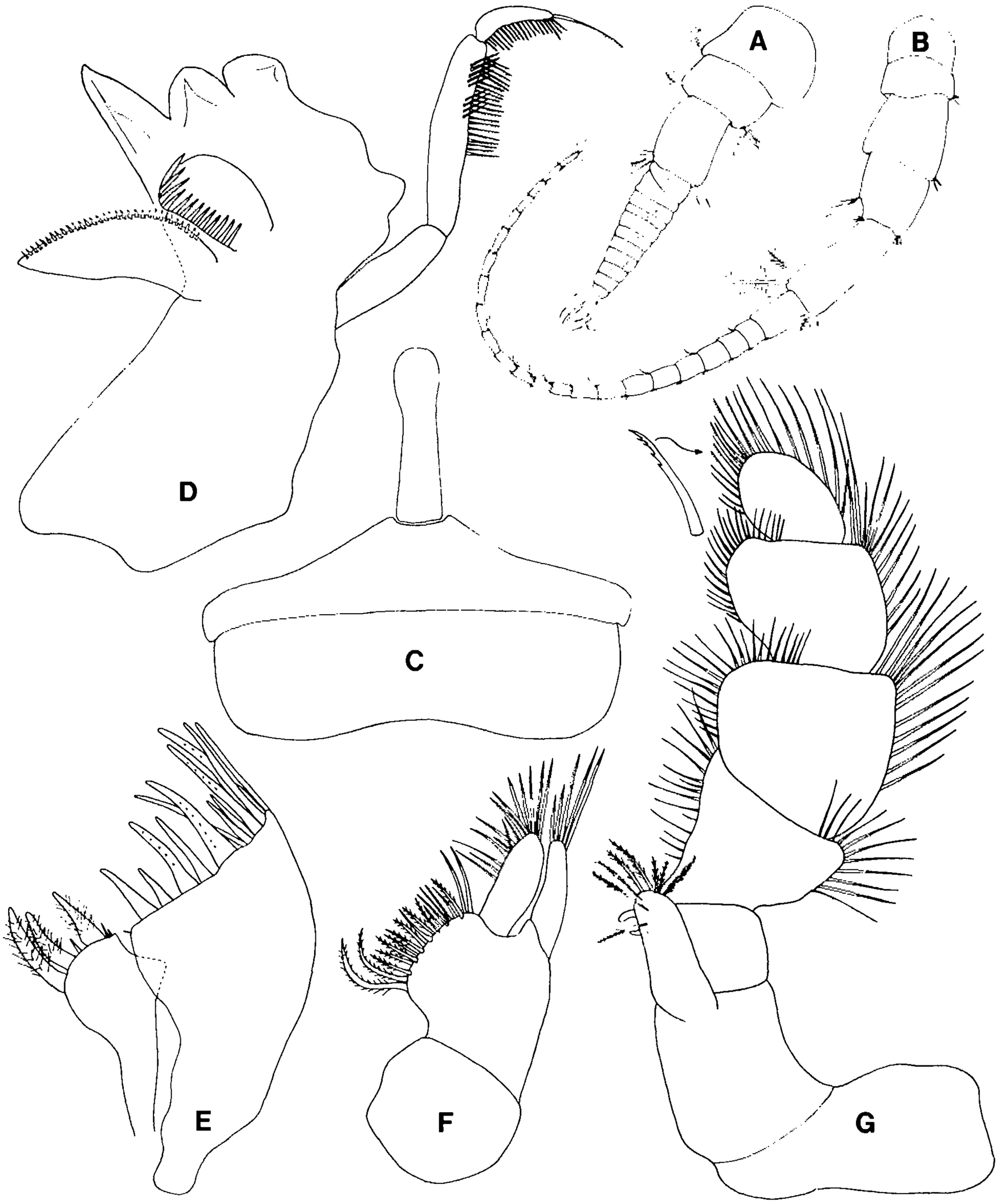



Figure 68. *Natatolana carlenae* n. sp. (USNM 252731), holotype, male: A, antennule (right), only proximal region of aethetascs shown. B, antenna (right). C, frontal lamina, clypeus, and labrum. D, mandible (right). E, maxillule (right). F, maxilla (right). G, maxilliped (right).

34. *N. nammuldi* Bruce, 1986. Victoria, Australia.
35. *N. narica* (Bowman, 1971). New Zealand.
36. *N. natalensis* (Barnard, 1940). South Africa.
37. *N. natalis* (Menzies and George, 1972). Peru.
38. *N. neglecta* (Hansen, 1890). Mediterranean.
39. *N. nitida* (Hale, 1952). Kerguelen and Crozet Islands, Indian Ocean.
40. *N. obtusata* (Vanhöffen, 1914). Antarctica.
41. *N. oculata* (Vanhöffen, 1914). Antarctica.
42. *N. pallidocula* (Kussakin and Vasina, 1982). Kerguelen Islands, Indian Ocean.
43. *N. pastorei* (Giambiagi, 1925). Tierra del Fuego.
44. *N. pellucida* (Tattersall, 1921). New Zealand and Australia.
45. *N. pilula* (Barnard, 1955). South Africa.
46. *N. prolixa* Bruce, 1986. Queensland, Australia.
47. *N. rossi* (Miers, 1876). New Zealand.
48. *N. schmidti* (Hansen, 1905). Faroes, northeast Atlantic.
49. *N. tenuistylis* (Miers, 1884). Australia.
50. *N. thalme* Bruce, 1986. Queensland, Australia.
51. *N. thurar* Bruce, 1986. Bass Strait, Australia.
52. *N. valida* (Hale, 1940). Bass Strait, Australia.
53. *N. variguberna* (Holdich, Harrison, and Bruce, 1981). Australia.
54. *N. vieta* (Hale, 1925). South Australia.
55. *N. virilis* (Barnard, 1940). South Africa.
56. *N. woodjonesi* (Hale, 1924). South Australia.
57. *N. wowine* Bruce, 1986. Victoria, Australia.
58. *N. wullunya* Bruce, 1986. New South Wales, Australia.

Key to Tropical Eastern Pacific *Natatolana* Species

1. Without eyes; pleotelson with 6–10 apical spines; mandibular palp with simple setae only; appendix masculina broadly curving, basally wide ..... *Natatolana californiensis*

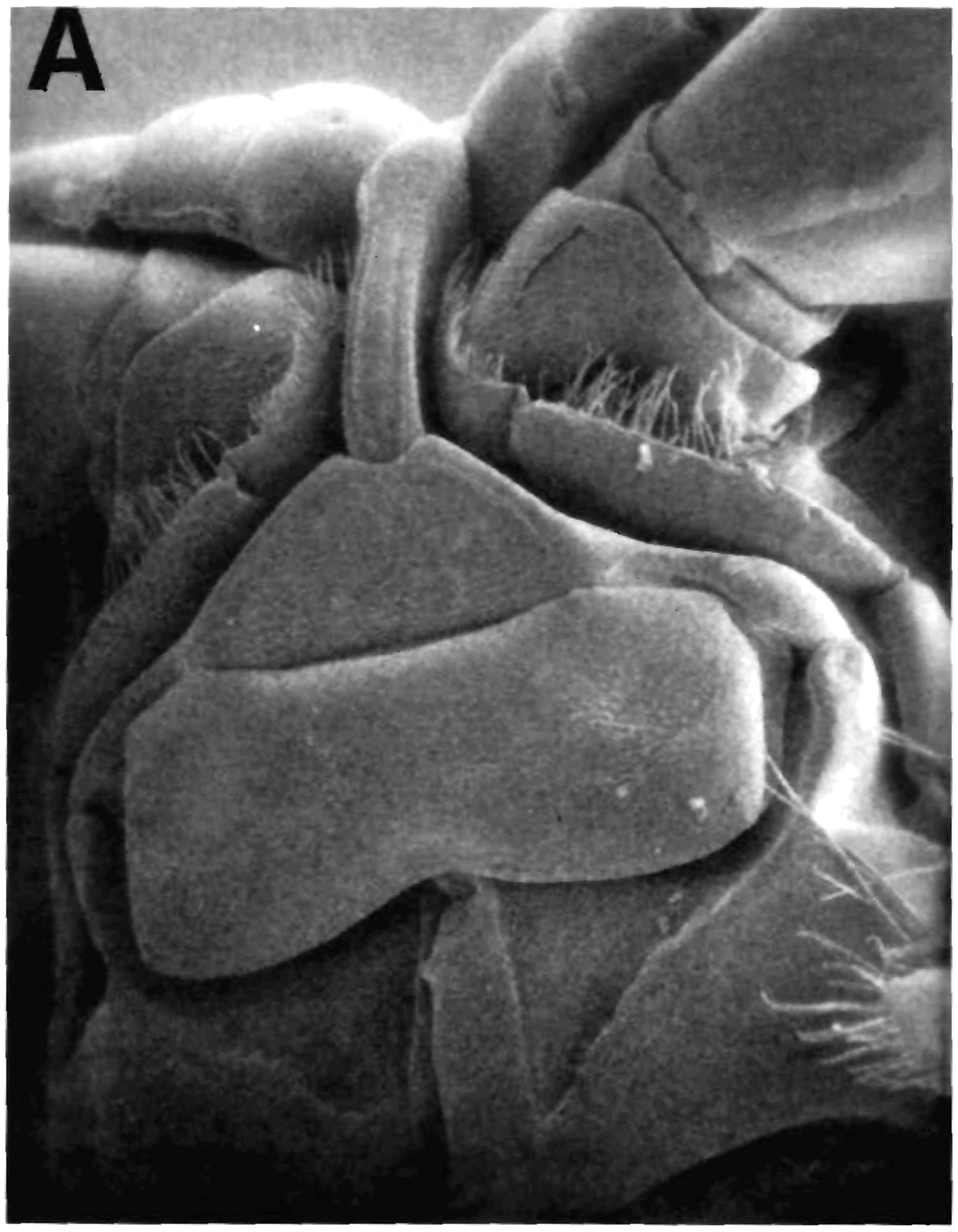






Figure 69. *Natatolana carlenae* n. sp. (AHF 959-1), scanning electron micrographs: A, frontal lamina, clypeus, and labrum, 40×. B, frontal lamina, 80×. C, pereopod I, dactylus, 40×. D, pereopod I, merus and carpus, 80×.

— With eyes (sometimes unpigmented but always with distinct ommatidia); pleotelson with 10–13 apical spines; mandibular palp with simple and comb setae; appendix masculina sublinear ..... *N. carlenae* n. sp.

*Natatolana californiensis* (Schultz, 1966)
Figs. 65A, 66, 67

*Natatolana californiensis* Bruce 1981a: 58; 1986a: 222. Brusca 1980: 228. Brusca and Iverson 1985: 37.

*Cirolana californiensis* Schultz 1966: 14; 1969: 178. Brusca and Ninos 1978: 379.

*Cirolana deminuta* Menzies and George 1972: 9. (Not *Cirolana diminuta* of Menzies, 1962b, and other authors).

*Type material examined.*—(1) Male holotype (LACM 60.88.4, AHF Type No. 6048): U.S.A., California, San Diego Co., Coronado Canyon, 32° 30.70' N, 117° 21.62' W, on green mud, 794 m; R/V *Velero IV* Sta. 6851-60; 1 Feb. 1960. (2) Paratypes (LACM 60.76.3, AHF Cat. No. 952-1): U.S.A., California, Los Angeles Co., San Clemente Island, Tanner Canyon, 54.8 mi., 250° T from China Point Light, 32° 37.87' N, 118° 58.70' W, 792 m; R/V *Velero IV* Sta. 6833-60; 29 Jan. 1960; 2 specimens.

*Other material examined.*—California specimens: (3) Santa Catalina Island, 6.75 mi. 92° T from Long Point Light; 33°24' N, 118° 13' W; R/V *Velero IV* Sta. 2228-53, AHF Cat. No. 752-1; 28 Feb. 1953; 1 male and 1 juvenile. (4) Santa Catalina Island, 33° 22' 30" N, 118° 36' 38" W, Campbell grab on sandy gray-green mud; R/V *Velero IV* Sta. 2847-54; 23 June 1954; 1 specimen. (5) San Clemente Island; R/V *Velero IV* Sta. 6351-59, AHF Cat. No. 933-1, LACM; 2 specimens. (6) San Clemente Island, 30.5 mi. 62° T to China Point; Sta. 24607-76, AHF Cat. No. 774-01, LACM; 1 male. (7) San Clemente Island, 63° T to China Point, 2–30 m; Sta. 24606, AHF Cat. No. 772-01, LACM; 2 mancas. (8) San Clemente Island, 29.7 mi. 66° T to China Point; AHF Cat. No. 773-01, LACM; 1 male. (9) No exact locality, 900–1250 m; SDNHM; 28 Aug. 1978; R/V *Calafia*, Calif. Dept. Fish and Game, coll. P. Gregory; 12 specimens.

Gulf of California specimen: (10) Angel de la Guarda Island, 7 mi. 253° T from south end, 1135–1138 m; R/V *Velero IV* Sta. 11827-67, LACM; 1 Dec. 1967; 1 nonovigerous female.

*Description of male.*—Cephalon width 1.8 times length. Eyes absent (Fig. 65A). Antennules extend barely to posterior region of cephalon; flagellum of 8–12 free articles, basal articles fused, each article with 1–5 long unjointed aesthetascs (only the most basal portion of aesthetascs figured) (Fig. 66A). Antenna reaching middle of pereonite II; flagellum of 10–22 articles (Fig. 66B). Frontal lamina not expanded anteriorly, narrowing and rounded (Fig. 66C). Mandibular spine row with about 11–14 stout spines; 2 lateral (outer) cusps of incisor weakly developed; middle and distal articles of palp with simple setae only (Fig. 66D). Maxillule's medial lobe with lateral protuberance, deep notch, and 3 stout strongly tapering circumplumose spines; lateral lobe with about 12 large spines, the largest with barbs, followed by 9 small subapical marginal spines (Fig. 66E). Maxilla medial lobe with 9 plumose setae and 4 simple setae; lateral lobes with 11 and 5 simple setae, respectively (Fig. 66F). Left maxillipedal endite with 2 or 3 coupling spines, right maxillipedal endite with 1 or 2 coupling spines and 2 apical and 2 subapical plumose setae; palp articles with simple marginal setae, most distal article also with comb setae as figured (Fig. 66G).

Pereon widest at pereonites IV and V. Coxae IV–VII produced beyond posterior margins of their segments; most posterior coxae visible in dorsal aspect (Fig. 65A). Pereopod I: inferior margin of ischium with long setae but no spines; inferior margins of merus, carpus, and propodus with stout spines as figured; superior lobe of ischium forms spoonlike depression into which merus collapses; carpus short (Fig. 67A). Pereopod IV not much longer pereopod I; distal superior margins of ischium and merus not produced; articles with setae and stout simple spines as figured (Fig. 67B). Pereopod VII not much longer than pereopod IV; basis and ischium with long plumose setae as figured; basis 2.5 times longer than wide; ischium, merus, carpus, and propodus with spines and simple setae as figured (Fig. 46C). Pereonite VII with small penile lobes (Fig. 67D).

Pleopodal rami with PMS as figured (Figs. 67F–J). Pleopod 1: peduncle's medial margin with 5 coupling spines and 3 plumose setae; lateral margin with 1 small spine; endopod 0.78 times width of exopod (Fig. 67F). Pleopod 2: peduncle's medial margin with 5 coupling spines and 3 plumose setae, lateral margin with 1 small spine; endopod 0.88 times width of exopod; appendix masculina scythelike, narrowing from base to apex, length 1.15 times exopod length (Fig. 67G). Pleopod 3: peduncle's medial margin with 4 coupling spines and 4 plumose setae, lateral margin with 1 short spine; endopod 0.95 times as wide as exopod, with short incision on lateral margin; exopod with short incision on medial margin (Fig. 67H). Pleopod 4: peduncle's medial margin with 4 coupling spines and 3 plumose setae, lateral margin with 1 spine; endopod 0.95 times as wide as exopod, with short incision on lateral margin; exopod with short incisions on medial and lateral margins (Fig. 67I). Pleopod 5: peduncle with 1 short spine on lateral margin, endopod width subequal to exopod width; exopod with short incisions on medial and lateral margins (Fig. 67J).

Pleotelson subtriangular, lateral margins slightly convex (not straight); distal quarter of pleotelson with marginal serrations and 6–10 spines interspersed with long PMS; dorsum with shallow paired submedian depressions near base (Fig. 65A). Uropods extend barely beyond apex of pleotelson, narrowed apically; rami without apical notches, margins slightly serrate, fringed with long PMS and short spines. Uropodal exopod 0.5 width of endopod; medial margin of exopod with 2–4 stout spines, lateral margin with 5–8 stout spines. Uropodal endopod with 4–6 stout spines on medial margin, 3–4 spines on lateral margin. Uropodal peduncle's inner angle with distal PMS; distolateral angle with 3 long spines (Fig. 67E).

*Female.*—Similar to male. Females not bearing oostegites have variously developed maxillipedal epipods.

*Size* —To maximum length of 13.4 mm.

*Distribution.*—*Natatolana californiensis* is primarily a southern California animal; we have examined a single specimen from the Gulf of California. Collection depths range from 792 to 1250 m.

*Remarks.*—The holotype is a male, not a female as reported by Schultz (1966: 15). Our description is based on the holotype and other California material. The single specimen from the Gulf of California differs from the California specimens in one regard only: the clypeus is notched anteriorly, below the posterior tip of the frontal lamina. Depth data for several of the *Velero IV* collection stations could not be found.

*Natatolana carlenae* n. sp.
Figs. 65B, 68-70

*Type material examined.*—(1) Male holotype (USNM 252731) and 5 male and female paratypes (USNM 252732): Mexico, Sonora (Gulf of California), Tiburon Island, on muddy sand, 73–101 m; Sta. No. 563-36, USNM Acc. No. 139772; 10 Mar. 1936.

Additional paratypes, Pacific Baja California specimens: (2) Cedros Island, 28° 04' N, 115° 20' W, 29 m; R/V *Velero IV* Sta. 1703-49, LACM; 5 Mar. 1949; 6 specimens. (3) 2 mi. S.E. of Cedros Island Light; 28° 20' N, 115° 10' W, 101 m; R/V *Velero III* Sta. 1265-41, LACM; 28 Feb. 1941; 5 specimens. (4) Dewey Channel, San Eugenio Point, 27° 49' 32" N, 115° 06'15" W; R/V *Velero III* Sta. 1260-41, LACM; 27 Feb. 1941; 1 male. (5) Thurloe Head, 27° 34' N, 114° 50' W, 70 m; R/V *Velero IV* Sta. 11841-67, LACM; 7 Dec. 1967; 1 male and 1 female.


Figure 70. *Natatolana carlenae* n. sp. (USNM 252731), holotype, male: A, pereopod I (right). B, pereopod IV (right). C, pereopod VII (right). D, uropod (right). E, pleopod 1 (right). F, pleopod 2 (right). G, pleopod 3 (right). H, pleopod 4 (right). I, pleopod 5 (right).

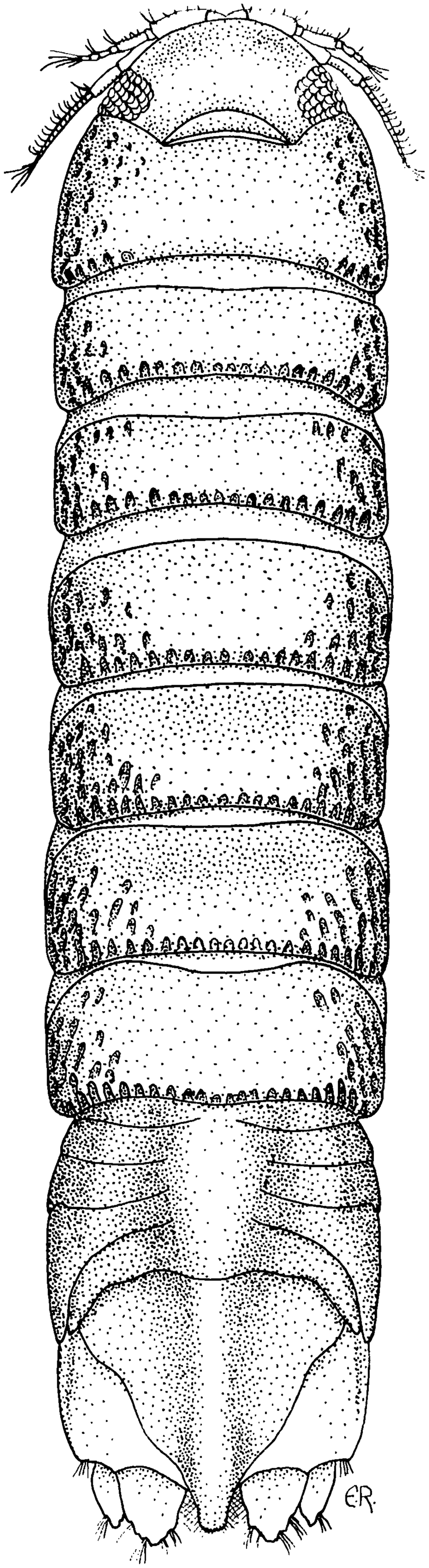


Figure 71. *Oncilorpheus jerrybarnardi* n. sp. (LACM 39-51.17, AHF Cat. No. 896-04), holotype, male.

Gulf of California specimens (all Baja California): (6) North of Angel de la Guarda Island, 73–128 m; R/V *Velero III* Sta. 546-36, USNM Acc. No. 139772; 5 Mar. 1936; 2 specimens. (7) North of Angel de la Guarda Island, 15–18 m; R/V *Velero III* Sta No. 551-36, USNM Acc. No. 139772; 1 specimen. (8) Angel de la Guarda Island, Puerto Refugio, 165 m; R/V *Velero III* Sta. 709-37, USNM Acc. No. 144492; 21 Mar. 1937; 3 specimens. (9) Angel de la Guarda Island, Puerto Refugio, on sand, 119 m; R/V *Velero III* Sta. 544-36, USNM Acc. No. 139772; 4 Mar. 1936; 4 specimens. (10) Angel de la Guarda Island, Puerto Refugio, with oysters, 28–55 m; R/V *Velero III* Sta. No. 542-36, USNM Acc. No. 139772; 4 Mar. 1936; 1 specimen. (11) Los Angeles Bay, on sand, 46–73 m; R/V *Velero III* Sta. 535-36, USNM Acc. No. 139772; 2 Mar. 1936; 1 specimen. (12) Los Angeles Bay, 33 m; R/V *Velero III* Sta. 702-37, USNM Acc. No. 144492; 20 Mar. 1937; 2 specimens. (13) Los Angeles Bay, 59 m; R/V *Velero III* Sta. 701-37, USNM Acc. No. 144492; 20 Mar. 1937; 3 specimens. (14) North of Coyote Point, 25° 49' N, 111° 11' W, dredge, sand, mud, and shell, 51 m; R/V *Velero IV* Sta. 1753-49, LACM; 20 Mar. 1949; 2 specimens. (15) Between Cerralvo Island and La Paz, benthic trawl, 247 m; Sta. 3, AHF Cat. No. 959-1, LACM; 7 Sept. 1969; coll. R. Schaffer; 4 specimens. (16) Ensenada de los Muertos, with shell fragments, 73 m; R/V *Velero III* Sta. 629-37, USNM Acc. No. 144492; 5 Mar. 1937; 1 specimen.

Central Eastern Pacific specimens: (17) Costa Rica, Port Parker; 10° 57' N, 85° 49' W, sandy mud, 9–18 m; R/V *Velero III* Sta. 936-39, LACM; 25 Mar. 1939; 2 specimens. (18) Panama, Secas Island, mud and shells, 46 m; USNM Acc. No. 128938; 22 Feb. 1934; 1 male, damaged, probably dried and rehydrated.

*Description of male.*—Cephalon width 1.9 times length. Eyes elongate, well-developed (Fig. 65B), unpigmented or golden (in ethanol), visible in ventral aspect. Antennular peduncle articles with simple and palmate setae; flagellum of 10 or 11 articles, each article with 1–3 long unjointed aesthetascs (only most basal portions of aesthetascs figured) (Fig. 68A). Antenna reaching pereonite III; flagellum of 23 to 24 articles, with simple and palmate setae as figured (Fig. 68B). Frontal lamina with anterior margin expanded and rounded (Fig. 68C, 69A, B). Mandibular spine row with about 13 stout spines; inner and middle cusps of incisor acute, outer cusp rounded, all 3 cusps with elevated ridges; middle and distal palp articles with simple and comb setae, apical seta of distal article very long as figured (Fig. 68D). Maxillule's medial lobe with lateral protuberance, 3 stout circumplumose spines, and 3 small simple spines; lateral lobe with about 12 large spines, largest spines with barbs (Fig. 68E). Maxilla's medial lobe with about 11 plumose and 8 simple setae; lateral lobes with 15 and 5 simple setae, respectively (Fig. 68F). Left and right maxillipedal endites short, each with 2 coupling spines and plumose setae; palp articles with simple setae, most distal article also with comb setae (Fig. 68G).

Pereon widest at pereonites IV and V. Coxae IV–VII visible in dorsal view, produced well beyond the posterior margins of their respective pereonites; coxa VII produced almost to posterior margin of pleonite 2 (Fig. 65B). Pereopod I: merus, carpus, and propodus with stout spines as figured; lobe of ischium and merus with very large distal spines; lobe of ischium forms distal spoonlike depression into which merus collapses; carpus very short (Figs. 69C, D, 70A). Pereopod IV with distal margins of ischium and merus not produced as on pereopod I; inferior margins of articles with very long simple setae and spines as figured (Fig. 70B). Pereopod VII long, very setose; basis 1.6 times longer than wide; ischium with simple and plumose setae, simple spines, and about 6 serrate spines; merus and carpus with simple setae and simple and serrate spines (Fig. 70C). Pereonite VII without penes.

Pleopodal rami with PMS as figured; all pleopodal peduncles with 1 lateral spine and cluster of sublateral simple setae (Figs. 70E–I). Pleopod 1: peduncle's medial margin with 5 coupling spines and 4 plumose setae; 1 spine near lateral margin; endopod width 0.66 times width of exopod (Fig. 70E). Pleopod 2: peduncle's

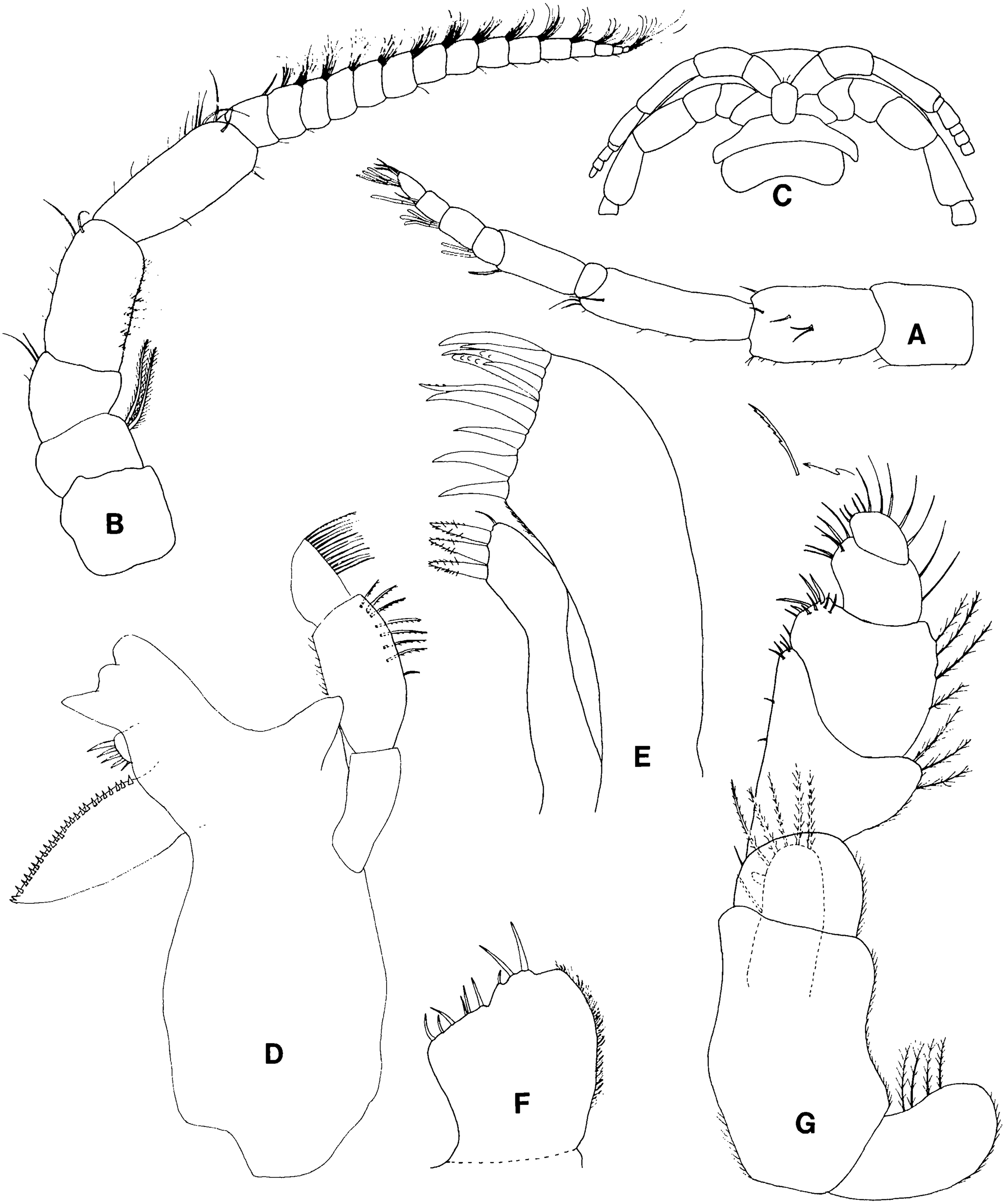
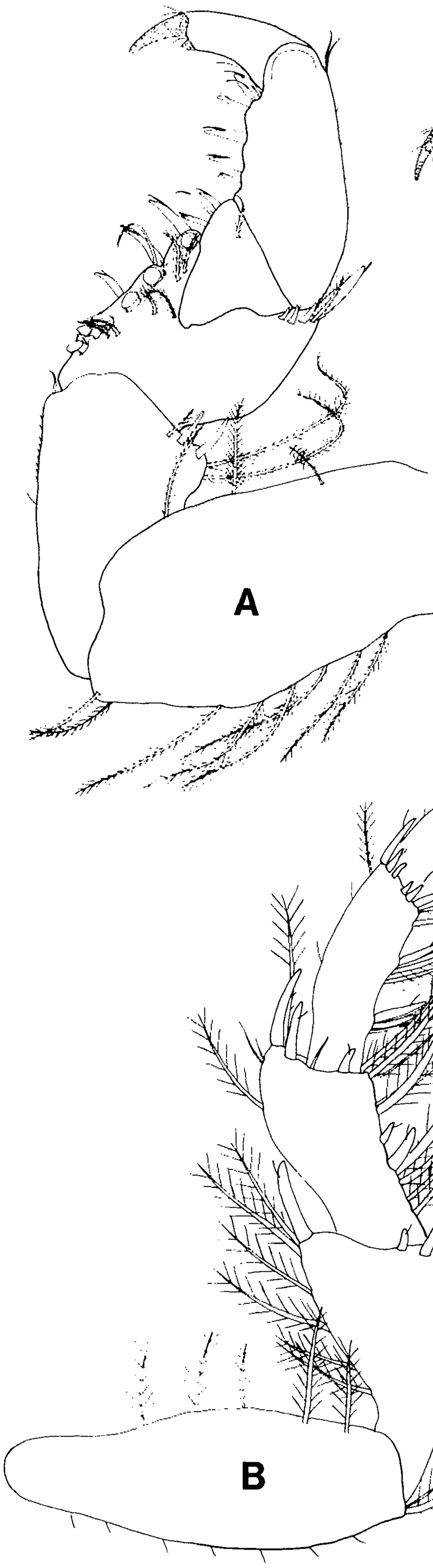
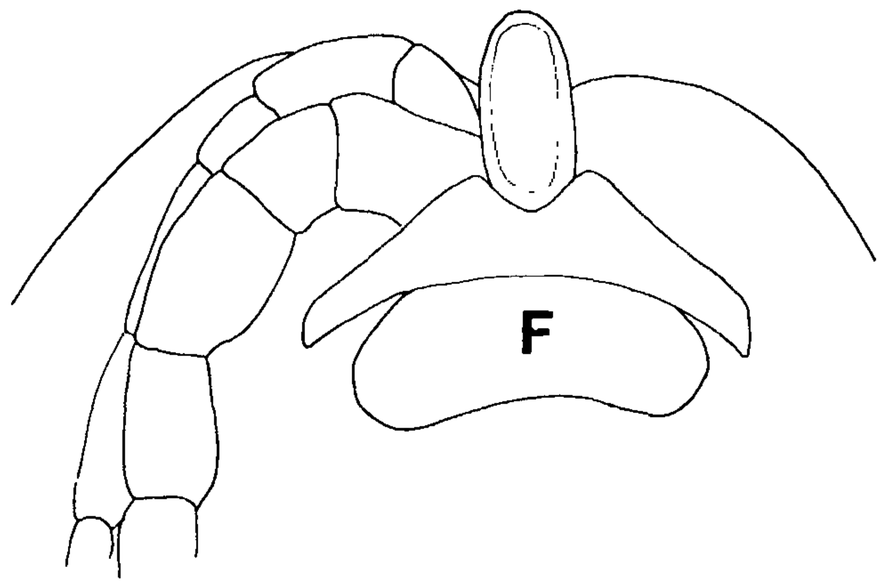



Figure 72. *Oncilorpheus jerrybarnardi* n. sp. (LACM 39-51.17, AHF Cat. No. 896-04): A, antennule (right). B, antenna (right). C, frontal lamina, clypeus, and labrum. D, mandible (left). E, maxillule (left). F, maxilla (left). G, maxilliped (left).

medial margin with 4 coupling spines and 5 plumose setae; endopod width 0.98 times width of exopod; appendix masculina simple; length 0.97 times endopod length (Fig. 70F). Pleopod 3: peduncle's medial margin with 4 coupling spines and 7 plumose setae; endopod subequal to exopod in width, with short incision on lateral margin; exopod with short incision on medial margin (Fig. 70G). Pleopod 4: peduncle's medial margin with 5 coupling spines and 7 plumose setae; endopod subequal to exopod in width, with short incisions on medial and lateral margins; exopod with short incision on medial margin (Fig. 70H). Pleopod 5: peduncle somewhat irregularly



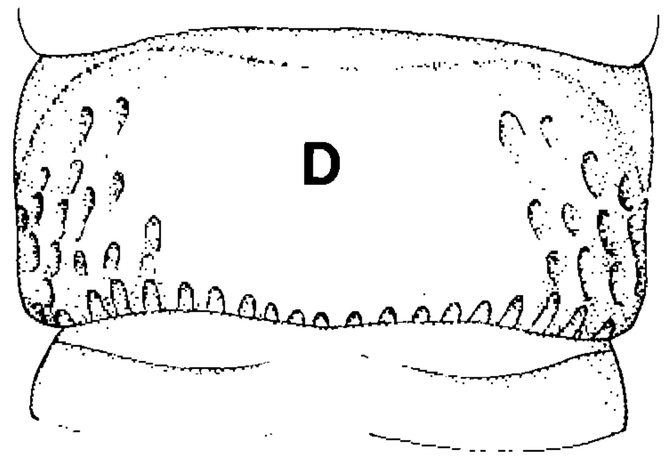










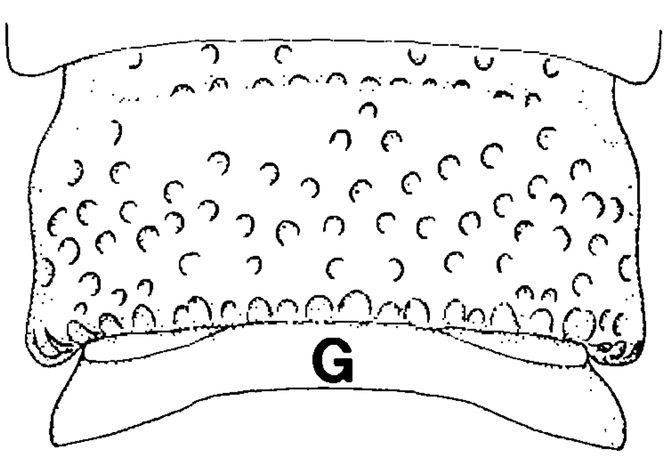




Figure 73. *Oncilorpheus jerrybarnardi* n. sp. (LACM 39-51.17, AHF Cat. No. 896-04): A, pereopod I (left). B, pereopod IV (left). C, pereopod VII (left). D, dorsal view of pereonite III. E, ventral view of penes on sternite VII, and pleopod 1. *Oncilorpheus stebbingi* (holotype): F, frontal lamina, clypeus and labrum. G, dorsal view of pereonite III.

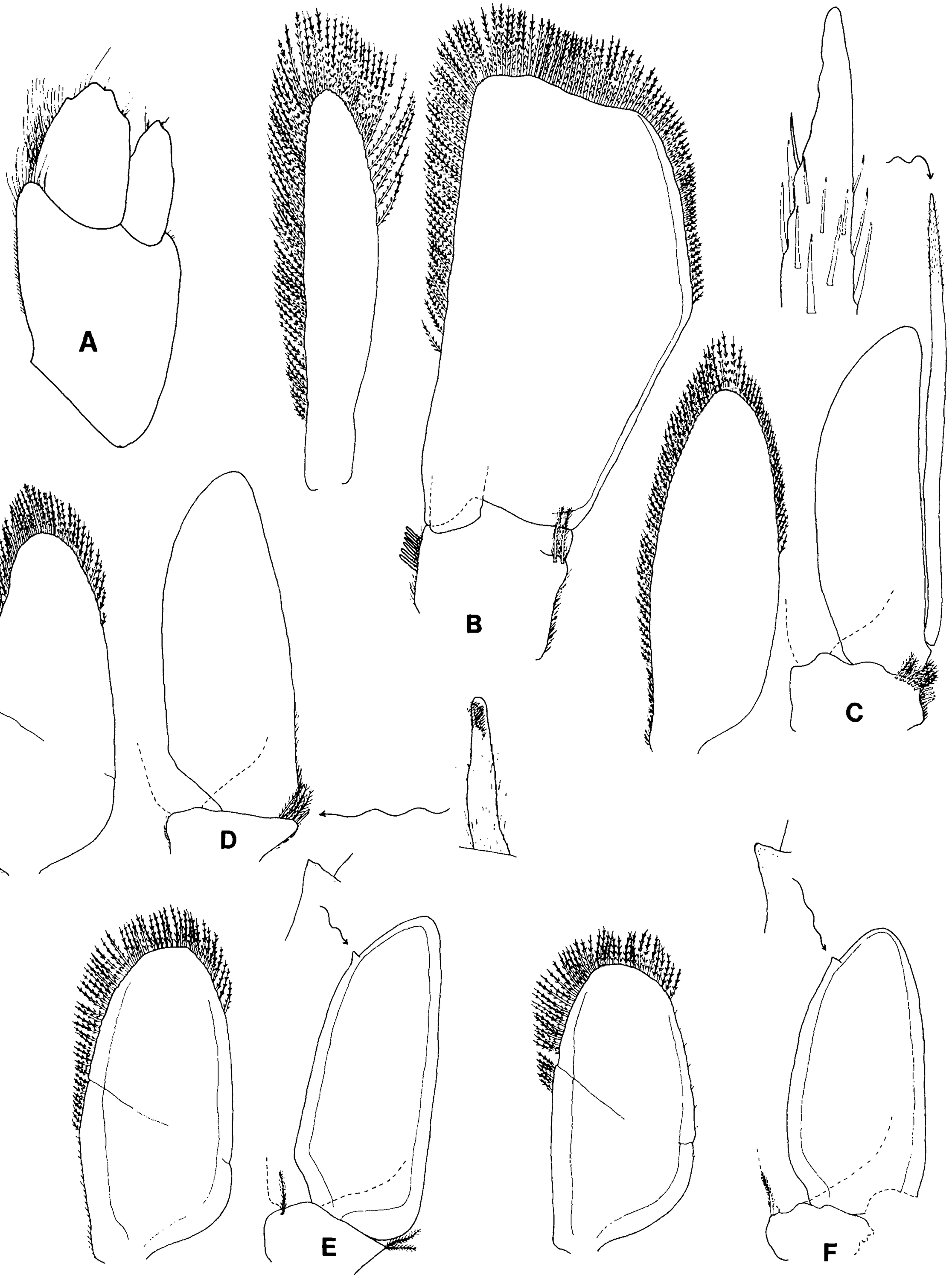



Figure 74. *Oncilorpheus jerrybarnardi* n. sp. A, uropod (left) from paratype, female (USNM 252738). B–F, pleopods (left) from holotype, male (LACM 39-51.17, AHF Cat. No. 896-04): B, pleopod 1. C, pleopod 2. D, pleopod 3. E, pleopod 4. F, pleopod 5.

shaped, lateral margin produced into elongate lobe; endopod subequal to exopod in width; proximolateral angle of exopod slightly produced, rounded, lobelike (Fig. 70I).

Pleotelson subtriangular, lateral margins slightly convex (not straight); distal quarter of pleotelson with marginal serrations, PMS, and 10–14 stout spines; dorsum devoid of tubercles or carinae, but with a pair of shallow submedian depressions near base. Uropods extend beyond apex of pleotelson, margins slightly serrate, fringed with long PMS and stout spines, narrowed apically, without apical notches on rami (Fig. 65B). Uropodal exopod 0.58 times width of endopod; medial margin of exopod with about 3 spines, lateral margin with 7–9 spines. Uropodal endopod with 4–7 spines on medial margin, spines on lateral margin, and a single apical spine. Uropodal peduncle inner angle with PMS; dorsal surface of lateral (outer) angle with 3 stout spines and PMS as figured (Fig. 70D).

*Female*. — Similar to male.

*Ultrastructural Features*.—When viewed with an SEM, most of the body and appendages show a scalelike cuticular structure. The dorsal regions of the antennules, antennae, and body have minute cuticular sensillae (Figs. 69A, B).

*Size*.—To maximum length of 16.8 mm.

*Distribution*.—Known from northwestern Baja California (Pacific), the Gulf of California, Costa Rica, and Panama, at depths ranging from 9 to 1168 m. Although the depth range of this species is remarkably broad, we have not observed any differences between shallow- and deep-water specimens. This species is generally found in waters shallower than is *N. californiensis*. Of 18 specimen lots with depth data, 16 were from depths of 9 to 165 m, and only 2 were from depths of 247 to 1168 m; most records are from depths of 25 to 170 m. Recorded substrates include sand, mud, and shell fragments; 1 specimen was found "with oysters." *Natatolana carlenae* appears to be fairly common in soft-bottom subtidal habitats, particularly in the Gulf of California.

*Remarks*.—This species is very similar to *Natatolana californiensis*. The main characters separating the two are the presence of eyes in *N. carlenae*, the number of apical pleotelson spines (10–14 in *N. carlenae*, 6–10 in *N. californiensis*), and uropod spination. Several small, barely postmanca specimens of *Natatolana carlenae* have definite pigmented eyes and 12 pleotelson spines, indicating that these are not age- or size-related variations but good species differences.

*Etymology*. — This common Gulf of California species is named for the senior author's daughter, Carlene, in appreciation of the many collecting trips she participated on in the Sea of Cortez, many before she was old enough to know what an isopod was.

## *Oncilorpheus* Paul and Menzies, 1971

*Type species*.—*Oncilorpheus stebbingi* Paul and Menzies, 1971, by original designation. Type specimens at USNM.

*Oncilorpheus* Paul and Menzies 1971: 29. Kensley and Schotte 1989: 139.

*Description*.—Body elongate, 4.0–5.0 times longer than broad; dorsum of pereon with numerous pits or scalloped depressions. Eyes moderate in size. Cephalon lacking rostrum, moderately immersed in pereonite I; posterior region of cephalon with nearly complete incision line. Frontal lamina robust, projecting anteroventrally, 1.8–2.4 times longer than broad, apex subacute or rounded; clypeus flat (sessile), short, broad, wider than long; labrum narrower than clypeus. Antennular peduncle 3-articulate; second article not articulated at right angles to first article (as in *Eurydice*); peduncular basal articles generally longer than wide; article 3 longest. Antenna short, only slightly longer than antennule; peduncle 5-articulate; articles 4 and 5 subequal in length and longer than others. Mandible with tridentate incisor; palp 3-articulate, middle article longest; spine row a small tapered lobe with stout spines. Maxillule's medial lobe with 3 stout circumplumose spines; lateral lobe with about 10 stout spines. Maxilla reduced, short, a single lobe, apex with simple setae. Maxillipedal palp 5-articulate; endite small, with 1 or 2 coupling spines and plumose setae.

Pereopodal dactyli with short stout accessory spine at base of unguis; distal superior margin of ischium of pereopods I–III not greatly produced; distal superior margin of merus produced. Pereopods V–VII with basis not markedly flattened or enlarged; pereopod VII long and slender; ischium, merus, carpus, and propodus subequal in length, each one successively narrower. Penes well developed on sternite of pereonite VII.

Pleon of 5 somites, which may be fused medially; lateral margins of pleonite 5 largely encompassed by pleonite 4. Pleopod 1's exopod large, indurate, and operculate; endopods of pleopods 2–5 lack PMS. Pleopodal peduncles 2–5 barely wider than long, without accessory lobes; appendix masculina of male arises subbasally from medial margin of endopod of pleopod 2. Pleotelson tapering strongly posteriorly, apex subacute or bluntly rounded, never indented. Uropodal peduncles longer than rami; inner angle strongly produced, with bluntly rounded apex; exopod triangular, distally acute.

*Remarks*. — Several emendations to the original description of this genus (Paul and Menzies 1971) are necessary. In both *Oncilorpheus stebbingi* and *O. jerrybarnardi* n. sp., the cephalon is moderately immersed in pereonite I. Figure 2 of Paul and Menzies' paper fails to show this degree of immersion in *O. stebbingi*. The frontal lamina, clypeus, and labrum of *O. stebbingi* are refigured in our Figure 73F. Paul and Menzies did not describe the uniquely reduced maxillae of this genus; in both *O. stebbingi* and *O. jerrybarnardi* n. sp. the lateral and medial lobes are reduced to a single simple lobe (indicated by a faint cuticular ridge in *C. jerrybarnardi* n. sp.). Their Fig. 3C identifies this appendage as "the inner plate of the second maxilla." They also did not describe or figure the unique body sculpturing typical of the genus (Figs. 71, 73 D, G).

*World list of species*.—

1. *O. stebbingi* Paul and Menzies, 1971. Venezuela.
2. *O. jerrybarnardi* n. sp. Pacific Costa Rica and Panama.

## *Oncilorpheus jerrybarnardi* n. sp.
Figs. 71–74

*Type material examined*.—(1) Male holotype (LACM 39-51.17): Panama (Pacific), Medidor Island, Honda Bay; R/V *Velero III* Sta. 948-39, AHF Cat. No. 896-04. Paratypes: (2) USNM 252737, Costa Rica (Pacific), Playa Blancas, along north point, with mud, sand, and algae, 28 m; R/V *Velero III* Sta. 461-35, USNM Acc. No. 131571; 8 Feb. 1935; 1 male. (3) LACM 39-48.8, Panama (Pacific), Secas Island, 50–52 m; R/V *Velero III* Sta. 945-39, AHF Cat. No. 2094; 1 female. (4) USNM 252738, Panama (Pacific), Secas Island; No. 458; 6 Feb. 1935; 3 specimens. (5) USNM 252739, Panama (Pacific), Secas Island, south of group, with mud and shells, 46 m; No. 250, USNM Acc. No. 128938; 22 Feb. 1934; 2 specimens.

*Description of male*.—Cephalon wider than long; frontal margin convex, evenly rounded. Eyes situated posterolaterally (Fig. 71). Antennule short, reaching posterior margin of cephalon; flagellum of 6–8 articles (Fig. 72A). Antenna reaching middle of pereonite I; flagellum of about 15 articles (Fig. 72B). Frontal lamina about 1.5 times as long as broad; apex forms blunt angle (Fig. Fig. 72C). Mandible with broad tridentate incisor; spine row with about 5 large stout spines; molar process with about 26 small acute spines; middle palp article with about 7 comb setae and 1 simple seta, distal article with about 14 simple and comb setae (Fig. 72D). Maxillule's

medial lobe with 3 circumplumose spines and 1 simple seta; lateral lobe with 10 stout spines, some armed with small apical barbs (Fig. 72E). Maxilla with about 9 simple apical setae and numerous fine lateral setae (Fig. 72F). Maxillipedal palp articles 2 and 3 with plumose setae on lateral margins; all articles with simple setae; left endite with 1 coupling spine, right endite with 2 coupling spines, each with 5 apical plumose setae (Fig. 72G).

Body very straight-sided; pereonite I longest, IV–VII subequal, longer than II and III; all pereonites subequal in width (Fig. 71). Coxae well developed but not projecting posteriorly beyond their respective pereonites; not visible in dorsal view. Pereonites heavily calcified, dorsum with numerous ridges and scalloped pits (Figs. 71, 73D). Pereopod I stout, with simple and plumose setae and spines as figured; inferior margin of merus with 6 distinct blunt molariform spines (Fig. 73A). Pereopod IV with carpus and propodus slender, slightly longer than merus, all articles with many plumose and simple setae and spines (Fig. 73B). Pereopod VII with carpus and propodus slender, longer than merus; all articles with many plumose and simple setae and spines as figured (Fig. 73C). Penes small, set close together in middle of sternite VII (Fig. 73G).

Pleon widest and longest at pleonite 4. Pleon with strong median dorsal carina, terminating at pleotelson apex. All pleonites (except occasionally I) fused medially (Fig. 71). Pleopodal rami with PMS as figured (Figs. 74B–F). Exopod of pleopod I highly calcified, longer than endopod, 3.2 times wider than endopod, fringed with short, close-set PMS; endopod slender, 5 times longer than wide, fringed with short PMS; peduncle subquadrate, with 6 coupling spines on medial margin and 2 plumose setae near distolateral margin (Fig. 74B). Pleopod 2: peduncle's medial margin with 4 coupling spines and 6 plumose setae; exopod slightly longer and wider than endopod; appendix masculina with rounded spinose apex; length 1.26 times endopod length (Fig. 74C). Pleopod 3: peduncle with 2 coupling spines and 3 plumose setae on medial margin; exopod slightly wider than endopod, subequal in length, exopod with incomplete transverse incision (Fig. 74D). Pleopod 4: peduncle with 1 or 2 coupling spines and 2 plumose setae on medial margin and 1 plumose seta on lateral margin; exopod wider than endopod but subequal in length, exopod with incomplete transverse incision; acute protuberance on endopod subapical margin (Fig. 74E). Pleopod 5: peduncle without coupling spines, with 1 plumose setae on lateral margin; exopod subequal in length and width to endopod, with incomplete transverse incision; acute protuberance on endopod's subapical margin (Fig. 74F).

Pleotelson subtriangular, lateral margins sinuate, apex narrowly truncate. Uropodal peduncle broadly expanded, about twice as wide as endopod, apex of distal–medial angle bluntly rounded (Fig. 74A). Exopod half as wide as endopod; both endopod and exopod extend beyond pleotelson apex. Pleotelson and uropods with abundant marginal setae, but apparently lacking spines (Fig. 71).

*Female.*—Similar to male.

*Size.*—To a maximum length of 15 mm.

*Distribution.*—A subtidal species, found at depths of 28 to 52 m on mud, sand, and shell bottoms. So far known only from three localities in the Pacific: Medidor and Secas Islands, Panama, and Playas Blancas, Costa Rica.

*Remarks.*—*Oncilorpheus stebbingi* is known from only 3 specimens collected off Venezuela in the Atlantic (11° 57' N, 64° 37' W), at 73 m depth (Paul and Menzies 1971). This distribution suggests that the only two species of the genus may be vicariant descendants of the transisthmian "Tertiary Caribbean Province" described by Woodring (1957, 1966), Croizat et al. (1974), Rosen (1975), Brusca (1980), and others.

*Oncilorpheus jerrybarnardi* n. sp. differs from *O. stebbingi* by the convex frontal margin of the cephalon, the restriction of cuticular sculpturing to marginal regions of the pereonites, the middorsal longitudinal carina of the pleon, pleonites 2–5 being fused medially, and the sinuate lateral margins of the pleotelson.

Bruce (1986a) and Botosaneanu et al. (1986) placed *Oncilorpheus* in an informal genus-group closely corresponding to the "*Conilera*-group" of Monod (1930). Wetzer et al. (1987) recommended removal of *Oncilorpheus* from this group.

*Etymology.* — This species is named in memory of the great amphipod taxonomist J. Laurens Barnard, an inspiration, often a sage, and always a kind and gentle man. The patronym stands in appropriate company with the only other described species in this genus.

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Note added in proof. The following new generic names in the family Cirolanidae were published while this paper was in press: *Aatolana* Bruce, 1993; *Dodecalana* Carpenter, 1994; *Plakolana* Bruce, 1993; *Seychellana* Kensley and Schotte, 1994; *Zulialana* Botosaneanu and Viloria, 1993.