PROC. BIOL. SOC. WASH.
100(3), 1987, pp. 659–663

BAHALANA MAYANA, A NEW TROGLOBITIC CIROLANID ISOPOD FROM COZUMEL ISLAND AND THE YUCATAN PENINSULA, MEXICO

Thomas E. Bowman

Abstract.—*Bahalana mayana* is described from two anchialine caves, Cueva Quebrada on the island of Cozumel, and Temple of Doom Cave on the adjacent Yucatan Peninsula near Tulum. It differs from the two known species, both from the Bahamas, *B. geracei* Carpenter from San Salvador Island, and *B. cardiopus* Notenboom from Mayaguana Island, in the ventrally projecting clypeus, pereopods 1–3 lacking the long processes on the merus and carpus, the armament of pleopods 3–5, and the narrow exopod of the uropod.

The genus *Bahalana* was proposed by Carpenter (1981) for an unusual troglobitic cirolanid isopod, *Bahalana geracei,* from the anchialine Lighthouse Cave on San Salvador Island, Bahamas. About 50 pages later in the same journal, a second very similar species, *B. cardiopus,* was described by Notenboom (1981) from Mount Misery Cave, Mayaguana Island, Bahamas. San Salvador and Mayaguana, both in the Bahama archipelago, are separated by about 250 km. Some 1300–1400 km to the southwest, a third species of *Bahalana,* described below, has now been discovered in anchialine caves on the island of Cozumel and the adjacent mainland of the Yucatan Peninsula near Tulum, Quintana Roo, Mexico.

Bahalana mayana, new species
Figs. 1–2

Material.—Mexico, Quintana Roo, Cozumel Island, Cueva Quebrada, leg. Dennis Williams and Jeffrey Bozanic, 19 Sep 1985, 1 ♀ 7.9 mm, USNM 233292; 1 ♂ 4.5 mm, USNM 233300.—Leg. Dennis Williams, 13 Jun 1986, 3 ♂ 5.9, 8.0, 8.2 mm, 1 ♀ 8.5 mm, 1 juv. 3.7 mm; 14 Jun 1986, 1 ♂ 10.0 mm (holotype), USNM 233298; 16 Jun 1986, 1 ♂ ca. 9.4 mm (head detached), USNM 233293; 17 Jun 1986, 1 ♂ 9.6 mm, 4 ♀ 8.2, 8.3, 8.4, not measured (dissected, larger than others), USNM 233295.—Tulum area, Temple of Doom Cave, leg. Dennis Williams, 20 Jun 1986, 1 ♂ 6.6 mm, USNM 233296.—Leg. Thomas M. Iliffe, 10 Nov 1986, 1 ♂ 6.4 mm, USNM 233299. All specimens except the holotype are paratypes.

Etymology.—Named for the Maya, native people of the Yucatan region.

Diagnosis.—*Bahalana mayana* is distinguished from its two congeners by the acutely produced clypeus, the long segment 2 of antenna 1, the fewer flagellar segments in antenna 1 and 2, the long subapical seta on the mandibular palp segment 2, the short segment 4 of the maxillipedal palp, the morphology of pereopods 1–3, and the narrow exopod of the uropod. The principal differences between the three species are set forth in Table 1.

Habitats.—For the following information on the caves inhabited by *Bahalana mayana* I thank Dr. Thomas M. Iliffe and Ms. Jill Yager.

Both Temple of Doom Cave and Cueva Quebrada, as well as numerous other caves in the region, were formed by the mixing of fresh ground water with subterranean Caribbean seawater in a highly reactive geochemical zone that produced enhanced carbonate dissolution (Back et al. 1986). Thus

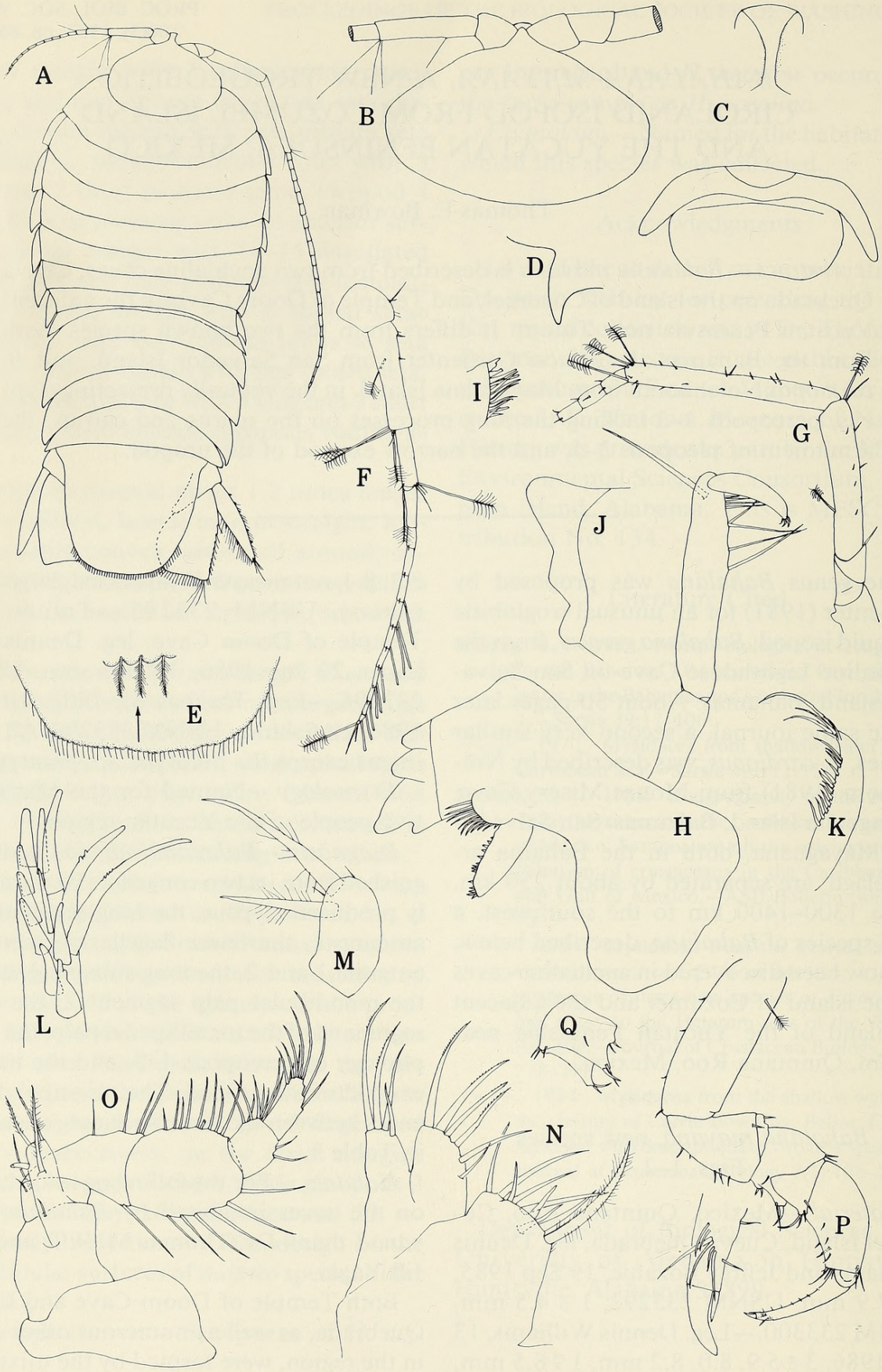

Fig. 1. *Bahalana mayana*: A, Habitus, dorsal; B, Head, dorsal; C, Frontal lamina, clypeus, and labrum; D, Clypeus, lateral; E, Posterior margin of telson; F, Antenna 1; G, Antenna 2, proximal segments; H, Right mandible; I, Lacinia of left mandible; J, Incisor of left mandible; K, 3rd segment of mandibular palp; L, Maxilla 1, apex of exopod; M, Maxilla 1, endopod; N, Maxilla 2; O, Maxilliped; P, Pereopod 1, lateral; Q, Pereopod 1, merus and carpus, medial.

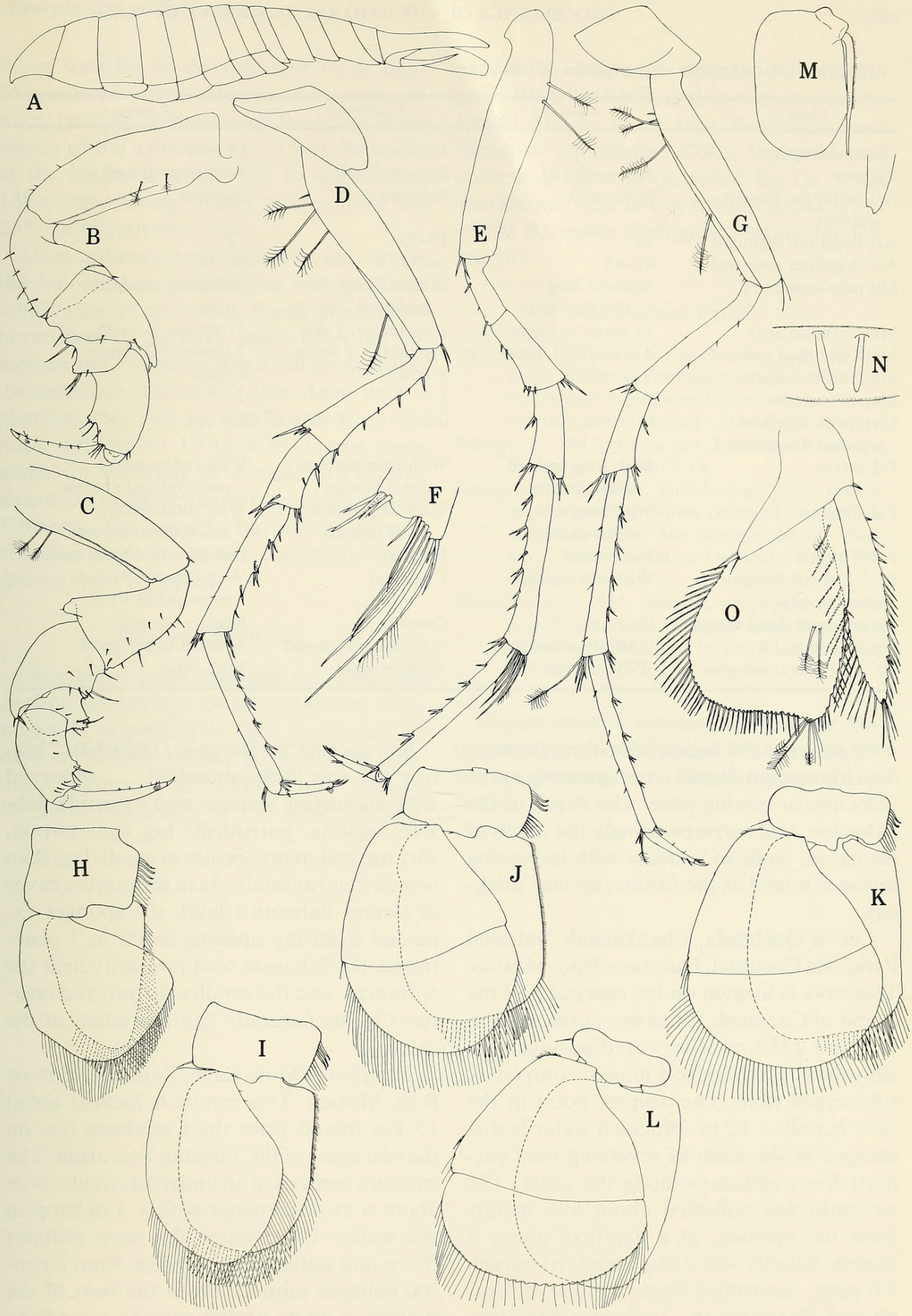

Fig. 2. *Bahalana mayana*: A, Habitus, lateral; B, Pereopod 2; C, Pereopod 3; D, Pereopod 5; E, Pereopod 6; F, Pereopod 6, distal end of carpus; G, Pereopod 7; H–L, Pleopods 1–5, ♀; M, Endopod of pleopod 2, ♂, setae omitted; N, Penes; O, Uropod, dorsal.

Table 1.—Characteristics of the species of *Bahalana*.

Character	*P. geracei*	*P. cardiopus*	*P. mayana*
Greatest length	15 mm	10 mm	10 mm
Clypeus	Not produced	Not produced	Acutely produced
A-1 peduncle, longest segment	Segment 3	Segment 3	Segment 2
A-1 flagellum segments	23	19–22	12
A-2 flagellum segments	40–45	ca. 32	ca. 22
Md palp segment 2	Without long subapical seta	Without long subapical seta	With long subapical seta
Mx-1 exopod apex	11 spine + 1 seta	10 spines + 1 seta	11 spines + 1 seta
Mx-1 endopod apex	4 spines + 1 setule	4 spines + 1 setule	2 spines + 2 setules
Mx-2 exopod apex	8 setae	8 setae	6 setae
Mxp retinacula	2	1	1
Mxp palp, length of segment 4/segment 3	0.7	0.8	0.4
P-1 merus	With long postero-distal process	With long postero-distal process	With rudimentary posterodistal process
P-2-3 merus	With long antero-distal process	With long antero-distal process	With rudimentary anterodistal process
P-4-7 unguis	Pectinate	Pectinate	Entire, with 2 basal spines
P1-3-5, distal margins of endopods	With a few setae	Unarmed	With setae in P1-3-4, unarmed in P1-5
Up endopod distal margin	Convex	Convex	Slightly concave
Up exopod width	½ width of endopod	½ width of endopod	⅓ width of endopod
Up rami lateral margins	Without setae	Without setae	With setae

most caves in the region have their primary development at depths corresponding to the halocline or mixing zone. The depth of the halocline, and correspondingly the depth of the caves, tends to increase with increasing distance inland as the freshwater lens thickens.

Cueva Quebrada, Chankanaab National Park, Isla Cozumel, Quintana Roo, Mexico: This cave is located on the east coast of the island of Cozumel. It has five surface openings and 2759 m of surveyed passage possibly making it Mexico's longest completely submerged cave. The deepest point in the cave is only −12 m. Brackish water is discharged in the form of reversing tidal currents from entrances along the coast. The cirolanid was collected about 800 meters from the opening, at a depth of about 5 meters. Salinity was 21‰; dissolved oxygen 3.0 ppm. Associated fauna include the amphipod *Bahadzia* sp., undetermined thermosbaenaceans, and *Procaris* sp.

As reported by Bozanic (1984:14), "Marine life was fairly abundant . . . observed were encrusting sponges and hydroids, lobsters, grunts, parrotfish, big eye, tarpon, shrimp, and many species of small (less than ¼ inch long) animals. As in the marine caves of Grand Bahama Island, the sponges extended from the opening as far as I penetrated, the fish were seen primarily near the entrances, and the smaller shrimp and creatures in the naturally lightless zones of the caves."

Temple of Doom Cave, Tulum, Quintana Roo, Mexico: This cenote is located about 15 km inland from the Caribbean Sea on the east coast of the Yucatan Peninsula. The entrance consists of an undercut circular hole about 6 m in diameter with a 3 m drop to the water. Underwater the cave radiates down and outward on all sides from a central collapse mound. From the base of the mound, a white-walled passage extends to a huge submerged chamber approximately

90 m long by 40 m wide and 10 m high. Maximum water depth was 18 m, with primary passage development occurring in the region of the halocline at −15 m. Salinities at the surface and at −18 m were 3 and 14‰, respectively. Water temperature was 25°C in November 1986.

Most animals were observed just above the halocline in oligohaline waters. Troglobitic species were only found in more remote areas of the cave, away from the numerous and voracious small fish present near the entrance. Collecting was done with a plankton net and suction bottle from the water column in 12 to 8 m depths using scuba. In addition to *Bahalana mayana,* specimens of the cirolanid *Creaseriella anops* (Creaser), the mysid *Antromysis* (*Antromysis*) *cenotensis* Creaser, amphipods, and shrimp were collected.

Acknowledgments

Once again I am indebted to skilful and resolute cave divers for the collection of remarkable isopods. For their successful efforts my sincere thanks go to Jeffrey Bozanic, Thomas M. Iliffe, and Dennis Williams. Collecting by Dr. Iliffe was supported by National Science Foundation grant BSR-8417494, and he was assisted by Dinah Drago, Juan José Fucat, Michael Madden, and James Coke; logistical and collecting aid was provided by Dr. John Markham. This is Contribution No. 1119 of the Bermuda Biological Station for Research.

Literature Cited

Back, W., B. B. Hanshaw, J. S. Herman, and J. N. Van Driel. 1986. Differential dissolution of a Pleistocene reef in the ground-water mixing zone of coastal Yucatan, Mexico.—Geology 14:137–140.

Bozanic, J. 1984. Caves of Cozumel.—Underwater Speleology 11(6B):12–14.

Carpenter, J. H. 1981. *Bahalana geracei* n. gen., n. sp., a troglobitic marine cirolanid isopod from Lighthouse Cave, San Salvador Island, Bahamas.—Bijdragen tot de Dierkunde 51(2):259–267.

Notenboom, J. 1981. Some new hypogean cirolanid isopod crustaceans from Haiti and Mayaguana (Bahamas).—Bijdragen tot de Dierkunde 51(2): 313–331.

Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C., 20560.