

THE STATUS OF *CIROLANA CALIFORNIENSIS*  
SCHULTZ, AND *C. DEMINUTA* MENZIES AND GEORGE,  
WITH A KEY TO THE CALIFORNIA SPECIES OF  
*CIROLANA* (ISOPODA: CIROLANIDAE)

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*Abstract.*—*Cirolana deminuata* Menzies and George 1972 is reduced to junior synonymy with *C. californiensis* Schultz 1966. A revised description, new figures and new records are presented. This species ranges from southern California to the Peru-Chile Trench, from depths of 40–2,000 m, although the majority of records are from below 700 m. A key to the California species of *Cirolana* is presented.

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In 1966 Schultz described *Cirolana californiensis* from 5 specimens taken by the Allan Hancock Foundation Southern California Submarine Canyon Study. He noted its resemblance to *C. cubensis* Hay and *C. gracilis* Hansen, both Caribbean species. In 1972 Menzies and George described a single gravid female as *Cirolana deminuta* from the Anton Bruun expedition to the Peru-Chile trench region. They did not discuss its affinities with other species of *Cirolana*. Both species were taken from fine sand bottoms in about 1,000 m of water. Examination by the authors of several dozen additional specimens of *C. californiensis* from California and western Mexico, as well as the types of both species, has revealed the two to be identical, and *C. deminuta* is herein made a junior synonym of *C. californiensis*.

*Cirolana californiensis* Schultz

*Cirolana californiensis* Schultz, 1966:14, pl. 8, figs. 1–8; 1969:178.

*Cirolana deminuta* Menzies and George, 1972:9.19, figs. 12–13 (not *Cirolana diminuta* Menzies, 1962:343, from Bahía de San Quintin, Mexico = *C. parva* Hansen—see Menzies and Glynn, 1968:38).

*Description.*—Cephalon immersed in pereonite I. Eyeless or eyes reduced and without pigmentation. Antenna 1 with 8–12 flagellar articles; articles bear many hair-like setae and esthetascs. Antenna 2 with 10–21 flagellar articles. Frontal lamina, clypeus and labrum as in Fig. 1; both anterior and posterior tips of frontal lamina vary slightly from round to subacute. Exopod of maxilla 1 with 12 strong spines; endopod ovate, with 3 terminal spines, each with a subapical circlet of spinules (Fig. 2). Maxilla 2 without spines; biramous exopod with long apical setae on each lobe; endopod with plumose setae (Fig. 3). Maxillipedal palp of 3 articles; endite very small, with 2 coupling hooks and plumose setae. Mandible with toothed incisor,

large lacina mobilis, and large, toothed, molar process; palp of 3 articles, heavily setose.

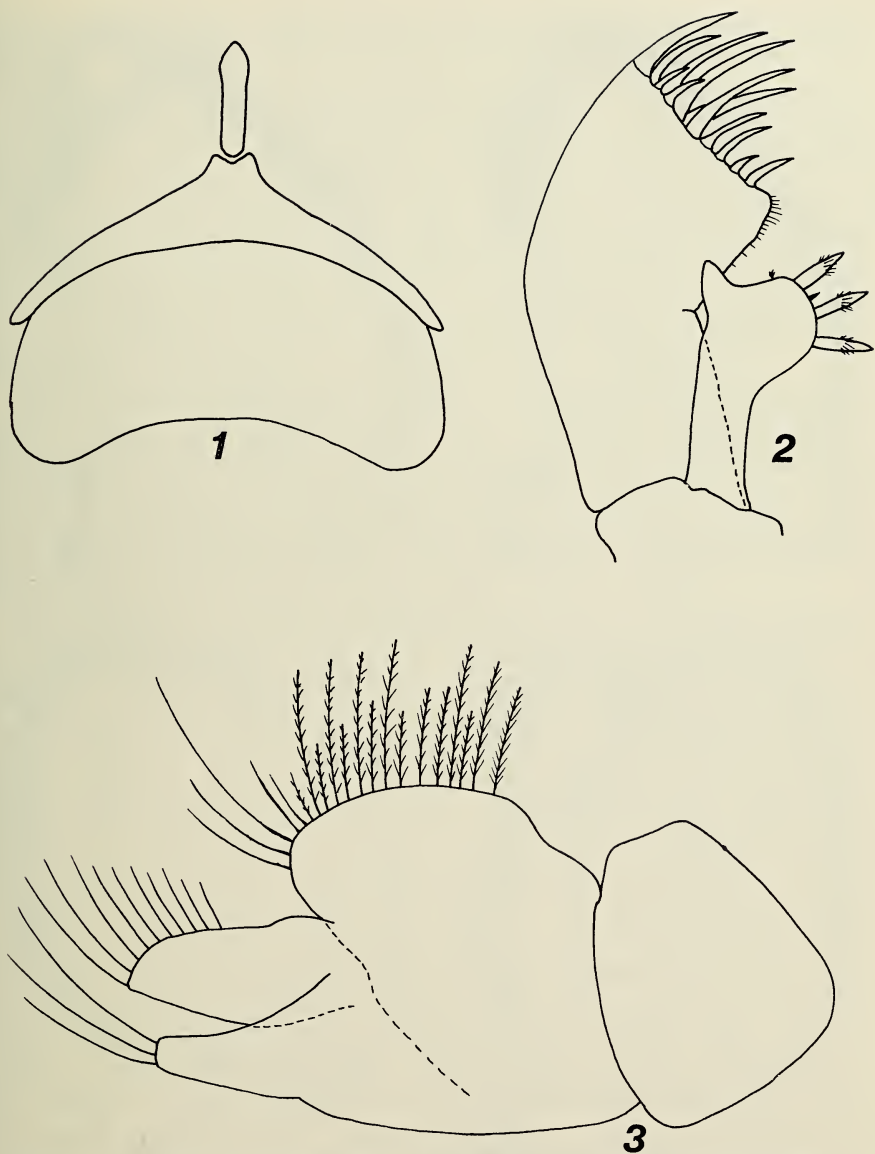
Coxal plates well developed on pereonites II–VII, usually visible on all segments but occasionally hidden from dorsal view on anteriormost pereonites; posterior coxal plates with acute posterolateral angles. Pereopods 1–3 with large dactyls; pereopods 4–7 laterally compressed, with long, plumose setae projecting from medial and lateral margins of basis, dactyls reduced. Pereopod 7 in some specimens abruptly smaller than all other pereopods, even in large individuals. Posterolateral corners of all pleonites acute; lateral margins of pleonite 5 hidden under pleonite 4. Pleotelson triangular, distally acute, with smooth margins (except for shallow notches where spines and setae are inserted); margins with 8–12 short, articulated spines and long plumose setae. Uropodal basis with produced distomedial corner; exopod and endopod both pointed, with spines and plumose setae; margins smooth except for shallow notches where spines and setae are inserted; uropods extended barely beyond posterior margin of pleotelson; endopod slightly longer than exopod. Pleonites 1–4 similar, with plumose setae on both rami (Figs. 4–6); Pleopod 5 with plumose setae on inner lamella only (Fig. 7); male appendix masculinum long, curved and without ornamentation (Fig. 6). Basis of pleopods 1–3 with plumose setae on median margin only; basis of pleopod 4 with plumose setae on both median and lateral margins; basis of pleopod 5 as figured. Length 7–19 mm.

*Type-locality*.—California, Coronado Canyon; *Velero* Station 6851; 812 m;  $32^{\circ}37'54''\text{N}$ ,  $118^{\circ}55'40''\text{W}$ .

*Additional records*.—We have examined material from throughout the southern California borderland, including Coronado and Tanner Canyons and the San Diego Trough. In addition, we have material from western Baja California (near Cedros Island) and the southern Gulf of California (between La Paz and Cerralvo Island). All of this material is deposited in the Allan Hancock Foundation.

*Remarks*.—Nearly all specimens were taken from depths between 700 and 2,000 m, although a few collections are from depths as shallow as 40 m (off Catalina Island, California, and Cedros Island, Baja California) and 250 m (southern Gulf record). All records are from fine sands or sand-clay mixtures, usually reported as gray-green sandy mud or olive-brown silty sand.

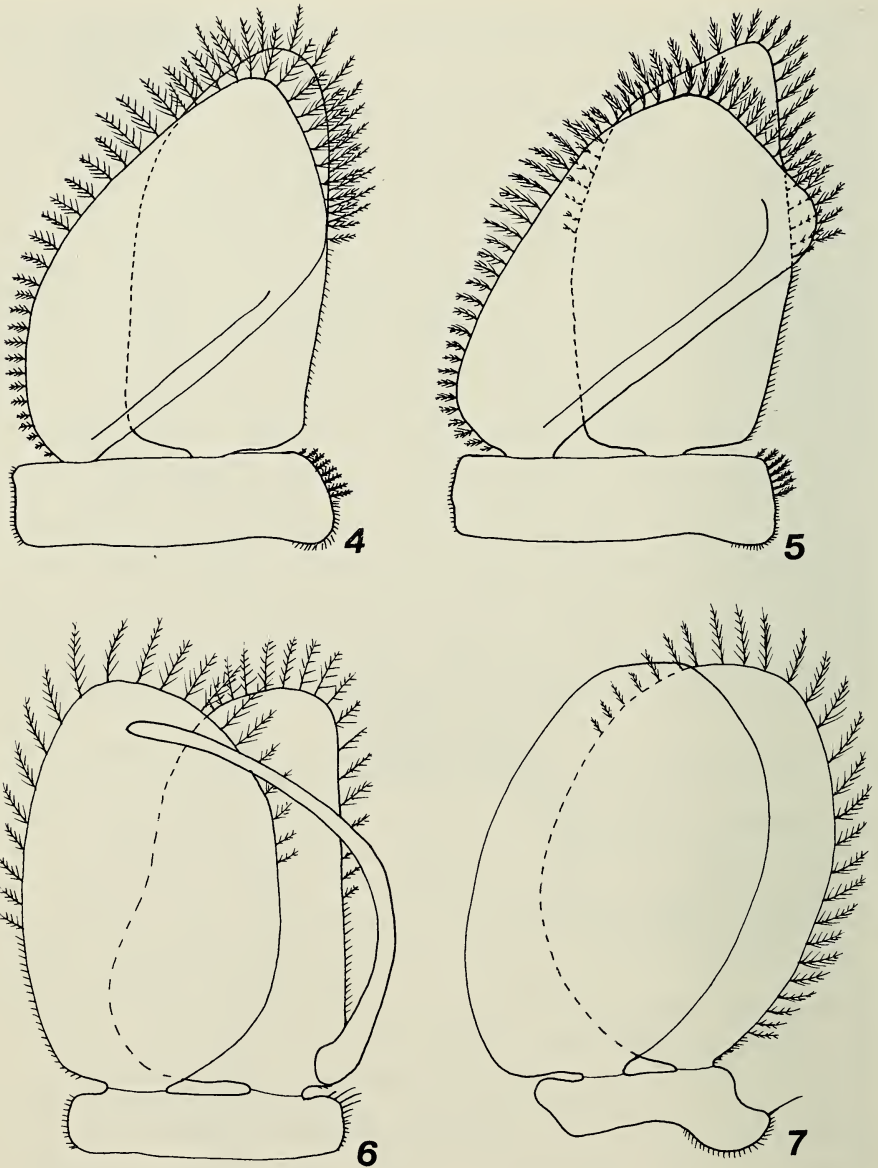
Several discrepancies exist between Schultz's and Menzies and George's original descriptions. The holotype of *C. diminuta* possesses rudimentary eyes entirely lacking in pigmentation and with few ommatidia, while the holotype of *C. californiensis* is entirely without ommatidia or pigmentation. Numerous other specimens we have examined, however, bear the unpigmented, reduced eyes characteristic of the southern hemisphere



Figs. 1-3. *Cirolana californiensis*: 1. Frontal lamina, clypeus and labrum. 2. Maxilla 1. 3. Maxilla 2.

form. Thus, it would appear that degeneration of the compound eyes is a variable feature within the species.

Menzies and George described the first antennae as having 8 flagellar articles, while Schultz found 9. In specimens we have examined the



Figs. 4-7. *Cirolana californiensis*: 4. Left pleopod 2, female. 5. Left pleopod 1, female. 6. Left pleopod 2, male. 7. Left pleopod 5, female.

number varies from 8-12. Schultz figured the uropods as being extended just barely to, or slightly beyond the distal border of the pleotelson, while Menzies and George figured them extending a considerable distance beyond the pleotelson. Examination of the holotype of *C. diminuta* has shown

Menzies and George's figure to be in error, and their specimen actually conforms to Schultz's types, as well as all of the material we have examined.

Menzies and George figured the frontal lamina, clypeus and labrum considerably different from Schultz. Examination of the types of both has revealed Schultz's illustration to be in error, and all specimens we have examined (including Schultz's types) conform to the figure presented by Menzies and George. We have redrawn these structures from Schultz's holotype (Fig. 1). Schultz's figure of the first maxilla differs considerably from that given by Menzies and George. Examination of this appendage from both holotypes has revealed Schultz's figure to be misleading, in that he figured the exopod (outer ramus) only (see Fig. 2, this paper).

Menzies and George suggested that *C. diminuta* could represent a neotenic species, as evinced by the reduced size of the seventh pereopods. Materials we have studied, however, reveal that the reduction of the seventh pereopods is, like reduction of the eyes, a variable character. The cause of this reduction is not known; however, when reduction does occur both right and left pereopods are always affected, suggesting a genetic basis (rather than predation or some other exogenous factor).

There are now 12 species of *Cirolana* known from the eastern Pacific: *C. californiensis* Schultz 1966 (= *C. diminuta*), southern California to Chile; *C. joanneae* Schultz 1966, also known from the submarine canyons of southern California; *C. harfordi* (Lockington, 1877), a shallow water species ranging from British Columbia to central west Baja California; *C. parva* Hansen 1890 (= *C. diminuta*), a eurythermal, circumtropical, shallow water species known in western America from Point Conception (California) south at least to central west Mexico; *C. bathyalis* Menzies and George 1972, known only from the type-locality (Peru-Chile Trench); *C. natalis* Menzies and George 1972, known only from the type-locality (Peru-Chile Trench); *C. ornamenta* Menzies and George 1972, known only from the type-locality (Peru-Chile Trench); *C. albinota* Vanhoffen 1914, Chile to Antarctica; *C. chilensis* Menzies 1962, southern Chile; *C. urostylis* Menzies 1962, southern Chile; *C. robusta* Menzies 1962, Chile; and *C. concinna* Hale, Australia and Chile. *Cirolana concinna* is an Australian species. Menzies (1962) hesitated to consider the Chilean form of *C. concinna* as new, however, the disjunct distribution and the differences he describes between these western and eastern Pacific forms suggest that specific or subspecific recognition may be warranted. Lacking specimens we cannot resolve this issue at the present time.

The relationships within the eastern Pacific *Cirolana* are difficult to assess, and until the tropical southern American and central American coastal and shelf faunas are better known they will remain so. Only one other species, *C. natalis*, is "blind" (lacks ommatidia) and of the 11 other species of *Cirolana* known to inhabit the continental shelf and littoral regions

of western America, *C. natalis* most resembles *C. californiensis*, sharing with it the following characters: maxilliped with 2 coupling hooks; cephalon deeply immersed in pereonite I; and, similar numbers of antennal articles. All 12 of the shelf/littoral species are similar in form, only *C. ornamenta* standing out as strikingly different from the others.

#### Key to the Species of *Cirolana* Known From California

1. Margin of pleotelson with fine setae but without spines; maxilliped with 1 coupling hook; edges of pleonite 5 not hidden by pleonite 4; distal margin of pleotelson truncate, but strongly scalloped *C. joanneae*  
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  - Margin of pleotelson with spines; maxilliped with 2 coupling hooks; edges of pleonite 5 hidden by pleonite 4; distal margin of pleotelson subacute 2
2. Without eyes, or eyes unpigmented; antenna 2 with flagellum of 10-21 articles; frontal lamina narrow; pleotelson with 8-12 spines; uropods not notched apically; rarely encountered in depths less than 100 m *C. californiensis*
  - Blindness extremely rare; antenna 2 with flagellum of 22-32 articles; frontal lamina broad; pleotelson with 8-32 spines; uropods notched apically, *or* not notched; rarely encountered in depths greater than 100 m 3
3. Uropodal rami with deep apical notch; pleotelson margin always with 8 spines *C. parva*
  - Uropodal rami without apical notch; pleotelson margin with at least 9-32 spines *C. harfordi*

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