CONTRIBUTIONS IN SCIENCE


Regina Wetzer, Paul M. Delaney, and Richard C. Brusca

A NEW ISOPOD CRUSTACEAN FROM PACIFIC PANAMA, EXCIROLANA CHAMENSIS NEW SPECIES (ISOPODA: FLABELLIFERA: CIROLANIDAE)

Richard C. Brusca and James R. Weinberg
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ABSTRACT. Politolana wickstenae, a new species of cirolanid isopod inhabiting the continental slope (488–600 m) in the northern Gulf of Mexico is described and figured. The genus now contains 7 species, and is restricted to the north and south Atlantic Ocean. The genus Politolana is redescribed, and a key to 6 genera of Bruce’s (1986) “Conilera genus-group” is presented (Conilera, Orphelana, Politolana, Dolicholana, Conilorpheus, Natatolana). Oncilorpheus is herein removed from this group.

INTRODUCTION

In 1985 M.K. Wicksten of Texas A&M University began a deep-water sampling program utilizing baited traps placed at depths of 400–800 m in the Gulf of Mexico. Wicksten was interested in recovering live specimens of large benthonic crustaceans, particularly crabs and the giant cirolanid isopod Bathynomus giganteus. Along with these crustaceans, her traps also captured numerous specimens of the new isopod described in this paper. This new species belongs to a genus-group of Cirolanidae informally recognized by Bruce (1986) and Botosaneanu et al. (1986), and closely corresponding to the “Conilera-group” of Monod (1930). According to Bruce (1986), this genus-group contains 7 genera: Politolana Bruce, 1981; Conilera Leach, 1818; Conilorpheus Stebbing, 1905; Dolicholana Bruce, 1986; Natatolana Bruce, 1981; Oncilorpheus Paul and Menzies, 1971; and Orphelana Bruce, 1981 (Bruce, 1986). Bruce characterized this genus-group by the following features: antennal peduncle articles 3 and 4 subequal in length; pereopod dactyls without a secondary unguis; anterodistal margins of ischium and merus of pereopods I–III produced; abundant long setae on posterior pereopods; no ornamentation on body somites; and frontal lamina usually flat and narrow.

In keeping with terminology currently used in cirolanid systematics, we use the terms “seta/setae” to refer to long, thin, flexible, often ornamented (plumose, etc.), articulated, cuticular processes; and the term “spine” to refer to stout, robust, rigid, unornamented, articulated, cuticular processes. The following abbreviations are used in this paper: LACM, Los Angeles County Museum of Natural History, Los Angeles, CA; USNM, National Museum of Natural History, Washington, D.C.; SAFM, The South African Museum, Cape Town, South Africa; ZMC, Zoologisk Museum, Copenhagen, Denmark; MCZ, Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts; BMNH, British Museum (Natural History), London, England; PMS, plumose marginal setae.

SYSTEMATICS

Order Isopoda
Suborder Flabellifera
Family Cirolanidae

Politolana Bruce, 1981

Type Species. Aega polita Stimpson, 1853 (by designation; Bruce, 1981).

Diagnosis. Cirolanidae with short antennules and antennae and large, smooth (unornamented) bodies, 2–6.5 times longer than broad. Eyes often reduced. Pereonite I usually about twice length of pereonite II. Antennule short, peduncle of 4 articles, article 3 longest, article 4 minute. Antenna short, peduncle of 5 articles, articles 1–2 short, 3–5 manifestly longer than 1–2 and progressively longer distally. Frontal lamina usually long and narrow, 2–3 times longer than broad; sessile; clypeus flat. Mouthparts similar to Cirolana. Pereopods I–III “ambulatory.” Pereopods I–III ischium and merus produced anterodistally; with long spines and setae. Pereopods IV–VII “natautory”; ischium and merus flattened and broadening distally; all articles generally with long setae. Pleon of 5 free somites, plus pleotelson; pleonite 5 with lateral margins overlapped by 4. Pleotelson and uropods with marginal spines.

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1. Invertebrate Zoology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007.
and PMS; uropod peduncle strongly produced medially; lateral (outer) margin of endopod with distal notch; exopod fails to reach endopodal notch, or extends beyond endopodal notch; endopod much broader than exopod. Pleopod rami all with PMS except endopod of pleopod 5; pleopod 1 peduncle about as long as broad; pleopod 1 endopod half as wide as exopod; pleopod 2 of male with appendix masculina arising subbasally and extended slightly past apex of endopod (appendix masculina arises submedially in *P. exima*, Bruce, *in litt.*).

**Remarks.** Bruce’s (1981) original description of *Politolana* did not include a description of the type species. We have examined types of *P. obtusispina* (Kensley, 1975) (holotype and paratypes), *P. exima* (Hansen, 1890) (syntypes), and *P. impressa* (syntypes), as well as nontype material of *P. concharum* (Stimpson, 1853), *P. polita* (Stimpson, 1853), and *P. microphalma* (Hoek, 1882). The emended diagnosis presented above is based on our examination of this material. In addition, we note the following. Bruce stated that antennal peduncle articles 3–5 are subequal, but judging from his figures, and our examination of specimens, descriptions, and figures of species in this genus, articles 3–5 are progressively longer. Bruce described the peduncle of pleopod 1 as being “as long as broad.” However, some variation in this ratio occurs, and in *P. wicksteniae* new species the peduncle is slightly wider than long (width = about 1.14 times length). In all cases though, the shape is basically squarish, as opposed to the rectangular shape (width much greater than length) of this article in most cirolanid genera. Bruce described the body as 2–3 times as long as broad, but the type species is about 4 times longer than broad, and *P. wicksteniae* is 6–6.5 times longer than broad. Bruce noted that peronite I is half as long as peronite II in this genus. This was surely a simple *lapsus*, as the opposite is actually the case.

Bruce (1981) discussed similarities of *Politolana* to other genera in the “*Conilera* genus-group.” Whether or not the “*Conilera* genus-group” (*sensu* Bruce, 1986) is a natural (monophyletic) group remains to be tested by phylogenetic analysis of the Cirolanidae, a large family containing approximately 45 genera and about 300 species. In any case, *Oncilorpheus* should not be considered part of the “*Conilera* genus-group,” since it lacks almost all the characters listed by Bruce that define the group (e.g., the ischium of pleopods I–III is not produced on the anterodistal margin, abundant long setae are not present on the posterior pleopods, the frontal lamina is not narrow). Bruce’s placement of *Oncilorpheus* in the “*Conilera*-group” was based solely on a review of the literature (Bruce, *in litt.*). The frontal laminae of *Orphelana*, *Dolicolhana*, and *Conilorpheus* also do not fit Bruce’s genus-group diagnosis; in *Orphelana* the lamina is short and triangular, and in the other two genera it is somewhat projecting (see following key). *Natatalona* and *Politolana* may be paraphyletic genera, because they seem to have no clearly unique synapomorphies that distinguish them.

Most species in the “*Conilera* genus-group” have flattened pereopodal articles, and in many cases these articles bear long setae, especially on pereopods V–VII. Such pereopods are typically referred to in the literature as “natatory legs.” However, in many cases it appears that flattening of the leg articles is associated with the development of a concave inner surface, allowing the adjacent distal article to collapse into the more proximal article(s) in a jackknife-like fashion. This arrangement suggests that the pereopods may be folded tightly against the body, perhaps for streamlining when the animal swims.

**Key to the Genera of the “*Conilera* Genus-Group.”**

1a. Uropod endopod with notch on lateral (outer) margin; pleopod VII basis without median longitudinal row of setae along outer surface ........................................... 2

1b. Uropod endopod without notch on lateral (outer) margin (except *Natatalona variguberna*); pleopod VII basis with or without row of setae along outer surface ......................... 4

2a. Pleopods 1 operculate to all others; pleopod 1 peduncle markedly longer than wide; labrum wider than clypeus ................................................................. *Conilera*

2b. Pleopods 1 not operculate to others; pleopod 1 peduncle width subequal to length; clypeus as wide or wider than labrum ........................................................................... 3

3a. Antennule flagellum shorter than peduncle; frontal lamina small, short, and triangular; body length 2.5–3.0 times width ............................................................... *Orphelana*

3b. Antennule flagellum longer than peduncle; frontal lamina long and narrow; body length 2.0–6.5 times width ......................................................................................... *Politolana*

4a. Endopods of pleopods 3 and 4 without PMS; frontal lamina projects posteroventrally; antennule peduncle article 4 longest .................................................. *Dolicolhana*

4b. Endopods of pleopods 3 and 4 with PMS; frontal lamina not projecting posteroventrally; antennule peduncle article 3 longest, article 4 minute, often partly fused .................................................. 5

5a. Peduncle of pleopod 1 width equal to length; frontal lamina projects anteriorly, wide, and multidentate; pereopods V–VII without median longitudinal row of long setae along outer face, and without cluster of long setae on posterodistal margin ...................................... *Conilorpheus*

5b. Peduncle of pleopod 1 wider than long; frontal lamina flat, not projecting, narrow, and not multidentate; pereopods V–VII basis with median longitudinal row of long setae along outer face, and with cluster of long setae on posterodistal margin ........................................... *Natatalona*

**Politolana wicksteniae** new species

**Material Examined.** *Holotype* (LACM type No. 3008): Nongravid female 24.75 mm long, NE Gulf of Mexico, 28°22.89'N, 86°14'W, approx. 488 m, 17 May 1985, R/V *Citation*, Coll. M.K. Wicksten & B. Cocke, baited bottom trap. *Paratypes* (LACM type No. 3009): 3 nongravid females, 24.26 mm, 26.07 mm, and 26.57 mm, same collection data as holotype. *Paratypes* (LACM type No. 3010): 2 nongravid females 27.89 mm and 30.53 mm long, NW Gulf of Mexico, May 1985, R/V *Citation*, Coll. M.K. Wicksten. *Paratypes* (LACM type No. 3011): 3 nongravid females 25.41 mm, 27.23 mm, and 27.38 mm, NE Gulf of Mexico, 28°22.89'N,
86°25.20'W, 500–600 m, June 1985, R/V Citation, Coll. M.K. Wicksten and B. Cocke, baited bottom trap. Paratype: 1 nongravid female, 32.67 mm, deposited USNM, same data as LACM 3011. Paratypes: (LACM type No. 3012) 32 females, 2 males (15.80 mm, 18.20 mm), "same general area" as LACM 3011, September, 1986, R/V Citation, Coll. M.K. Wicksten and B. Cocke, baited bottom trap (specimens in poor condition).

**Comparative Material Examined.** Cirolana (=Politolana) obtusispina: 2 paratypes, SAfM. Cirolana (=Politolana) exigua: 2 syntypes, ZMC; 4 nontype specimens, USNM. Cirolana (=Politolana) impressa: 4 syntypes, MCZ; 1 nontype specimen, MCZ; 2 nontype specimens, USNM. Politolana concharum: 27 nontype specimens, MCZ; 2 nontype specimens, BMNH; 18 nontype specimens, USNM. Politolana polita: 22 nontype specimens, MCZ; 7 nontype specimens, USNM.

**Key Diagnostic Characters.** Large, length to at least 32.7 mm; body 6–6.5 times longer than broad. Eyes greatly reduced, with or without remnants of cuticular ommatidial facets. Frontal lamina 3–4 times longer than broad, constricted medially, in dorsal view not extended anteriorly beyond basal articles of antennules. Clypeus short and broad, 5–6 times wider than long, wider than labrum. Labrum posterior margin markedly concave. Antennules not reaching posterior margin of cephalon. Antennae not quite reaching posterior margin of pereonite I. Coxal plates not visible in dorsal aspect, but large and distinct in lateral and ventral aspects, III–VII extended beyond posterior margins of their respective segments. Pereopods I–III ischium and merus inner distal margins produced as a scoop-shaped process into which adjacent distal articles collapse. Pleonite I entirely covered by pereonite VII. Pleopod 5 endopod of female with large proximal accessory lobe. Pleotelson and uropods with marginal spines and PMS, as figured. Uropod peduncle produced medially, but process shorter than exopod; exopod does not reach endopodal notch; marginal notch of endopod with 1 spine and 1 circumplumose seta; exopod subovate, with 1 large apical spine, 2 spines on inner (medial) margin, and 1 spine on outer (lateral) margin; endopod with 8 apical spines and several blunt outer (lateral) spines near notch. Male appendix masculina arising sub-basally, tapering evenly to the apex.

**Description.** Body elongate, smooth, 6–6.5 times as long as wide. Large, females to at least 32.7 mm, males to at least 18.2 mm in length. Eyes reduced; some specimens with remnants of ommatidia and cuticular facets, others without discrete ommatidia or facets and only with scattered subcuticular pigmentation. Faint suture line on dorsal surface of cephalon between frontal margin and eyes (Figure 1).

Frontal lamina 3–4 times longer than broad, constricted medially, barely visible dorsally, projecting between basal articles of antennules but not extended beyond them; clypeus short and very broad, 5–6 times wider than long; labrum broad but narrower than, and weakly immersed in, clypeus, markedly concave on posterior margin (Figures 3c, 5a–c). Antennules and antennae both separated by frontal lamina.

**Figure 1.** Dorsal view of female holotype (LACM type No. 3008) (setules of PMS on pleotelson and uropods omitted).
Figure 2.  a, maxilliped.  b, maxillule.  c, right mandible.  d, maxilla.  e, pereopod I.  f, pereopod VII.  g, pereopod IV (all from holotype).
Figure 3.  a, antennule.  b, antenna.  c, frontal lamina, clypeus, and labrum.  d, pleopod 1.  e, pleopod 2.  f, pleopod 3.  g, pleopod 4.  h, pleopod 5.  i, pleopod 2 (male) (a–h from holotype (female); i from male paratype, LACM type No. 3012).
circumplumose spines and 0–1 smaller spines (Figures 2b, 7d). Maxilla with simple and plumose setae (Figures 2d, 7f), as figured. Maxilliped slender; basis elongate, palp 5-articulate, all articles with long setae; endite short with 2 small coupling hooks (Figures 2a, 7a, c).

Pereonites IV–VII considerably longer than pereonites II and III; pereonite VII about 2½ times longer than pereonite II. Coxal plates large and compact on pereonites II–VII, not visible in dorsal aspect but distinct and visible in lateral and ventral aspects; coxae increasing in size and acuteness posteriorly, III–VII extending beyond posterior margins of their respective pereonites. Pereopods I–III with abundant long setae, simple and bifid spines; basis concave on medial (inner) margin, receiving ischiium; ischiium and merus with scooped-shaped distal processes into which adjacent distal articles collapse; carpus very short; dactylus slightly curved (Figures 2c, 7e). Basis of pereopods V–VII somewhat concave on medial (inner) margin (as in I–III); with abundant setae of various sizes; dactylus slightly curved (Figures 2f, g).

Pleon comprising 5 free pleonites plus pleotelson, devoid of tubercles and setae. Pleonite 1 completely overlapped by pereonite VII; 1 and 5 narrower than 2–4. Pleotelson with abundant PMS and a few scattered, minute, spines on margin; number of marginal spines uncertain as most are lost in preserved specimens. Uropodal endopod and exopod with PMS and spines as figured (Figure 4); peduncle produced medially but failing to reach apex of exopod; endopod reaching, or barely exceeding pleotelson apex; exopod short, not reaching notch of endopod; exopod slender subovate, never as broad as endopod; lateral (outer) margin of endopod with distal notch containing 1 spine and 1 circumplumose seta; endopod with 8 apical/subapical spines and several blunt outer (lateral) spines near notch; exopod with 1 large apical spine, 2 spines on inner (medial) margin, and 1 spine on outer (lateral) margin (uropod setae and spines are easily lost in preserved specimens).

Pleopodal rami undivided (Figures 3d–i). Pleopods 1–4 with 4–6 coupling spines on medial margin of peduncle; pleopod 5 without coupling spines, and with proximal accessory lobe on endopod in female; 2–4 with small lobe on medial and lateral margin of peduncle. Male appendix masculina on pleopod 2 arising sub-basally, long and slender, tapering evenly and extending slightly past endopod apex (Figure 3i); penes separate, flattened, long (about as long as ischiium or merus of pereopod VII).

Remarks. Of the 44 specimens in the type series, only 2 are males, and these are markedly smaller than all remaining females in the type series. These data suggest the possibility of protandry in this species.

There are now 7 described species of Poliliana. All are offshore benthic creatures taken from depths of 35–640 m. At least 1 (P. concharum) has been taken in the water column, indicating that it is capable of swimming. Interestingly, none occur outside the Atlantic Ocean. All previously described North American species have been reported only from the New England coast. The genus now includes: P. wickstenae new species, northern Gulf of Mexico; P. polita (Stimpson, 1853), NW Atlantic (Bay of Fundy to Massachusetts); P.
concharum (Stimpson, 1853), NW Atlantic (Nova Scotia to South Carolina); P. impressa (Harger, 1883), NW Atlantic (Maryland to New Jersey); P. eximia (Hansen, 1890), Brazil; P. microphthalmia (Hoek, 1882), Europe; and P. obtusispina (Kensley, 1975), South Africa. As Bruce (1981) pointed out, species in this genus are all very similar to one another. None of the 6 previously described species has been adequately diagnosed or figured, and types were not designated for any but Kensley's South African P. obtusispina. The type species (P. polita) has never been properly described. When Stimpson (1853) erected P. concharum he did not actually describe it, but simply compared it as an addendum to his description of P. polita. The best available descriptions of the 3 previously described North American species are those of Harger (1883), although it is not clear whether Harger utilized type material in his study. Richardson (1905) and Kussakin (1979) apparently based their interpretations of these species on Harger's descriptions. There have been no subsequent studies of the North American Politolana. Two of us (RCB & RW) are currently undertaking a phylogenetic and biogeographic study of this genus.

Politolana wickstenae is easily differentiated from all other known species of Politolana by its short ovate uropodal exopods, which fail to reach the endopodal notch, the uniformly slender appendix masculina of males, the evenly convex pleotelson margin, the compactness of the coxae (not visible in dorsal aspect), and the unique spination of the legs and uropods. Politolana wickstenae closely resembles P. polita and P. impressa. However, these species differ in shape, setation, and spination of the leg articles, pleotelson, and uropod spination, and the relative length and shape of the uropodal lamellae (see Harger, 1883 for comparisons). The uropods of P. polita and P. impressa differ from those of P. wickstenae in having long, narrow, scimitar-like exopods that are about the same length as the inner process of the peduncle, extending at least to or beyond the endopodal notch. In P. wickstenae the exopod is sub-acute ovate and shorter, and never extends to the endopodal notch. Other, more subtle differences exist between these species, such as: the body of P. polita is more robust and deeper (in dorsoventral plane) than that of P. wickstenae; the frontal lamina of P. polita is extremely narrow, but manifestly expanded at its anterior end; the proximal articles of the antennule peduncles of P. polita are so close together as to be touching each other (this close approximation is rare in P. wickstenae); and the lateral (outer) lobe of the peduncle of pleopods 2–4 is large in P. impressa, markedly expanded distally (in P. wickstenae this lobe is small, and primarily expanded proximally).
Etymology. *Politolina wickstenae* is named for M.K. Wicksten, crustacean biologist and professor of marine biology at Texas A&M University who, along with B. Cocke, collected the type material of this species.

Distribution. Gulf of Mexico; so far known only from the vicinity of 28°N, 86°W.

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Figure 7. Scanning electron micrographs of female paratype (LACM type No. 3011). a, maxilliped (50×). b, maxillule, lateral lobe (100×). c, coupling hooks on maxilliped endite (500×). d, maxillule, medial lobe (200×). e, pereopod I, distal articles (50×). f, maxilla (100×).


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A NEW ISOPOD CRUSTACEAN FROM PACIFIC PANAMA,
EXCIROLANA CHAMENSIS NEW SPECIES
(ISOPODA: FLABELLIFERA: CIROLANIDAE)

Richard C. Brusca¹ and James R. Weinberg²

ABSTRACT. A new species of cirolanid isopod is described, Excirolana chamensis new species, with remarks on its distribution and ecology. Excirolana chamensis is currently known only from the littoral zone of Pacific Panama. This brings the number of nominate Excirolana species in the eastern Pacific to 10. Excirolana chamensis is sympatic with the widespread E. braziliensis, and several additional undescribed species in this genus. Excirolana chamensis is a small species (length 2.4–4.3 mm), that can be quickly distinguished from the similar E. braziliensis by its 2-articulate mandibular palp and large stellate chromatophores, as well as other characters.

INTRODUCTION

The genus Excirolana Richardson, 1912, contains 17 recognized species, nine of which have been reported from the east Pacific: E. chiltoni (Richardson, 1905) and E. linguifrons (Richardson, 1905) from the temperate northeast Pacific; E. chilenis Richardson, 1912, E. hirsuticauda Menzies, 1962, and E. monodi Carvacho, 1977, from Chile; E. braziliensis Richardson, 1912, and E. mayana (Ives, 1891) from the tropical west Atlantic and tropical east Pacific; and E. koepckei (Bott, 1954) and E. salvadorensis (Schuster, 1954), endemic to the tropical east Pacific. Since the turn of the century, the status of many of these species has been confused, and numerous synonyms and homonyms exist in the literature. The status of E. koepckei and E. salvadorensis, which were synonymized with E. braziliensis by Glynn et al. (1975), is currently being reinvestigated, and several additional undescribed Excirolana species are known to exist in the east Pacific. The east Pacific Excirolana are currently being monographed by R. Brusca, thus the above species will not be discussed in the present paper. We are concerned here only with E. chamensis new species, a species very similar in appearance to, and sympatic in the east Pacific with, E. braziliensis. A fair amount of ecological research has already been accomplished based on the assumption that there is only one species of Excirolana (E. braziliensis) occurring on tropical east Pacific sand beaches (Dexter, 1972, 1974, 1976, 1977, 1979; Glynn et al., 1975). All comparisons to E. braziliensis noted below are based on examination of the holotype of E. braziliensis (USNM Cat. No. 43655, off Cape St. Roque, Brazil) as well as additional collections of this species from the Caribbean and east Pacific. The following abbreviations are used in this paper: PMS, plumose marginal setae; LACM, Los Angeles County Museum of Natural History; USNM, U.S. National Museum of Natural History, Smithsonian Institution.

SYSTEMATICS

Order Isopoda
Suborder Flabellifera
Family Cirolanidae

Excirolana chamensis new species

Material Examined. Holotype (LACM type No. 3013): Panama, near Panama City, polluted beach near old part of town by National Theater; 15 Dec. 1984; coll.: J. Weinberg; male, length 4.3 mm. Paratype (LACM type No. 3014): same locality and collection as holotype; 1 male, head broken from body. Paratypes (LACM type No. 3015): Panama, near Panama City, Pt. Chame Bay; fine sand beach; 25 Sept. 1984; coll.: J. Weinberg; 5 adults (lengths 2.4–2.6 mm), 3 mancas (length 1.7 mm each). USNM Acc. No. 365596: Panama, near Panama City, Pt. Chame Bay; upper intertidal, fine sand beach; coll.: J. Weinberg; 5 adults (lengths 3.1–3.6 mm), 2 mancas (lengths 1.6–2.3 mm).

Type Locality. Pacific Panama, near Panama City, Pt. Chame Bay.

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1. Invertebrate Zoology Section, Natural History Museum of Los Angeles County, 900 Exposition Boulevard, Los Angeles, California 90007.
2. Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543.
Diagnosis. Dorsal surface ornately pigmented with stellate chromatophores, occurring in band between eyes on cephalon, in median row on pereon, and in lateral rows on pleon. Eyes small, interocular distance greater than width of one eye. Antennules longer than antennae; antennule peduncle 2-articulate because articles 1 and 2 are fused; article 3 small, not much larger than first flagellar article. Antenna peduncle 4-articulate, articles 1–3 subequal, article 4 longest. Mandible with 2-articulate palp. Maxilliped with single coupling hook. Pereopods with acute spines along inner margin and acute dactyls (never with blunt or truncated spines or dactyls); pereopod I ischium with several stout spines. Pereopod VII ischium without lateral spines. Pleonite I not hidden by peraeonite VII. Pleopod 5 endopod fully divided. Pleotelson posterior border round, without marginal spines. Uropod exopod nearly twice as long as endopod, with 6 long, thin, simple,
apical spines, 2 large medial spines, and numerous very short medial spines or denticles; with plumose setae on medial margin and apex. Uropod endopod extended barely to posterior margin of pleotelson; with 3 distomedial spines, and plumose setae along distal inner and outer margins. Flat surfaces of both uropodal rami covered with very fine setae. Appendices masculinae of males arise off proximal lamellar lobe of endopod, 1/3 distance up base; stout and short, not reaching apex of endopod. Adults 2.4–4.3 mm long (front of cephalon to posterior most tip of pleotelson).

**Description.** Body smooth and evenly convex. Cephalon with a band of medial chromatophores between eyes, usually discernable as 3 distinct, separate bands; 2 states of cephalic chromatophore pigment dispersion occur in the type series, state 1 being a less dispersed state (Figure 1), and state 2 being a more dispersed state appearing to the naked eye almost as a black band across the head (Figure 1, inset). J. Weinberg has seen intermediate forms between these two extremes. Eyes small, width much less than interocular distance.

Antennules long, extending to pereonite V; peduncle 2-articulate, because articles 1 and 2 are fused; article 3 not much larger than first article of flagellum; flagellum of 7–12 (6 in mncas) articles. Antennae shorter, extending to pereonite IV; peduncle 4-articulate, articles 1, 2, and 3 subequal, 4 longest; articles 2 and 3 with small denticles or spinules
on inner margin; article 4 inner margin toothed and bearing simple setae; flagellum of 9–11 articles (8 in mancas). Although the antennules are always longer than the antennae, both tend to have the same number of flagellar articles on any given individual. Mandible with 4-cusped incisor, with 2 distolateral horns; inner cusp of left mandible markedly elongate; palp 2-articulate, distal article with 2 lateral setae and 2 long apical setae; lacinia and molar process well developed; molar process not extended much beyond apex of inner tooth of incisor. Maxillule inner lobe with 3 stout plumose setae and 1 short simple seta; outer lobe with about 10 stout setae and 1 slender seta. Maxilla inner lobe with 3 plumose setae and about 9 simple setae; bifurcate outer lobe with comb spines as figured. Maxilliped with 5-articulate palp, each article with simple setae; endite short, extending to middle of second palp article and bearing a single stout coupling hook.

Pereonite I longest, II–VII subequal in length, widest at IV–V; median row of stellate chromatophores on pereonites I–VII (chromatophores always present on pereonites VI–VII, usually present on IV–VII, occasionally present on I–III); chromatophores usually increasing in density posteriorly;
coxal plates not visible in dorsal aspect. Pereopods all with acute dactyls and spines, never with blunt or stout truncate spines or dactyls. All pereopods with spines on inner margin of ischium through propodus, as figured. Pereopod VII ischium inner margin distinctly notched but with long setae only (no spines).

Pleonites subequal in width and length; all pleonites with lateral chromatophores, as figured. Submedian depressions on pleotelson distinct; chromatophores encircle depression, and occur centrally within it. Posterior border of pleotelson round, but with minute, barely discernable, truncate apical region, crenulate, and bearing long PMS. Uropodal endopod extended barely to pleotelson margin; exopod nearly twice length of endopod; both rami covered with minute setae; peduncle barely expanded on inner margin and with PMS, but with 3–5 stout spines on outer distal margin. Uropodal exopod with about 6 simple, thin, apical spines, 2 large medio-distal spines, and numerous minute spines or denticles along medial margin; PMS on inner margin. Uropodal endopod with 3 stout medial spines, and PMS as figured; lateral margin with a distinct pit. Pleopods 1–4 with coupling hooks; 1–3 with PMS on inner margin of peduncle; 3–5 with naked endopods; 1 with very narrow endopod; 5 with fully divided endopod. Appendix masculinum of male arises from proximal lamellar lobe of endopod, ½ distance from base; stout and short, not reaching apex of endopod.

**Taxonomic Remarks.** *Excirolana chamensis* is a small species. Specimens of the type series range from 2.4 to 4.3 mm in total length; mancas range from 1.6 to 2.3 mm in length. *Excirolana chamensis* superficially resembles *E. braziliensis*, but can quickly be differentiated by its 2-articulate mandibular palp (3-articulate in *E. braziliensis*), fully divided endopod on pleopod 5 (not fully divided in *E. braziliensis*), acute spines on all pereopods, small eyes, and distinct uropods on which the exopod bears a cluster of 6 fragile simple setae and 2 stout inner marginal setae. All specimens of *E. chamensis* we have examined have the distinct, large, stellate chromatophore pattern shown in Figure 1, which also quickly distinguishes this species from *E. braziliensis*, which has indistinct, punctate, or minute stellate chromatophores. We caution workers against relying on this character alone because it is possible that the chromatophores also occur in the punctate state in *E. chamensis* (although we have never observed such a case). J. Weinberg has preliminary (unpublished) data from the Chame Bay locality, indicating that the 2 cephalic chromatophore patterns shown in Figure 1 each occur in about 25% of the individuals, while intermediates comprise about 50% of the population. Other, more subtle characters that serve to differentiate *E. chamensis* from *E. braziliensis* include: (1) ischium of pereopod I with stout spines on inner margin (without spines in *E. braziliensis*); (2) ischium of pereopod III with a single spine on inner margin (with several spines in *E. braziliensis*); (3) ischium of pereopod VII without marginal spines (with several spine clusters or rows in *E. braziliensis*); (4) antenna peduncle article 3 subequal to 2 (longer than 2 in *E. braziliensis*); (5) maxilla inner lobe with PMS only on inner apical margin (all spines on inner lobe are plumose in *E. braziliensis*); (6) antennules always longer than antennae (in specimens of *E. braziliensis* less than 4 mm long, the antennules may be shorter than the antennae); (7) dorsal curvature (arching) of body much greater in *E. chamensis*; (8) marginal pit of endopod shallow in *E. chamensis*, deep in *E. braziliensis*. The function of the marginal pit on the uropodal endopod remains unknown, but seems to be diagnostic of almost all species in this genus.

**Etymology.** *Excirolana chamensis* is named after the type locality, Pt. Chame Bay, Pacific Panama.

**Ecological Remarks.** We have not performed tests to measure the adaptive value of the distinct dorsal chromatophore pattern of *E. chamensis* as possible camouflage from visual predators. Nonetheless, the high densities of small fishes and shorebirds in the surf zone at Chame Bay (pers. observ., J. Weinberg) suggest that camouflage may be important to the survival of these isopods. We have noticed that, unlike the sediments on most tropical Pacific beaches that are fairly homogeneous in color, Chame Bay beach sand is very heterogeneous. To the naked eye, Chame Bay sand is spotted black and white. The size of the black sediment particles is approximately the size of the stellate chromatophore region on the dorsum of *E. chamensis*. We hypothesize that the chromatophore pattern of this species is adaptive in reducing intensity of predation by visual feeders at Pt. Chame Bay. Such an adaptation might give *E. chamensis* the competitive edge needed to co-exist with other species of *Excirolana* that occur on mixed black/white sand beaches in the tropical east Pacific.

Considering that species of the genus *Excirolana* are usually the most abundant macroscopic invertebrates occurring on tropical American sand beaches, it is remarkable that this species, and others yet to be described, have not been discovered earlier. A number of studies have been published on *Excirolana* from tropical Pacific American shores (Bott, 1954; Brusca, 1980; Brusca and Iverson, 1985; Duster, 1972, 1974, 1976, 1977, 1979; Glynn et al., 1975; Schuster, 1954; Schuster-Dieterichs, 1956; Weinberg, 1985). Most of these studies were allegedly concerned with *E. braziliensis*, probably the most common species in this region. *Excirolana chamensis* apparently has a highly restricted distribution. We have collected it only from the Panama City area, and the Perlas Islands (i.e., Pacific coast of Panama, between 79° and 80°W, and 8° and 9°N). We have examined thousands of specimens of *Excirolana* from over 100 locations in the eastern Pacific, ranging from Mexico to Chile, plus numerous samples from the Caribbean and Brazil, and in no other collections was this species found.

In addition to its restricted range, *Excirolana chamensis* is patchily distributed. *Excirolana chamensis* and *E. braziliensis* co-occur on at least four beaches in Panama. Based on samples collected in 1984, 1985, and 1986 by J. Weinberg, *E. chamensis* is very abundant at Pt. Chame Bay, outnumbering *E. braziliensis* by at least 9:1. This is the only location we have found where *E. chamensis* is dominant. It has also been collected from the following beaches: (1) San Telmo, in the Perlas Islands (by S. Garrity); (2) near the National Theater in Panama City (by J. Weinberg); and (3) under the
Bridge of the Americas, at the Pacific entrance to the Panama Canal (by J. Weinberg). In the San Telmo collection, the ratio of *E. chamensis* to *E. braziliensis* specimens is about 1:4; the collection from the Bridge of the Americas beach has a ratio of about 1:8. *Excirolana chamensis* was not present in collections from four other beaches in the Panama City area that contained populations of *E. braziliensis*. Beach sand from Pt. Chame Bay is barged into Panama City for various commercial purposes, and this activity could have introduced *E. chamensis* to beaches in this area (e.g., the “National Theater” site noted above) (Neal Smith, Smithsonian Tropical Research Institute, pers. comm.).

In a forthcoming paper by R. Brusca, several additional new species of *Excirolana* will be described from the tropical eastern Pacific and the status of *E. braziliensis* will be reassessed. At least one of the new species also occurs in the Panama City region. Recognition of these new species demands caution in interpretation of previous studies on *Excirolana* from this region.

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LITERATURE CITED


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