Gulf Research Reports

Volume 8 | Issue 4

January 1992

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DOI: 10.18785/grr.0804.02

Gulf Research Reports, Vol. 8, No. 4, 363-374, 1992 Manuscript received September 20, 1990; accepted January 15, 1992

ISOPODS OF THE GENUS *EXCORALLANA* STEBBING, 1904 (CRUSTACEA, ISOPODA, CORALLANIDAE) FROM THE EAST COAST OF MEXICO WITH A SUPPLEMENTAL DESCRIPTION OF *E. SUBTILIS*

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ABSTRACT Eight species of *Excorallana, E. acuticauda, E. delaneyi, E. oculata, E. sexticornis, E. subtilis, E. tricornis tricornis, E. warmingii*, and *Excorallana* sp. are recorded for the eastern coast of Mexico. The range of *E. delaneyi* is extended south in the Gulf of Mexico. *Excorallana oculata* and *E. subtilis* are reported for the first time in the Gulf. Based on specimens from the east coast of Mexico, a supplemental description of *E. subtilis* is presented and its taxonomy to other closely related species discussed. A key is provided to the adult males of the species of *Excorallana* now known to occur in the southwestern Gulf of Mexico and the Caribbean coast of Mexico.

Introduction

A variety of marine isopod crustaceans have been collected in conjunction with ongoing ecological and faunal surveys off the eastern coast of Mexico. This study deals with the new distribution records for the excorallanid isopod genus *Excorallana* Stebbing, 1904 from the Gulf and the Caribbean coasts of Mexico. Except for *E. oculata*, which occurs in both the eastern (west coast of Africa) and the western Atlantic, the 21 other species of *Excorallana* are restricted to the tropical and temperate waters of the Atlantic and Pacific coasts of the Americas. Of these, 16 species are endemic to the western Atlantic between 30°N and the Equator (Lemos de Castro and Lima 1971; Delaney 1989). The range of *E. delaneyi* is extended south in the Gulf. *Excorallana oculata* and *E. subtilis* are reported for the first time in the Gulf. Six female specimens of the latter species were collected in Sabancuy, Campeche and Puerto Morelos, Quintana Roo, allowing its redescription and the determination of differences among the specimens reported from Brazil by Lemos de Castro and Lima in 1971.

Materials and Methods

Specimens used for this study were obtained from several localities and sites along the eastern coast of Mexico (Fig. 1). These were Isla de Sacrificios off Veracruz, Sabancuy and El Cayo in Terminos Lagoon; Seibaplaya, Campeche; Yucalpetén and Río Lagartos, Yucatán, Isla Mujeres, and along the shore and the barrier reef off Puerto Morelos in the Yucatan Peninsula. Specimens from Terminos Lagoon were collected during 1983 in seagrass beds (*Thalassia testudinum*) using a 0.65m wide (0.451mm mesh) Colman-Segrove sled (Eleftheriou and Holme 1985). Other specimens were obtained from hand-collected sponges living on the seagrass beds at El Cayo. Material from the Yucatán Peninsula and Sacrificios Island was hand-collected while skin diving and SCUBA diving during several field trips from 1985 to 1987.

The specimens examined during this study are deposited in the Carcinological Collection at the Instituto de Biología, National University of Mexico (IB-UNAM). Water temperature was recorded in the field with a hand thermometer. The four to five digit catalogue numbers for these specimens are preceded by the letters EM. Specimens were fixed in 10% seawater formalin, sorted in the laboratory, identified, catalogued, and stored in 70% ethanol. The sex, total length (L) and width (W) of each specimen is indicated under material examined for each species. The length and width were determined using a calibrated ocular micrometer in a dissecting microscope. Illustrations were made with the aid of a camera lucida.

Results

Eight species of *Excorallana* taken along the coast of eastern Mexico have been identified in the collections of IB-UNAM. Specific information on the occurrence, habitat, and hosts, when known, is presented for each species treated.

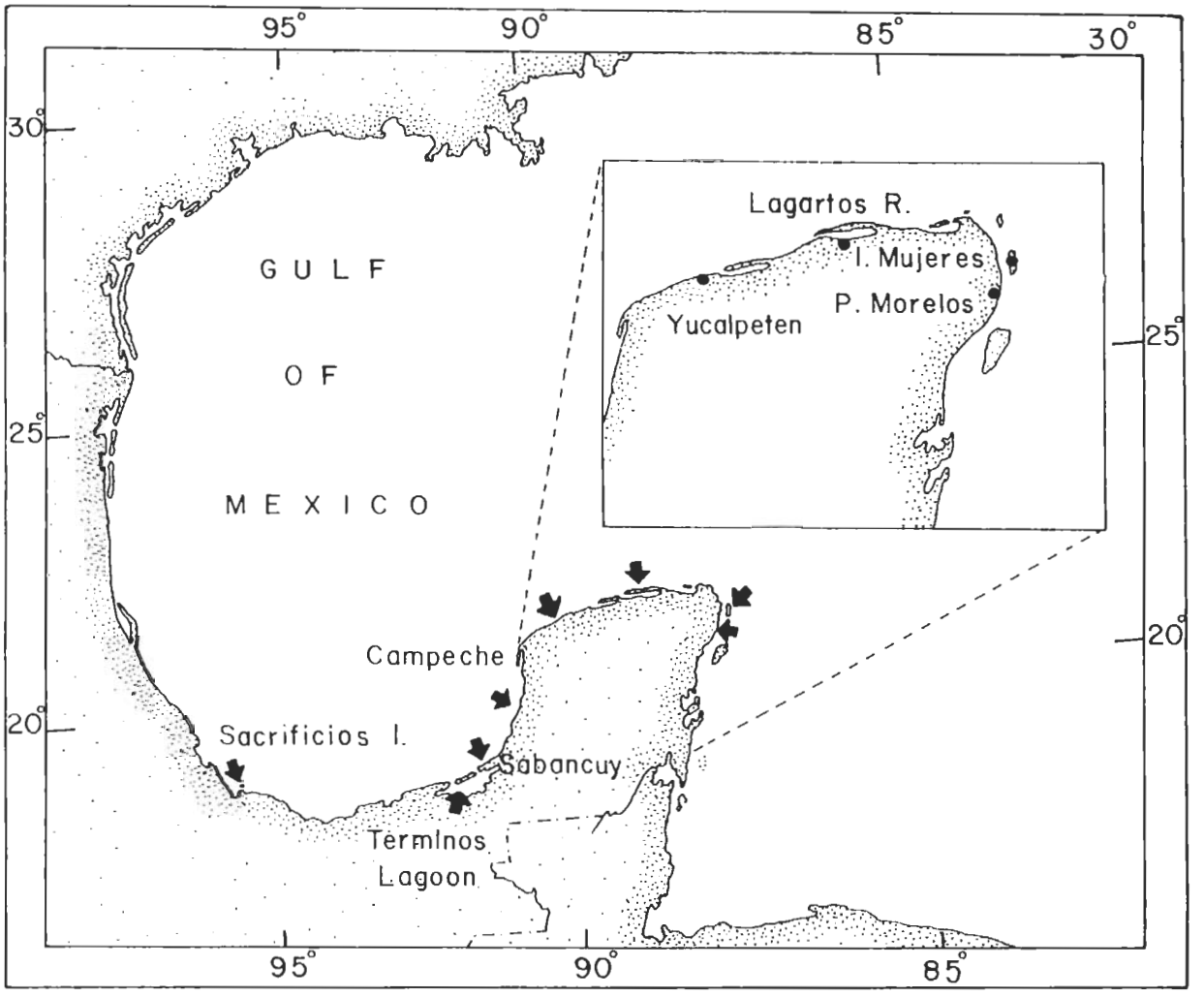

Figure 1. Sampling sites of *Excorallana* specimens recorded in this study in the southwestern Gulf of Mexico and the Mexican Caribbean.

Excorallana acuticauda (Miers 1881)
Fig. 2 a-c

Material examined. Puerto Morelos; EM-9588 f L:6.6, W:2.0mm.

Diagnosis. Eyes large, not contiguous, separated by a distance of half the length of an eye. Males and females without cephalic horns. Telson with lateral notches and mid-dorsal excavation. Frontal lamina elongate, distal end round.

Distribution. Key West, Florida; St. Thomas (Richardson 1905); South Bank, Texas (Clark and Robertson 1982); Caribbean and Brazil (Delancy 1989). New record: Puerto Morelos, Quintana Roo, Mexico.

Ecological notes: Occurs in reefs, low tide (Richardson 1905). Intertidal (Schultz 1969). At Puerto Morelos, associated with the coral reef, in shallow water; collected at temperature 29.5°C.

Excorallana delaneyi Stone and Heard, 1989
Fig. 3 a-c

Material examined. Terminos Lagoon, Gulf of Mexico; EM-9248-f m l:8.3, W:3.2; ov L:9.8, W:2.9; EM-9519 f L:3.6, W:1.2; EM-9224 m L:8.4, W:3.5; ov L:9.1, W:3.5; ov L:9.6, W:3.6; EM-10561 m L:7.0, W:2.6; m L:7.7, W:7.7; m L:8.1, W:2.7; f L:7, W:2.1; f L:5.4, W:1.7; f L:4.6, W:1.5; f L:5.2, W:1.5; ov l:6.7, W:2.0; ov L:7.0, W:2.3; ov L:7.2, W:2.2; ov L:6.2, W:2.1; ov L:7.9, W:2.3; ov L:7.1, W:2.2; ov 9.1, W:3.3; ov L:6.0, W:2.1. Yucalpetén; EM-7530 m l:6.6, W:2.5; EM-7411 m L:8.2, W:2.9; ov L:8.1,W:3.0; ov L:8.4, W:3.2. Río Lagartos; EM-4960 m L:8.8, W:3.0.

Diagnosis. Eyes separated. Three cephalic horns in male and two rudimentary horns or tubercles in female;

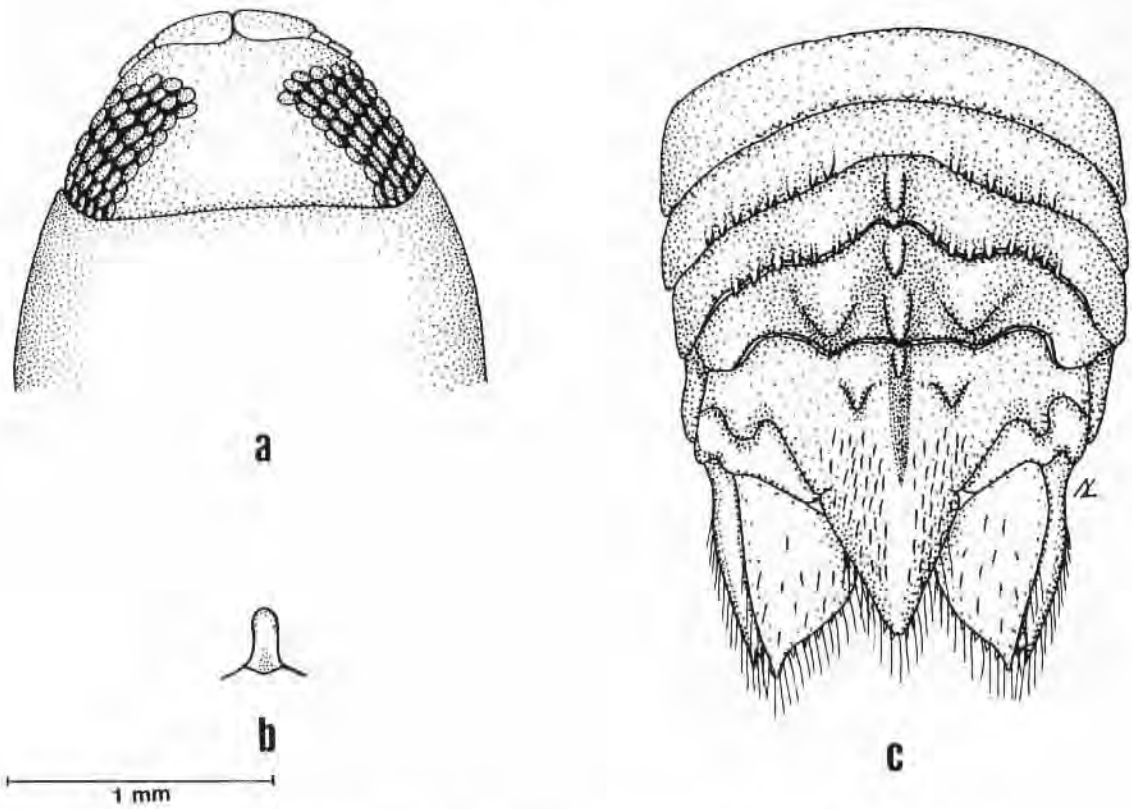

Figure 2. ***Excorallana acuticausa*** **(Miers 1881): a, cephalon; b, frontal lamina; c, telson.**

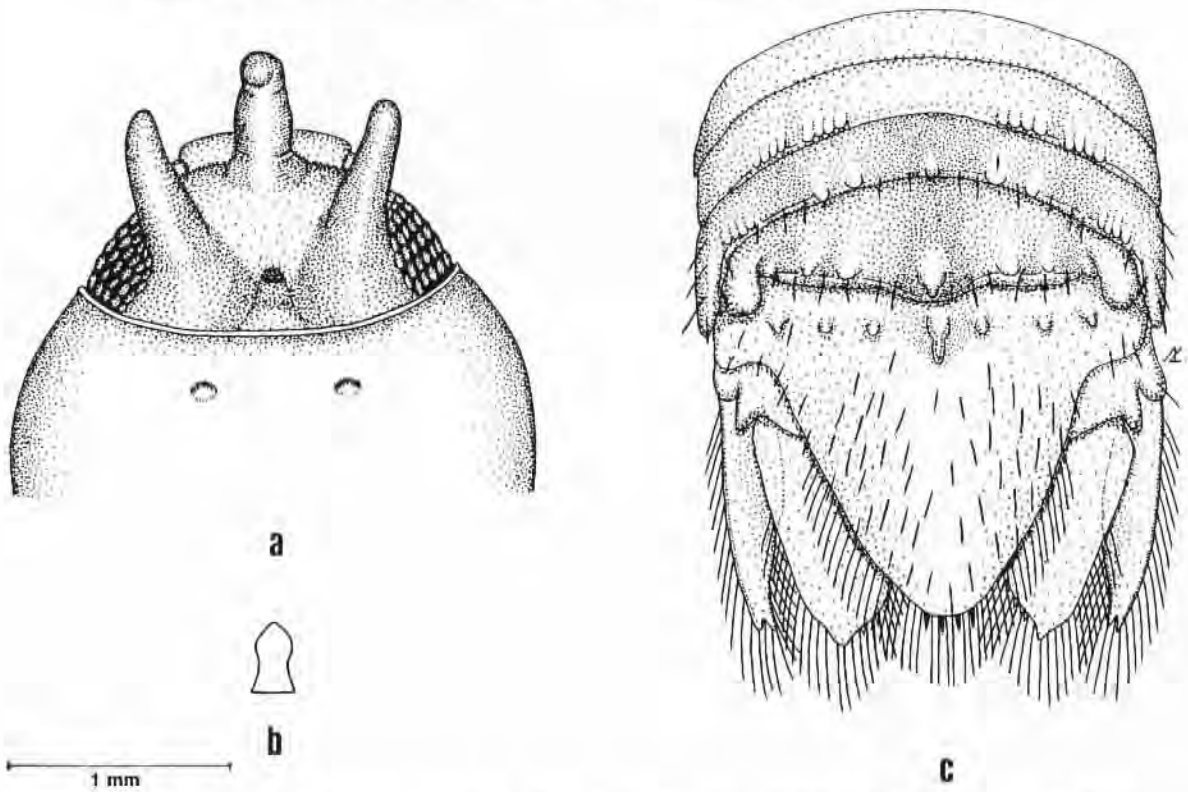

Figure 3. ***Excorallana delaneyi*** **Stone and Heard, 1989: a, male cephalon; b, frontal lamina; c, telson.**

rostral horn in male cylindrical similar to the lateral horns. Telson without lateral notches, with four terminal spines, apex weakly crenulate. Frontal lamina elongate, distal end triangular.

Distribution. Gulf of Mexico; St. Joseph's Bay, Florida (Stone and Heard 1991). New records: Terminos Lagoon, Campeche; Yucalpetén and Río Lagartos in Yucatan Peninsula.

Ecological Notes. Associated with sponges inhabiting *Thalassia testudinum* seagrass beds in shallow water from 0.2 to 2m depth. Also found on sandy bottoms of marsh flats (this study and Stone and Heard 1989).

Excorallana oculata (Hansen 1890)
Fig. 4 a-c

Material examined. Sacrificios Island off Veracruz, Gulf of Mexico: EM-8768 m L:6.6, W:2.1.

Diagnosis. Eyes large, contiguous. Males and females without cephalic horns. Telson with lateral notches. Frontal lamina elongate, narrow, distal tip rounded.

Distribution. Caribbean, Brazil, and Annabon Island, Gulf of Guinea, West Africa (Delaney 1989). New record: Sacrificios Island off Veracruz, Southwestern Gulf of Mexico.

Ecological Notes. Shallow water, associated with coral reefs.

Excorallana sexticornis (Richardson 1901)
Fig. 5 a-d

Material examined. Puerto Morelos, Quintana Roo: EM-8556 ov L:6.2, W:2.2; EM-9161-a ov L:7.0, W:2.4; EM-9177-a f L:7.0, W:2.5; m L:6.5, W: 2.0, m l:7.1, W:2.4; m L:6.0, W:2.2; m L:7.5, W:2.3; m L:7.0, W:2.1; EM-9648 m L: 6.4, W:2.1; EM-9687-a m L:7.0, W:2.3; m L:6.0, W:2.1; f L:6.3, W:2.2; f L:7.8, W:2.6; f L:6.0, W:2.1; f L:6.9, W:2.3; f L:7.5, W:2.5.

Diagnosis. Eyes normal, separated. Male with four cephalic horns and two on basal segments of first antennae, females with four small tubercles on posterior half of the head. Telson with lateral notches. Frontal lamina short, rounded.

Distribution. Key West, Florida (Richardson 1905), Eastern Florida Bay (Rouse 1969), Caribbean (Delaney 1989), Belize (Kensley and Schotte 1989). New record: Puerto Morelos, Quintana Roo, Mexico.

Ecological Notes. In shallow water to 1.5m depth in submerged wood and in broken coral heads, at temperatures of 31.5°C.

Remarks. The presence of two cephalic tubercles in females of this species was cited by Richardson (1905). Seven of our eight females have four slightly developed cephalic tubercles between the eyes, two located on the same position as the male's largest horns, and two anterior to these.

Excorallana subtilis (Hansen 1890)
Figs. 6 a-g, 7 a-c

Material examined: Seibaplaya, Campeche, Southwestern Gulf of Mexico: EM-5610 f L:9.0, W:2.6; Puerto Morelos, Quintana Roo: EM-5705 f L:7.5, W:2.1; EM-9161 f L:6.0, W:2.0; EM-9177 f L:6.9, W:2.3; f L:7.5, W:2.3; EM-9687 ov L:6.0, W:1.8.

Diagnosis. Eyes medium in size, separated. Females without cephalic horns or tubercles. Telson with lateral notches. Frontal lamina subquadrate, excavated ventrally.

Description. Female; without cephalic horns or tubercles; anterior cephalic margin produced between bases of antennae (Fig. 6a). Eyes medium in size, separated anteriorly by a distance slightly greater than the length of an eye. First antennae with three peduncular articles, basis strongly dilated; with six to eight flagellar articles (Fig. 6b) reaching pereonite I. Second antennae reaching pereonite IV, with 18-21 flagellar articles (Fig. 6c), articles two to eight densely setose. Frontal lamina subquadrate, a little longer than wide, somewhat narrower towards the widely rounded apex and excavated ventrally near the base (Fig. 6d); clypeus narrow, partially concealed; labrum concealed. Maxilliped with epipodite reduced, palp with five segments, with smooth margins, ante-penultimate segment short, penultimate segment curved proximally, tip of distal segment with tuft of setae (Fig. 6e). Right mandible with four subapical cusps, one just below the incisor process, the other three forming the apical part of a medium broad flat tubercle (Fig. 6f); left mandible with three subapical cusps, first and second located below incisor process, third tubercle flat in shape (Fig. 6g); mandibles with lacinia mobilis, without molar process. Pereonites I-VII without dorsal tubercles or setae. Pereopods I-III prehensile; differing among them, in common merus with four short spines on posterior medial margin, ischium with one short spine on posterodistal median margin (Fig.7a). Pleonites one to five without dorsal tubercles, naked. Pleopods 1-5 with plumose marginal setae. Pleotelson subtriangular, without dorsal setae; two prominent submedian tubercles on dorsal surface near base; margin fringed with setae, lateral margins with deep notches (Fig. 7b); apex rather acute, with two small spines, each tipped with a hair (Fig. 7c). Uropods slightly longer than pleotelson; fringed with setae; uropodal endopod broad, posteriorly subtruncate, distal lateral angles pointed, lateral inner margin armed with six short spines, lateral outer margin with one spine; uropodal exopod less than half the width of the endopod, narrowing to a bifid tip, lateral inner margin without spines, lateral outer margin with one spine.

Male; unknown.

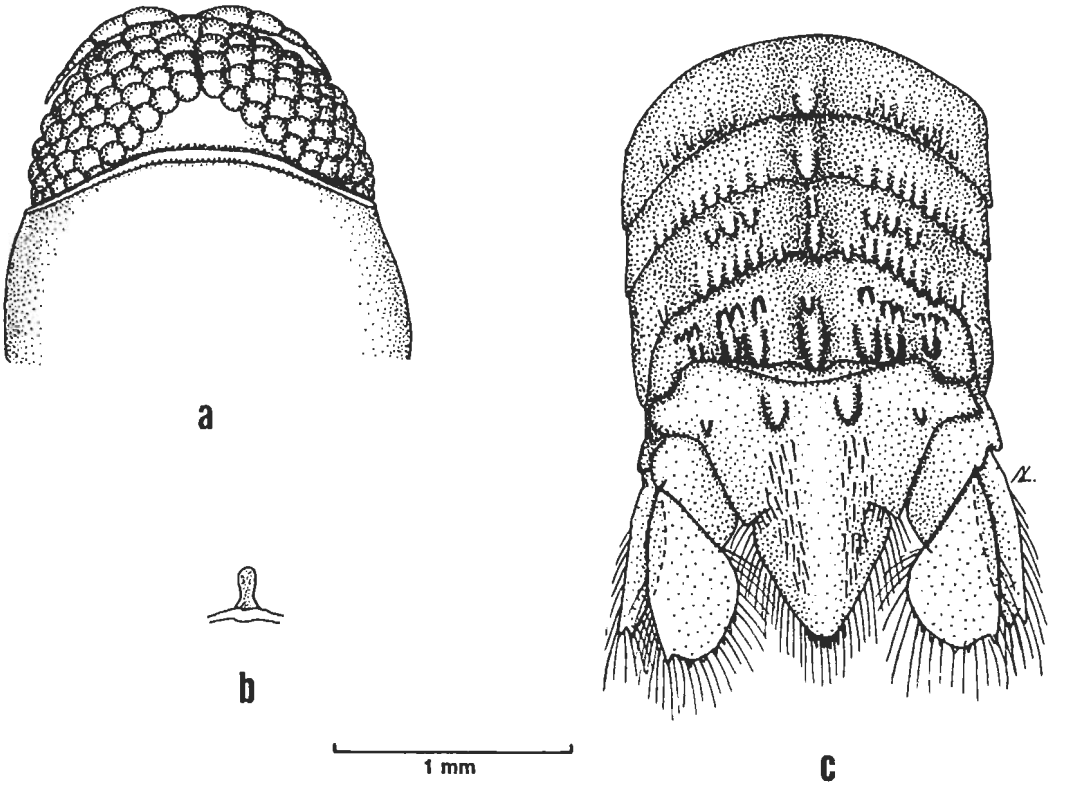

Figure 4. *Excorallana oculata* (Hansen 1890): a, cephalon; b, frontal lamina; c, telson.

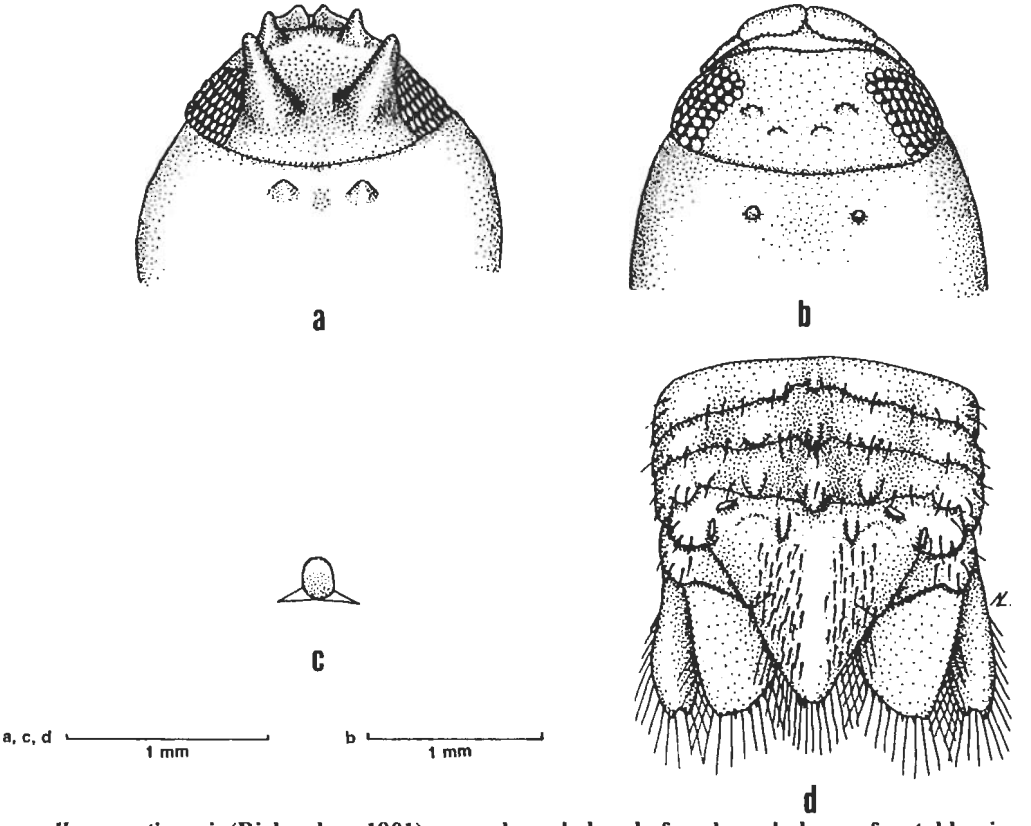

Figure 5. *Excorallana sexticornis* (Richardson 1901): a, male cephalon; b, female cephalon; c, frontal lamina; d, telson.

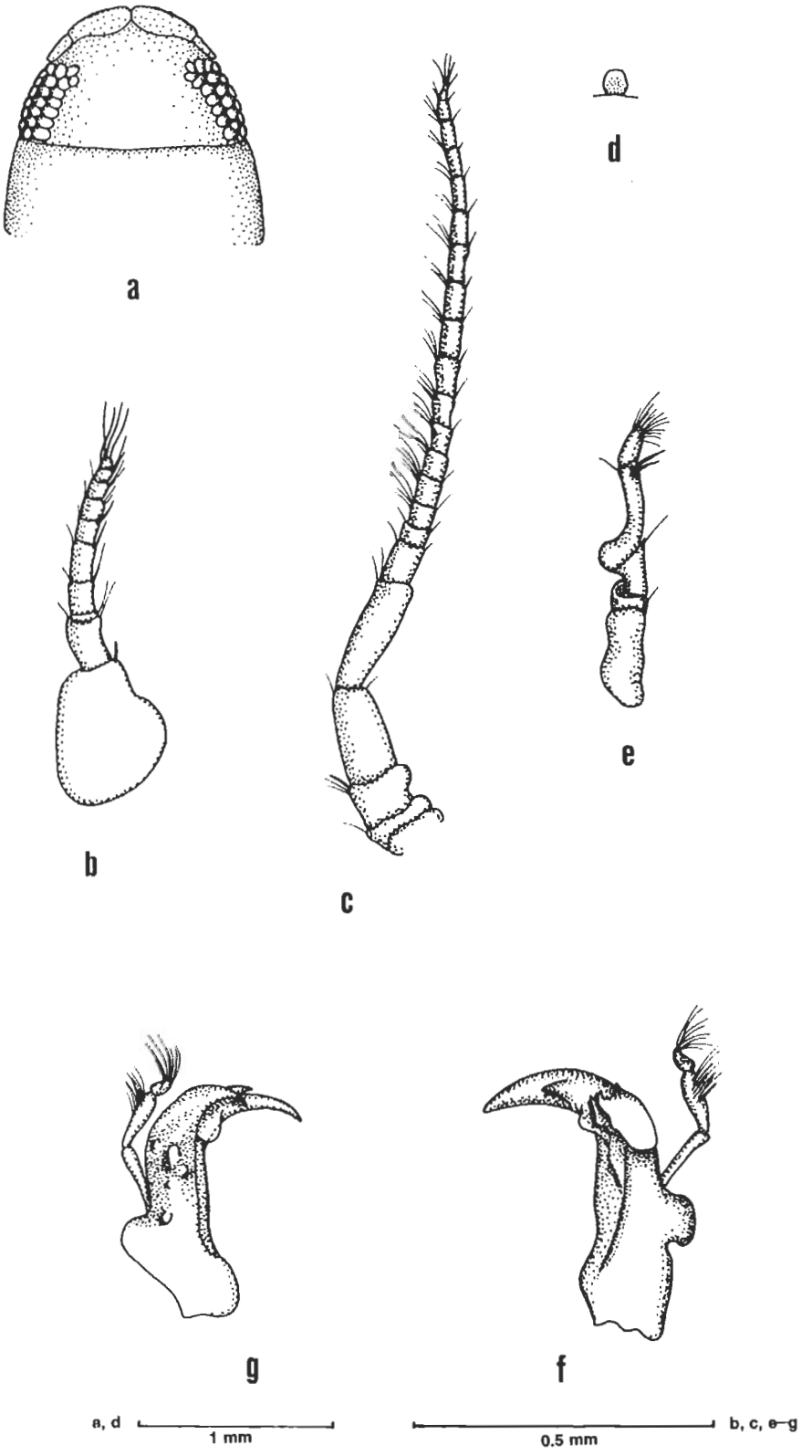

Figure 6. Excorallana subtilis (Hansen 1890): a, cephalon; b, first antennae; c, second antennae; d, frontal lamina; e, maxilliped; f, right mandible; g, left mandible.

Distribution. St. Thomas, West Indies (Hansen 1890). New records: Seibaplaya, Campeche, southwestern Gulf of Mexico, and Puerto Morelos, Quintana Roo.

Ecological Notes. Inhabiting shallow waters from 1 to 2m depth; associated with dead coral heads, algae on coral rock and submerged wood.

Remarks. Since Hansen's description (1890) of a single molting female specimen from St. Thomas, the identity of this species has been regarded as uncertain by several authors. Two females of *E. subtilis* were reported by Lemos de Castro and Lima (1971) in Brazil and regarded as a synonym of *E. antillensis* due to their close morphological resemblance and sympatric distribution. The affinity with *E. richardsonae* was also observed in the similarity of the first antennae and frontal lamina. Delaney (1989) mentioned the similarity of *E. subtilis* with *E. acuticauda* and *E. richardsonae*, and considered at the same time *E. antillensis* to be a junior synonym of *E. acuticauda*. Kensley and Schotte (1989) expressed their uncertainty to the identity of the only known specimen. Nevertheless, the redescription of *E. subtilis* from specimens found in the southwestern Gulf of Mexico and the Mexican Caribbean validates the existence of Hansen's species. A comparison with the description of the Brazilian specimens of Lemos de Catro and Lima (1971) shows that the latter specimens belong to a different species due to the presence of tubercles on pleonite 5; the presence of submedial rows of setae along the telson; the lack of the two apical spines; the anterior part of the frontal lamina with a more pronounced angle; the maxilliped with a surface covered with tubercles; and the absence of subapical cusps and lacinia mobilis in both mandibles. Therefore, we consider a species complex formed by *E. acuticauda*, *E. richardsonae*, and *E. subtilis* in which each of the species can be recognized.

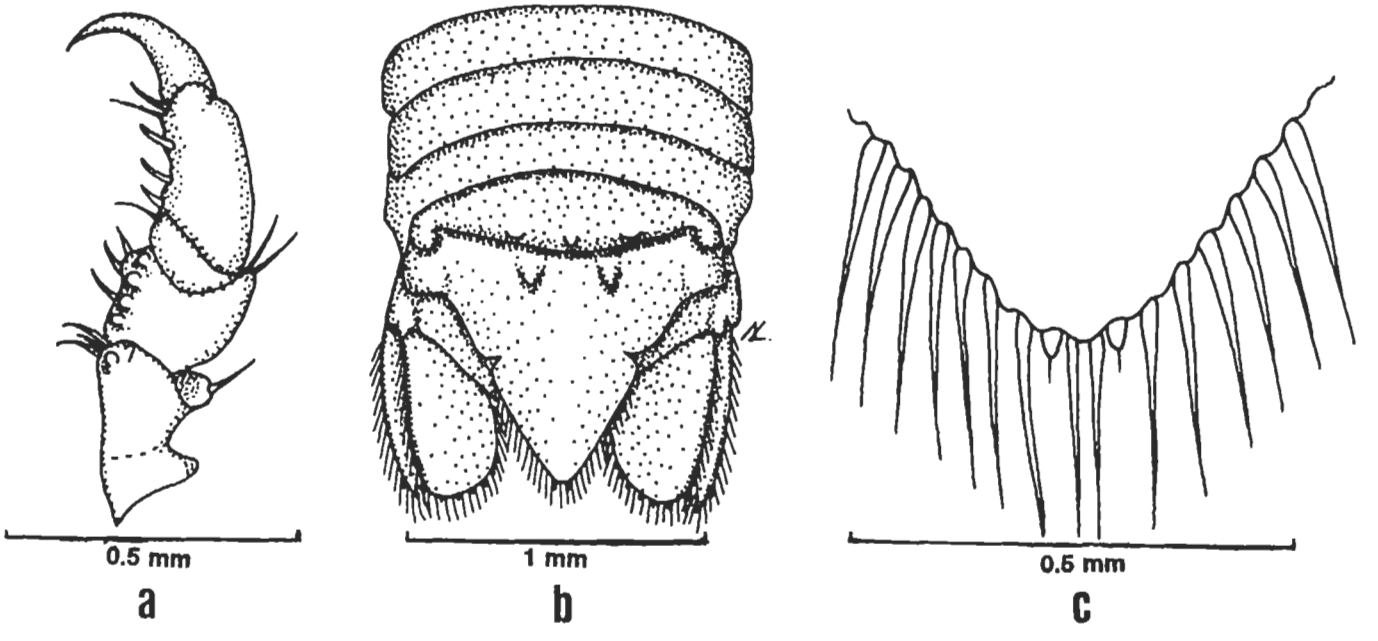

Figure 7. Excorallana subtilis (Hansen 1890): a, pereopod I; b, telson; c, tip of telson.

Excorallana tricornis tricornis (Hansen 1890)
Fig. 8 a-c

Material examined. Terminos Lagoon, Southwestern Gulf of Mexico: EM-9315 f L:4.0, W:1.5; ov L:6.7, W:1.9; Puerto Morelos, Quintana Roo; EM-5643 m L:6.6, W:2.4; Isla Mujeres, Quintana Roo; EM-7320 m L:6.6, W:2.4; m L:6.0, W:2.3; EM-7327 m L:10.2, W:3.5, m L:10.8, W3.8, ov L:10.8, W:3.6; EM-7379 m L:7.9, W:3.1; m L:7.8, W:2.9; f L:6.1, W:2.3; ov L:11.0, W:3.7; EM-

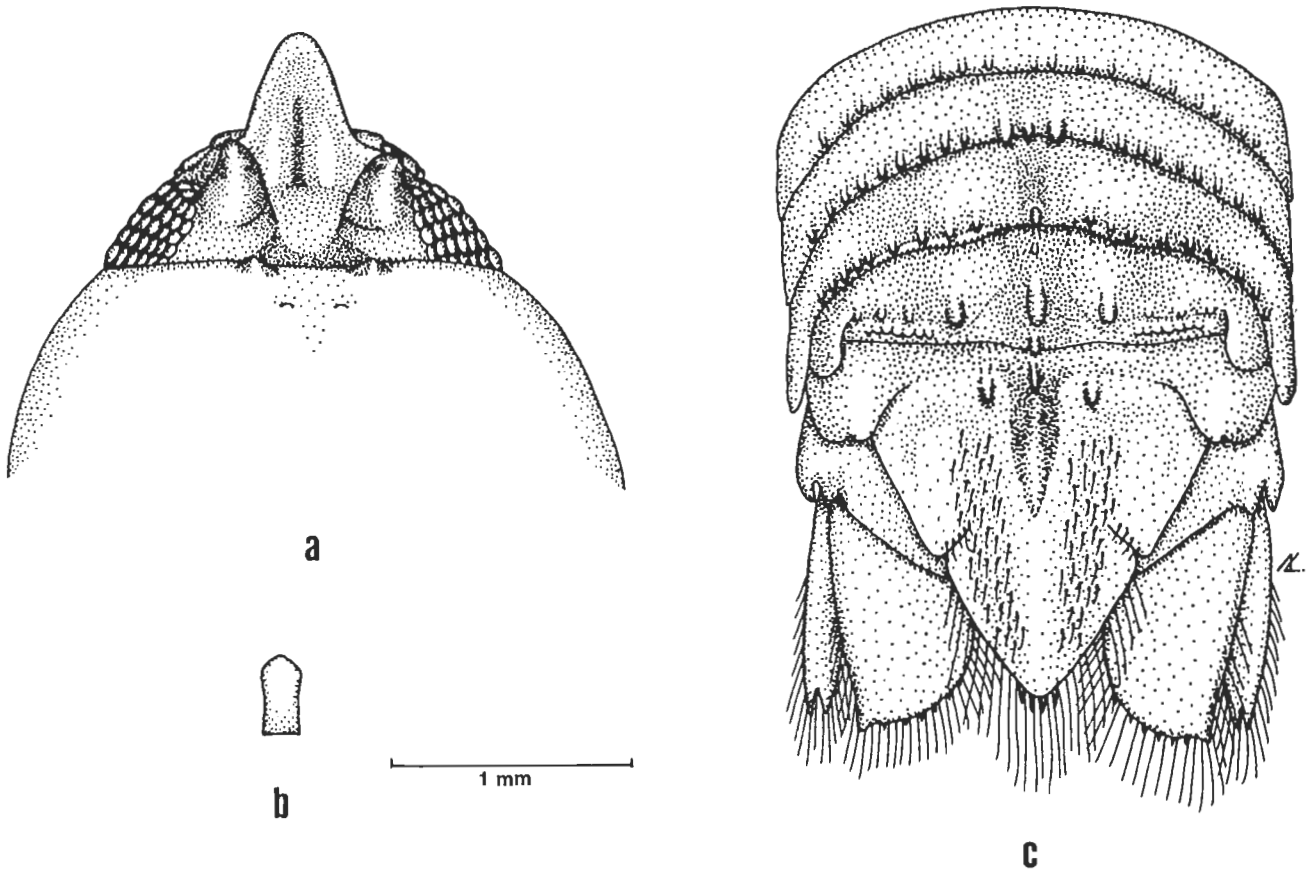

Figure 8. *Excorallana tricornis tricornis* **(Hansen 1890): a, male cephalon; b, frontal lamina; c, telson.**

7459 ov L:8.5, W:3.0; ov L:7.6, W:2.4.

Diagnosis. Eyes separated; male with three cephalic horns, rostral horn concave, broad, lateral horns cylindrical; horns in female rudimentary; telson with lateral notches, apex with four short spines, rows of setae on either side of medial longitudinal area. Frontal lamina elongate, distal end triangular.

Distribution. Gulf of Mexico and Caribbean (Delaney 1989). New records: Terminos Lagoon, southwestern Gulf of Mexico; Isla Mujeres, and Puerto Morelos, Quintana Roo, Mexico.

Ecological Notes. Reported depths varying from the intertidal to 183m (Delaney 1984) from 44 to 503m (Schultz 1969), and from 18 to 73m in the northeastern Gulf (Menzies and Kruczynski 1983). Found in shallow waters of 1 to 2 m depth in these samples. Material from the Caribbean was found on dead coral heads and submerged rocks. The species was associated with *Thalassia testudinum* seagrass beds in Terminos Lagoon.

Excorallana warmingii (Hansen 1890)
Fig. 9 a-c

Material examined. No material available in collections in Mexico.

Diagnosis. Eyes large, semispherical, contiguous, most of surface of head; males and females without cephalic horns; telson without notches on lateral margins, dorsal surface smooth. Frontal lamina elongate, distal end narrowing and ending in a sphere.

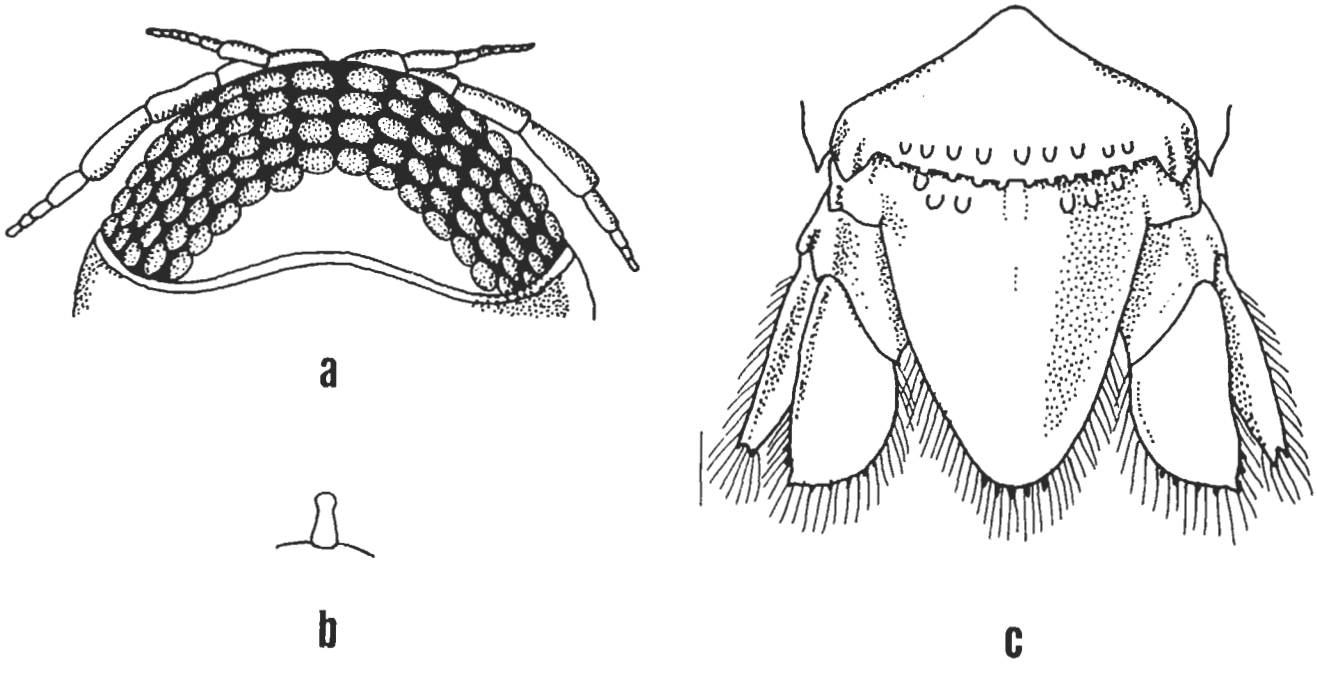

Figure 9. ***Excorallana warmingii*** **(Hansen 1890): a, cephalon; b, frontal lamina; c, telson (after Richardson 1905).**

Distribution. Off Cape Catoche, Yucatan (Richardson 1905), Caribbean (Delaney 1989).

Excorallana sp.
Fig. 10 a-c

Material examined. EM-7601 ov L:9.4, W:2.8.
Diagnosis. Eyes large, not contiguous, separated by less than 0.25 the length of an eye; female without cephalic horns or tubercles; telson with lateral notches, dorsal surface smooth. Frontal lamina elongate, narrowing distally, ending in a triangular tip.

Occurrence. Puerto Morelos, Quintana Roo.

Ecological Notes. Occurs in shallow water at 1.5m depth, associated with coral.

Remarks. The ovigerous female of *Excorallana* sp., occurring in Puerto Morelos is an isolated record requiring more material to be described as a new species. Affinities to the existing species of *Excorallana* are its resemblance to *E. acuticauda* in the lack of cephalic tubercles, the presence of large eyes separated by less than half an eye-length, and the presence of lateral notches on the telson. The female differs from *E. acuticauda* in the smooth dorsal surface of the pleonites, the absence of the median longitudinal depression and the two proximal tubercles on the telson, the shape of the frontal lamina, and the larger eyes. The texture of the dorsal surface of the pleonites has been considered important and has previously been recognized in subspecies differentiation even to its high degree of variability (Bowman 1977; Menzies and Kruczynski 1983). Comparing the female *Excorallana* sp. with females of *E. acuticauda*, the authors discard the possibility that the characters of the former could belong to a juvenile form due to the size and ovigerous state of the specimen, suggesting that it could be a new species.

The following identification key is provided for the seven *Excorallana* species recorded from eastern Mexican waters.

1. Eyes contiguous 2
   Eyes separated, large or medium in size 3
2. Telson with lateral notches ..... *E. oculata*
   Telson without lateral notches ..... *E. warmingii*
3. Eyes large; distance between them half or less the length of an eye 4
   Eyes medium sized; distance between them greater than the length of an eye 5
4. Pleotelson with two submedian tubercles proximally; distance between eyes almost half the length of an eye ..... *E. acuticauda*
5 Telson without lateral notches; adult male with 3 cephalic horns, rostral horn cylindrical; adult female with cephalic tubercles in same position as male horns ..... *E. delaneyi*
   Telson with lateral notches 6
6. With cephalic horns (males) or tubercles (females) 7
   Without cephalic horns or tubercles; only females known ..... *E. subtilis*
7. Male with 3 cephalic horns, rostral horn wide at base and concave; female with slightly developed cephalic tubercles in same position as horns in male ..... *E. tricornis tricornis*
   Male with four cephalic horns, larger ones between eyes, two smaller ones in anterior position, small horns on base of antennular peduncle; female with four small tubercles slightly developed between eyes ..... *E. sexticornis*

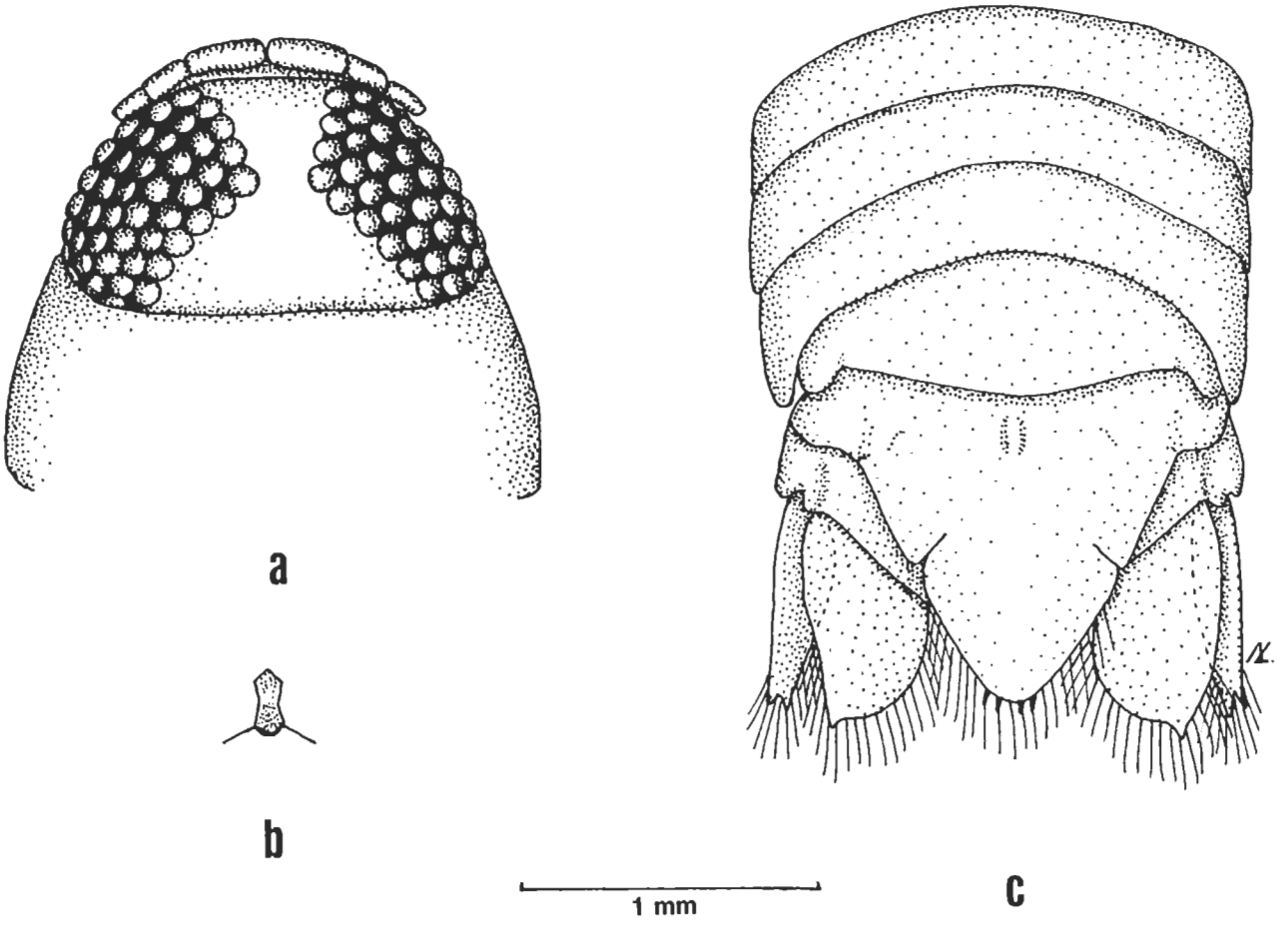

Figure 10. ***Excorallana*** **sp.: a, cephalon; b, frontal lamina; c, telson**

Discussion

Twenty-two species of the genus *Excorallana* have been described for the tropical western Atlantic and eastern Pacific, of which only 20 were included in the revision of the family Corallanidae by Delaney (1989). *Excorallana bicornis* (Lemos de Castro and Lima 1971) was omitted in that list and is herein included as an additional species occurring in the western Atlantic. Occurrence of the genus in the Gulf of Mexico, following Antoine's (1972) subdivision of the Gulf, has been recorded for *E. acuticauda* (Clark and Robertson 1982; Menzies and Kruczynski 1983), *E. delaneyi* (Stone and Heard 1989), *E. mexicana*, *E. tricornis tricornis* (Menzies and Kruczynski 1983), *E. warmingii* (Richardson 1905) and *E. sexticornis* (Rouse 1969). The new records herein extend the range of *E. delaneyi* south in the Gulf of Mexico and increase the number of species occurring in this region to eight with the new reports of *E. oculata* and *E. subtilis* in the Gulf.

Distribution of these species is probably habitat-selective, since most occur in reef patches in the Gulf as well as in seagrass beds. The inclusion of some of the species in the southwestern Gulf of Mexico can be explained by the parasitic behavior reported for *E. tricornis tricornis* (Delaney 1984) and *E. berbicensis* (Stone and Heard 1989) and may follow the distribution patterns of host fish. Western Atlantic species fall into two groups: a southern group of seven species restricted to the Brazilian coast and part of the Caribbean, and a northern group of 10 species distributed in the Gulf of Mexico, the West Indies and the Caribbean. The geographical distribution of these groups shows a diffused pattern probably related to direct development, besides the geographical barriers.

Acknowledgments

The authors wish to express their appreciation to Dr. Thomas E. Bowman of the Smithsonian Institution, Dr. Richard C. Brusca of San Diego Natural History Museum, Dr. Richard Heard of Gulf Coast Research Laboratory, and Dr. Luis A. Soto and Biól. José Luis Villalobos of UNAM for their critical reviews on an earlier version of this manuscript. Gratitude is expressed to Patricia Flores, Enrique Lira, Juan Carlos Nates, Patricia Schmitsdorf, Ma. Dolores Valle, Bruno Gómez and the Benthic Ecology Lab for their support in the field. This research was sponsored by CONACyT project PCCNCNA-031542 and DGAPA-208089. This is Contribution No. 678 from the Instituto de Ciencias del Mar y Limnología.

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