BULLETIN DE L'INSTITUT ROYAL DES SCIENCES NATURELLES DE BELGIQUE, BIOLOGIE, 73: 81-90, 2003
BULLETIN VAN HET KONINKLIJK BELGISCH INSTITUUT VOOR NATUURWETENSCHAPPEN, BIOLOGIE, 73: 81-90, 2003

A new genus of stygobitic/troglomorphic cirolanid (Isopoda: Cirolanidae) from a "blue hole" cave in the Bahamas

by Lazare BOTOSANEANU & Thomas M. ILIFFE

Abstract

From an inland "blue hole" cave on Norman's Pond Cay (Exumas, Bahamas) one female specimen of a remarkable new stygobitic/troglomorphic cirolanid has been caught, which is here described as *Exumalana reptans* n.g. n.sp. A combination of numerous characters, especially of antennal, pereiopodal, pleopodal, and tail-fan morphology, distinguishes the new genus from all hypogean cirolanids already described, its affinities being for the time being unclear. Moreover, the behaviour of the new species seems to be original.

Key-words: Isopoda Cirolanidae, stygobitic/troglomorphic fauna, Bahamas, taxonomy.

Résumé

Un exemplaire femelle d'un remarquable cirolanide stygobie/troglomorphe a été capturé dans une grotte du type "blue hole" creusée à l'intérieur de Norman's Pond Cay (Exumas, Bahamas). Celui-ci est decrit comme *Exumalana reptans* n.g. n.sp. Le nouveau genre se distingue de tous ceux de Cirolanidae souterrains decrits à ce jour, par la combinaison de nombreux caractères surtout de morphologie des antennes, des pereiopodes, des pleopodes, du pleotelson et des uropodes; les affinités du nouveau genre restent pour l'instant obscures. Le comportement de la nouvelle espèce semble être original.

Mots-clés: Isopoda Cirolanidae, faune stygobie/troglomorphe, Bahamas, taxonomie.

Introduction

During exploration by diving (2002) in caves of the Exumas (Bahamas) the 2nd author has rediscovered two cirolanid species already described: *Cirolana (Cirolana) troglexuma* BOTOSANEANU & ILIFFE, 1997 has been caught (1 ♀ 14.VIII.2002) in the type locality: Oven Rock Cave, Great Guana Cay; and 1 ♂ of *Bahalana yagerae* (CARPENTER, 1994) has been caught (9.VIII.2002) in a new locality for the species: Basil Minn's Blue Hole, Great Exuma. However, the most interesting discovery of Cirolanidae during this field work campaign has been that of a remarkable new genus which will be described below.

Diagnosis of *Exumalana* n.g.

A small, entirely depigmented, anophtalmous cirolanid, able to a limited extent to roll its body. Cephalon transversely oval. Pleon short, from 5 distinct segments. Pleotelson large, almost semicircular in outline, very strongly vaulted, only with minute setulae on distal margin. AI and AII short, AII even slightly shorter than AI, peduncle of both AI and AII from 4 articles. Molar lobe of mandibles distally with perfectly marginal row of denticles, proximally with long row of cilia; left mandible with strong sclerotized element at external end of spine row of plump spinose lobe. Lateral lobe of maxilla I ending in complex of 3 dark "teeth". Pereiopods I and II similarly prehensile (without exceedingly strong propodi), in strong contrast with ambulatory pereiopods III-VII which are basically similar; unguis of all pereiopods with a pair of secondary unguis. All pleopods with protopodites transversely elongate; only endopodites I and II (very scarcely) setose; exopodites III-V entirely bipartite, setation of endopodites IV and V very scarce. Uropods completely ankylosed, shorter than pleotelson, almost entirely concealed under its vault; basipodite very thick – set, very scarcely armed; exopodite small, oval; endopodite much larger – only slightly shorter than basipodite – , nearly round; marginal armament of exo-and endopodite characteristic, strongly asymmetric.

Exumalana reptans n.sp.
(Figs 1-25)

LOCALITY AND MATERIAL

Female holotype (deposited in the crustacean collection of the Institut Royal des Sciences Naturelles de Belgique, Brussels, n° I.G. 29862) collected by Th. M. ILIFFE on 15.VIII.2002 in Norman's Pond Cave, Norman's Pond Cay, Exumas, Bahamas, from the rock wall of the first room of this inland "blue hole" cave, in some 8m. depth. The water in Norman's Pond Cave is completely marine: at high tide seawater flows directly into the cave. A profile map of the cave has been published in KORNICKER & ILIFFE, 1998.

Fig. 1. *Exumalana reptans* n.g. n.sp., electronic photo of the live ♀ holotype (taken with a Nikon Coolpix 5000 digital camera through a Leica S6D trinocular dissecting microscope).

DESCRIPTION

Fully extended the specimen measures 6.2 mm. It is completely depigmented, anophtalmous, devoid of tegumental relief. The habitus drawing made from the specimen in alcohol, shows that a limited capacity of rolling the body does exist.

Cephalon short but broad, roughly transversely oval, not entirely inserted into Ist pereional segment, with small pointed rostrum. Clypeus with tips protruding beyond labrum without leaning up against its sides; lamina frontalis strong, broadening distad, blunt ending. All pereional coxal plates are similarly oval and not ending in sharp points; from those of pereionites IV-VII there are strong projections directed ventrad, and placed cephalad from the roots of the pereiopods. Pleon short, from 5 free segments; in the partly rolled animal, pleonite I- although large – is mainly concealed under pereionite VII; tips of all pleonites small, rhombic, those of pleonite V concealed under pleonite IV (all tips concealed in the rolled specimen). Pleotelson large, almost semicircular in outline, very strongly vaulted; its distal margin is only minutely indented, and only armed with minute setulae.

Antenula and antenna both short, not reaching beyond posterior limit of IInd pereional segment, AII even slightly shorter than AI. AI peduncle with 4 articles (3d longest), all with plumose setae – not less than six on 2nd article; flagellum with 12 articles, articles 3-6 and 11 distally with one aesthetask, articles 7-10 with pair of aesthetasks. AII peduncle with 4 articles, art. 1-2 similarly short, art. 3 longer, art. 4 longest, not less than six plumose setae distally on art. 4; flagellum with 14 articles, 1st one longest, all with distal tuft of short setae.

Acies of right and left mandible very dissimilar; in both mandibles molar lobe characterized: distally by long, perfectly marginal row of rather large denticles, and proximally by long row of cilia; in the left mandible the "plump spinose lobe" shows – as externalmost element of the spine row – a strong, sclerotized "tooth".

Maxilla I: lateral lobe with well individualized tip consisting of three sclerotized (dark, glabrous) teeth placed in a ventral plane, lobe margin armed with 9 finely pectinate setae; endite very strongly clavate, its four apical setae circumplumose.

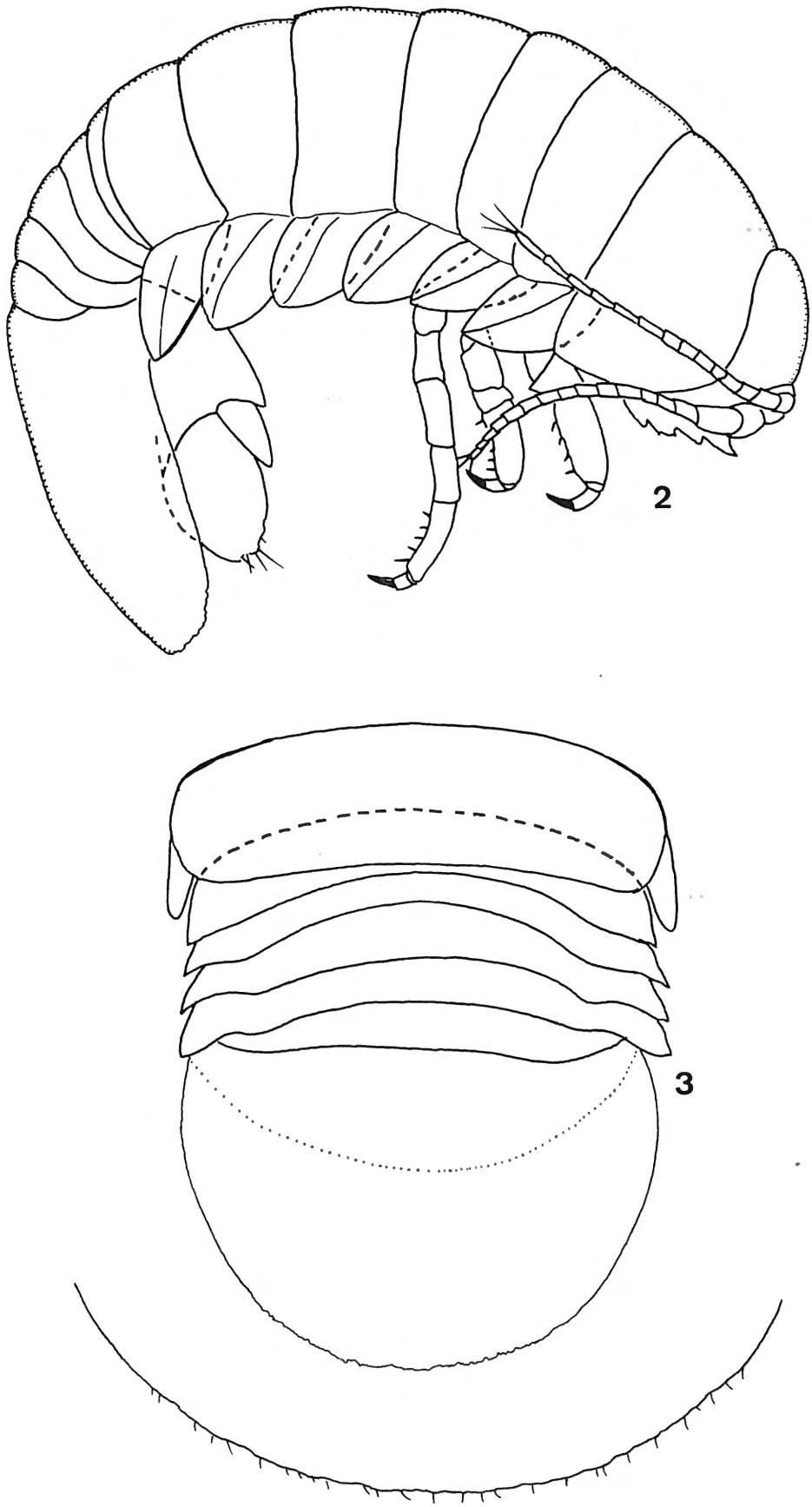
Maxilla II: external lobe with some 7 finely pectinate setae, median lobe with 11 setae- 5 external ones finely pectinate, remaining ones very shortly plumose –, large, twisted internal lobe with about 16 circumplumose setae.

Maxilliped: masticatory lobe (perpendicularly fastened to palp surface) with 2 coupling hooks and 5 plumose setae – two of them apical.

The essential trait of the pereiopodal morphology is the strong contrast between the raptorial PI-II and the ambulatory PIII-VII. PI and PII, strongly armed and strong, despite the fact that their propodi are not excessively broadened, are very similar, the most marked difference between them being in the shape of carpus (triangular in PI, rectangular in PII). PIII-VII are all very similar, although they become progressively longer (ischium and propodus being mainly responsible for this). Three elements are characteristic for *all* pereiopods: short dactyli, unguis accompanied by a pair of secondary unguis, short pectinate spines with annex seta being the dominant element of the armament.

Pleopod protopodites all strongly elongate transversely, the number of their coupling spines decreasing in the series. Endopodites strongly increasing in size in the series, those of Pl. I and II with only three apical setae, remaining ones glabrous. Exopodites large; setation relatively scarce on those of Pl I-III, reduced to some 6 setae on Pl IV, and to only two on Pl V.

The uropods, shorter than the pleotelson, are completely ankylosed (natatory function certainly lost); they are tightly rooted inside the pleotelson vault, and almost completely concealed under this vault; basipodite very thick-set, apico-internal angle scarcely developed, apico-external angle developed as rather large blunt projection, only a few short spines along external margin; exopodite small (2/3 of the length of the endopodite), perfectly oval; endopodite much larger, roughly round in outline; the characteristic marginal armament of exo-and endopodite needs no description, being illustrated in detail (rather surprising is the presence on the dorsal surface of the endopodite of only one plumose seta).



Figs 2-3. *Exumalana reptans*, habitus of ♀ holotype, and dorsal view of pereionite VII, pleon, and pleotelson (with strongly magnified distal margin).

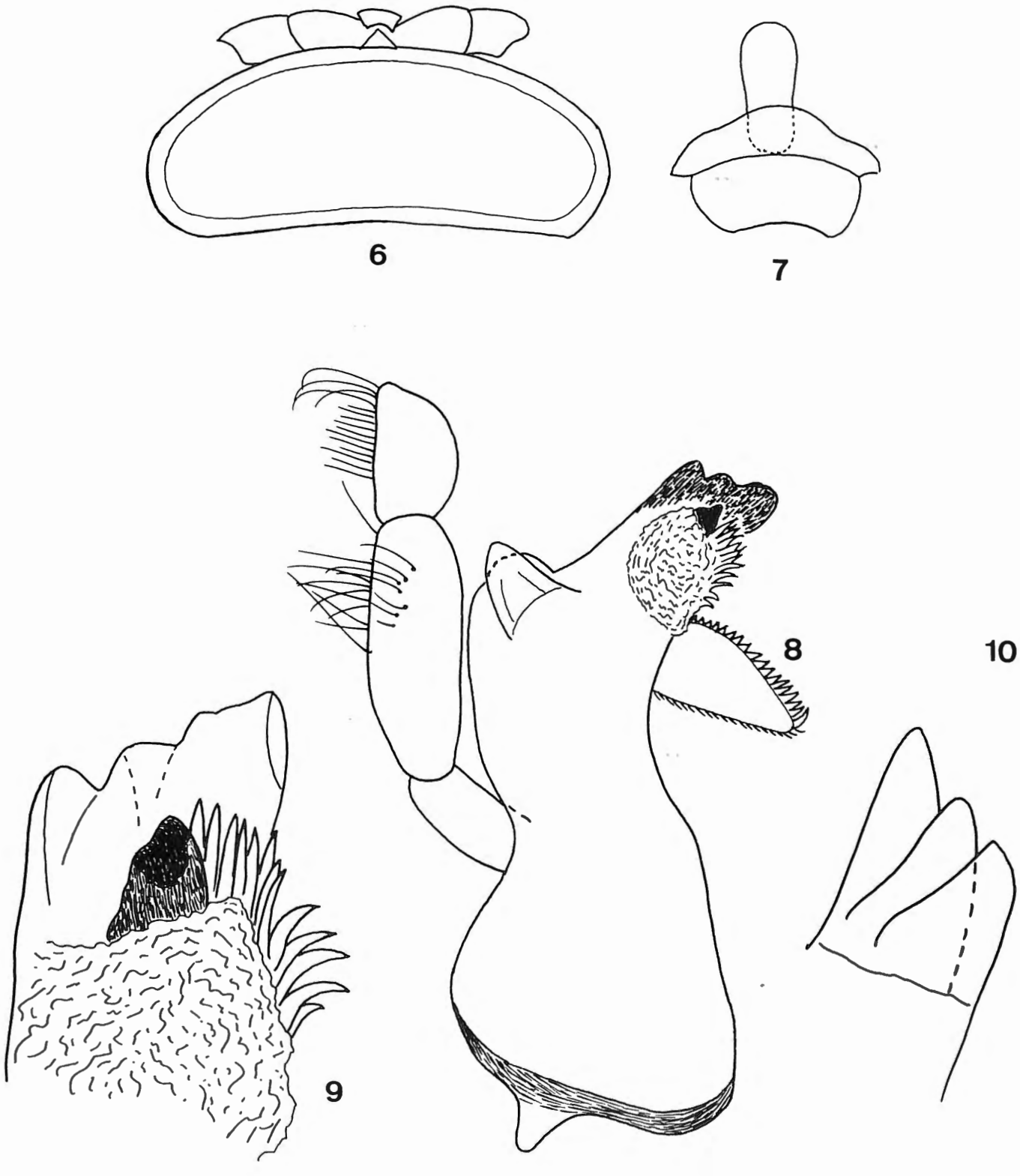
Figs 4-5. *Exumalana reptans*, left AI and AII (same scale).

AFFINITIES

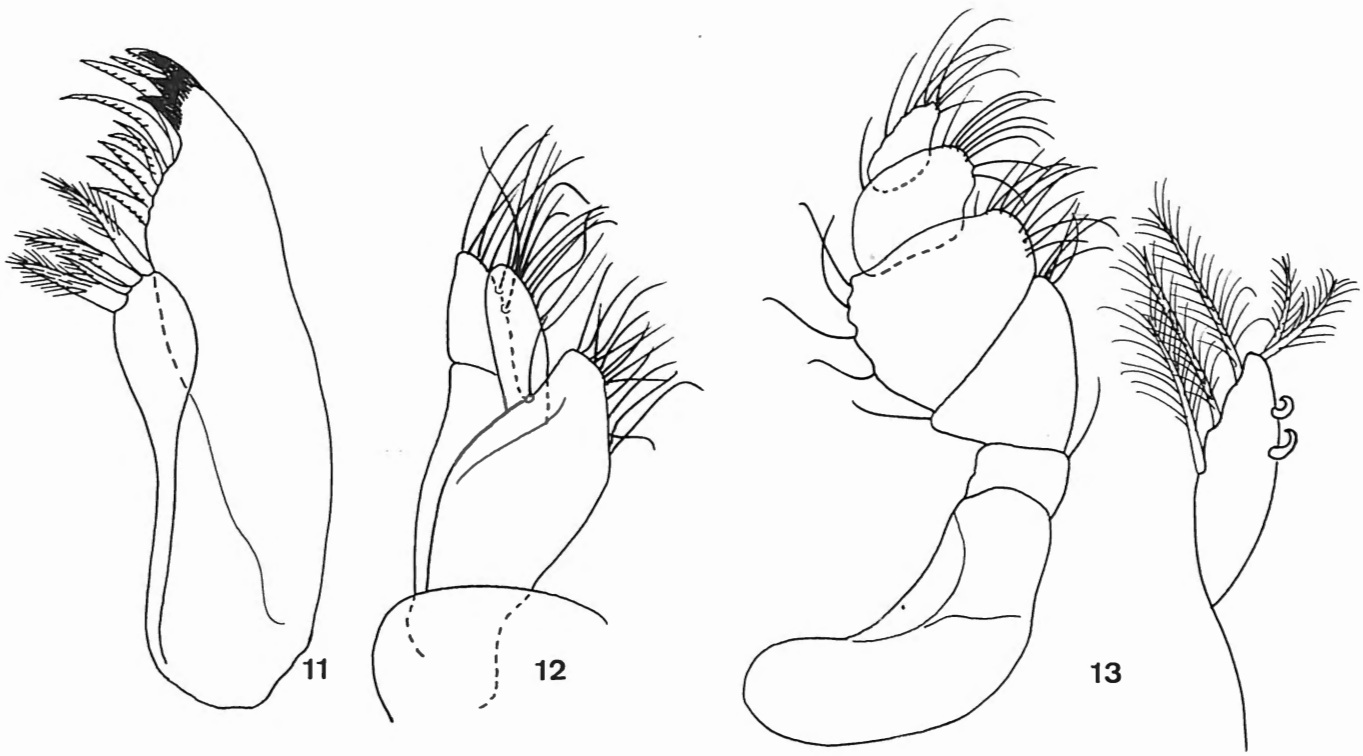
Careful comparison with all described genera of (or at least including) subterranean Cirolanidae – as listed in BOTOSANEANU, BRUCE & NOTENBOOM (1986), or in BOTOSANEANU (2001: 38) – shows that it would be quite artificial to "push" the new species into one of them. Of course, some morphological details are shared with species belonging to one or another of already described genera. Nevertheless, the combination of numerous characters as detailed in the diagnosis (some of them of paramount importance, concerning antennae, pereiopods, pleopods, tail-fan ...) is evidence that we have here a well defined genus of obscure affinities. It seems improbable that convincing evidence will be found in the future for kinship with some marine, non troglomorphic genus.

BEHAVIOUR

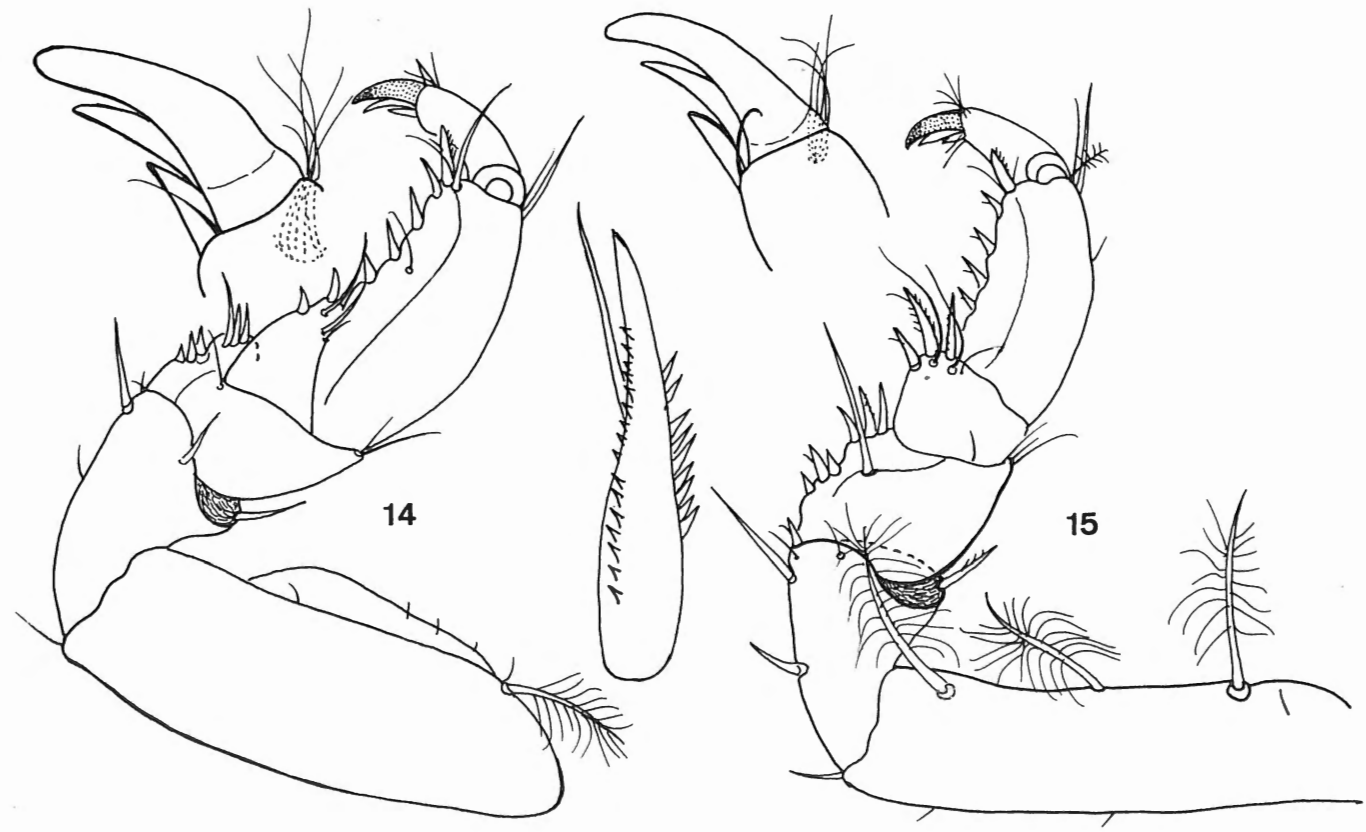
The 2nd author has been diving in Norman's Pond Cave on numerous occasions during several years, but the holotype of *Exumalana reptans* n.g. n.sp. is the only isopod specimen having been seen there. The specimen has been collected from the rock wall of the cave where it was moving in and out small holes in the bedrock – a behaviour in contrast with that of most other Bahamian cave isopods which are found either swimming in the water column, or skimming across bottom



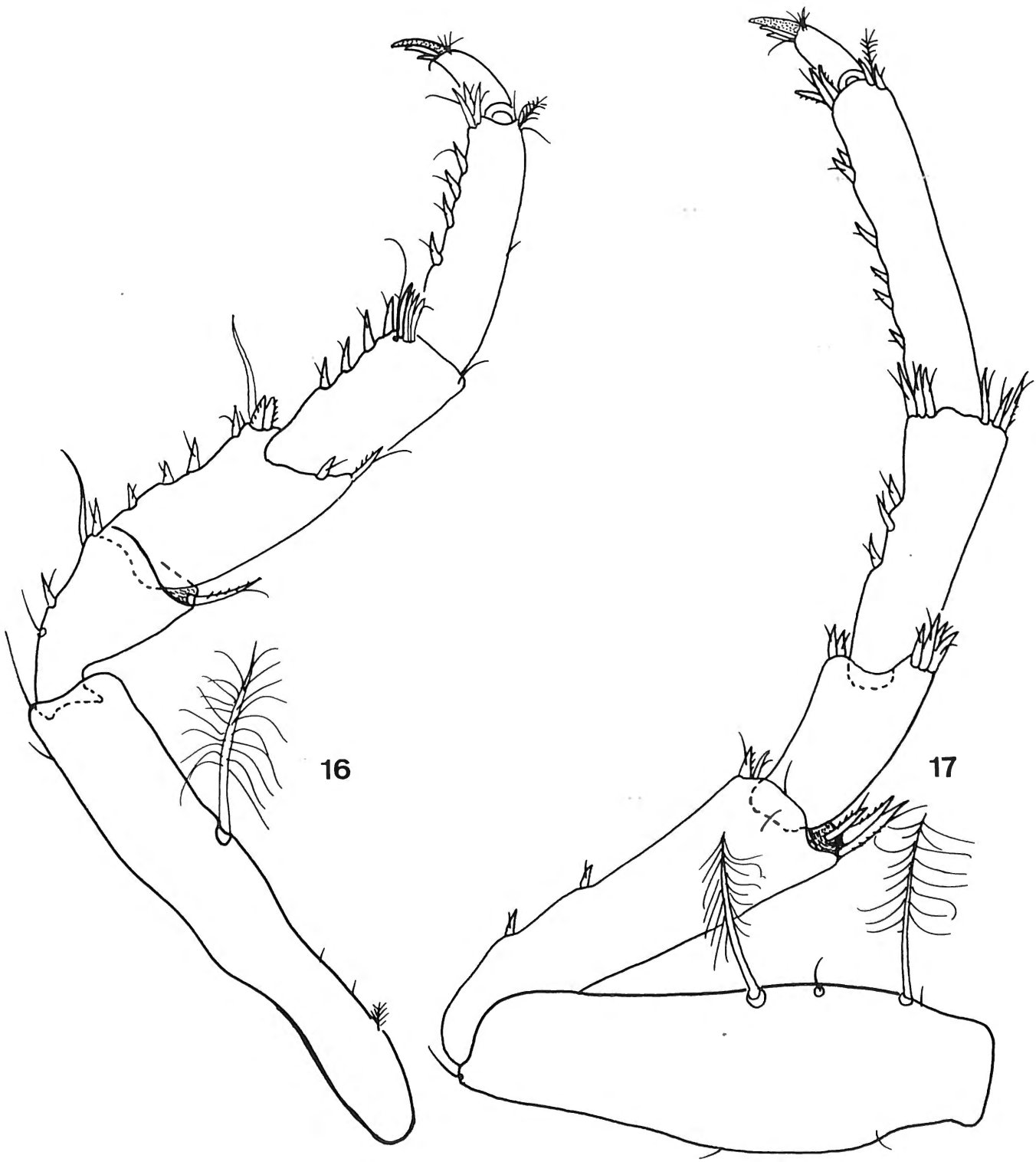
Figs 6-10. *Exumalana reptans*. 6. Cephalon. 7. Clypeo-labrum with lamina dorsalis. 8. Left Mdb., dorsal. 9. More strongly magnified acies of left Mdb. with the "plump spinose lobe". 10. Acies of right Mdb. (same scale, and in exactly the same position as that in fig. 9).



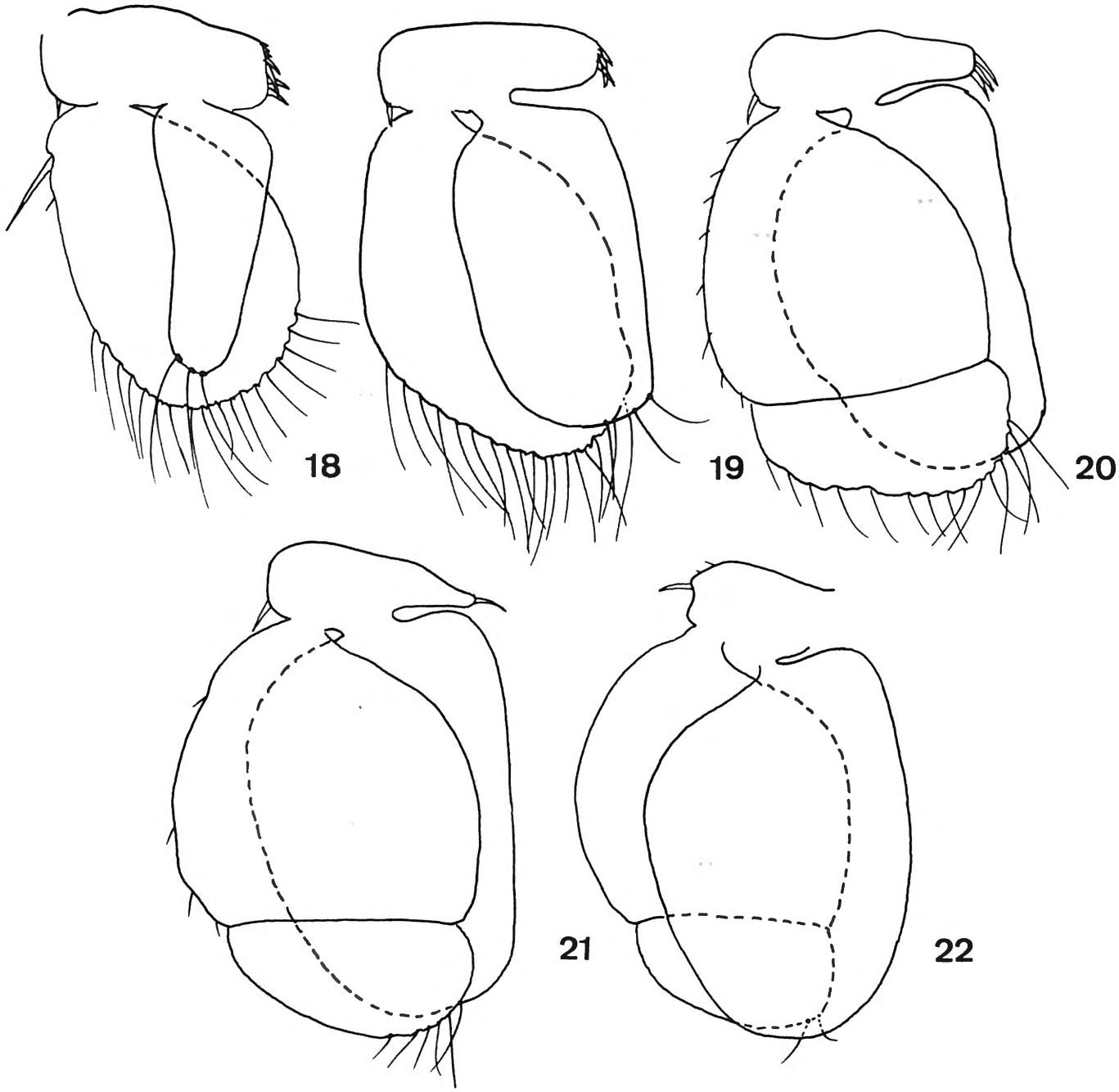
Figs 11-13. *Exumalana reptans*. 11. Left MxI, ventral. 12. Left MxII, dorsal. 13. Left Mxp., dorsal, with its endite (masticatory lobe) slightly more strongly magnified.



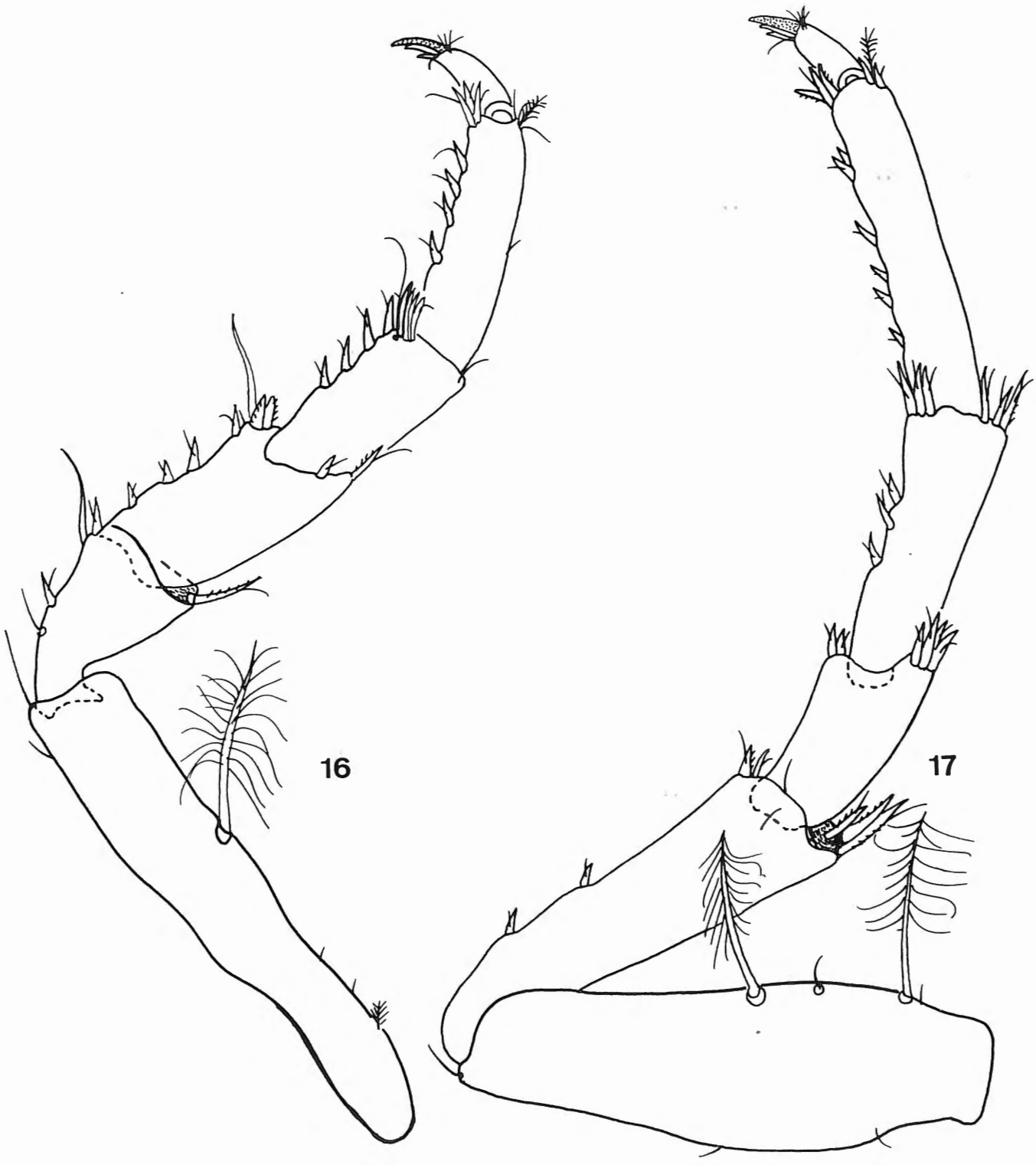
Figs 14-15. *Exumalana reptans*, left gnathopod and pereiopod II (same scale), both with more strongly magnified unguis; between them, a strongly magnified pectinate spine, most characteristic element of their armament.



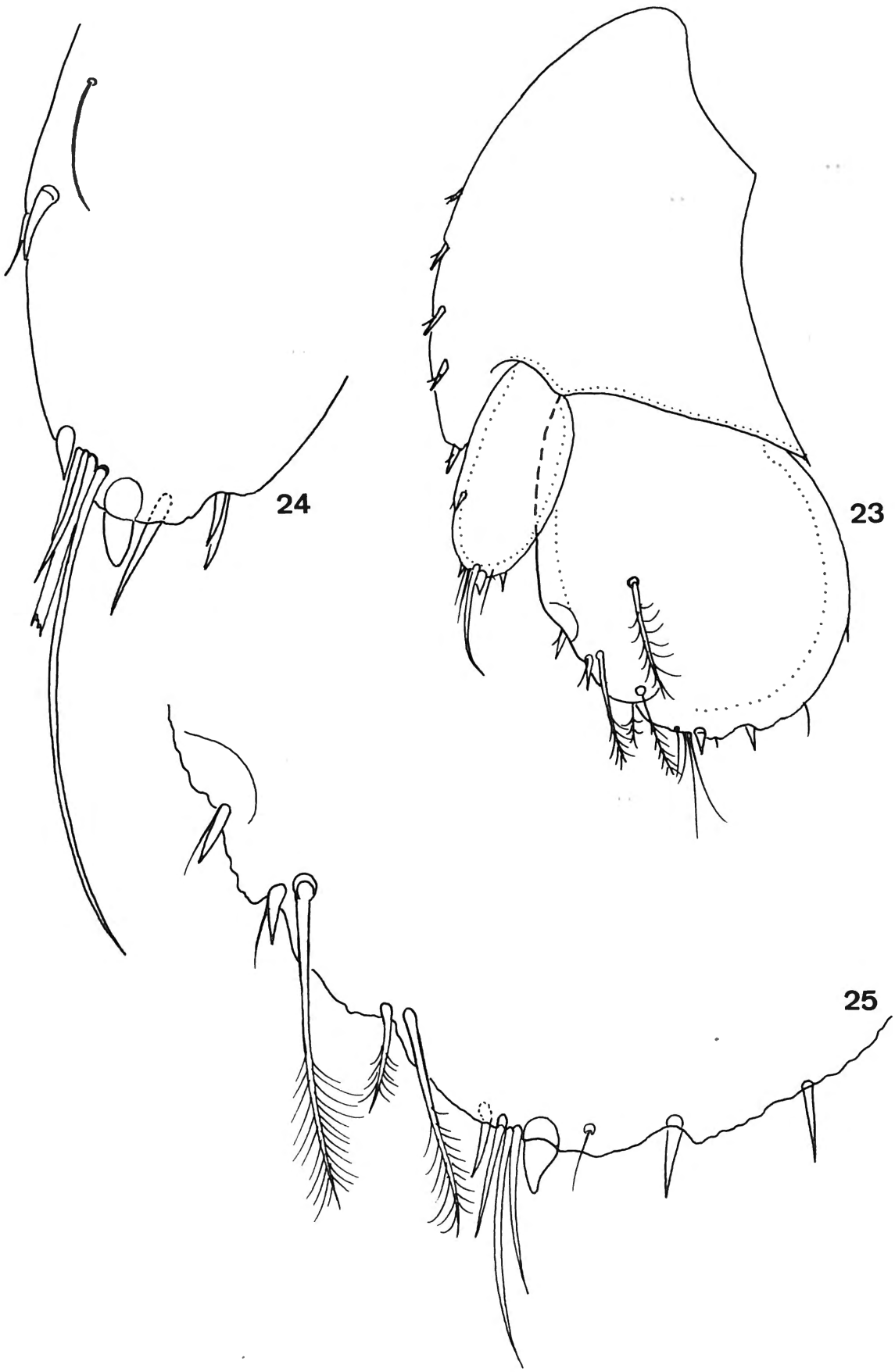
Figs. 16-17. *Exumalana reptans*, left pereiopods III and VII (same scale).



Figs. 18-22. *Exumalana reptans*, the pleopods (all same scale). 18-19. Left Pl. I and Pl. II, dorsal. 20-21. Right Pl. III and Pl. IV, ventral. 22. Left Pl. V, dorsal.



Figs. 16-17. *Exumalana reptans*, left pereiopods III and VII (same scale).



Figs. 23-25. *Exumalana reptans*. 23. Left uropod, dorsal. 24. More strongly magnified apex of uropod exopodite. 25. More strongly magnified disto-external margin of endopodite.

sediments. The specific name alludes to the creeping behaviour of the species.

Acknowledgement

The Ms of this paper has been typed by Mrs Liesbeth VERMEULEN.

References

BOTOSANEANU, L., BRUCE, N. & NOTENBOOM, J., 1986. Isopoda: Cirolanidae. In: BOTOSANEANU, L. (Ed.), Stygofauna Mundi, E.J. Brill, Leiden: 412-422.

BOTOSANEANU, L., 2001. Morphological rudimentation and novelties in stygobitic Cirolanidae (Isopoda, Cymothoidea). *Vie et Milieu*, 51(1-2): 37-54.

KORNICKER, L.S. & ILIFFE, T.M., 1998. Myodocopid Ostracoda (Halocypridina, Cladocopina) from anchialine caves in the Bahamas, Canary Islands, and Mexico. *Smithsonian Contributions to Zoology*, 599: 1-93.

Lazare BOTOSANEANU
Zoölogisch Museum
Universiteit van Amsterdam
Plantage Middenlaan 64
1018 DH Amsterdam
The Netherlands

Thomas M. ILIFFE
Department of Marine Biology
Texas A & M University at Galveston
Galveston, Texas 77553-1675
U.S.A.