29 April 1988

PROC. BIOL. SOC. WASH.
101(1), 1988, pp. 221–226

TULUMELLA UNIDENS, A NEW GENUS AND SPECIES OF THERMOSBAENACEAN CRUSTACEAN FROM THE YUCATAN PENINSULA, MEXICO

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Abstract.—*Tulumella,* new genus, the sixth genus of Thermosbaenacea, with type species *T. unidens,* new species, is reported from Najaron Cave, near Tulúm, Quintana Roo, Mexico. It is characterized by having small non-functional eyestalks, a scale on antenna 2, mandibles that may lack a lacinia mobilis and have reduced molars, a biramous pereopod 1, and a reduced pleopod 2. The family Monodellidae is recognized as valid, and a key is given to the families and genera of Thermosbaenacea.

In November 1986 the second author made collections in nine caves and cenotes on the Yucatan Peninsula, Mexico, mostly in the vicinity of the ancient Mayan city of Tulúm. From one of these caves he obtained three specimens of the new thermosbaenacean described below.

Order Thermosbaenacea Monod, 1927
Family Monodellidae Taramelli, 1954

Telson separate from pleonite 6. Seven pairs of pereopods present. Maxilliped of ♂ with or without endopod.

Tulumella, new genus

Diagnosis.—Small eyestalks present, without visual elements. Antenna 1 long, with up to 18 flagellar segments. Antenna 2 with scale (exopod). Right or both mandibles without lacinia mobilis; molar slender, cylindrical; chewing surface divided into a few slender spiniform teeth. Maxilla 2 with 2 broad basal endites armed with spoon-shaped setae; exopod setose, inserted well lateral to endopod. Maxilliped with broad endopod and exopod, both with several marginal setae. Pereopod 1 biramous, endopod 5-segmented (including basis); pereopods 2–7 with 2-segmented exopod and 6-segmented endopod. Pleopod 1 a small pyriform unarticulated lobe; pleopod 2 articulated, elongate. Uropod exopod slightly longer than endopod; 1st segment slightly longer than 2nd.

Type species.—*Tulumella unidens,* new species.

Etymology.—From the ancient Mayan city of Tulúm, with the diminutive Latin suffix "ella."

Tulumella unidens, new species
Figs. 1–2

Material.—Mexico: Quintana Roo, near ruins of Mayan city of Tulúm: Najaron (Naharon) Cave, leg. T. M. Iliffe 11 Nov 1986 (collection no. 86-106), 3 specimens: holotype, 2.9 mm, USNM 233394; paratypes, 3.0 and 1.8 mm, USNM 233395.

Etymology.—From the Latin "uni-" (one) + "dens" (tooth), referring to the lack of a lacinia mobilis in both mandibles.

Diagnosis.—As for the genus.

Description.—Length up to about 3 mm (the 3 mm paratype is in 2 pieces; hence its measurement is approximate). Carapace covering pereonites 1–6. Eyestalks oval, close together, partly covered by carapace.

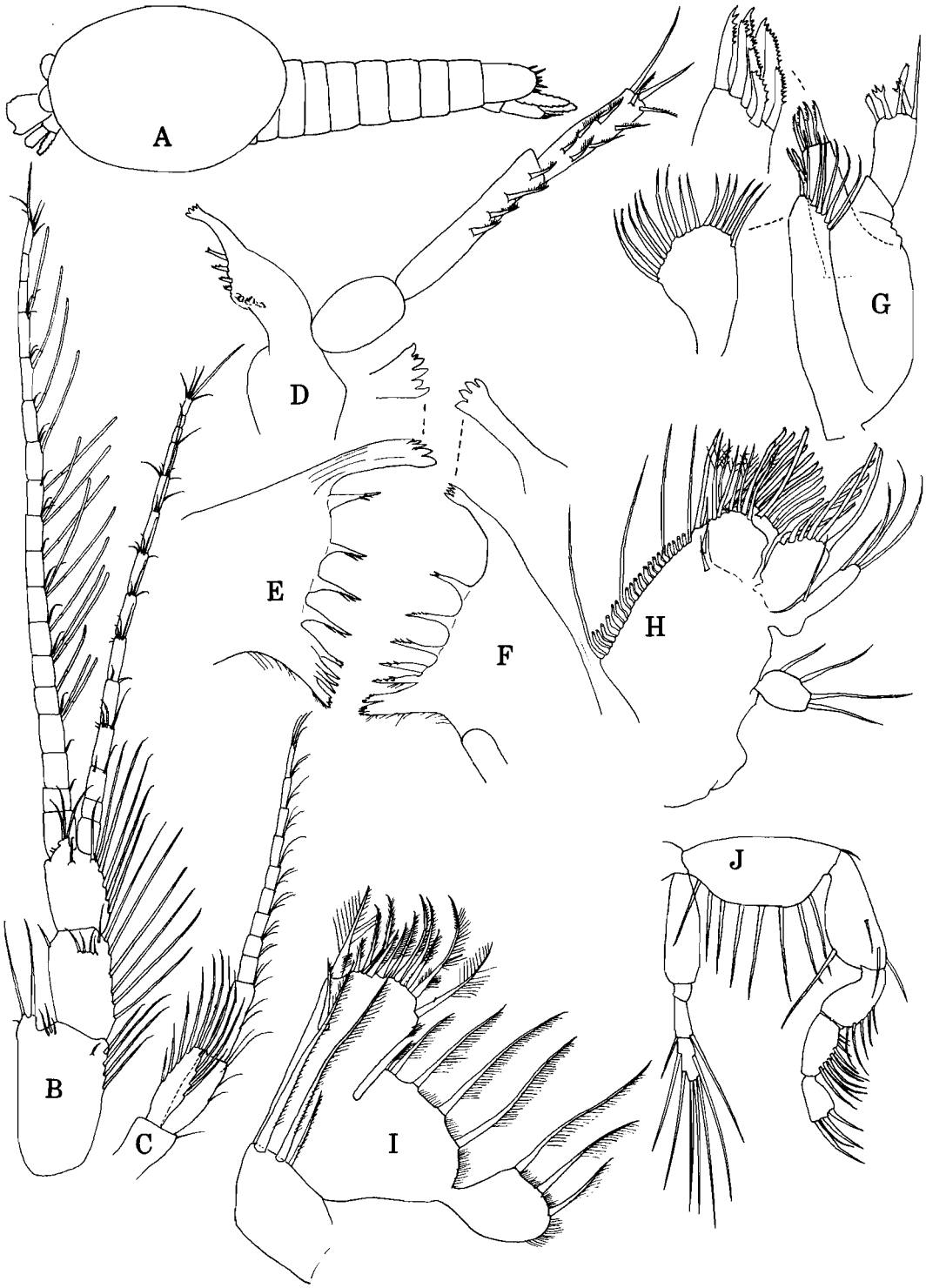

Fig. 1. *Tulumella unidens*: A, Habitus; B, Antenna 1; C, Antenna 2; D, Right mandible; E, Left mandible; F, Right mandible; G, Maxilla 1; H, Maxilla 2; I, Maxilliped; J, Pereopod 1.

Telson linguiform, ⅓ longer than wide; posterior margin with medial pair of short spines flanked by 2 pairs of distinctly longer spines.

Antenna 1 nearly ¾ length of body. Peduncle segments progressively shorter, armed medially with long setae; segment 1 with lateral flange produced distally into blunt process bearing 2 long setae, segment 3 with median distal process bearing 3 apical setae. Outer flagellum 18-segmented, segments 4–15 each with 1 or 2 long esthetes and 1 or 2 shorter curved setae. Inner flagellum about 0.7 length of outer flagellum, 14-segmented, each segment with several distal setae of varying lengths. Antenna 2 scale about 3.5× as long as wide, with 10 marginal setae; flagellum about half as long as inner flagellum of antennae 1, 10-segmented.

Incisor of mandible slender with long neck, left 6-cuspate, right 4-cuspate. Left spine-row with 8 spines, right with 6, gaps between spines decreasing toward molar. Segment 2 of mandibular palp with single row of 4 pectinate spines on distal half, segment 3 with double row of 3 pectinate spines (6 in all) and pair of longer naked apical spines.

Maxilla 1, coxal endite with 15 plumose setae; basal endite with 9 apical spines with denticulate medial margins; endopod (palp) 2-segmented, distal margin of 2nd segment armed with 2 tricuspid spines, 2 spatulate apically ciliate spines, and 1 naked seta. Maxilla 2 coxa with row of about 22 long setae on medial margin; coxal endite with about 9 marginal setae; basal endites with 11 and 6 spoon-shaped setae respectively; endopod subequal in length to basal endites but much narrower, armed with 1 seta on medial margin, 1 subapical seta, and 3 apical setae; exopod oval, with 4 marginal setae.

Coxa of maxilliped not produced into endite; distal margin with 2 long setae reaching distal margin of basal endite and lateral to them a seta about ⅓ as long. Basal endite with 13 setae on apical margin as shown in Fig. 1I and 1 surface seta near medial margin. Endopod a broad shallow lobe with 5 marginal setae. Exopod oval, with narrow base and 3 setae on apical margin.

Pereopod 1 basis expanded anteriorly, with row of long setae on anterior margin. Ischium ¾ length of basis, expanded anteriorly with 1 long seta on anterior margin. Merus and carpus with long setae on posterior (flexor) margin. Propus broadening distally; distal margin with 3 spiniform and 1 slender setae, largest (anterior) spiniform seta interpreted as dactyl.

Pereopods 2–7 of uniform structure (Fig. 2A). Flexor margin of dactyl with row of delicate peg-shaped spines on proximal half and minutely serrate apex.

Pleopod 1 a short pyriform lobe with very long apical seta. Right and left pleopods separated by distance equal to ⅔ length of apical seta. Near lateral margin of pleonite 1, a second pyriform lobe with 2 setae at apex, 1 on lateral margin, and 1 at base of medial margin. Posterior margin of pleonite 1 between 2 lobes armed with 4 short setae with swollen bases (Fig. 2C). It is not known whether pleopod 1 is represented by the medial lobe only or by both lobes plus the intervening setae.

Pleopod 2 a pair of elongate rami nearly 8× as long as wide inserted close together in an emarginate medial part of pleonite 2. Apex of ramus with apical seta more than 1.5× length of ramus; lateral margin with 5 setae, penultimate of which nearly as long as ramus.

Exopod of uropod about ¼ longer than endopod, 1st segment slightly longer than 2nd. Medial margin of 1st segment and both margins of 2nd and of endopod armed with plumose setae. Distolateral corner of 1st segment of exopod with 3 spines increasing in size distally and several setae as shown in detail of Fig. 2E. Telson about 1.4 as long as wide; posterior margin armed with 3 pairs of spines with lengths (anterior to posterior) $2 > 1 > 3$.

Comparisons.—The presence of a scale

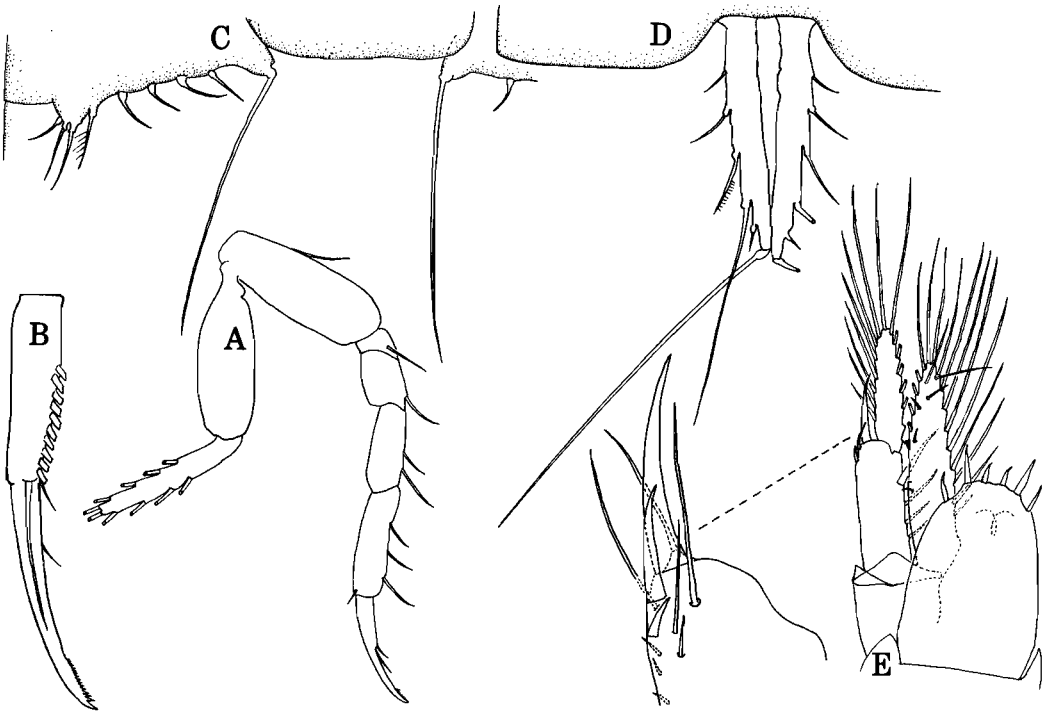

Fig. 2. *Tulumella unidens*: A, Pereopod 2; B, Pereopod 4 dactyl; C, Pleopod 1; D, Pleopod 2; E, Telson and uropod, dorsal.

on antenna 2 and the absence of a lacinia mobilis from both mandibles are unique features for *Tulumella*; the other features given in the diagnosis are shared with one or more of the other genera. However, undescribed species of *Tulumella* from the Bahamas have a lacinia mobilis on the left mandible (J. Yager, pers. comm.).

It is surprising that the family Monodellidae, proposed by Taramelli (1954), has not been recognized in subsequent works except those of Barker (1959) and McLaughlin (1980). Indeed, the family was overlooked by Bowman and Abele (1982) and Bowman and Iliffe (1986). In a recent list of all known Thermosbaenacea, Stock (1986) recognizes only one family, Thermosbaenidae Monod, 1927. However, we are convinced that the differences, given in the following key, are sufficient to merit the recognition of two families.

Key to the Families and Genera of Thermosbaenacea

1. Telson fused with pleonite 6. Maxilliped of ♂ without endopod. 5 pairs of pereopods ..... Thermosbaenidae Monod, 1927, *Thermosbaena* Monod, 1927
– Telson separate from pleonite 6. Maxilliped of ♂ with or without endopod. 7 pairs of pereopods ..... Monodellidae Taramelli, 1954 ... 2
2. Eyestalks lacking. Exopod of pereopod 6 and 7 1-segmented. Pleopods 1 and 2 with basal articulation, nearly as long as their pleonites .. .. *Monodella* Ruffo, 1949
– Eyestalks present. Exopod of pereopod 6 1- or 2-segmented. Pleopod 1 a small unarticulated lobe or absent 3

3. Antenna 2 with scale. Lacinia mobilis present in left mandible or lacking in both mandibles. Pereopod 7 exopod 2-segmented .... *Tulumella,* new genus
- Antenna 2 without scale. Lacinia mobilis present in left mandible. Pereopod 7 exopod 1- or 2-segmented 4
4. Pereopod 7 exopod 2-segmented .. .. *Halosbaena* Stock, 1976
- Pereopod 7 exopod 1-segmented .. 5
5. Pereopod 1 endopod ending in long acute spine, flanked by 2 short spines. Flagella of antenna 1 with 3 and 4 segments .... *Limnosbaena* Stock, 1976
- Pereopod 1 endopod ending in 3 digitiform spines. Flagella of antenna 1 with 14 and 29 segments .... *Theosbaena* Cals and Boutin, 1985

Habitat.—Najaron (Naharon) Cave is a completely underwater limestone cenote cave located about 8 km inland from the Caribbean Sea on the eastern coast of the Yucatan Peninsula (Coke & de Groot 1987). The spacious underwater entrance to the upstream, spring cave opens from the far side of a large open spring/siphon pool. The walls of the cave are stained black, as are the numerous underwater stalactites and stalagmites. Cave passages are primarily developed at the depth of the halocline, about −15 m. At the halocline, a highly reactive geochemical zone is produced by the mixing of fresh ground water with subterranean Caribbean seawater, thus enhancing carbonate dissolution and formation of cave passages (Back et al. 1986). Salinities at the water surface in the open cenote and at just above the halocline at −14 m were 1.5‰, while those just below the halocline at −15 m and at the bottom at −20 m were 32.5 and 35‰, respectively. Water temperature was 24°C in November 1986. Water currents are localized to the upper fresher water layers in the cave. The spring cave consists of two main passages, each about 700 m in length. All biological collections were made from the Halocline System or East Side of the cave complex. Most animals were observed just above the halocline in oligohaline waters. Collecting was done with a plankton net and suction bottle from the water column in −10 to −18 m depths using scuba. In addition to *Tulumella unidens,* specimens of copepods, amphipods, shrimp, and remipedes—all still under study—were also collected from the cave.

Acknowledgments

Cave collections in Yucatan by T. M. Iliffe were supported by National Science Foundation Grants BSR-8215672 and BSR-8417494. We thank James Coke, Dinah Drago, Juan Jose Fucat, and Michael Madden for assistance with cave diving collections and Dr. John Markham for logistical and collecting aid. We thank Jill Yager for reviewing the manuscript. This publication is Contribution No. 1130 of the Bermuda Biological Station for Research.

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Note added in proof.—Monod & Cals (1988: Comptes Rendus de l'Académie des Sciences, Paris 306 (Série III):99–108) recently rearranged the classification of the Thermosbaenacea, dividing the order into two families: 1. Thermosbaenidea, with the subfamilies Thermosbaeninae and Monodellinae; 2. Halosbaenidae, new, with the subfamilies Halosbaeninae, new, and Limnosbaenin, new. Under this scheme *Tulumella* would go into the Halosbaeninae.