

The genus *Rocinela* (Crustacea: Isopoda: Aegidae) in the tropical eastern Pacific

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Descriptions, illustrations, synonymies and distributional data are provided for the eight species of *Rocinela* (Isopoda: Aegidae) now known from the tropical eastern Pacific, and for the temperate species *R. angustata* Richardson, 1904. A revised description of the genus is presented, as well as a key to all species known from the eastern Pacific (Alaska to Tierra del Fuego). Lectotypes are designated for three species: *R. angustata*, *R. laticauda* Hansen, 1897 and *R. tuberculosa* Richardson, 1898, and a neotype is designated for *R. belliceps* (Stimpson, 1864). One new species is described, *R. wetzeri* sp. nov. *Rocinela hawaiiensis* Richardson, 1903 is reported for the first time outside the Hawaiian Islands (from Guadalupe Island, Mexico). Our examination of material in this genus from various institutional collections indicates that specimens are often misidentified. Use of the mouth appendages or pleopods to characterize or identify species is unreliable as there is little interspecific variation in these characters. Useful characters are those of frontal margin and frontal lamina morphology, pereopodal armature (although this is somewhat polymorphic in most species), and the shape and armature of the uropods. Four species (*R. angustata*, *R. laticauda*, *R. australis* Schiödte & Meinert, 1879, and *R. murilloi* Brusca & Iverson, 1985) are very similar and easily confused, but they can be distinguished with the key provided. The most commonly collected species in the tropical eastern Pacific are *R. murilloi*, *R. belliceps* and *R. signata* Schiödte & Meinert, 1879; the former is a deep-water species, the latter two are shallow-water. *Rocinela australis* has not been reported since its original description, more than 110 years ago.

KEY WORDS:—Isopoda – Aegidae – *Rocinela* – taxonomy – marine – Pacific.

CONTENTS

Introduction	232
Methods and materials	235
Systematics	236
<i>Rocinela</i> Leach, 1818	236
Key to species of <i>Rocinela</i> known from the Eastern Pacific	237
<i>Rocinela</i> of the tropical eastern Pacific	241
<i>Rocinela angustata</i> Richardson, 1904	241
<i>Rocinela belliceps</i> (Stimpson, 1864)	245
<i>Rocinela hawaiiensis</i> Richardson, 1903	249
<i>Rocinela laticauda</i> Hansen, 1897	252
<i>Rocinela modesta</i> Hansen, 1897	255
<i>Rocinela murilloi</i> Brusca & Iverson, 1985	258
<i>Rocinela signata</i> Schiödte & Meinert, 1879	262
<i>Rocinela tuberculosa</i> Richardson, 1898	268
<i>Rocinela wetzeri</i> sp. nov.	271
Acknowledgements	273
References	273

INTRODUCTION

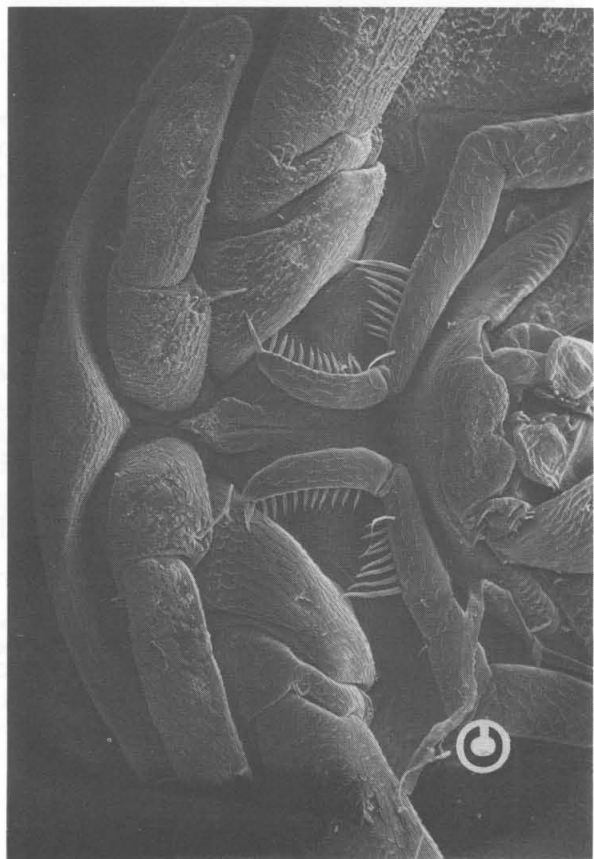
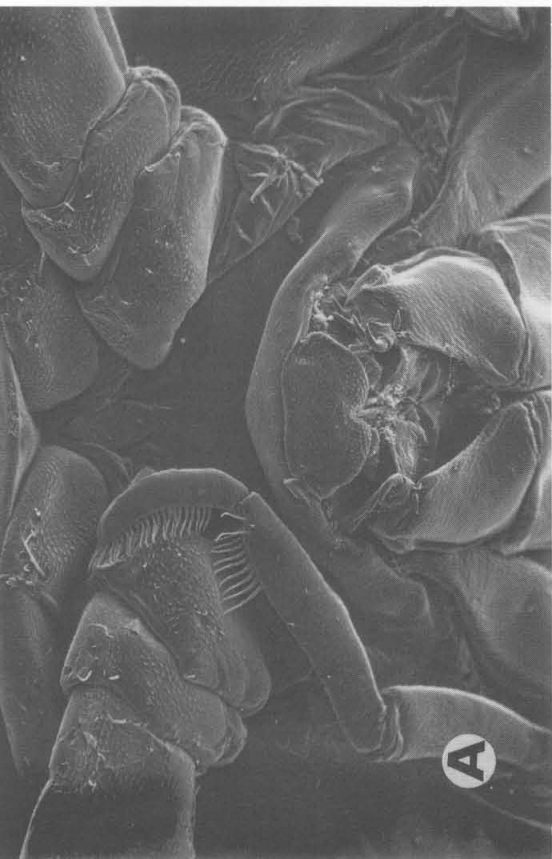
This is one in a series of regional monographic treatments on the marine isopod crustaceans of the tropical eastern Pacific (the "Panamic Region" of Ekman 1953; the "Tropical Eastern Pacific Zoogeographic Region" of Brusca & Wallerstein, 1979b). The family Idoteidae was treated by Brusca & Wallerstein (1977, 1979a, b) and Brusca (1983a, 1984), Cymothoidae by Brusca (1981), Tridentellidae by Delaney & Brusca (1985) and Corallanidae by Delaney (1984, 1989). The family Aegidae is being treated in two parts; the genus *Aega* has been completed (Brusca, 1983b), and the present paper treats the genus *Rocinela*. A monograph on the family Cirolanidae is in preparation.

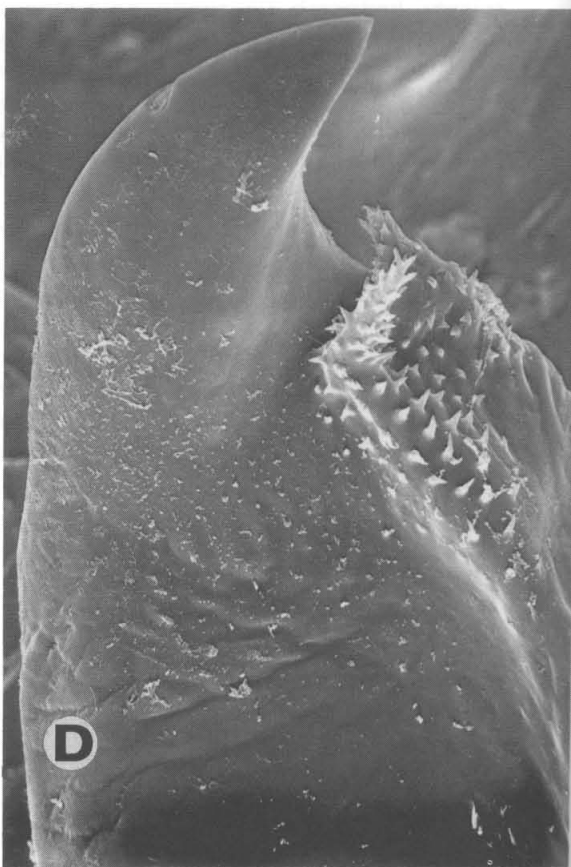
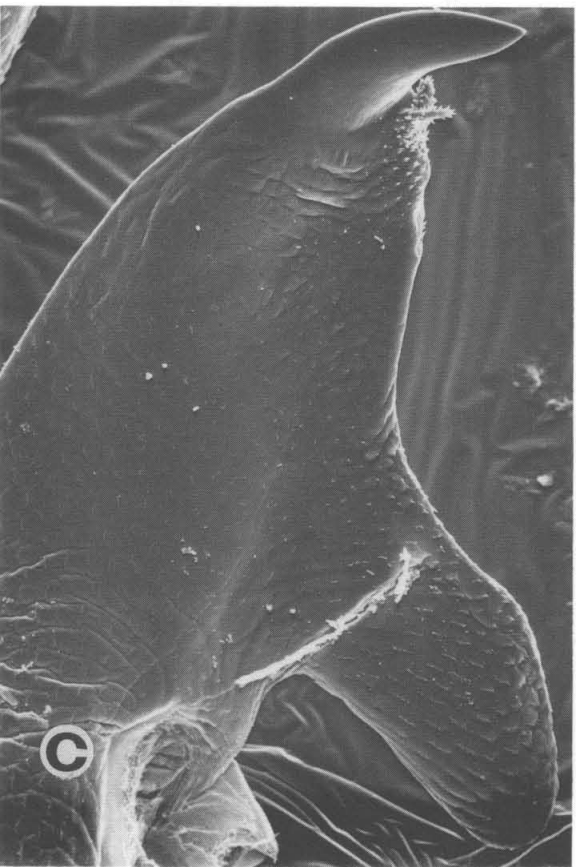
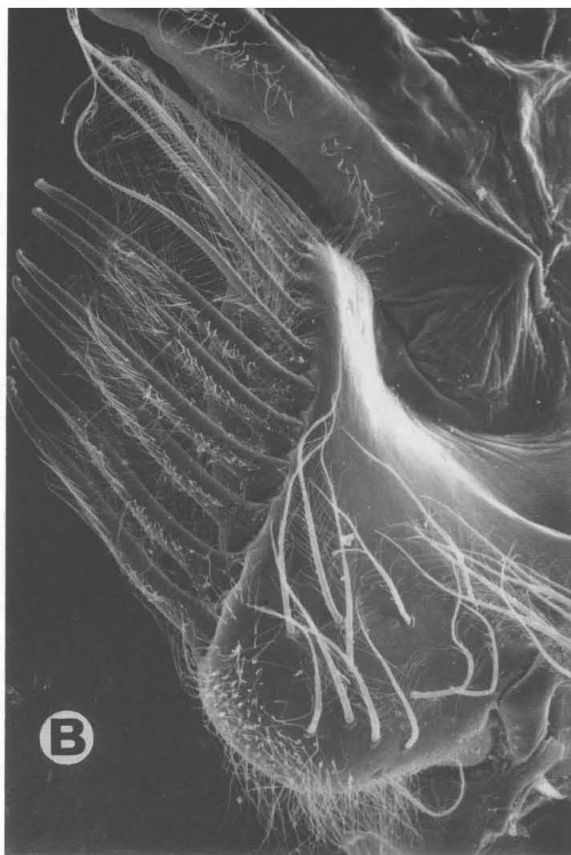
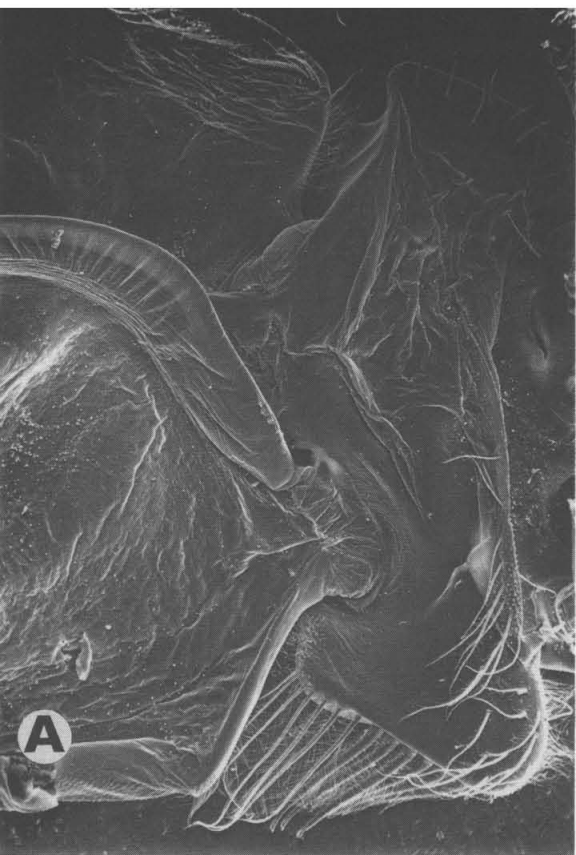
A review of eastern Pacific studies on the family Aegidae can be found in Brusca (1983b), and Bruce (1983) provides a good review of the Australian Aegidae. A family diagnosis and key to the three eastern Pacific genera of Aegidae are also provided in Brusca (1983b). The isopod genus *Rocinela* Leach, 1818 is poorly known, and the only attempt to describe this genus on a worldwide basis was by Schiödt & Meinert (1879). Many species appear to be rare (or at least rarely collected) and are known from only their original description or from only a few specimens, and for many species types can be found no longer or were never designated. Of the species treated in the present paper, all but two (*R. murilloi* Brusca & Iverson, 1985 and *R. wetzeri* sp. nov.) were described before 1905. Furthermore, one species is known from only a single specimen (*R. modesta*), one is known from only two specimens (*R. hawaiiensis*), one from only three specimens (*R. wetzeri* sp. nov.), and two from only five specimens each (*R. laticauda*, *R. tuberculosa*).

Rocinela is a cosmopolitan genus, containing about 40 described species. Fourteen species are known to occur in the eastern Pacific, from Alaska to Chile, eight of which occur in tropical/subtropical latitudes. In the present paper we describe and figure these eight species, plus *R. angustata*, a north-east Pacific temperate species that ranges as far south as central Baja California, Mexico (to Cedros and Guadalupe Islands). A key is provided for all 14 known species of eastern Pacific *Rocinela*.

The genus *Rocinela* is distinguished from all other aegid genera by the gradually tapering lateral body margins, a 2- or 3-articulate maxillipedal palp, normal (unexpanded) antennal peduncles, a small frontal lamina and broadly expanded clypeus region, a small free labrum and an elongate first mandibular palp article. Species of *Rocinela* are very similar and often difficult to distinguish, and misidentifications of museum specimens are common. The characteristics that are most useful in distinguishing species are the shape of the frontal margin and frontal lamina (Fig. 1), the pereopodal armature, and the shape and armature of the uropods. In general, the mouth appendages and pleopods show little interspecific variation.

Figure 1. Scanning electron micrographs showing detail of the frontal complex; note the shape differences of the frontal lamina and the antero-ventral projection of the clypeus: A. Antero-ventral view of *Rocinela murilloi* ($\times 55$). B. Ventro-lateral view of *Rocinela murilloi* ($\times 60$). C. Antero-ventral view of *Rocinela signata* ($\times 95$). D. Antero-ventral view of *Rocinela belliceps* ($\times 65$).





Species of *Rocinela*, like other genera of Aegidae, are blood-sucking temporary parasites on marine fishes (see Brusca, 1983b for a discussion of aegid natural history). Bruce (personal communication) has suggested that some species may also feed on fish mucous. However, specimens are rarely collected on their host fishes, and most are captured in bottom trawls, although many of these may represent specimens that have abandoned their host once trapped in the net. Garzon-Ferreira (1990) reported being bitten by *Rocinela signata*, a species commonly found in shallow bay environments, while snorkeling on the Caribbean coast of Colombia. Bowman (personal communication) notes specimens of *R. signata* in the collection of the USNM that were collected while taking an apparent blood meal on swimmers at Cancún, Mexico. However, most *Rocinela* species live offshore, so are not a problem for swimmers. Only three species from the tropical eastern Pacific inhabit shallow waters (*R. belliceps*, sublittoral to 284 m; *R. signata*, littoral to 658 m; *R. tuberculosa*, 15–20 m); no other species have been reported shallower than 150 m, and most inhabit depths greater than 800 m.

METHODS AND MATERIALS

The specimens upon which this study is based were obtained from a variety of sources. The aegid holdings of the Los Angeles County Natural History Museum (which includes the Allan Hancock Foundation Material) formed the core collection and include the material acquired by the senior author. A considerable amount of material was also borrowed from other museums; these institutions are listed below with their abbreviated designations as used in the text. Primary types of all species were examined. AHF, Allan Hancock Foundation (note: the Crustacea collections of the Allan Hancock Foundation are now at LACM); AMS, The Australian Museum, Sydney; BMNH, The Natural History Museum (formerly British Museum (Natural History)); LACM, Los Angeles County Natural History Museum; SDNHM, San Diego Natural History Museum; SIO, Scripps Institution of Oceanography (University of California, San Diego), Benthic Invertebrates Collection; USNM, National Museum of Natural History (Smithsonian Institution); ZMC, Zoological Museum, Copenhagen.

Methods, terminology and format follow that of Brusca (1981, 1983b). Plumose marginal setae are indicated in the species descriptions by the abbreviation PMS. Complete synonymies, geographic data and type depositions are provided for all species treated. Because species of *Rocinela* are frequently misidentified in museum collections, geographic ranges are based primarily upon material examined during this study. The first reference cited in the synonymy of each species is the original description, and is followed by a period. Subsequent published references to that name follow, separated by semi-colons. Although the present monograph treats only the tropical/subtropical eastern Pacific, we have

Figure 2. Scanning electron micrographs of *Rocinela murilloi*: A. Posterior view of peduncle of right second pleopod showing row of basal setae lateral setae and medial coupling spines and setae ($\times 45$). B. Detail of (A) showing 6 coupling spines ($\times 100$). C. Distal part of right mandible showing molar process, claw-like incisor, and bilobed denticulate process ($\times 210$). D. Detail of apex of right mandible ($\times 600$).

included a key to all known *Rocinela* from the eastern Pacific (Alaska to Tierra del Fuego). This key was constructed from examination of types and other specimens of all 14 species known to occur in this region. Because little variation exists in the mouthparts and pleopod morphology between species of *Rocinela*, we describe only those of *R. murrilloi* (perhaps the most commonly encountered species) and then compare all other species to it.

SYSTEMATICS

Aegidae Dana, 1853

Rocinela Leach, 1818

Rocinela Leach, 1818: 348.

[Citations: Bate & Westwood, 1863–1868: 289; Schiödte & Meinert, 1879: 380; Richardson, 1898: 8, 1905a: 190; Sars, 1897: 65; Stebbing, 1893: 348, 1905: 23; Barnard, 1914: 367; Hale, 1925: 182; Menzies, 1962: 118; Menzies & Glynn, 1968: 45; Menzies & George, 1972: 12; Kensley, 1978: 59; Kussakin, 1979: 251; Brusca, 1980: 229; Bruce, 1983: 778; Brusca & Iverson, 1985: 42; Kensley & Schotte, 1989: 119.]

Not *Rocinela* of Bovallius (synonymized with *Syscenus* Harger, by Sars, 1897).

Acherusia Lucas, 1849 [Explor. Algérie, Crust., p. 78].

Type species. Rocinela danmoniensis Leach, 1818 (by monotypy).

Diagnosis. Body less compact and more strongly depressed than in *Aega*. Anterior margin usually extended to form short rostrum covering all or part of antennular peduncles; eyes large and usually well separated (occasionally meeting medially); head without carinae; frontal lamina small, narrow or somewhat arrowhead-shaped, indistinctly fused with large flat clypeus; labrum small and free. Antennules much shorter than antennae, with distinct peduncles of which first two articles are not unusually expanded. Mandible with incisor narrow, not divided or denticulate; molar process a weakly developed, simple, rounded lobe; palp 3-articulate, first article greatly elongate (middle article subequal to, or barely longer than, first article). Maxillule styliiform, tapered to apical tooth set among cluster of five stout, acute setae. Maxilliped with 2- or 3-articulate palp, if 3-articulate terminal article is minute. Pleon merges smoothly with pereon, not narrower (or only slightly narrower) than pereon; pereopods I–III often with inferior margin of propodus with a spine-bearing lobe. Uropodal rami with PMS.

Supplementary description based on Eastern Pacific species. Head subtriangular. Mandibles with a minute, bilobed denticulate process in place of lacinia/spine row (not easily seen with light microscopy; see Fig. 2C, D). Maxilla with setose medial margin; inner lobe finger-like, with 2 stout, recurved spines, 1 apical and 1 subbasal; outer lobe broadly rounded with 2 small, recurved spines near distomedial margin. Two distal articles of maxillipedal palp (occasionally all 3 palp articles) each with 2 stout recurved spines apically; endite minute. Pereopods I–III distal superior margin of propodi with 1 plumose seta and 1–8 simple setae, and palm of propodi with 1 simple seta (if no palm, then seta on inferior margin); carpi with a single simple seta medially; distal superior margin of meri with fringe of 3–12 simple setae and often with 1–2 bifurcate setae, palm with 2–5 simple setae, and medial surface with 1 simple seta; ischium supradistal

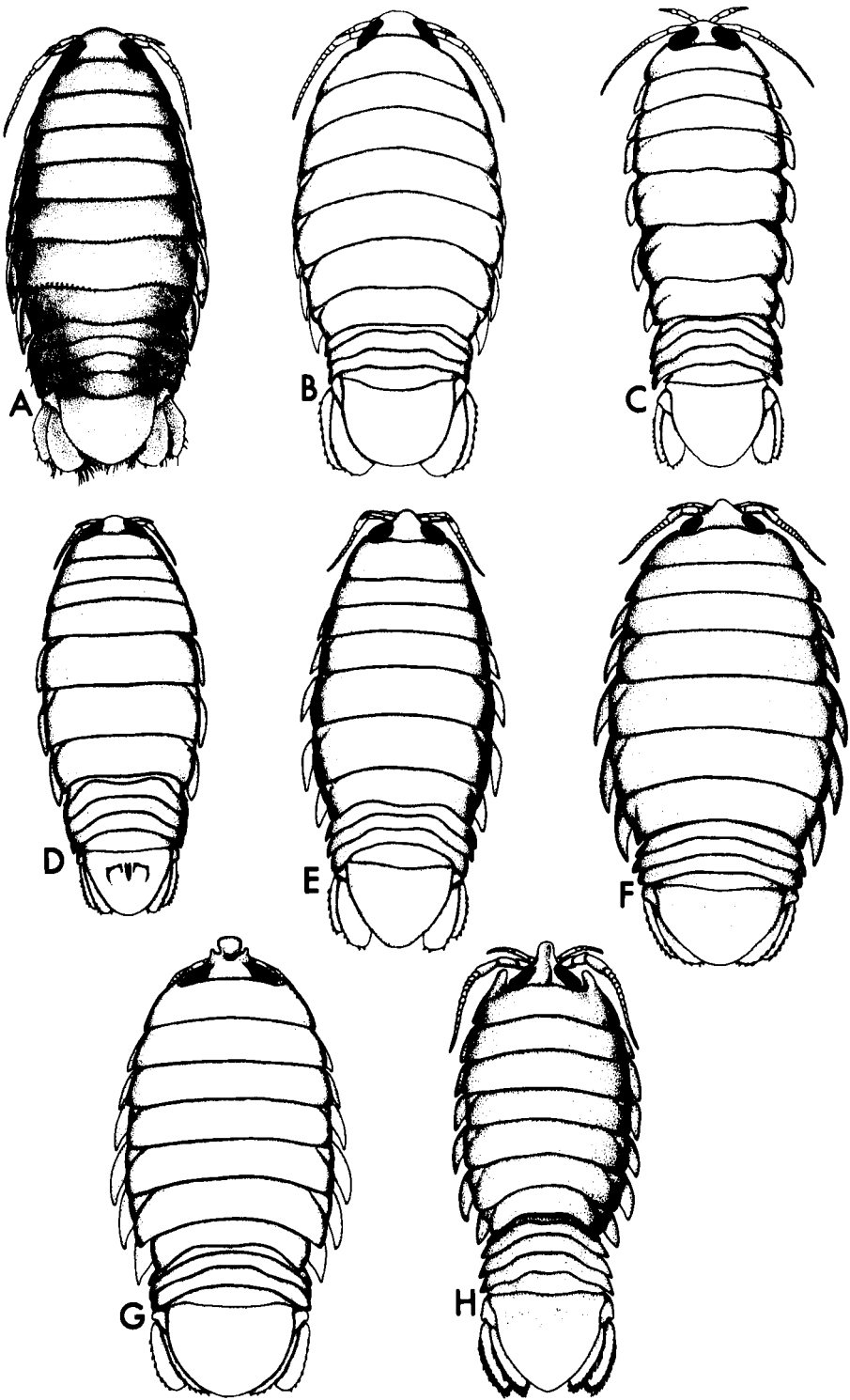
corner with 1–2 spines; basis with row of 3–6 plumose setae. Pleotelson posterior margin spinose and fringed with PMS.

Remarks. Leach erected the genus *Rocinela*, and its type species (*R. danmoniensis*), based on a single, badly damaged specimen for which he provided no species description. The first adequate descriptions of the genus and species were provided by Bate & Westwood (1863–1868).

*Key to species of Rocinela known from the Eastern Pacific**

- 1a Elongate rostrum with lateral projections at base forming trifurcate structure; propodi of pereopods I–III with 6–7 thin, acute spines; meri of pereopods I–III with 5 blunt spines . *R. tridens*
- 1b Without rostrum, or if rostrum present without lateral projections; propodi of pereopods I–III with 1–6 spines; meri of pereopods I–III with 4–8 acute spines, or with 3–5 blunt spines . 2
- 2a Rostrum very long, extended about one eye-length beyond antennal peduncles; antero-lateral angles of pereonite I large and extended forward a little less than half the length of the head . *R. cornuta*
- 2b Rostrum short or absent; antero-lateral angles of pereonite I extend forward less than half of one eye-length 3
- 3a Propodi of pereopods I–III without expanded medial lobe, but with spines (minute in *R. signata*); dactyls of pereopods I–III subequal in length to propodi 4
- 3b Propodi of pereopods I–III with large, broad, spine-bearing medial lobe; dactyls of pereopods I–III longer than propodi (except in *R. propodialis*) 5
- 4a Frontal lamina small but expanded into subrectangular shape; tubercles present on posterior margin of all pereonites; propodi of pereopods I–III with 3 curved spines; merus of pereopod I with 2 blunt spines *R. tuberculosa*
- 4b Frontal lamina thin and narrow, not rectangular; pereon without tubercles; propodi of pereopods I–III with 1 or 2 minute spines; merus of pereopod I with 3 blunt spines. *R. signata*
- 5a Meri of pereopods I–III with acute spines; medial angle of uropodal peduncle not extended more than 50% of length of endopod. 6
- 5b Meri of pereopods I–III with blunt spines; medial angle of uropodal peduncle may or may not extend more than 50% of length of endopod 9
- 6a Merus of pereopod III with 5–8 spines total, 2 or more spines in subbasal position; medial angle of uropodal peduncle extended less than 40% of length of endopod; lateral margins of pleonite 5 truncate; propodi of pereopods I–III with 4 acute spines; merus of pereopod I with 3–6 spines *R. angustata*

**Rocinela juvenalis* Menzies & George, 1972 is not included in the key. Only a single individual of this species has ever been collected, the holotype. In their original description, Menzies & George (1972) stated that the individual is “perhaps identical to [*R.*] *angustata* Richardson”. We discuss the similarities between *R. angustata*, *R. murilloi*, *R. laticauda* and *R. australis* below. Based on the admittedly questionable locality data available (Menzies & George claimed that the station number associated with the type specimen is in error), *R. juvenalis* is not likely to be *R. angustata*. The type specimen is almost surely a juvenile female belonging to *R. murilloi* or *R. australis*. In our key, it would be identified as *R. murilloi*.



- 6b Merus of pereopod III with 4 spines total, 1 spine in subbasal position; medial angle of uropodal peduncle extended more than 40% of length of endopod; lateral margins of pleonite 5 acute; propodi of pereopods I–III with 4–6 acute spines; merus of pereopod I with 3 spines 7
- 7a Eyes very large, separated by less than one eye-width; pleotelson subsequal to, or slightly narrower than, width of pleonite 5; medial angle of uropodal peduncle extended less than 50% of length of endopod; endopod shorter than exopod . . . *R. australis*
- 7b Eyes somewhat smaller, separated by about one eye-width; pleotelson wider than pleonite 5; medial angle of uropodal peduncle extended about 50% of length of endopod; uropodal rami subequal in length 8
- 8a Propodi of pereopods I–III with 5 thin, straight, acute spines; distomedial spines on meri of pereopods I–III set among dense setae, and superior margin of meri with long dense setae extending well beyond carpus; apical article of maxillipedal palp with thin, nearly straight, acute spines; lateral (outer) margin of basal article of maxilliped with plumose setae *R. laticauda*
- 8b Propodi of pereopods I–III with 4–6 stout, recurved, acute spines; distomedial spines on meri of pereopods I–III set among sparse setae, and superior margin of meri with setae not extending beyond (or much beyond) carpus; apical article of maxillipedal palp with recurved, stout, acute spines; lateral (outer) margin of basal article of maxilliped without plumose setae *R. murilloi*
- 9a Propodi of pereopods I–III with medial lobe curled posteriorly, edge lined with 6 coalesced spines; meri of pereopods I–III with 5 spines *R. propodialis*
- 9b Propodi of pereopods I–III not as above, with 3–6 free spines; merus of pereopod I with 3 spines; meri of pereopods II–III with 3–4 spines 10
- 10a Dactyls of pereopods I–III broadly arced and much longer than propodi and carpi combined; propodi with weak medial expansion bearing 3 spines which decrease in size distally
R. wetzeri sp. nov.
- 10b Dactyls of pereopods I–III not broadly arced, and no longer than propodi and carpi combined; propodi with strong medial lobe bearing 3–6 spines of equal size 11
- 11a Medial angle of unropodal peduncle very long, extended more than 75% length of endopod; frontal lamina expanded into spatulate shape *R. bellicepts*

Figure 3. *Rocinela* of the eastern Pacific, dorsal views. PMS of uropods and pleotelson have not been figured. Note that *R. hawaiiensis* and *R. signata* are engorged individuals, causing pereonites V–VII to be stretched (see also Fig. 5G, I). A. *Rocinela tuberculosa*, lectotype, female. B. *Rocinela propodialis*, holotype, male. C. *Rocinela hawaiiensis*, holotype, male. D. *Rocinela signata*, lectotype, female. E. *Rocinela signata* "variant", Costa Rica specimen, male. F. *Rocinela bellicepts*, neotype, female with brood. G. *Rocinela tridens*, Anacapa Island, California, specimen, male. H. *Rocinela cornuta*, holotype, male.

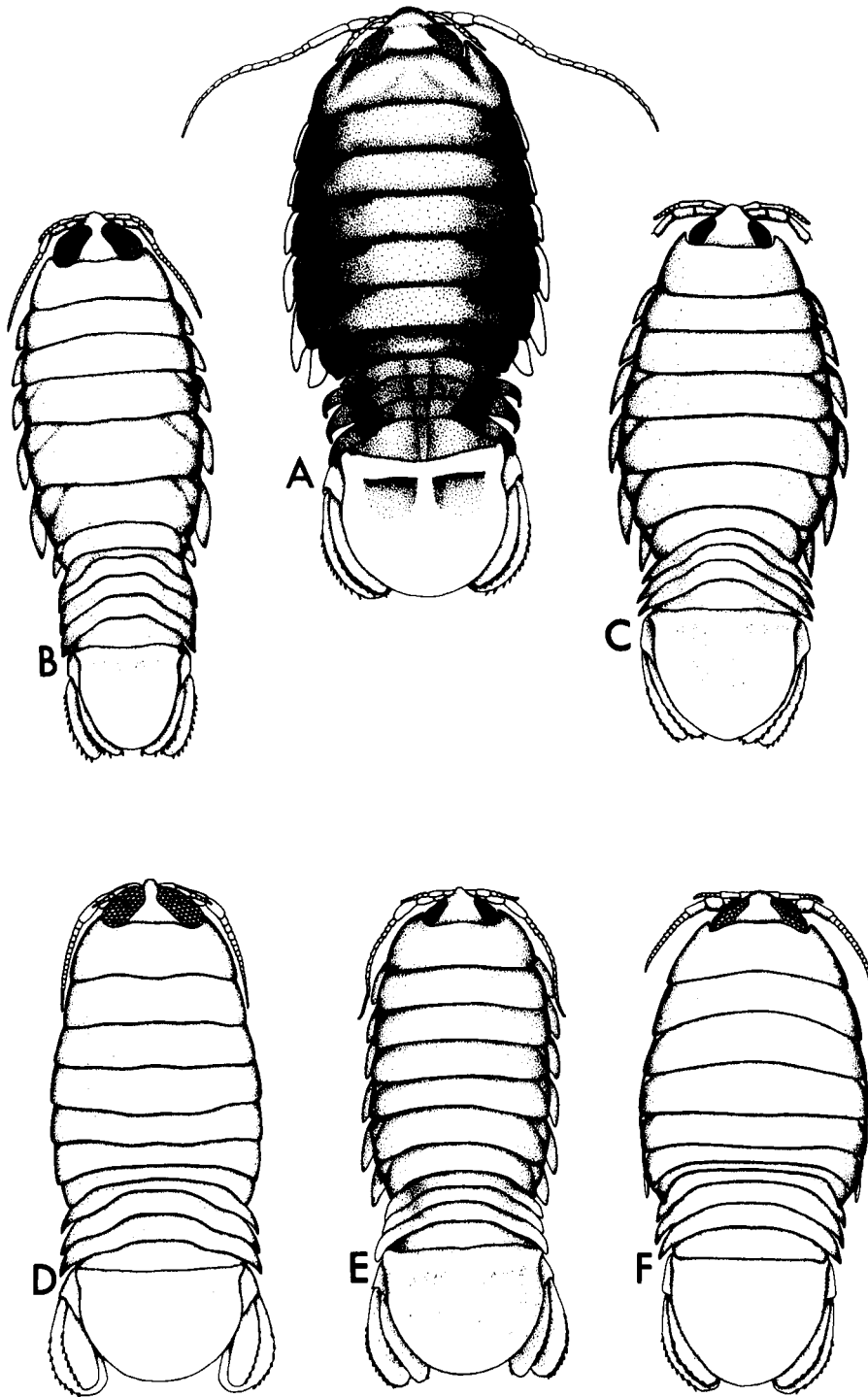


Figure 4. *Rocinela* of the eastern Pacific, dorsal views, contd. A. *Rocinela murilloi*, holotype, female. B. *Rocinela wetzeri* sp. nov., paratype, postmanca. C. *Rocinela modesta*, holotype, female. D. *Rocinela australis*, lectotype, female. E. *Rocinela laticauda*, lectotype, male. F. *Rocinela angustata*, lectotype, female.

- 11b Medial angle of uropodal peduncle extended about 50% of length of endopod; frontal lamina narrow 12
 12a Pleotelson wider than pleonite 5; propodi of pereopods I-III with 4 spines; eyes separated by greater than one eye-width . . . *R. modesta*
 12b Pleotelson narrower than pleonite 5; propodi of pereopods I-III with 3 spines; eyes separated by less than half an eye-width
R. hawaiiensis

Rocinela of the tropical eastern Pacific

Rocinela angustata Richardson, 1904

(Figs 4F, 5B, 6)

Rocinela angustata Richardson, 1904a: 33; 1905a: 206; 1905b: 214; 1909: 83; 1914: 362 (note: Richardson's 1914 record was from northern Peru (5° 47'S, 81°24'W, 992.7 m) and may be an incorrect identification; based on its location and depth, it is likely to have been a misidentified specimen of *R. murilloi*); Birstein, 1973: 170.

Rocinela laticauda of Richardson, 1898: 14; 1899: 828 (not of Hansen, 1897 and all other authors).

Type material. Rocinela angustata. Lectotype (herein designated): USNM 22710 [= Cat. No. 20088 in Richardson 1905a: 207], female (12.6 mm × 30.3 mm), Bering Sea, Alaska, NW of Unimak Island, 54°48'50" 165°42'E, 157.4 m, "Albatross" Sta. 3225. Paralectotypes: (1) USNM 22710 [= Cat. No. 20088 in Richardson, 1905a: 207], 1 female (14.1 mm × 37.4 mm), Bering Sea, Alaska, NW of Unimak Island, 54°48'50" 165°42'E, 157.4 m, "Albatross" Sta. 3225. (2) USNM 22707, 1 male (12.2 mm × 27.1 mm), U.S.A., Washington, Puget Sound, 47°36'N 122°23'15"W, 151.9 m, "Albatross" Sta. 3067, 18 June 1889. (3) USNM 22708, 1 female (4.7 mm × 11.3 mm), U.S.A., California, off Esteros Bay, 35°23'30"N 121°02'30"W, 170.4 m, "Albatross" Sta. 3194, 5 April 1890. (4) USNM 22709, 1 male (10.8 mm × 26.8 mm), U.S.A., California, off San Luis Obispo Bay, 35°14'N 121°7'W, 466.7 m, "Albatross" Sta. 3195, 5 April 1890. (5) USNM 29226, male (15.0 mm × 32.0 mm), Japan, Honshu, Manazuru Zaki, 26°W, 222-490 m, "Albatross" Sta. 3697, 5 May 1990 [questionable; see remarks below].

Other material examined. AMS material: U.S.A., Alaska, Gulf of Alaska, otter trawl, 3 females, 7 males and 1 postmanca, Coll. Shell Oil Co., Sta. No. "Maria" 42-3, 8 August 1976, Cat. No. P37848. U.S.A., Alaska, NE Gulf of Alaska, 59°57'N 142°47'W to 59°56'N 143°01'W, 144-187 m, otter trawl, 1 female, R/V "Western Viking", Sta. "Yvonne" 47-3, 25-31 July 1976, Cat. No. P40426. U.S.A., Alaska, NE Gulf of Alaska, 59°47'-57'N 143°13'-24'W, 150-318 m, otter trawl, 2 males, R/V "Western Viking", Sta. No. "Maria" 19-15, 8 August 1976, Cat. No. P40427. *BMNH material:* U.S.A., Alaska, NE Gulf of Alaska, otter trawl, 1 female, Sta. No. "Yvonne" 46-1. U.S.A., Alaska, NE Gulf of Alaska, 1 female and 1 male. *LACM material:* U.S.A., Alaska, Petersburg, 2 females and 4 males, Coll. July 1936. U.S.A., Bering Sea, St. George Basin, 55°31'N 166°41'W, trawl, 1 male, Coll. Shell Oil Co., 31 May 1976, AHF Cat. No. 1425-02. U.S.A., California, 10 km 002° to San Mateo Point, on fish, 453.7 m, 2 males, Coll. P. Gregory, Sta. [?] 1H4-3044, 22 Sept.

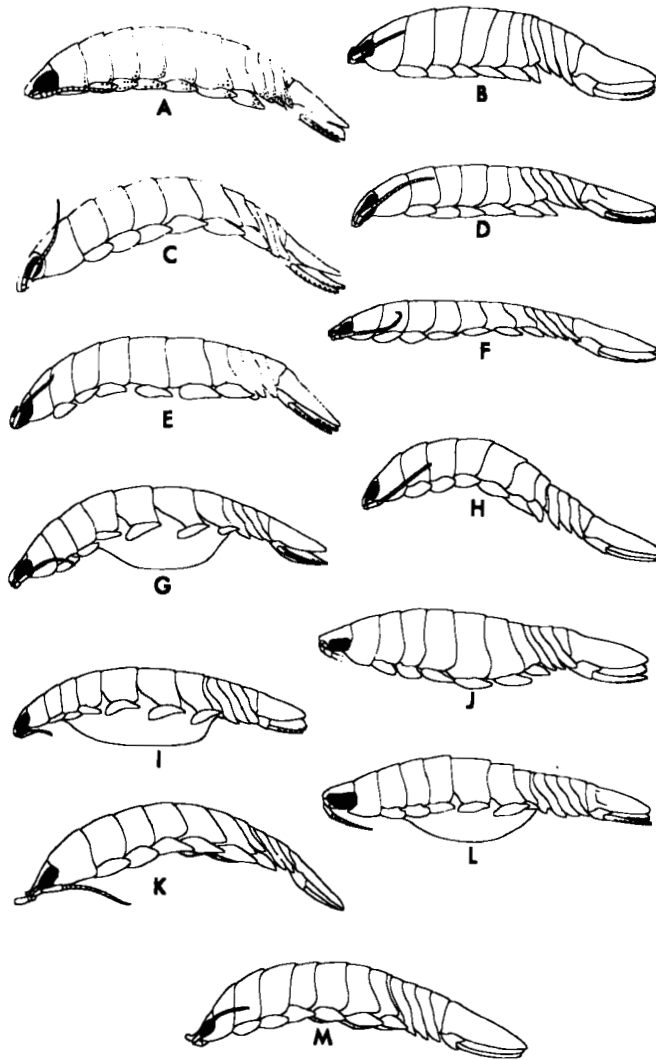


Figure 5. *Rocinela* of the eastern Pacific, lateral views. A. *Rocinela tuberculosa*, lectotype, female. B. *Rocinela angustata*, lectotype, female. C. *Rocinela propodialis*, holotype, male. D. *Rocinela austratis*, lectotype, female. E. *Rocinela bellicepts*, neotype, female with brood. F. *Rocinela laticauda*, lectotype, male. G. *Rocinela hawaiiensis*, holotype, male (engorged specimen). H. *Rocinela murilloi*, holotype, female. I. *Rocinela signata*, lectotype, female (engorged specimen). J. *Rocinela modesta*, holotype, female. K. *Rocinela tridens*, Anacapa Island, California, specimen, male. L. *Rocinela wetzleri* sp. nov., paratype, postmanca (engorged specimen). M. *Rocinela cornuta*, holotype, male.

1978. U.S.A., California, Monterey Bay, Pinos Point Light, 36°N 121°W, olive-green silt, 1 manca, "Velero III" Sta. No. 6460-59, 1 Oct. 1959. U.S.A., California, 17.9 km 254.5° from Ventura Pier Light, 34°14'N 119°23'W, 85.2 m, 1 female, "Velero IV" Sta. No. 1654-59, 11 March 1959. U.S.A., California, Santa Barbara, Point Light, 34°N 119°W, 97 m, 1 female and 1 male, "Velero IV" Sta. No. 5173-57, 3 July 1957. U.S.A., California, 11 km 179° from San Clemente Pier, 33°18'30"N 117°37.5'W, 200 m, fine green silty sand, 1 postmanca, "Velero IV", 21 Feb. 1958, Sta. No. 5626-58. U.S.A., California,

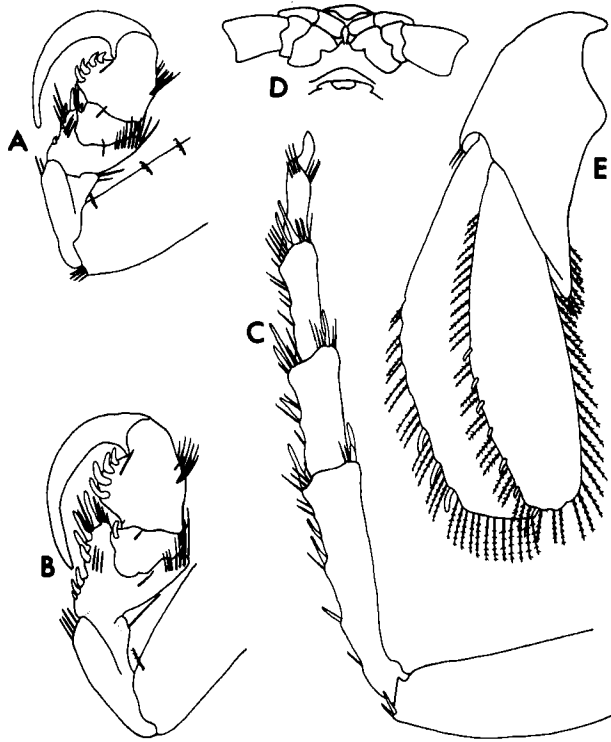


Figure 6. *Rocinela angustata* (all Figs from lectotype). Pereopods (L): A, I; B, III; C, VII; D, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum; E, uropod.

Los Angeles, off Whites Point, 304.8 m, mud, 1 male, AHF Cat. No. 1244-01. U.S.A., California, Los Angeles County, San Pedro Channel, 5.8 km west of Balboa, green mud, 1 female, R/V "Velero III", Sta. No. 1227-41, 26 Dec. 1941. *SIO material*: U.S.A., California, Piedras Blancas Point, 35°32.1'N 121°24.5'W, 567-603 m, trawl, 1 female Coll. T. Matsui and B. Burnett, R/V "Agassiz", April 1974, Cat. No. C3864. U.S.A., California, Loma Sea Valley, due west of Point Loma, San Diego, 326-351 m, trawl, 1 female, Coll. E. W. Fager, 21 Jan. 1965, Cat. No. C3800. U.S.A., California, due west of Point Loma, San Diego, 220-274 m, trawl, 1 female and 2 males, Coll. E. W. Fager, 28 Jan. 1965, Cat. No. C3712. U.S.A., California, off San Diego, 32°40.6'N 117°21.6'W, 201 m, trawl, 1 female and 1 male, Coll. R. R. Rosenblatt, R/V "New Horizon", 29 Feb. 1980, Cat. No. C4830. Mexico, off NW Baja California, 31°25'N 117°45'W, 2026-2050 m, trawl, 1 female, Coll. C. Hubbs, R/V "Agassiz", 29 May 1971, Cat. No. C3868. Mexico, Baja California, Isla Guadalupe, 28°51.5'N 118°16.5'W, 81.5-96.3 m, trawl, 1 female, Coll. C. Hubbs, R/V "Agassiz", 18 May 1971, Cat. No. C3761. Mexico, Baja California, between San Benitos and Cedros Islands, 28°17.8'N 115°25.3'W, 250-268.5 m, trawl, 1 male, Coll. C. Hubbs, R/V "Agassiz", 27 May 1971, Cat. No. C3789. *USNM (nontype) material*: U.S.A., Alaska, Gulf of Alaska, 59°47'N 143°13'W, 150-318 m, 5 females, 2 males, 1 postmanca, and 7 mancas, R/V "Western Viking", Aug. 1976, USNM 184114. U.S.A., Alaska, Gulf of Alaska, 59°51'N

142°47'W, 144–187 m, 1 female and 3 males, R/V "Western Viking", 25 July 1976, USNM 184113.

Description. Cephalon. Head 2.0–2.7 × wider than long. Eyes large, separated by about 1 eye-width. Frontal margin produced anteriorly beyond antennae. Frontal lamina narrow, not expanded. Antennule flagellum 6-articulate. Antenna extended to, or beyond, pereonite 2, flagellum of 14–16 articles. Mandibular palp second article with 13 spines and 3 setae, otherwise mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body about 2.5 × longer than wide; pereonite 1 longest; pereonite 4 or 5 widest; coxae VI visible in dorsal aspect, coxae II–V may or may not be visible. Pereopod I dactylus longer than carpus and propodus combined; propodus with expanded palm, with 4 stout acute curved spines (rarely with acute, slender, straight spines); carpus with 1 spine; merus with 3–5 acute spines, 2–4 distal spines among setae, distalmost spine distinctly longer than others, 1 proximal spine; distal superior fringe of setae lacking bifurcate setae. Pereopod III similar to I, but merus with 5–8 subacute spines, 3–5 distal spines among setae, two distalmost spines distinctly longer than others, and 2–3 proximal spines. Pereopods IV–VII with short dactyls, much shorter than propodi; ischium, merus, and carpus with fringe of long acute spines on distal margin and acute spines along inferior margin, as figured for pereopod VII.

Pleon. Pleonites 2,3,4 subequal in length and width; pleonites 1 and 5 narrower than others, pleonite 5 manifestly longer than 4; pleonite 1 covered laterally by pereonite VII; pleonite 5 lateral margins truncate. Pleotelson broadly rounded, slightly wider than pleonite 5. Uropods extended slightly beyond posterior margin of pleotelson; inner angle of peduncle extended about 40% length of endopod; both rami elongate-oval; endopod with about 6 spines on lateral (outer) margin and 3 spines on subtruncate apex; exopod much wider and slightly longer than endopod, with about 8–9 lateral (outer) marginal spines. Pleopods similar to those of *Rocinela murilloi*; peduncles 1–4 each with 6–7 coupling spines.

Distribution. Bering Sea, Alaska south along coast of western North America to Guadalupe and Cedros Islands, Baja California, Mexico; one paralectotype specimen from Honshu, Japan. Recorded depths of collection *c.* 150–466 m.

Remarks. While this species is not part of the eastern tropical Pacific fauna, it is redescribed here in order to designate a lectotype, and to clarify its status as distinct from the very similar species *R. laticauda*, *R. murilloi* and *R. cornuta*. We have found *R. angustata* misidentified as *R. cornuta* in the bulk of the collections we have examined, despite the fact that the large anterolateral projections of pereonite I easily distinguish *R. cornuta*.

In 1898 Richardson redescribed *Rocinela laticauda* Hansen, 1897, based on material collected by the United States Fish Commission's "Albatross" expeditions in the north-eastern Pacific. Hansen's original description of this species was still in press at the time Richardson published her redescription. Unfortunately, although Richardson presumably had Hansen's type specimen at hand at the time, all of the other specimens (the "Albatross" material) upon which she based her redescription eventually proved not to be *R. laticauda*. Hansen's type specimen (also "Albatross" material) came from Acapulco, Mexico; Richardson's material came from "Albatross" collections made in Alaska, Canada and California. Recognizing her mistake, Richardson later

TABLE 1. Comparison of numbers of propodal and meral spines on pereopods I, II and III of type series of *Rocinela angustata*

<i>R. angustata</i>	Pe I		Pe II		Pe III	
	Propodus	Merus	Propodus	Merus	Propodus	Merus
Lectotype (F)	4	5/4	4	6	4	7 (3)/7 (2)*
Alaska (F)	4	4	4	7/6	4	8 (3)/6 (2)
San Luis Obispo (M)	4	3	4	5	4	6 (2)
Esteros Bay (F)	4	3	4	5	4	5 (2)
Puget Sound (M)	4	3	4	5	4	6 (2)
Japan (F)	4	3	4	4	4	4 (1)

*The number to the left of the backslash is the total number of spines on the left limb, and to the right the total number of spines on the right limb, where these differ; the number of sub-basal spines on the merus is given in parentheses

(1904a) established a new species for the "Albatross" material she had examined, *R. angustata*, and she included among the original N.W. Pacific material an additional "Albatross" specimen collected in Manazura, Japan. Richardson did not designate a type specimen for *R. angustata*, thus all the original specimens she examined are syntypes. We have examined all of this material and herein designate a lectotype—a female specimen from Alaska (USNM No. 22710). The remaining specimens of the type series are herein designated paralectotypes.

The lectotype is very similar to *R. laticauda* except that it bears 4 spines on the propodus of pereopod I (vs 5 or more in *R. laticauda*), 2 or more proximal spines (6 or 7 total) on the merus of pereopod III (vs 1 proximal spine [4 total] in *R. laticauda*), and a slightly shorter medial process on the peduncle of the uropod. There is some degree of variation in numbers of spines on the pereopods within the type series of *R. angustata* and even on a single individual, from the left limb to the right limb (see Table 1).

It may eventually prove unfortunate that Richardson included the Japanese specimen in her description of *R. angustata*. This specimen differs from the lectotype and paralectotypes in the spination of the merus of pereopod III (only 4 spines total and 1 subbasal—the same pattern as seen in *R. laticauda* and *R. murilloi*), shape of the pleotelson (tapers to narrow terminal margin vs broadly rounded), shape and spination of the uropodal rami, and length of the medial process of the unropodal peduncle (about 50% length of endopod—as in *R. laticauda* and *R. murilloi*). However, until additional material from Japan is examined we refrain from addressing this problematic specimen.

Rocinela belliceps (Stimpson, 1864)

(Figs 1D, 3F, 5E, 7, 8)

Aega belliceps Stimpson, 1864: 155.

Aega alascensis Lockington, 1877: 46.

Rocinela alascensis Richardson, 1898: 11.

Rocinela belliceps Richardson, 1899a: 169; 1899b: 827; 1900: 219; 1904a: 24; 1904b: 214; 1905a: 199; 1905b: 213; 1909: 82; Boone 1920: 14; Fee 1926: 25; Hatch 1947: 209; Schultz 1969: 203.

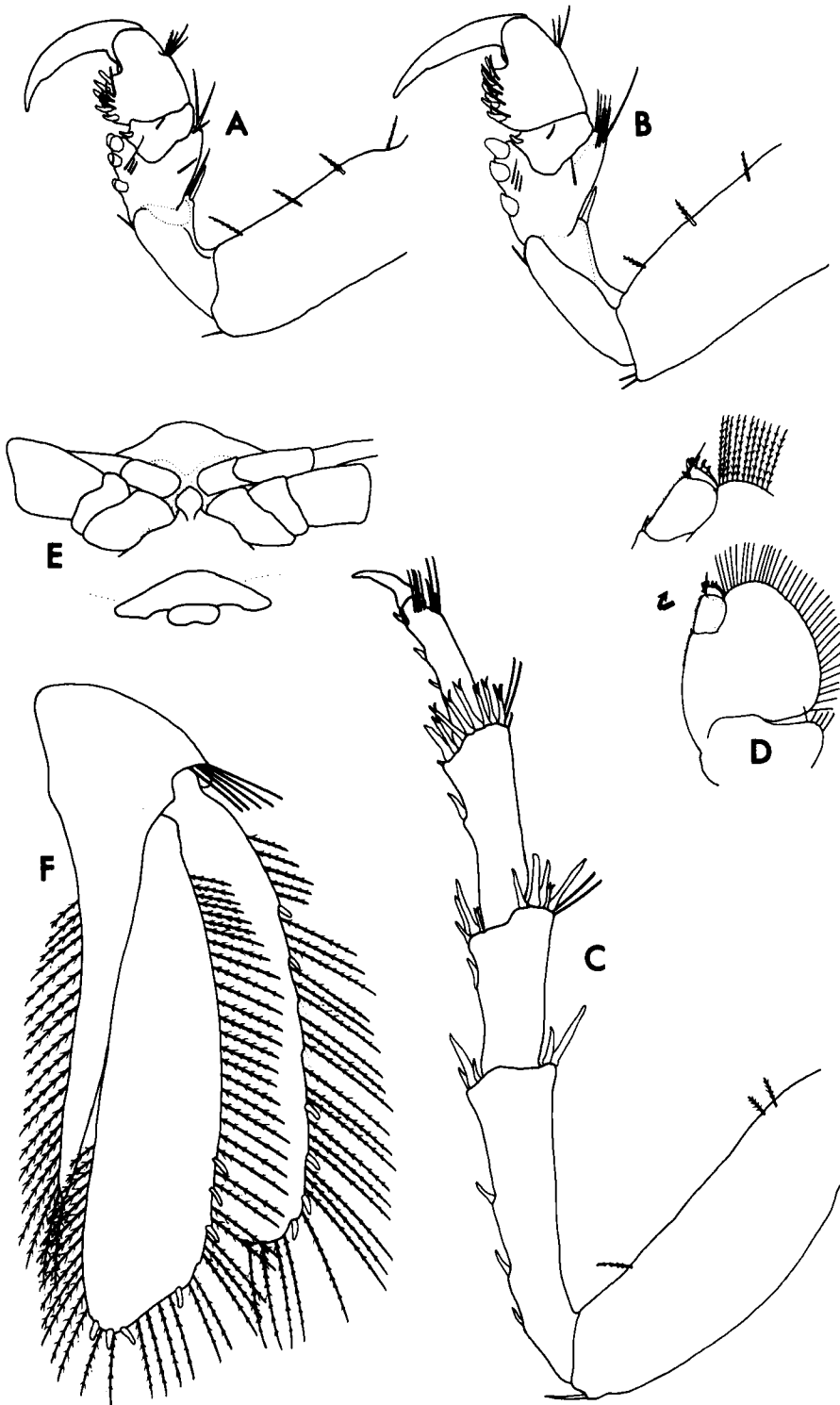


Figure 7. *Rocinela belliceps* (all Figs from neotype). Pereopods (L): A, I; B, III; C, VII; D, maxilliped and detail; E, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum; F, uropod.

Type material. Rocinela bellicepts. Neotype (herein designated): USNM 67676, female with brood (p 5; 13 mm × 25 mm), USA, Washington, San Juan Island (Note—original label in jar reads “San Jose Island”), dredged along shore, Coll. by K. L. Hobbs, 6 August 1928.

Other material examined. [Note: the number of propodal spines on pereopod I are indicated below for all individuals examined, e.g. p3 = 3 spines present on propodus of pereopod I, followed by overall dimensions.] U.S.A., Alaska, Unalaska Island, 14.8–22.2 m, 1 male (p 4; 12.5 mm × 29 mm), Coll. D'Arcy Thompson, ZMC. U.S.A., Alaska, Kodiak Island, Karluk, 2 males (p 4; 11.5 mm × 27 mm, 11 mm × 26 mm), Coll. J. K. Bean, 8 May 1889, ZMC. U.S.A., California, 7.5 km from Pinos Point Light, 36°41'56"N 121°58'42"W, 116.7 m 1 female (p 3; 4.5 mm × 10 mm), “Velero IV” 2 October 1959, LACM Cat. No. 6474. California, Santa Cruz Island, 0.8 km north of Platt Point, 34°3'50"N 119°45'25"W, 66–87 m, dredge, 1 male (p 5; 7.4 mm × 16.3 mm) and 1 female (p 6; 7.4 mm × 16.3 mm), “Velero III”, 12 April 1941, LACM AHF Cat. No. 864–01. California, Santa Catalina Island, 5 km east of Long Point Light, 33°24'N 118°21'W, 124 m, 2 males (p 4; 5.1 mm × 11.3 mm, 5.0 mm × 12.4 mm), “Velero IV” Sta. No. 2128–52, 25 June 1952, LACM. Mexico, Clarion Island, Sulphur Bay, 18°20'N 114°44'W, 9 m, coralline, 1 female (p 3; 12.2 mm × 29.1 mm), “Velero III” Sta. No. 915–39, 16 March 1939, LACM. Additional material examined (number of propodal spines indicated): *AMS material:* U.S.A., California, Santa Catalina Island, off Howland's Landing, 33°28'N 118°28'W, 113 m, 1 female with brood (p 4) and 1 male (p 5), R/V “Velero III”, Sta. No. 1181–40, 10 September 1940, Cat. No. P37830. *BMNH material:* Bering Sea, Robben Island, 1 male (p 4). *LACM material:* U.S.A., California, Point Dune, 46.3–55.5 m, dredged, 2 females, 1 with brood (p 5), Sta. No. A4052, 8 January 1940. U.S.A., California, Point Santa Barbara, 34°22'30"N 119°42'30"W, 61 m, mud, 1 male and 1 female (p 5), Sta. No. 897–38. California, Redondo Beach, 1 male (p 5), Coll. Burch, 14–21 July 1940, Coll. No. [?] 40110. California, Redondo Beach, 185 m, 2 females (p 5), Coll. Burch, April 1938, AHF Cat. No. 867. California, Redondo Beach, 50 m, 2 specimens (p 5), Coll. Burch, AHF Cat. No. 869–01. California, Los Angeles County, off London beach breakwater lighthouse, 5–6 m, “Velero IV”, 20 July 1951, 1 female (p 5), Sta. No. 2045–51. 1 male (p 5), Cat. No. 66–36. California, 22.5 km SSE of Los Angeles Breakwater, 4 specimens, AHF Cat. No. 2053–01. California, Santa Cruz Island, 5.8 km NE of San Pedro Point, 85–87 m, sand, 1 male (p 5), “Velero III” Sta. No. 1418–41, 17 September 1941. California, Santa Cruz Channel, 34°02'N 120°01'W, 63 m, 1 female (p 5), “Velero III” Sta. No. 1005–39, 18 August 1939. California, Santa Rosa Island, 5 km east of South Point, 42.6–48 m, dredge, 1 male (p 5), Sta. No. 1281–41, 10 April 1941. California, Catalina Island, Emerald Bay, 3.3 km offshore, 111–166.7 m, 1 female (p 5), “Velero III” Sta. No. 909–39, 29 January 1938. California, Santa Catalina Island, 6.7 km SE of east end, 33°15'N 118°15'W, 192.6–250 m, dredge, 1 female (p 3), “Velero IV” Sta. No. 1848–49, 12 June 1949, AHF Cat. No. 285–02. California, San Clemente Island, S. of Pyramid Cove, 28–35 m, sand & shell, 2 females (p 4), “Velero III” Sta. No. 1012–39, 9 November 1939. California, San Clemente Island, Pyramid Cove, 32°47'10"N 118°22'10"W, 144.5–203.7 m, 1 female (p 4), “Velero III” Sta. No. 904–39, 19 February 1939. *SDNHM material:* California, Monterey County, SW of Point Soberanes, 185 m,

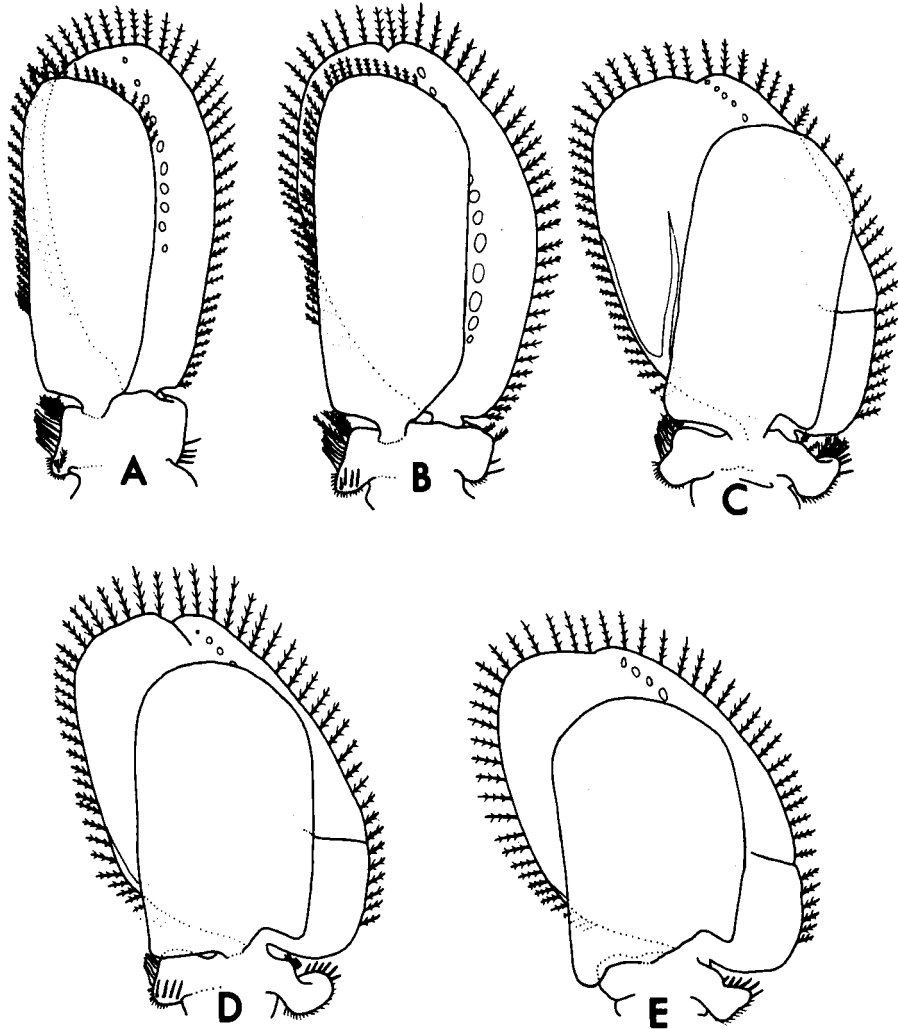


Figure 8. *Rocinela belliceps* (all Figs from neotype). Pleopods (L): A, first; B, second; C, third; D, fourth; E, fifth.

1 male (p 4), R/V "Searcher" Sta. No. C71-51, 21 July 1971. California, Santa Monica Bay, 27.8 m, 1 male (p 5), Coll. Burch sta. 3824, 19 June 1938. California, Redondo Beach, 18.5-37 m, 5 females and 6 males (p 5) and 1 female (p 6), Coll. Burch, 31 August 1940. *SIO material*: Mexico, Gulf of California, E. of Angel de la Guarda, otter trawl, 29°19.9'N 113°10.4'W to 29°20.4'N 113°12'W, 265-284 m, 1 female (p 3), R/V "Thomas Washington", 20 January 1968, Cat. No. C3850.

Description. Cephalon. Head *c.* 2 × wider than long. Eyes large, separated by 1 to 2 eye-widths. Frontal margin produced slightly anterior to antennal peduncles, subtruncate in dorsal aspect. Frontal lamina arrowhead-shaped. Antennule flagellum of 5-6 articles. Antenna extended to pereonite 2, composed of about 15 flagellar articles. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body 2.0–2.5 × longer than wide; pereonite I longest; pereonites IV and V widest; coxae II–VII visible in dorsal aspect, III–VII with distolateral angles extended beyond posterior margin of their respective pereonites. Pereopod I dactylus longer than propodus; propodus with expanded, rounded lobe with 3 to 6 stout acute spines; carpus with 1 acute spine; merus with 3 blunt spines. Pereopod III similar to pereopod I. Pereopods IV–VII with short dactyls, much shorter than propodi; ischium, merus and carpus with fringe of long acute spines on superior distal margin; ischium, carpus and propodus with short acute spines along inferior margin as figured, merus may or may not possess spines on inferior margin.

Pleon. Pleonites 2, 3 and 4 subequal in width and length, wider than pleonites 1 and 5; pleonite 1 covered by pereonite VII; lateral margins of pleonites 2–5 pigmented. Pleotelson equal in width to pleonite 5, tapering to rounded posterior margin; pleotelson often with pigmented patches near anterior margin on either side of medial line. Uropods not extending beyond pleotelson; medial process of peduncle extended more about 70–80% length of endopod; both rami elongate-ovate; endopod wider and longer than exopod, with about 4 lateral and 3 terminal spines; exopod with about 7 or 8 lateral spines. Pleopods 2–5 exopods with apical incision, 3–5 also with lateral incision; peduncles 1–4 with 5–6 coupling spines; pleopods otherwise similar to those of *Rocinela murilloi*.

Distribution. Unalaska Island, Alaska, U.S.A., south along coast to Baja California and Clarion Island (Mexico); one record from within the Gulf of California (Isla Angel de la Guarda, Gulf of California, Mexico). Recorded collection depths are shallow coastal waters to *c.* 284 m.

Remarks. Hatch (1947) described a subspecies of *R. belliceps* as “var. *pugettensis*” which differed in the number of spines on the propodus of pereopod I (5 or 6 vs 3 or 4 on the type), slightly longer spines on the merus, and smaller overall size. We have been unsuccessful in locating the type for *R. belliceps* or for the “*pugettensis*” subspecies. However, in the 48 specimens examined from Puget Sound to the Gulf of California, there are representatives of both forms. We could not detect a great difference in the size of the meropodite spines on the pereopods from the different localities. We have also found no relationship between body length and spination. The number of propodal spines could be used alone to group specimens, but such groupings would seem to have no biological significance and show no biogeographic pattern. Hatch justified the creation of a subspecies because of the “largely nonoverlapping [geographic] distribution of the two”. However, our samples indicate that there is complete overlap in spine count samples (In our samples there are 6 three-spined individuals, 3 six-spined individuals, 11 four-spined and 27 five-spined individuals.). We herein designate a neotype for this species from the type locality—Puget Sound.

Rocinela hawaiiensis Richardson, 1903

(Figs 3C, 5G, 9, 10)

Rocinela hawaiiensis Richardson, 1903: 821.

Type material. *Rocinela hawaiiensis*. Holotype, USNM 28972, male (10 mm × 24 mm), “Albatross” Sta. 3981, Hawaii, Kauai Island, 766–1178 m.

Other material examined. *SIO material*: Mexico, Baja California, E of SE end of

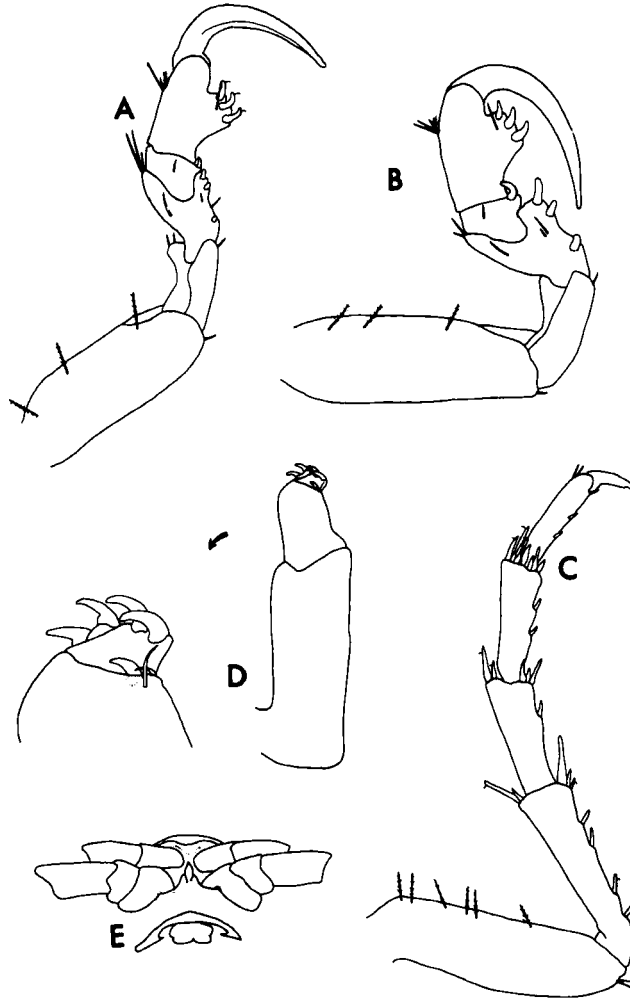


Figure 9. *Rocinela hawaiiensis* (all Figs from holotype). Pereopods (R): A, I; B, III; C, VII; D, maxilliped and detail; E, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

Isla Guadalupe, 28°52.7'N 118°12.2'W, 1298 m, free-vehicle setlines, 1 female (11 mm × 30 mm), Coll. C. Hubbs and S. Luke, R/V "Agassiz", 22 May 1971, Cat. No. C3854.

Description. Cephalon. Head $c.2 \times$ wider than long. Eyes large, separated by less than one-half of one eye-width. Frontal margin subtruncate, directed ventrally; frontal lamina narrow, tapering anteriorly. Antenna 1 flagellum with 4 articles. Antenna 2 extending to posterior edge of pereonite II, flagellum of 18 articles. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body $2.4 \times$ longer than wide; coxae II-VII visible in dorsal aspect. Pereopod I dactylus longer than propodus and carpus combined; propodus with expanded lobe bearing 3 stout, recurved spines; carpus with single spine; merus with 3 blunt spines (2 distal, 1 proximal), distal superior fringe of setae lacking bifurcate setae. Pereopod III same as pereopod I. Pereopods IV-VII with

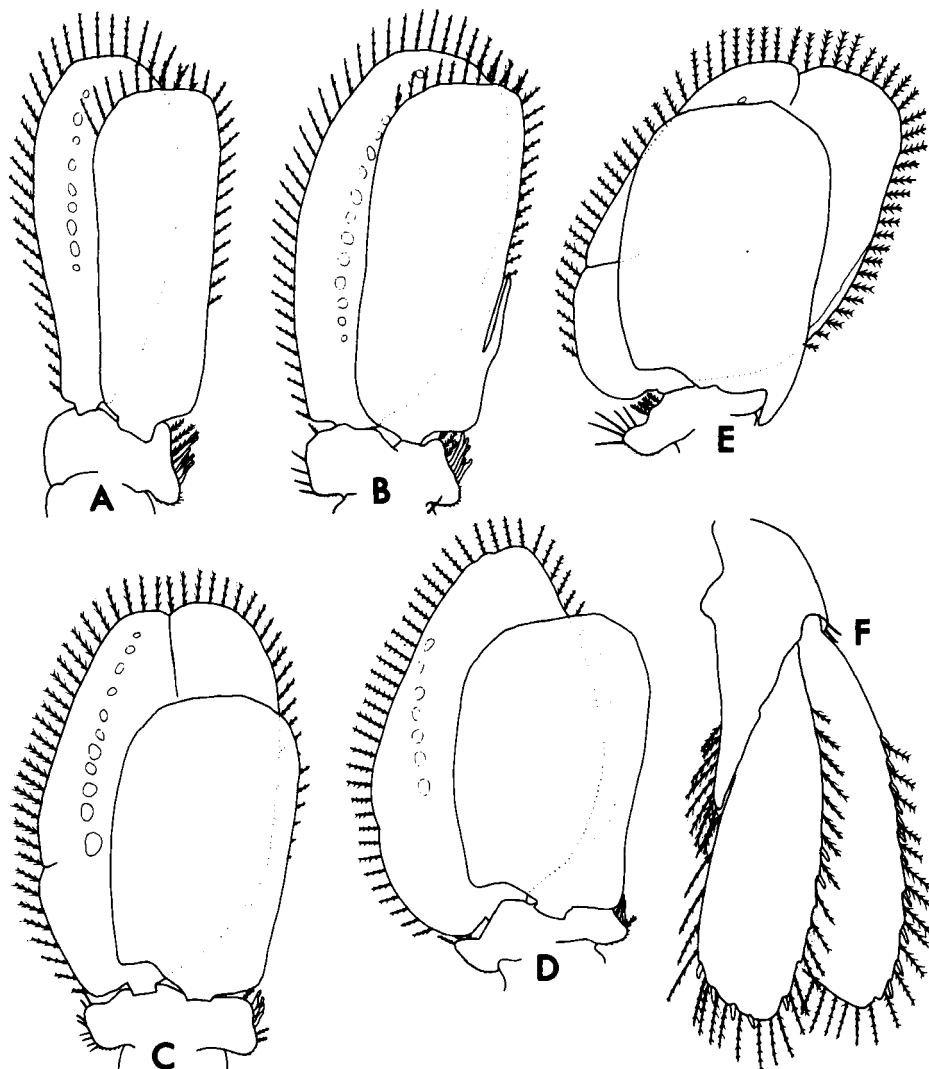


Figure 10. *Rocinela hawaiiensis* (all Figs from holotype). Pleopods (R): A, first; B, second; C, third; D, fourth; E, fifth; F, uropod.

dactyls much shorter than propodi; ischium, merus and carpus with long acute spines on distal margin; ischium, merus, carpus and propodus with short acute spines on inferior margin, as figured for pereopod VII.

Pleon. Pleonite 1 largely covered by pereonite VII. Pleotelson slightly narrower than pleonite 5, tapering to rounded posterior margin. Uropods extend to posterior margin of pleotelson; inner angle of peduncle slightly less than 50% length of endopod; endopod subrectangular, equal in length to exopod; endopod with about 6 distolateral and 4 terminal spines; exopod with 12 lateral spines. Pleopods similar to those of *Rocinela murilloi*, as figured; peduncles 1-4 with 5 coupling spines.

Distribution. Known only from type locality and offshore Isla Guadalupe, Baja California, Mexico. Recorded collection depths are *c.* 1100-1200 m.

Remarks. This little known species had not been reported since its original description. The occurrence of this Hawaiian species at Guadalupe Island was unexpected, but given the potential for dispersal on host fishes it is perhaps not remarkable. Guadalupe Island is 303 km from mainland Baja California, Mexico, and 4623 km SE of Kauai (Hawaii). *Rocinela hawaiiensis* is now known from only one male and one female specimen.

Rocinela laticauda Hansen, 1897
(Figs 4E, 5F, 11, 12)

Rocinela laticauda Hansen, 1897: 108. Richardson, 1899a: 169; 1899b: 828; 1905a: 204.

Type material. *Rocinela laticauda*. Lectotype (herein designated), USNM 20722, 1 male (15.5 mm × 41.4 mm), "Albatross" Sta. 3418, Mexico, off Acapulco, 1201 m.

Other material examined. SIO material: USA, California, Piedras Blancas Point, 35°24.4'N 121°42.8'W to 35°30.6'N 121°52.7'W, 1170–1189 m, 25 foot otter trawl, 2 males (15 mm × 41 mm, 15 mm × 39 mm), Coll. T. Matsui and B. Burnett, R/V "Agassiz", 31 March 1974, Cat. No. C3860. U.S.A., California, Piedras Blancas Point, 35°29.3'N 121°35.8'W to 35°34.5'N 121°42'W, 906 m, 25 foot otter trawl, 2 males (13 mm × 37 mm, 14 mm × 37 mm), Coll. T. Matsui and B. Burnett, R/V "Agassiz", 1 April 1974, Cat. No. C3777.

Description. Cephalon: Head *c.* 2 × wider than long. Eyes large, separated by about one eye-width. Rostrum extended anteriorly beyond antennal peduncles, not reflected ventrally. Frontal lamina narrow, not expanded. Antennular flagellum of 6 articles. Antenna extended to pereonite III, flagellum of 16 articles. Mandibular palp second article with a row of 8 spines and 2 setae. Maxillipedal palp 3-articulate; apical article very small, with 2 acute spines; second article with 2 acute spines and 1 seta on apex and 1 short, acute spine on posterior surface near proximal edge; distomedial corner of first article with 2 setae, one long and extended beyond apex of palp; distolateral margin of basis with plumose marginal setae. Mouthparts otherwise similar to those of *R. murilloi*.

Pereon. Body strongly depressed, very thin in lateral aspect, 2.6–2.8 × longer than wide. Pereonite I longest; pereonites III–VI widest, subequal in width; coxae II–VII visible in dorsal aspect, V–VII extended posteriorly beyond posterior edge of their respective pereonite. Pereopod I dactylus as long as carpus and propodus combined; inferior margin of propodus with distally expanded, broadly-rounded lobe, with 5 thin, straight, acute spines and distolateral margin densely setose; carpus with 1 spine; merus with 2 distal, large, subacute spines set among setae and 1 sub-basal subacute spine; fringe of setae on distal superior margin dense, long and extended to midway along propodus. Pereopod III with 4 subacute spines on merus (3 distal, 1 proximal), otherwise as pereopod I. Pereopods IV–VII dactyls much shorter than propodi; ischium, merus and carpus with fringe of long acute spines on distal margin; ischium, merus, carpus and propodus with short acute spines along inferior margin, as figured for pereopod VII.

Pleon. Pleonites 1–4 increase in width posteriorly; pleonite 5 narrower but longer than others, lateral margins weakly acute; pleonite 1 covered by pereonite

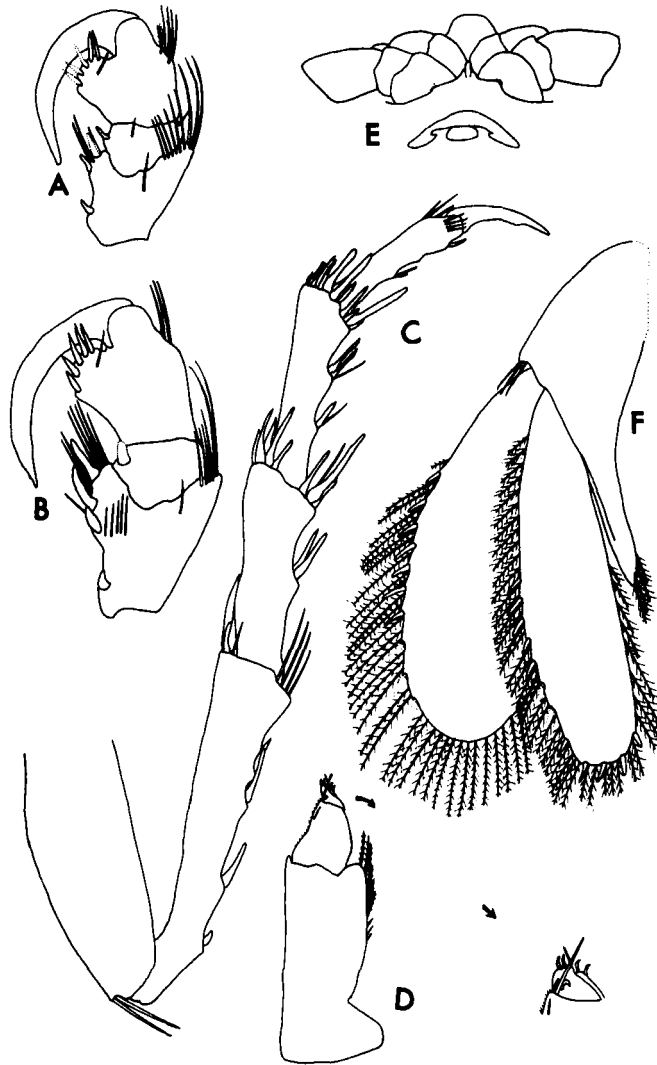


Figure 11. *Rocinela laticauda* (all Figs from lectotype except uropod). Pereopods (L): A, I; B, III; C, VII; D, maxilliped and detail; E, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum; F, uropod.

VII. Pleotelson wider than pleonite 5, broadly rounded. Uropods extended slightly beyond pleotelson; inner angle of peduncle extended about 50% length of endopod; endopod elongate-ovate, much narrower and slightly shorter than exopod (the wider and longer uropodal exopod is oriented at almost 90° to the endopod; when the uropod is dissected, mounted on a slide and flattened beneath a coverslip, the resulting orientation gives the false impression that the endopod is actually longer than the exopod, e.g. compare Figs 4E and 11); endopod with about 8 distolateral spines and about 4 terminal spines; exopod rounded terminally, with about 10 lateral spines. Pleopodal exopods 4–5 with deep apical incision; pleopods 1–4 peduncles with 5–7 coupling spines, PMS on

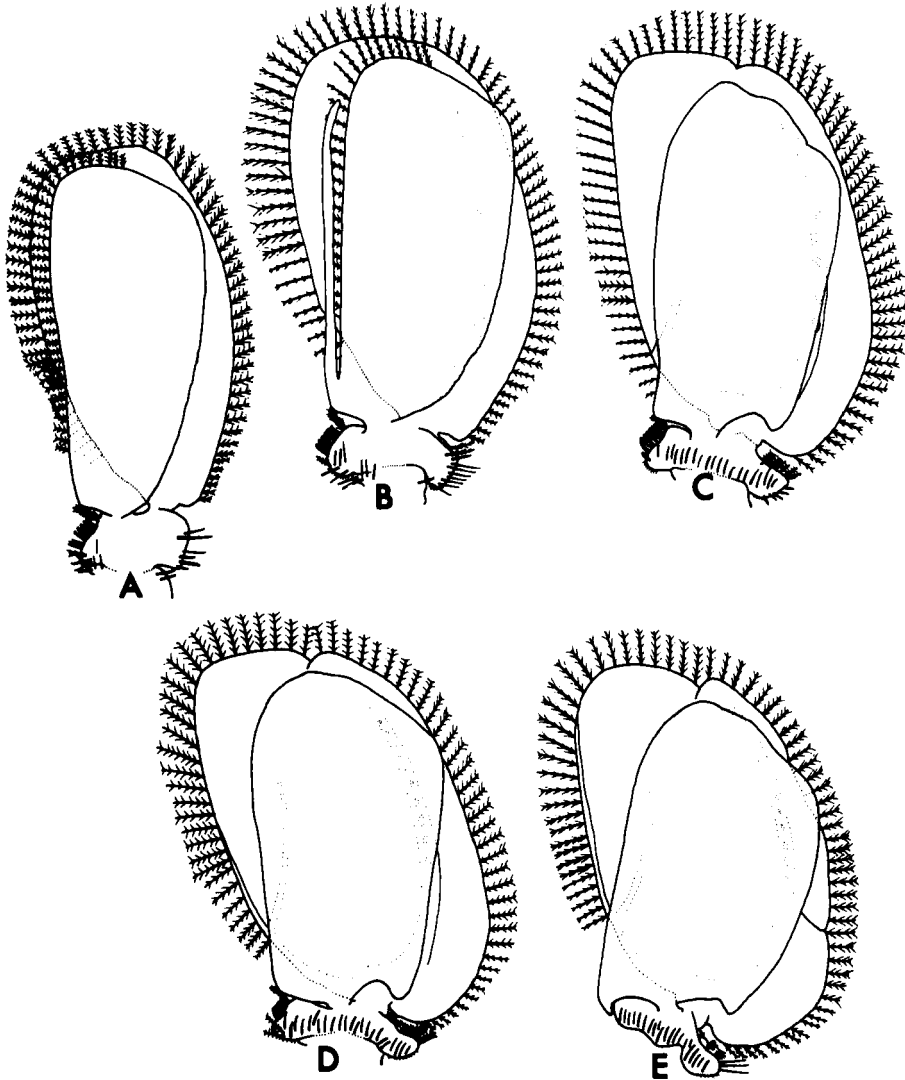


Figure 12. *Rocinela laticauda* (all Figs from lectotype). Pleopods (L): A, first; B, second; C, third; D, fourth; E, fifth.

medial margin and row of simple setae on proximal margin; pleopods otherwise similar to those of *R. murilloi*.

Distribution. As currently understood, we have positive records for this species from only two localities: California (Piedras Blancas Point, near San Simeon) and Acapulco (Guerrero), Mexico. Recorded collection depths are 906 m and 120 m.

Remarks. Hansen did not designate a type for this species. The type series comprises three specimens (syntypes), one large male and two small females. Hansen's original description included figures of two specimens—a male and a female—both of which we have examined. The male specimen (USNM 20722), collected from offshore Acapulco, Mexico, is in a vial containing a USNM label

marked "type". The female specimen (USNM 20723), collected off Acapulco, 6° north of San Blas (Nayarit), Mexico, is in a vial containing a USNM label stating "cotype." The disposition of the third specimen is not known. The male specimen is in poor condition, having been mounted on a pin and possibly dried out, and is missing some spines on the pereopods and uropods. For the purposes of the description, we determined the number of spines by counting spine sockets on the type, and by comparison to other specimens. The two syntypes we examined differ in the shape of the spines on the propodus, in the amount of setae shrouding the meral spines, in the dense elongate setae on the superior margin of the meri of pereopods I and III and in the size and shape of spines and setae on the maxilliped. We herein designate the large male the lectotype. The female specimen is removed to the species *Rocinela murilloi*.

Rocinela murilloi is very similar in morphology to *R. laticauda*. In addition to morphological similarities, it should be noted that the only specimens of *R. laticauda*, apart from the lectotype, that we have been able to locate were mixed in with specimens of *R. murilloi* from Piedras Blancas Point, near San Simeon, California. We initially considered synonymizing these two species. However, the consistent differences noted above between the lectotype and "cotype"-labelled specimen, and other specimens we examined, convinced us to retain the separate species status. Judging by the collections we have examined, these two species are also broadly sympatric.

Hansen's (1897) original description also noted the similarity of *R. laticauda* to the southern hemisphere temperate species *R. australis*. This comparison is also appropriate to *R. murilloi* which has the same structure and shape in the spination of the first three pereopods. The distribution of *R. laticauda* is enigmatic, with only two verified records, one from California and one from Acapulco.

Rocinela modesta Hansen, 1897

(Figs 4C, 5J, 13, 14)

Rocinela modesta Hansen, 1897: 109.

Type material. *Rocinela modesta*. Holotype, USNM 20724, female with oostegites (10.5 mm × 24.1 mm), "Albatross" Sta. 3384, 1891, Panama, Gulf of Panama, 7°31'30"N 79°14'W, 848.2 m.

Description. Cephalon. Head 1.7 × wider than long; eyes relatively small, separated by about 2 eye-widths. Frontal margin expanded into short, truncate rostrum. Frontal lamina narrow, tapering to acute point anteriorly. Antennule flagellum 6-articulate. Antennal flagella missing from the type specimen. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body 2.3 × longer than wide; pereonite 5 longest and widest; coxae II–VII visible in dorsal aspect; coxae IV–VII with posterior angle acutely produced, corners of VI and VII extended beyond posterior edges of their respective pereonites. Pereopod I dactylus longer than propodus; propodus with large distal lobe bearing 4 thin acute spines; carpus with 1 spine, distal superior margin with 1 simple seta; merus with 3 blunt spines, 2 distal and 1 proximal, distal superior fringe of setae lacking bifurcate setae. Pereopod III merus with 4 blunt spines, 3 distal and 1 proximal, otherwise as pereopod I. Pereopods IV–VII with short dactyls, much shorter than propodi; ischium, merus and

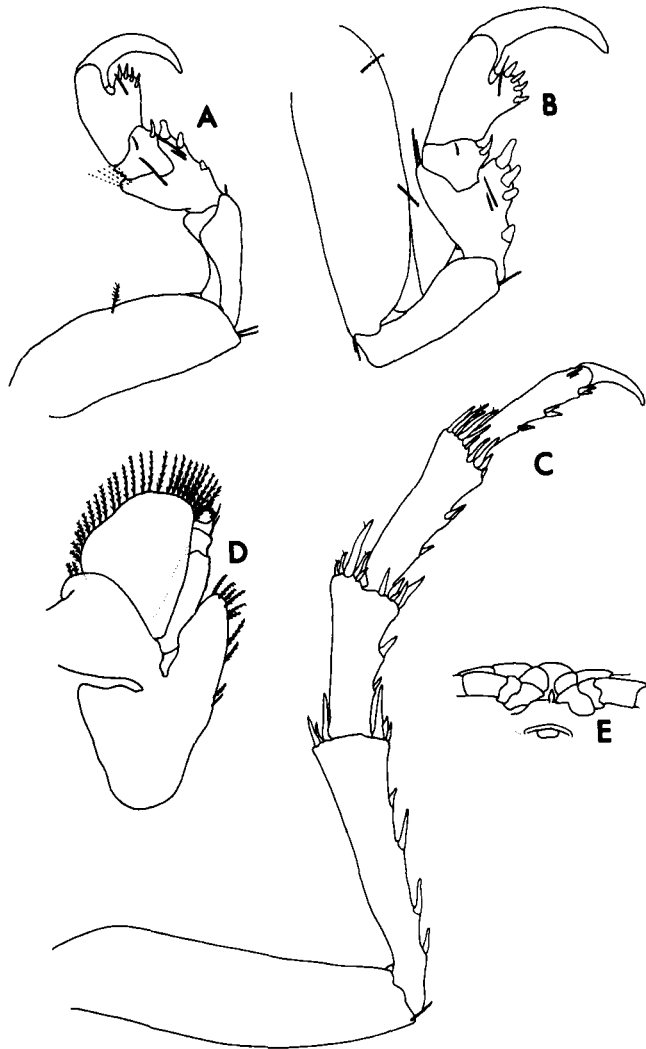


Figure 13. *Rocinela modesta* (all Figs from holotype). Pereopods (L): A, I; B, III; C, VII; D, maxilliped (with oostegite); E, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

carpus with fringe of long acute spines on distal margin; ischium, merus, carpus and propodus armed with short acute spines along inferior margin, as figured for pereopod VII.

Pleon. Pleonites 2, 3, and 4 of equal length and width; pleonite 1 covered by pereonite VII; pleonite 5 longer but narrower than others. Pleotelson slightly wider than pleonite 5, broadly tapered. Uropods extended slightly beyond pleotelson; inner angle of peduncle extended slightly more than 50% length of endopod; endopod elongate-ovate [tapering to distolateral corner], longer than exopod; endopod probably with about 9 spines (about 4 terminal and 5 distolateral); exopod wider than endopod, rounded terminally, probably with about 9 lateral spines (note: numerous spines appear to be broken off the uropod

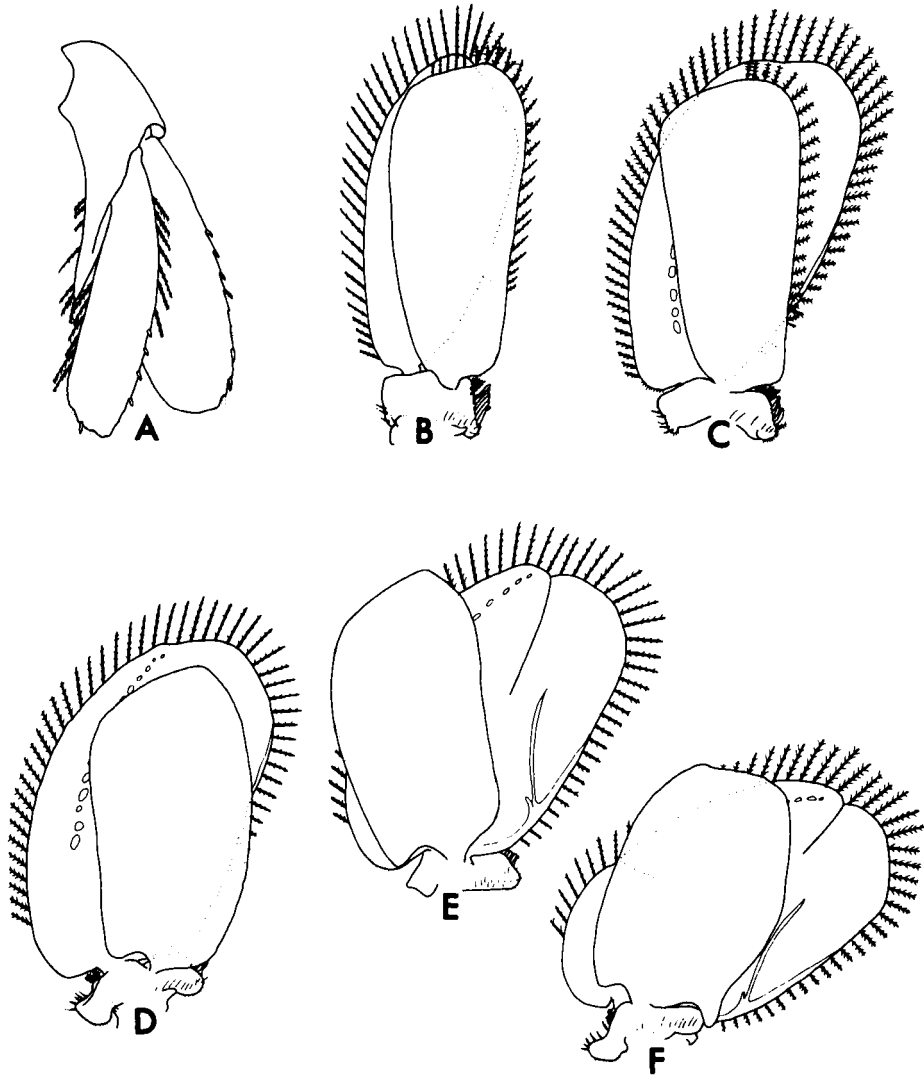


Figure 14. *Rocinela modesta* (all Figs from holotype). A, Uropod; pleopods (R); B, first; C, second; D, third; E, fourth; F, fifth.

on the type specimen). Pleopods similar to those of *Rocinela murilloi*; peduncles 1–4 with 5–6 coupling spines.

Distribution. Only known from type locality (Bay of Panama, Panama), from 848 m.

Remarks. Hansen described this species from a single specimen taken in the Bay of Panama by the "Albatross" Expedition. It has not been reported in the literature since that time, nor have we found any specimens in any material we have examined. The holotype is in poor condition; the antennal flagella are missing and many uropodal spines are apparently broken off. This is the first redescription of this species.

Rocinela murilloi Brusca & Iverson, 1985
(Figs 1A, B, 2, 4A, 5H, 15, 16, 17)

Rocinela murilloi Brusca & Iverson, 1985: 44.

Type material. *Rocinela murilloi*. Holotype, LACM-AHF Cat. No. 202-05, 1 female (11.5 mm × 27.5 mm), "Velero IV" Sta. 18932, Costa Rica, 23 km 233°T from Pt. Guiones, 09°45'18"N 85°52'24"W, 1866 m. Paratopotypes, 8 specimens, same collection.

Other material examined. *AMS material:* U.S.A., California, San Diego Trough, 32°21.8'N 117°24.0'W to 32°30.7'N 117°32.8'W, 1235 m, 25 foot otter trawl, 2 females, Coll. Hubbs, Luke, and Wisner, R/V "Agassiz", 1-2 June 1971, Cat. No. P37849. *LACM material:* California, San Diego Trough, 32°21.8'N 117°24.0'W to 32°30.7'N 117°32.8'W, 1235 m, 25 foot otter trawl, 1 female and 2 males, Coll. Hubbs, Luke, and Wisner, R/V "Agassiz", 1-2 June 1971. Peru, between Lobos de Tierra & Lobos de Afuera, 6°42'S 80°59'W, 800 m, beam trawl, 1 male, Sta. SNP1-24, 22 January 1974, AHF Cat. No. 100-03. Peru, near Lobos de Afuera, 7°07'S 80°46'W, 1200 m, beam trawl, 1 female, Sta. SNP1-13, 20 January 1974, AHF Cat. No. 94-09. *SIO material:* U.S.A., California, offshore Point Sur, 1000 m bottom trawl, 2 males and 1 manca, Coll. W. Waldo Wakefield, Sta. SLS-24, November 1984. California, Piedras Blancas Point, 35°24.4'N 121°42.8'W to 35°30.6'N 121°52.7'W, 1170-1189 m, 25 foot otter trawl, 13 females, 11 males, and 2 mancas, Coll. T. Matsui and B. Burnett, R/V "Agassiz", 31 March 1974, Cat. No. C3860. California, Piedras Blancas Point, 35°29.3'N 121°35.8'W to 35°34.5'N 121°42'W, 906 m, 25 foot otter trawl, 11 females and 8 males, Coll. T. Matsui and B. Burnett, R/V "Agassiz", 1 April 1974, Cat. No. C3777. California, San Diego Trough, 32°35'N 117°28'W to 32°40'N 117°32'W, 1111-1194 m, 4 foot pipe steam dredge, 4 females, Coll. F. Rokop and S. Luke, R/V "Oconostata", 7 November 1969, Cat. No. C3804. California, San Diego Trough, 32°26.1'N 117°30.7'W to 32°22.5'N 117°28.8'W, 1244-1259 m, 25 foot otter trawl, 3 females and 2 males, Coll. F. Rokop, R. McConnaughey and S. Luke, R/V "Agassiz", 26 October 1970, Cat. No. C3828. California, San Diego Trough, 32°24.7'N 117°27.75'W to 32°29.2'N 117°30.2'W, 1204-1226 m 25 foot otter trawl, 3 males and 2 postmancas, Coll. F. J. Rokop, R/V "Agassiz", 18-19 January 1971, Cat. No. C3799. California, San Diego Trough, 32°21.8'N 117°24.0'W to 32°30.7'N 117°32.8'W, 1235 m, 25 foot otter trawl, 31 females, 17 males and 4 postmancas, Coll. Hubbs, Luke, and Wisner, R/V "Agassiz", 1-2 June 1971, Cat. No. C3855. California, San Diego Trough, 32°24.8'N 117°28.3'W to 32°25.0'N 117°28.5'W, 1260 m, on tail of *Anoplopoma*, 1 male, Coll. R. McConnaughey, R/V "Agassiz", 22 June 1971, Cat. No. C3757. California, San Diego Trough, 32°31'N 117°30'W, 1234 m, 25 foot otter trawl, 4 females and 1 postmanca, Coll. R. McConnaughey, R/V "Agassiz", 22 June 1971, Cat. No. C3798. California, San Diego Trough, 32°25'N 117°26.8'W to 32°26'N 117°28.1'W, 1208-1244 m, 25 foot otter trawl, 2 females and 2 males, Coll. F. Rokop, R/V "Agassiz", 14 July 1971, Cat. No. C3831. California, San Diego Trough, 32°26'N 117°29'W to 32°31'N 117°32'W, 1241-1260 m, 40 foot otter trawl, 3 females, Coll. T. Matsui, R/V "Agassiz", 14 September 1971, Cat. No. C3796. California, San Diego Trough, 32°24.4'N 117°29.5'W to 32°31'N 117°33.4'W, 1222-1260 m, 40 foot otter trawl, 1 female and 1 male, Coll. T. Matsui, R/V "Agassiz", 1 November 1971, Cat. No. C3797.

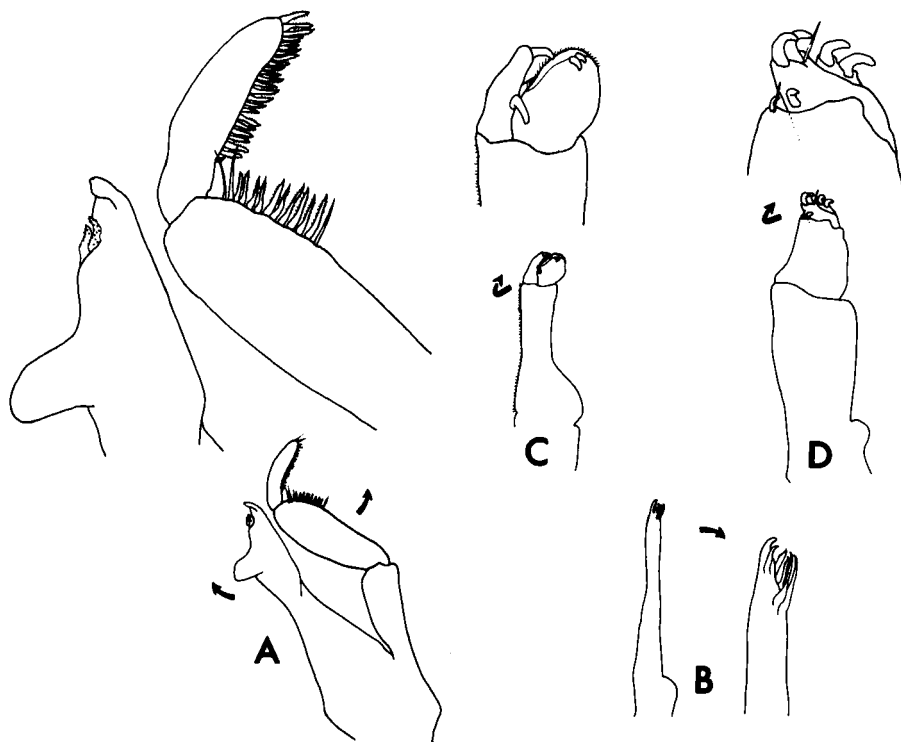


Figure 15. *Rocinela murilloi* (all Figs from holotype). Mouthparts: A, mandible and detail; B, maxillule and detail; C, maxilla and detail; D, maxilliped and detail.

California, San Diego Trough, 32°26.2'N 117°31.6'W to 32°30.4'N 117°34.3'W, 1189 m, 25 foot otter trawl, 1 female, Coll. T. Matsui, R/V "Oconostota", 9 February 1972, Cat. No. C3784. California, San Diego Trough, 32°31.7'N 117°34.1'W to 32°25.7'N 117°28.4'W, 1225 m, 25 foot otter trawl, 1 female, Coll. T. Matsui and B. Burnett, R/V "Agassiz", 27 March 1974, Cat. No. C3782. California, off San Diego, 32°24.7'N 117°27.75'W to 32°29.2'N 117°30.2'W, 1219–1259 m, 25 foot otter trawl, 1 female, Coll. T. Matsui, 18–19 January 1971, Cat. No. 3844. California, East Cortes Basin, 32°32'N 118°53.1'W to 32°32.7'N 118°53.6'N, 1298 m, 25 foot otter trawl, 13 females, 1 male and 1 postmanca, Coll. J. Siebenaller, R/V "Agassiz", 6 May 1975, Cat. No. C1676. Mexico, Baja California Norte, 26.2 km south of Pta. Descanso, 32°0.6'N 117°2.9'W, 827 m, 1 female, Coll. C. Hubbs, 7 December 1966, Cat. No. C3921. Costa Rica, south of Pt. Guianes, 09°32.5'N 85°43.0'W to 09°36.7'N 85°40.5'W, 1154–1157 m, 10 foot Issacs-Kidd midwater trawl, 1 male, Coll. C. Hubbs and S. Luke, R/V "Agassiz", 20 April 1973, Cat. No. C1706. Chile, off Arica, 18°40.5'S 70°36.0'W to 18°32.2'S 70°29.8'W, 768–968 m, 25 foot otter trawl, 1 male, Coll. R. Wisner and S. Luke, R/V "Thomas Washington", 7 May 1972, Cat. No. C2916. Chile, off Arica, 18°42'S 70°37'W, 1097–1152 m, 25 foot otter trawl, 19 females, 11 males, and 1 postmanca, Coll. S. Luke, R/V "Thomas Washington", 7 May 1972, Cat. No. C2908. *USNM material*: Mexico, San Blas, 21°19'N, 106°24'W, 1201 m, 1 female, "Albatross" Sta. 3425, Cat. No. 20723

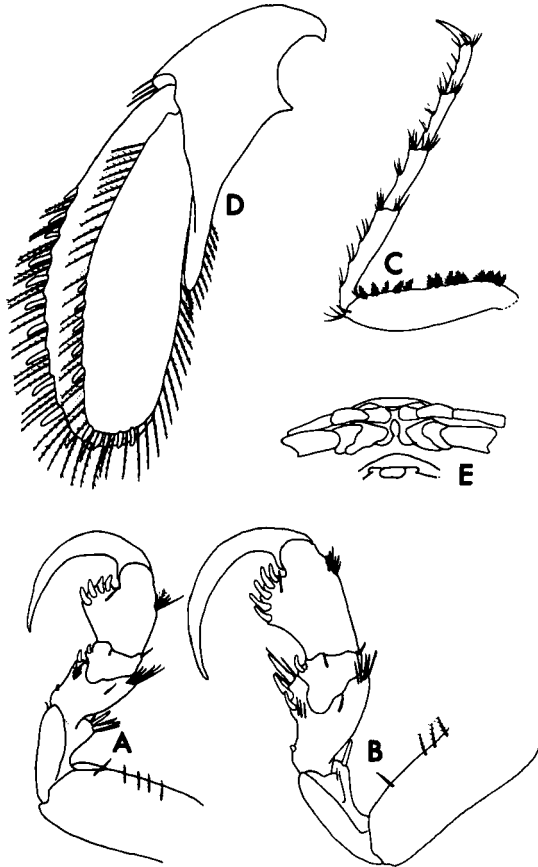


Figure 16. *Rocinela murilloi* (all Figs from holotype). Pereopods (L): A, I; B, III; C, VII; D, uropod; E, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

(This female is the "co-type" specimen removed from *R. laticauda*; see *Remarks*). Chile, 33°39'S 72°10'W, 1170–1480 m, 1 female and 2 males, "Anton Bruun" cruise 18A, Sta. 699, 10 August 1966.

Description. Cephalon. Head about 2–2.5 × wider than long; eyes large, separated by about one eye-width. Frontal margin extended anteriorly barely beyond antennal peduncles, subtruncate. Frontal lamina narrow, arrowhead shape. Antennule flagellum 6-articulate. Antenna extended to pereonite III, flagellum with 16 articles. Mandible with narrow apex, claw-like incisor, simple linguiform molar process, and bidentate lobe covered by minute spines (lacinia mobilis?) between incisor and molar (see Fig. 2C, D); palp 3-articulate, second article more than twice as long as third and with row of 10 serrate spines and 2 distal simple setae. Maxillule styliform, tapered to apical tooth set among cluster of 5 stout, acute setae. Maxilla with setose medial margin; inner lobe finger-like, with 2 stout, recurved spines, 1 apical and 1 sub-basal; outer lobe broadly rounded with 2 small, recurved spines on distomedial edge. Maxillipedal palp 3-articulate; apical article very small, with 2 stout, recurved spines; second article with 2 stout recurved spines, 1 apical seta, and 1 stout recurved spine on posterior surface near proximal edge.

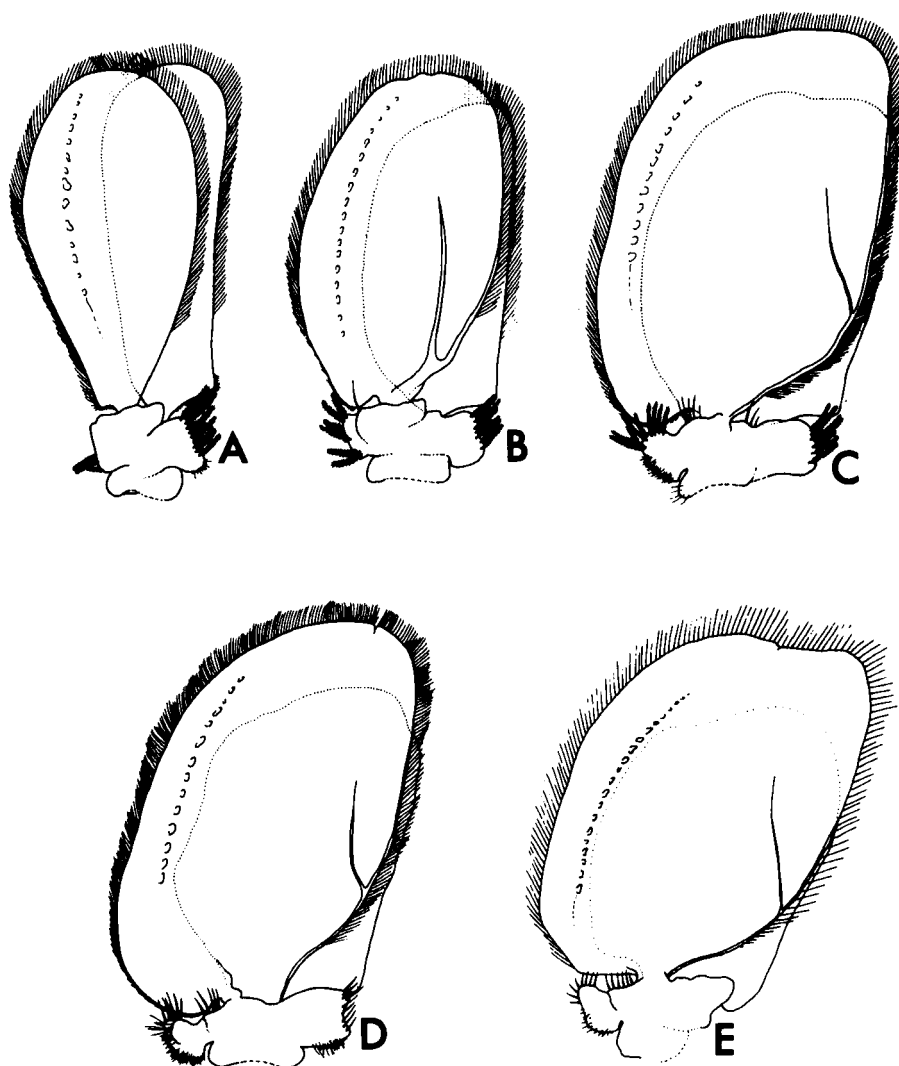


Figure 17. *Rocinela murilloi* (all Figs from holotype). Pleopods (L): A, first; B, second; C, third; D, fourth; E, fifth.

Pereon. Body 2.3–2.5 × longer than wide; pereonite 1 longest; pereonites IV–V widest; coxae II–VII visible in dorsal aspect, posterior angles of V–VII extended beyond posterior edges of their respective pereonites. Pereopod I dactylus as long as propodus and carpus combined; inferior margin of propodus with distally expanded, broadly-rounded lobe, with 4–6 stout recurved spines; carpus with 1 spine; merus with 2 distal subacute spines and 1 subbasal short subacute spine, distal superior fringe of setae lacking bifurcate setae. Pereopod III with 4 subacute spines on merus (3 distal, 1 proximal), otherwise as pereopod I. Pereopods IV–VII dactyls much shorter than propodi; ischium, merus and carpus with fringe of long acute spines on distal margin; ischium, merus, carpus and propodus with acute spines along inferior margin.

Pleon. Pleonites 2–4 subequal in width and length; pleonite 5 narrower but longer than others; pleonite 1 covered by pereonite VII. Pleotelson wider than pleonite 5, broadly rounded. Uropods extended slightly beyond pleotelson; inner angle of peduncle extended about 50% or more length of endopod; endopod elongate-ovate, narrower and slightly shorter than exopod; endopod with about 6–8 distolateral spines and about 4–5 terminal spines; exopod rounded terminally, with about 10–13 lateral spines. Pleopods 1–5 exopods ovate, with PMS and a lateral row of maculae; exopods 2–5 with lateral vein, and 4–5 with apical incision; endopods smaller, sub-rectangular, with PMS on 1 and 2 only; peduncles with transverse row of basal setae; pleopods 1–4 peduncles with 6–8 coupling spines (see Fig. 2A, B) and PMS on medial margin and peduncles 2–5 with PMS on lateral margin; pleopod 5 without coupling spines, exopod with deep lateral incision, and endopod with proximal lobe; appendix masculina simple.

Distribution. Point Sur, California, U.S.A. south to Arica, Chile. Collection records are from 768 m to 1866 m.

Remarks. Considerable variation in spination on the propodi of pereopods I–III occurs among the type series of *R. murilloi*. The holotype has 5 spines on the propodi of pereopods II and III but 4 spines on pereopod I. Four other individuals show this pattern on at least one side of the body, but two individuals have 5 spines on each propodus and two others have 4 spines on each propodus. There is even internal variability with some of the “4:5:5” individuals which have a “5:4:5” pattern on either the left or right side. The exact number of spines may vary (4–6), however the shape and size of the spines, as well as the lobe of the palm, remain consistent. The spines are relatively stout, slightly curved and acute. Note that the figure of pereopod I of *R. murilloi* in Brusca & Iverson (1985) omitted 2 spines on the merus. The degree of variation revealed in this species after examination of a large number of specimens (see material examined) allowed us to remove the female “cotype” of *R. laticauda* to *R. murilloi* (see *Remarks* under *R. laticauda*).

Rocinela signata Schiödte & Meinert, 1879
(Figs 1C, 3D, E, 5I, 18, 19, 20)

Rocinela signata Schiödte & Meinert, 1879: 399.

[Citations: Richardson, 1898: 11; 1901: 524; 1905a: 209; 1912: 189; Moore, 1901: 171; Menzies & Glynn, 1968: 45; Schultz, 1969: 201; Brusca & Iverson, 1985: 42; Garzon-Ferreira, 1990: 813.]

Rocinela aries Schiödte & Meinert, 1879: 401–403.

[Citations: Richardson, 1898: 11; 1899a: 170; 1899b: 828; 1905a: 210–211; 1914: 362; Steinbeck & Ricketts, 1941: 425; Menzies, 1962: 345; Schultz 1969: 201.]

Type material. *Rocinela signata*. Lectotype, ZMC, female (6 mm × 13 mm), St. Croix Island, West Indies. Paralectotypes, Central America (Atlantic coast) and West Indies.

Other material examined. Mexico, Sonora, Bahía Venetia, (about 30 miles N Guaymas), 4.5 m, on gills of barred Pargo *Hoplopagurus guntheri*, 6 females (3.3 mm × 9.0 mm; 3.5 mm × 9.0 mm; 3.8 mm × 9.2 mm; 3.8 mm × 8.7 mm; 5.4 mm × 12.5 mm; 4.8 mm × 11.4 mm), 1 postmanca (3.0 mm × 7.3 mm), Coll.

R. C. Brusca, 3 July 1975. Mexico, Sonora, Puerto Peñasco, on intertidal mud flats, 1 male (4.4 mm × 10.5 mm), Coll. R. C. Brusca, 28 September 1974. Mexico, Baja California Sur, El Bajo, 2 Mi. N Loreto, on gills of *Anisotremus interruptus*, 1 male (5.5 mm × 12.5 mm), 20 August 1980. Mexico, Baja California, SW tip of Isla San Jose, 24°45'N 110°35'W, intertidal, 1 male (9.8 mm × 20.6 mm), 14–15 April 1960, SIO Acc. No. BI6O-15. Mexico, Baja California Sur, Tortugas Island, 9 m, 1 female* (4.2 mm × 9.2 mm), "Velero III" Sta. 692-37, 17 March 1937, LACM. Costa Rica, Golfo Dulce, 8°24'N 83°13'W, 35–89 m, mud & fine sand, 1 male* (4.6 mm × 12.2 mm), "Velero III" Sta. No. 941-39, 26 March 1939, LACM. Mexico, Baja California, Puertecitos, "shallow water," 1 female (7.8 mm × 15.4 mm), 29 December 1959, CAS Cat. No. 025947.

Additional material examined. CAS material: Mexico, Gulf of California, Baja California Norte, Puertecitos, shallow water, 1 female, Coll. R. Dempster, 29 December 1959, Cat. No. 025947. Mexico, Oaxaca, 1 female, Coll. A. J. Ferreira, December 1971, Cat. No. 028443. Mexico, Gulf of California, Isla del Espiritu Santo, Eclipse Bay, dredged, 1 female, CAS-BASF Expedition, 13 December 1960, Cat. No. 028590. *LACM material:* Mexico, Baja California Norte, Bahía San Carlos, 1 male, Sta. ESR-1, 2 February 1948 (58?). Mexico, Baja California Sur, Isla Asuncion, 27°06'N 114°17'W, 7.6–21.3 m, 1 female, Coll. James McLean & Peter Oringer (Dwyer Exped.), 12 December 1967, Cat. No. 67-66. Mexico, Gulf of California, Baja California, El Bajo (near Loreto), subtidal rocks, 1 postmanca, Coll. E. W. Iverson, 20 August 1980. Mexico, Gulf of California, Baja California, Isla Ildefonso, 92.6 m, 1 female, "Velero III" Sta. No. 677-37, 15 March 1937. Mexico, Guerrerro, near Acapulco, 10 m, 1 female, AHF Cat. No. 843-01. Mexico, Baja California, Scammon's Lagoon (Laguna Ojo de Liebre), 6.5–15 m, 1 female, R/V "Horizon", 13 September 1953, No. KG-4. Mexico, Gulf of California, Baja California Sur, Punta Chivato, from gills of Colorado snapper, 2 females and 2 postmancas, 9 August 1976. Mexico, Baja California Sur, Scammon's Lagoon (Laguna Ojo de Liebre), 8–16.6 m, 1 male, 13 September 1953, No. KG-6. Mexico, Gulf of California, Baja California Sur, Bahía Pulmo, 23°22'N 109°25'W, 1.5–6 m, 1 female and 2 males, Coll. James McLean & Peter Oringer, 6–7 April 1966, Cat. No. 66-19. Costa Rica, Golfo de Nicoya, Punta Morales area, shallow mangrove bay habitat, Coll. W. Szelistowski, 1984–85. Panama, Taboga Island, 8°48'N 79°30'W, 4.6 m, mud and sand, 1 female, "Velero III" Sta. No. 959-39, 2 May 1939. Ecuador, Santa Elena Peninsula, SE side Punta Ancon, 2°20'S 80°53.5'W, intertidal, Coll. James H. McLean, 7 March 1970, Cat. No. 70-12. *SDNHM material:* U.S.A., California, Los Angeles County Newport Bay, 1 female, Coll. 20 November 1949. Mexico, Baja California Sur, Scammon's Lagoon (Laguna Ojo de Liebre), Isla Conch, living among dead shells of *Pecten circularis*, littoral zone, 2 female, Coll. W. Williams, 6 May 1946. Mexico, Gulf of California, Sonora, Guaymas, Bahía Baccochibampo, 1 female, otter trawl, 8 February 1975. Mexico, Baja California Sur, Scammon's Lagoon (Laguna Ojo de Liebre), in gills of black sea bass, 1 female, Coll. D. Bostic, 6 February 1972. Mexico, Gulf of California, Sonora, Puerto Peñasco, Bahía Cholla, under dead sand dollar tests at water's edge (low tide), 3 males, 1 female with brood, Coll. R. C. Brusca, 24

*For explanation of asterisk see *Remarks* on p. 266 for occurrence.

March 1978. Mexico, Gulf of California, Sonora, Puerto Peñasco, Bahía Cholla, night seing haul on ebbing tide 1 female, Coll. D. Dawkins, 19 September 1971. Mexico, Gulf of California, Baja California Norte, Bahía de Los Angeles, from gill cavity of Gulf Grouper *Mycteroperca jordani*, 1 female, 5 April 1972. Mexico, Gulf of California, Baja California Sur, Isla Carmen, Puerto Ballandro, 1 female, Coll. M. Gilligan, 1 August 1974. Mexico, Gulf of California, Sonora, Puerto Peñasco, littoral, clinging to dead sand dollar tests on mud, 1 male and 1 female, Coll. R. C. Brusca, 15 August 1981. Mexico, Gulf of California, Isla San Pedro Nolasco, 0.3 m. 1 female, 27 March 1975. Mexico, Gulf of California, Sonora, Puerto Peñasco, Bahía Cholla, littoral zone, 2 females, Coll. J. Kudenov, 29 January 1972. Mexico, Gulf of California, Baja California Sur, Isla Cerralvo, 7.6 m, 2 females, Coll. M. Gilligan, 7 August 1974. Costa Rica, Golfo de Nicoya, Estero de Pta. Morales, shallow water of coastal mangrove swamp, 4 females and 4 postmanca, Coll. Diane Perry, 20 February–6 March 1984. Costa Rica, Puntarenas, Golfo de Nicoya. Punta Morales, from floating mangrove leaves in shallow mangrove habitat, 2 females and 1 postmanca, Coll. W. Szelistowski, December 1987. Panama, Panama Bay, Palo Seco, > 12 individuals, dredged, Coll. P. Glynn, 5 August 1974. *SIO material*: Mexico, Gulf of California, 25°31'N 111°4'W, 3–4.5 m, 1 female, Coll. R. R. Rosenblatt, 11 July 1965, Cat. No. C2444. Mexico, Gulf of California, Bahía Kino, 28°41'N 112°06'W, 26–35 m, 1 female, otter trawl, 25 March 1960, Cat. No. C3794. Mexico, Islas Tres Marias, Maria Madre Island, 21°31'N 106°33'W, 0–7.6 m, 3 females, Coll. F. H. Berry, 15 August 1961, Cat. No. C3787. *USNM material*: Ecuador, S of Islas Galapagos, 1°57'S 89°37'W, 68 m, 1 female*, R/V "Anton Bruun", 20 September 1966. Ecuador, Golfo de Guayaquil, 20°49'S 80°31'W, 1 female, 2 mancas and 1 postmanca, Menzies trawl, R/V "Anton Brunn", 11 September 1966. *Material borrowed from Dr. E. Williams (Univ. Puerto Rico)*: Panama, Isla Venado, NW shore, 0–2 m, small rocks, sand and silty mud, 1 male, Coll. C. E. Dawson, 15 April 1972. Panama, 1 postmanca, 3 December 1974, Acc. No. 272580 (NMNH-STRI FARFAN Q-1). Panama, Bahía Panama, 8°51'03"N 79°33'43"W, 7–8 m, sand, 1 female, Coll. C. E. Dawson. Panama, Playa Venado, low tide pool, 2 females, Coll. C. E., Dawson, 16 January 1972. Panama, Playa Venado, Tidepools, 0–0.6 m, small rocks and sandy silt, 2 females* and 2 males*, Coll. C. E. Dawson, 19 March 1972.

Description. Cephalon: Cephalon 2 × wider than long. Eyes separated by greater than one eye width. Frontal margin broadly rounded, short ventrally-directed rostral process not separating antennules. Frontal lamina arrowhead-shaped, narrow between antennae, bluntly rounded anteriorly. Antennule flagellum 4-articulate. Antenna extends to anterior margin of pereonite 3, flagellum of 12 articles. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body *c.* 2.5 × longer than wide; pereonite VI longest and widest. Coxal plates IV–VII (III?) large, distinct, with acute posterior angles; coxae extended to or slightly beyond posterior margins of their respective pereonites. Pereopod I dactylus subequal in length to propodus; propodus not expanded, with 1 small, acute, distal, spine (set among 1–2 setae) and 1 minute, proximal spine; carpus with 1 minute spine; merus with 3 blunt spines (2 large distal spines, 1 small proximal spine). Pereopod III similar to pereopod I. Pereopods IV–VII dactyls much shorter than propodi; ischium, merus and carpus with long acute spines on distal margin; ischium with short acute spines along inferior

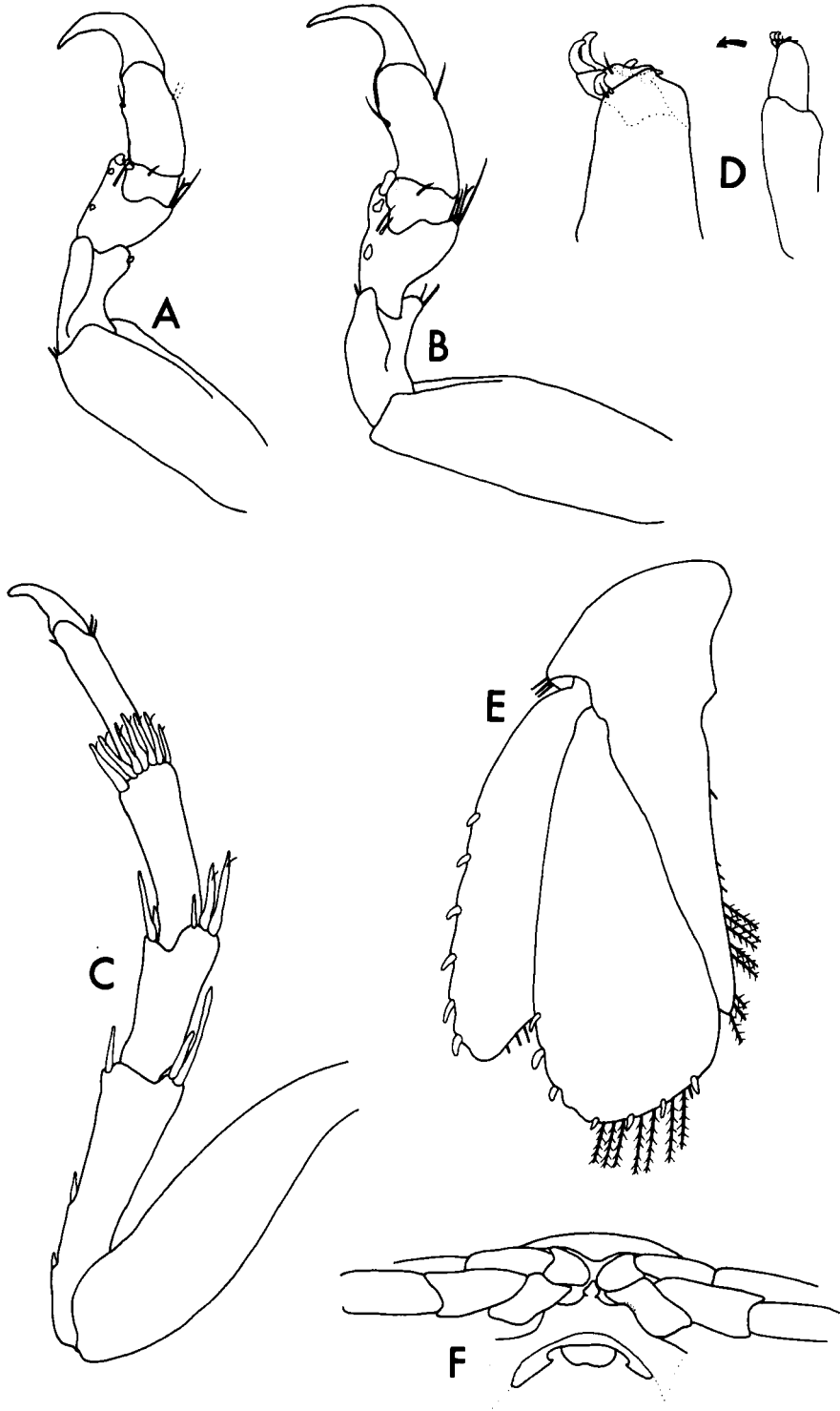


Figure 18. *Rocinela signata* (all Figs from lectotype). Pereopods (L): A, I; B, III; C, VII; D, maxilliped and detail; E, uropod; F, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

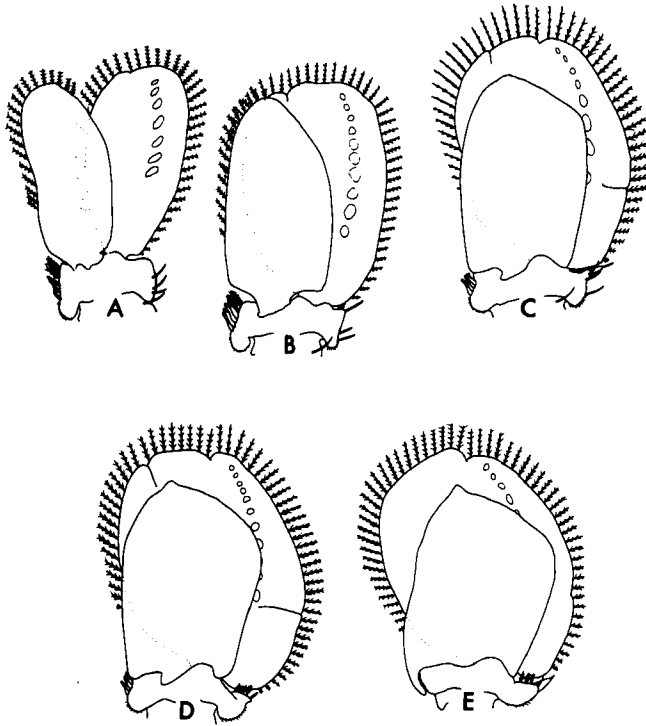


Figure 19. *Rocinela signata* (all Figs from lectotype). Pleopods (L): A, first; B, second; C, third; D, fourth; E, fifth.

margin, as figured for pereopod VII (although many specimens also have spines along the inferior margin of the carpus and propodus).

Pleon. Pleonites 2, 3, 4 subequal in length and width; pleonites 1 and 5 narrower than others; pleonite 1 partly covered by pereonite VII. Pleotelson narrower than pleonite 5, posterior margin acutely rounded. Pleotelson usually with "M"-shaped pigmented region, but in some specimens this may be absent or incomplete. Uropods extended slightly beyond pleotelson; inner angle of peduncle robust, longer than two-thirds length of endopod, with PMS on inner (medial) margin; endopod wide, subtriangular, subtruncate, longer than exopod; endopod with about 6–7 spines (4 terminal, 3 on distolateral border); exopod elongate-ovate, with about 6 lateral spines. Pleopods similar to those of *Rocinela murilloi*; peduncles 1–4 with 4–5 coupling spines.

Distribution. From Newport Bay, Los Angeles County, California south through Mexico (Baja California and throughout the Gulf of California), Costa Rica, Panama and the Gulf of Guayaquil, Ecuador. (Note: one of the variant specimens was found south of the Galapagos Islands.) The type material for this species is from the Caribbean and distributional records from the west Atlantic extend from Florida throughout the Gulf coast of the U. S., Mexico and Central American, and south to Brazil (see Bowman, 1977; Kensley & Schotte, 1989). Reported collection depths are from the intertidal zone to 68 m; most records are from the littoral and shallow sublittoral.

Remarks. The small size and variable pigmentation patterns of *Rocinela signata* have resulted in some confusion with this species in the literature. Menzies &

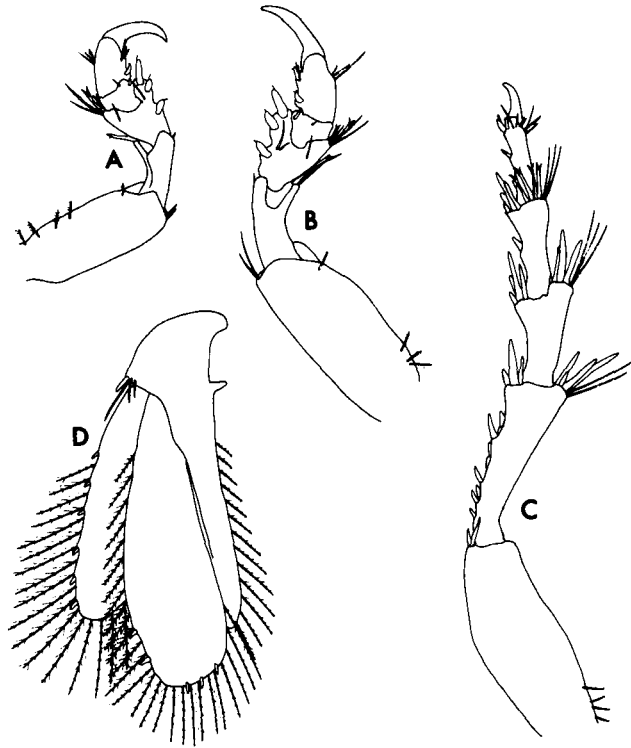


Figure 20. *Rocinela signata* "variant" specimen from Golfo Dulce, Costa Rica. Pereopods: A, I (R); B, III (L); C, VII (L); D, uropod.

Glynn (1968) (and see Bowman, 1977) synonymized *Rocinela aries* with *Rocinela signata* after finding specimens from a single locale with a range of pleotelson pigment patterns. Our observations also confirm the variable nature of the dorsal chromatophore pattern. Examination of the type material (lectotypes and paralectotypes) revealed that even these specimens were variable in their pigmentation pattern, with several specimens having no visible pigmentation at all. The latter may be a result of extreme contraction of chromatophores in the natural state or the result of a long period of preservation and bleaching. The type material we examined came from the Zoologisk Museum, Copenhagen. It is unclear from the labels who designated the material as lectotype and paralectotype specimens. Two of the labels (there are five vials, each with a label) are dated 10/11/1917, but this may refer to a reexamination date since the same labels also bear the dates 1863 and 66.

Unlike Richardson's (1905a) description of *Rocinela signata*, the propodi of pereopods I—III are not unarmed (note: in her description of *R. aries*, since synonymized with *R. signata*, Richardson described the propodi or pereopods II and III as having one spine). In our examination of more than 60 specimens we have found that there are actually two spines on the propodi of legs I—III. Dissected pereopods have a tendency to lie twisted in a dish (or slide) making it difficult to observe both the small distal spine and the minute proximal spine behind their associated setae.

Examination of specimens of this species also included seven specimens which varied in other characters, notably the propodi of pereopods I–III, the uropods and pereopod VII. These specimens are indicated by an asterisk(*) in the *Material examined* sections. However, they were collected within the known geographic range of *Rocinela signata* and are not sufficiently different to warrant separate taxonomic status. We note the differences here to illustrate the range of variability (Fig. 20): the spines on the propodi of pereopods I–III are large and easily visible; pereopod VII is more spinose on the medial and distal margins of the ischium, merus and carpus; the distal region of the ischium, merus and carpus is prominently flared; the uropods do not extend beyond the pleotelson; the endopod is not obliquely truncate, but more evenly rounded, with two lateral and three terminal spines; and the pleotelson is more acutely tapered.

Rocinela signata is the only eastern Pacific species in the genus to occur in the littoral and shallow subtidal region. It is commonly found under dead sand dollars and clam shells on tidal flats during low tides, and has been reported biting snorklers in the Caribbean (Garzon-Ferreira, 1990; Bowman, personal communication).

Rocinela tuberculosa Richardson, 1898

(Figs 3A, 5A, 21, 22)

Rocinela tuberculosa Richardson, 1898: 16; 1899a: 828; 1899b: 170; 1905a: 208.

Type material. *Rocinela tuberculosa*. Lectotype (herein designated), USNM 20652, female, "Albatross" Sta. 2828, 30 April 1888, Gulf of California, 18.3 m. Paralectotype, USNM 22711, 1 female (3.7 × 7.5 mm), "Albatross" Sta. 2824, 30 April 1888, Gulf of California, 24°22'30"N, 110°19'30"W, 14.6 m.

Other material examined. *LACM material:* Mexico, Gulf of California, Isla Carmen, Punta Perico, 1 mile WSW 25°57'N, 111°05'W, 20 m, "dredge coarse sand", 1 female (4.2 × 8.5 mm), R/V "Velero IV" Sta. No. 1759–49, 21 March 1949. Mexico, Gulf of California, E. of Isla San Marcos, 33 m, mud bottom, 1 female (3.1 × 9.2 mm), R/V "Velero III" Sta. No. 579–36, 14 March 1936.

Description. Cephalon: Cephalon only weakly subtriangular, much wider than long, width 3 × length; frontal margin broadly rounded. Eyes separated by greater than one eye-width. Frontal lamina wide, quasi-rectangular shaped. Antennular flagella 4-articulate. Antenna extends to anterior margin of pereonite 3; flagellum of 12 articles. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body 2 × longer than wide; pereonite VI longest and widest; posterior margins of pereonites with tubercles. Coxal plates II–VII visible in dorsal aspect, distinct, with acute posterior angles; all coxae extend beyond posterior border of their respective pereonites. Pereopod I dactylus relatively short, subequal to propodus; propodus barely expanded, with 2 proximal and 1 distal stout, recurved, acute spines; carpus with 1 spine; merus with 2 large blunt spines, distal spine the longer of the two. Pereopod III with 3 blunt spines on merus, otherwise as pereopod I. Pereopods IV–VII with short dactyls, much shorter than propodi; ischium, merus and carpus with long acute spines on distal margin; ischium, carpus and propodus with short acute spines along interior margin, as figured for pereopod VII.

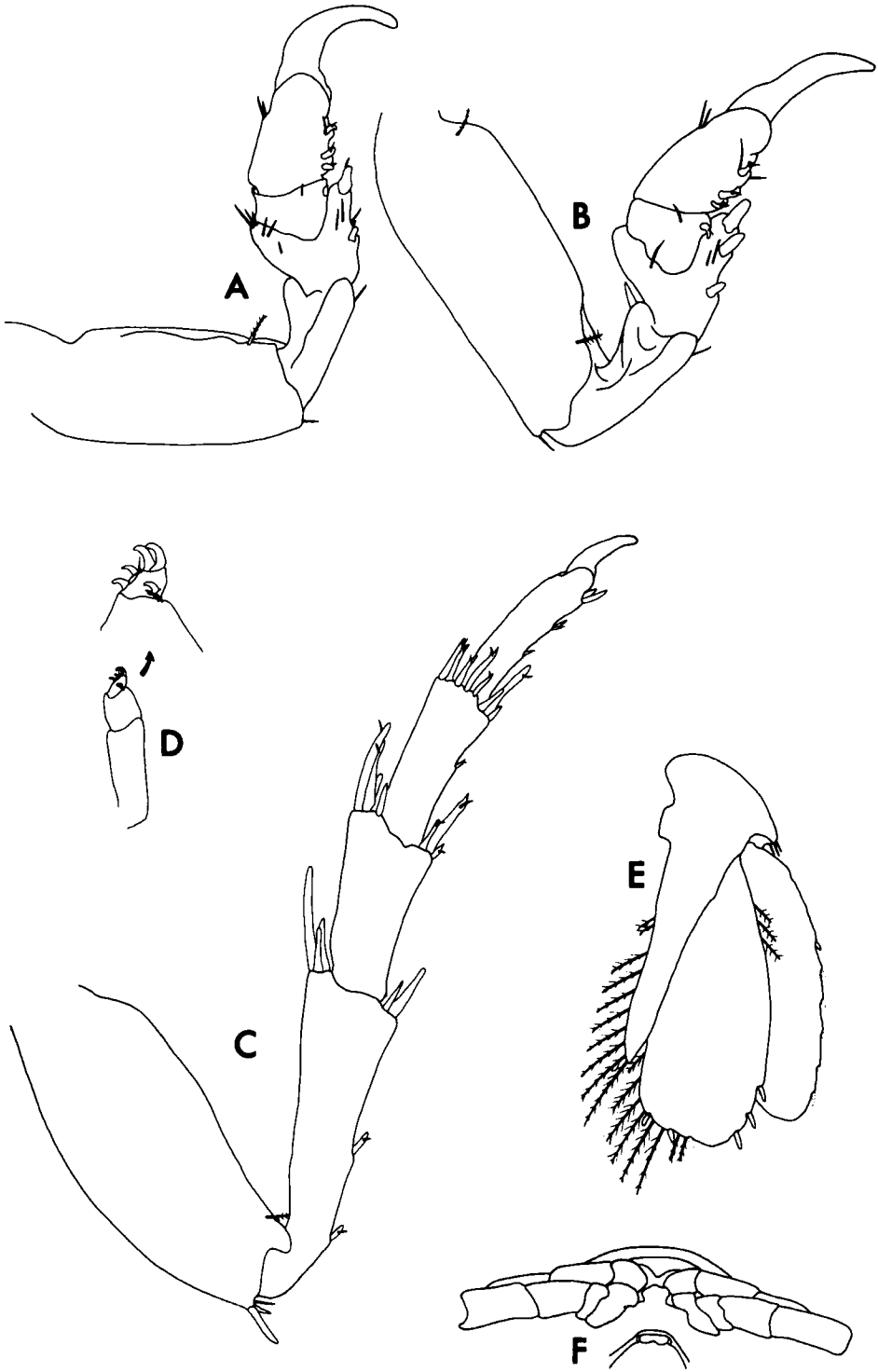


Figure 21. *Rocinela tuberculosa* (all Figs from lectotype). Pereopods (R): A, I; B, III; C, VII; D, maxilliped and detail; E, uropod; F, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

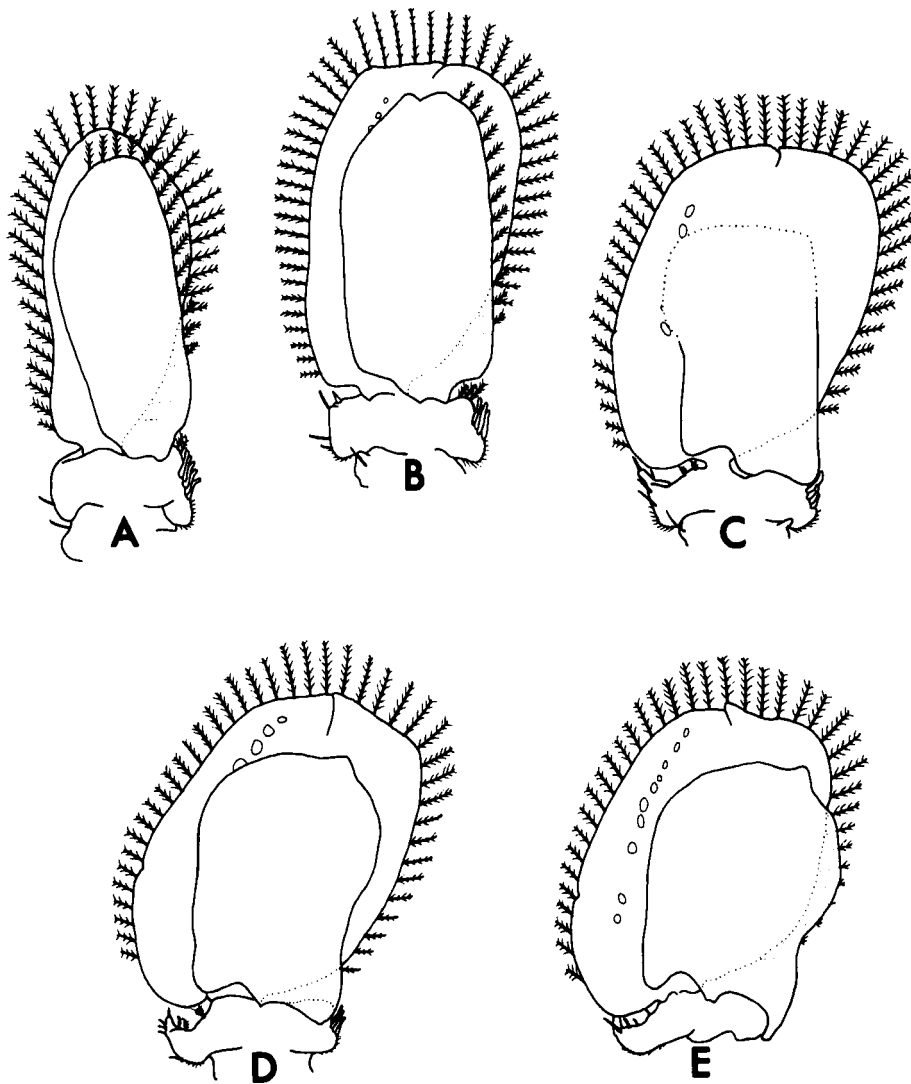


Figure 22. *Rocinela tuberculosa* (all Figs from lectotype). Pleopods (R): A, first; B, second; C, third; D, fourth; E, fifth.

Pleon. Pleonites 2, 3, 4 subequal in length and width; pleonites 1 and 5 narrower than others, pleonite 1 covered by pereonite VII. Pleotelson subequal in width to pleonite 5, posterior margin narrowly rounded. Uropods extended slightly beyond pleotelson; inner angle of peduncle extended about 70% length of endopod, with PMS on medial border; endopod wide, obliquely truncate, longer than exopod; endopod with 6 spines (3 terminal and 3 on distolateral border); exopod elongate-ovate, with 6–7 lateral spines. Pleopods similar to those of *Rocinela murilloi*; peduncles 1–4 with 4–5 coupling spines.

Distribution. Known only from the Gulf of California, Mexico, from 15–33 m depth.

Remarks. Richardson (1898) based this species on 2 female specimens taken by the "Albatross" expedition. Her original labels designated these as "Albatross"

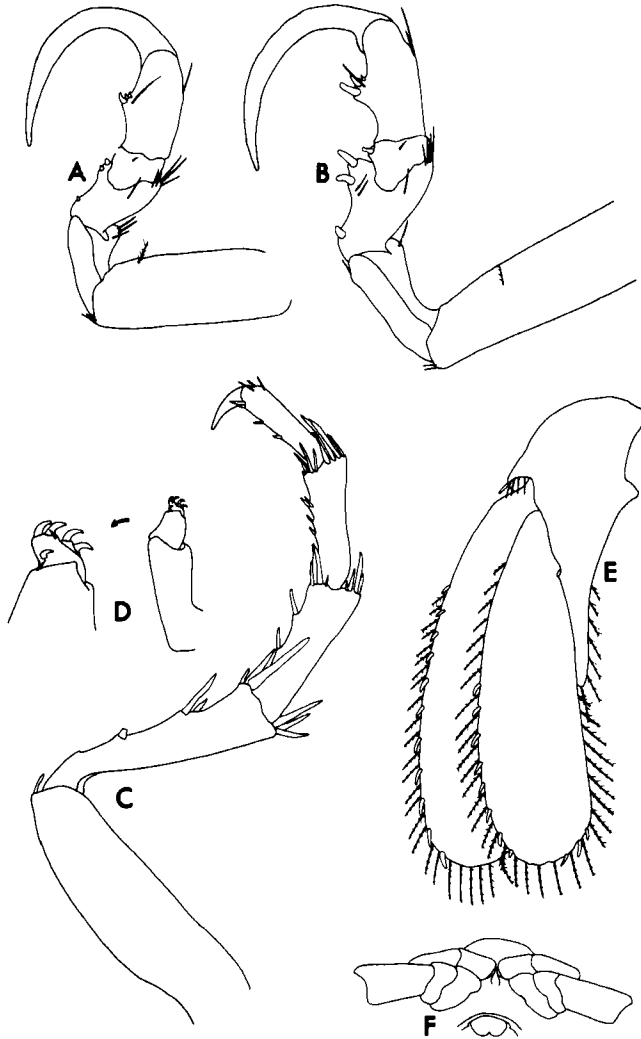


Figure 23. *Rocinela wetzeri* sp. nov. (all Figs from holotype). Pereopods (L): A, I; B, III; C, VII; D, maxilliped and detail; E, uropod; F, ventral view of frontal margin illustrating frontal lamina, clypeus and labrum.

Sta. Nos. 2824 (USNM Cat. No. 22711) and 2828 (USNM Cat. No. 20652). The published data appear to have confused these numbers. No holotype was designated. We herein select USNM Cat. No. 20652 as the lectotype and designate No. 22711 as the paralectotype.

Rocinela tuberculosa is a shallow-water species that is apparently endemic to the Gulf of California, Mexico.

***Rocinela wetzeri* sp. nov.**

(Figs 4B, 5L, 23, 24)

Type material. *Rocinela wetzeri*. Holotype: SIO Cat. No. C3846, female (23.2 mm × 61.9 mm), Galapagos Islands, James Island, about 13 km off James Bay, 2000 m, found on rear third of *Coryphaenoides* sp., 26 October 1970.

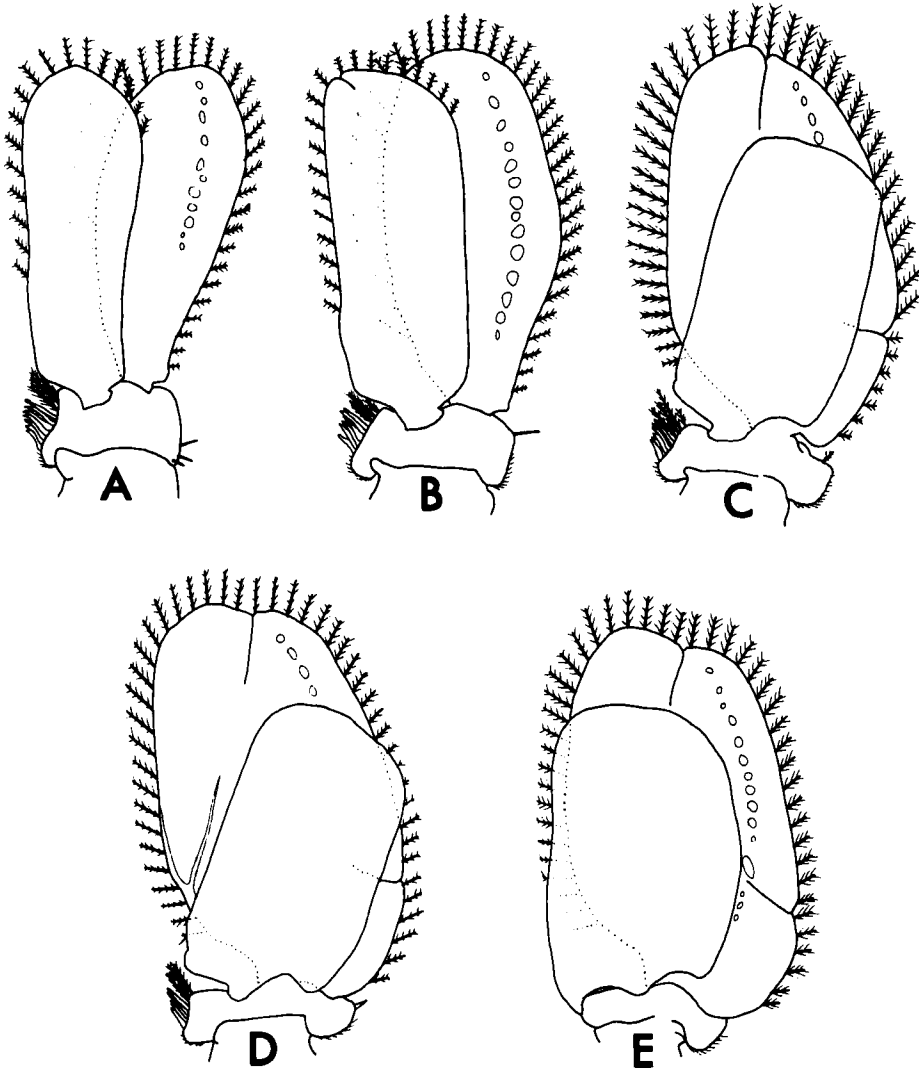


Figure 24. *Rocinela wetzeri* sp. nov. (all Figs from holotype). Pleopods (L): A, first; B, second; C, third; D, fourth; E, fifth.

Paratypes: SIO Cat. No. C1706, 2 postmancas (9.3 mm \times 24.9 mm, 8.6 mm \times 24.8 mm), Costa Rica, south of Pt. Guianes, 09°32.5'N 85°43.0'W to 09°36.7'N 85°40.5'W, 1157–1454 m, 10 foot Issac's-Kidd Midwater Trawl, Coll. C. Hubbs, S. Luke, R/V "Agassiz", 20 April 1973.

Description. Cephalon: Head 2.4 \times wider than long. Eyes large, separated by less than one-half an eye-width. Frontal margin produced anteriorly beyond antennae, subtruncate. Frontal lamina narrow, elongate, arrow-head shaped. Antennule flagellum 6-articulate. Antenna extended beyond midlength of pereonite II, flagellum of 20 articles. Mouthparts similar to those of *Rocinela murilloi*.

Pereon. Body about 2.7 \times longer than wide; pereonite V longest and widest; coxae II–VII visible in dorsal aspect, posterolateral corners rounded, VI–VII

extended beyond posterior margin of associated pereonite. Pereopod I dactylus broadly arched, longer than propodus and carpus combined; propodus with slight expansion at midlength, with 3 spines (distalmost smaller than other 2); carpus with 1 spine; merus with 3 blunt spines (2 distal, 1 proximal), distal superior fringe of setae lacking bifurcate setae. Pereopod III same as pereopod I. Pereopods IV–VII with dactyls much shorter than propodi; ischium, merus and carpus with fringe of long acute spines on distal margin; ischium, merus, carpus and propodus with acute spines along inferior margin, as figured for pereopod VII.

Pleon. Pleonites 2–4 subequal in width and length; pleonite 1 not covered by pereonite VII; pleonite 5 about as wide as pleonite 1. Pleotelson narrower than pleonite 5, tapering to rounded terminal margin. Uropods extended slightly beyond pleotelson; inner angle of peduncle extended less than 50% length of endopod; endopod elongate-ovate, narrower and slightly shorter than exopod; endopod with 8 lateral spines and about 5 terminal spines; exopod *c.* 1.5 × broader than endopod, with 11 lateral spines. Pleopodal peduncles 1–4 with 6–7 coupling spines; exopods 3–5 with apical and lateral notches; pleopods otherwise similar to those of *Rocinela murilloi*.

Distribution. Known only from the Galapagos Islands (2000 m) and mainland Costa Rica (1157–1454 m).

Remarks. *Rocinela wetzeri* sp. nov. is currently known only from one adult female specimen (from James Island, Galapagos) and two postmanecas (from Costa Rica).

Etymology. We are pleased to name this species in honour of our colleague Regina Wetzer, whose devotion to detail and tireless enthusiasm has benefited both our daily lives and the field of isopod systematics.

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