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THE SOUTH AMERICAN NERITIC COPEPOD *CTENOCALANUS HERONAE* VEGA-PÉREZ AND BOWMAN (CALANOIDA) IN THE GULF OF MEXICO, WITH COMMENTS ON THE TAXONOMY OF THE GENUS

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ABSTRACT A single adult female specimen of the calanoid copepod *Ctenocalanus heronae* Vega-Pérez and Bowman was collected during a zooplankton survey carried out in February 1997 in Campeche Sound, the central-southeastern portion of the Gulf of Mexico. The taxonomy of the genus *Ctenocalanus* Giesbrecht is still unclear. Characters used to separate the species have been considered rather subtle. In this paper the taxonomic illustrations of the specimen collected are accompanied by a revision of the taxonomic features commonly used to identify the species. New, previously overlooked characters such as the cephalosome/urosome ratio, the shape of the 5th legs and particularly the structure of legs 1 and 2, are presented and might turn out to be useful to separate some of the species. This record of *C. heronae* in the Gulf of Mexico also represents the first reported occurrence of the genus in the Northwestern Tropical Atlantic and increases remarkably the known distribution of the species from the 24°S to the 18°N.

INTRODUCTION

The genus *Ctenocalanus* Giesbrecht belongs to the calanoid superfamily Clausocalanoidea, family Clausocalanidae. It is distributed mainly in cold neritic waters of the Antarctic, Sub-antarctic and temperate regions (Fransz 1988, Björnberg 1981, Mauchline 1998). Only 5 species of this genus (*C. vanus* Giesbrecht 1888, *C. citer* Heron and Bowman 1971, *C. campaneri* Almeida Prado-Por 1984, *C. tageae* Almeida Prado-Por 1984 and *C. heronae* Vega-Pérez and Bowman 1992) have been described (Razouls 1996, Mauchline 1998). The former 2 are the most widely distributed, mainly in the Antarctic and Sub-antarctic regions, whereas the other 3 have more restricted distributions: in the Gulf of Elat (*C. campaneri* and *C. tageae*) and in southern Brazil (*C. heronae*). According to previous reports (Owre and Foyo 1967, Reid 1990, Campos and Suárez-Morales 1994, Suárez-Morales and Gasca 1998), the genus *Ctenocalanus* has not been recorded previously in the Northwestern Tropical Atlantic.

From a zooplankton survey carried out in Campeche Sound, the central-southeastern portion of the Gulf of Mexico, a single female *Ctenocalanus heronae* was recorded. This geographic record is presented herein along with taxonomic comments, illustrations of the material examined and notes on this genus.

MATERIAL AND METHODS

Zooplankton were collected from 12–18 February 1997 (winter) during the oceanographic cruise PERFOTOXIII, carried out by the Instituto Mexicano del Petróleo on board the vessel *Justo Sierra*, of the Universidad Nacional Autónoma de Mexico. Samples were taken from 10 stations in the Campeche Sound, Gulf of Mexico, off the west coast of the Yucatan Peninsula. Copepods were sorted and then processed for identification. A single specimen of *Ctenocalanus* was recorded at station 10 on February 18. The taxonomically relevant structures for the identification of the species are illustrated herein. This specimen was deposited in the zooplankton collection of El Colegio de la Frontera Sur, Chetumal.

RESULTS

Ctenocalanus heronae Vega-Pérez and Bowman, 1992 (Figure 1)

Material. 1 adult female, ethanol-preserved, partially dissected, mounted on DEPEX medium. One locality in Campeche Bay, Gulf of Mexico at 18°46.944 N; 92°22.026W. A vial containing the cephalothorax, urosome and mounted appendages are deposited under access number ECOCH-ZOO-00412.

Remarks. The taxonomic analysis of *Ctenocalanus* in the samples resulted in the identification of an adult female of *C. heronae* (Figure 1 A–I). The genus *Ctenocalanus* can be readily distinguished by the presence of comb-like spines (ctenospines) inserted in deep notches on the outer margin of the 3rd exopods of legs 3 and 4, and by the reduced uniramous of female 5th leg (Björnberg 1981, Vega-Pérez and Bowman 1992, Mauchline 1998) (Figure 1 K). However, the taxonomic separation of the 5 species of the genus is difficult

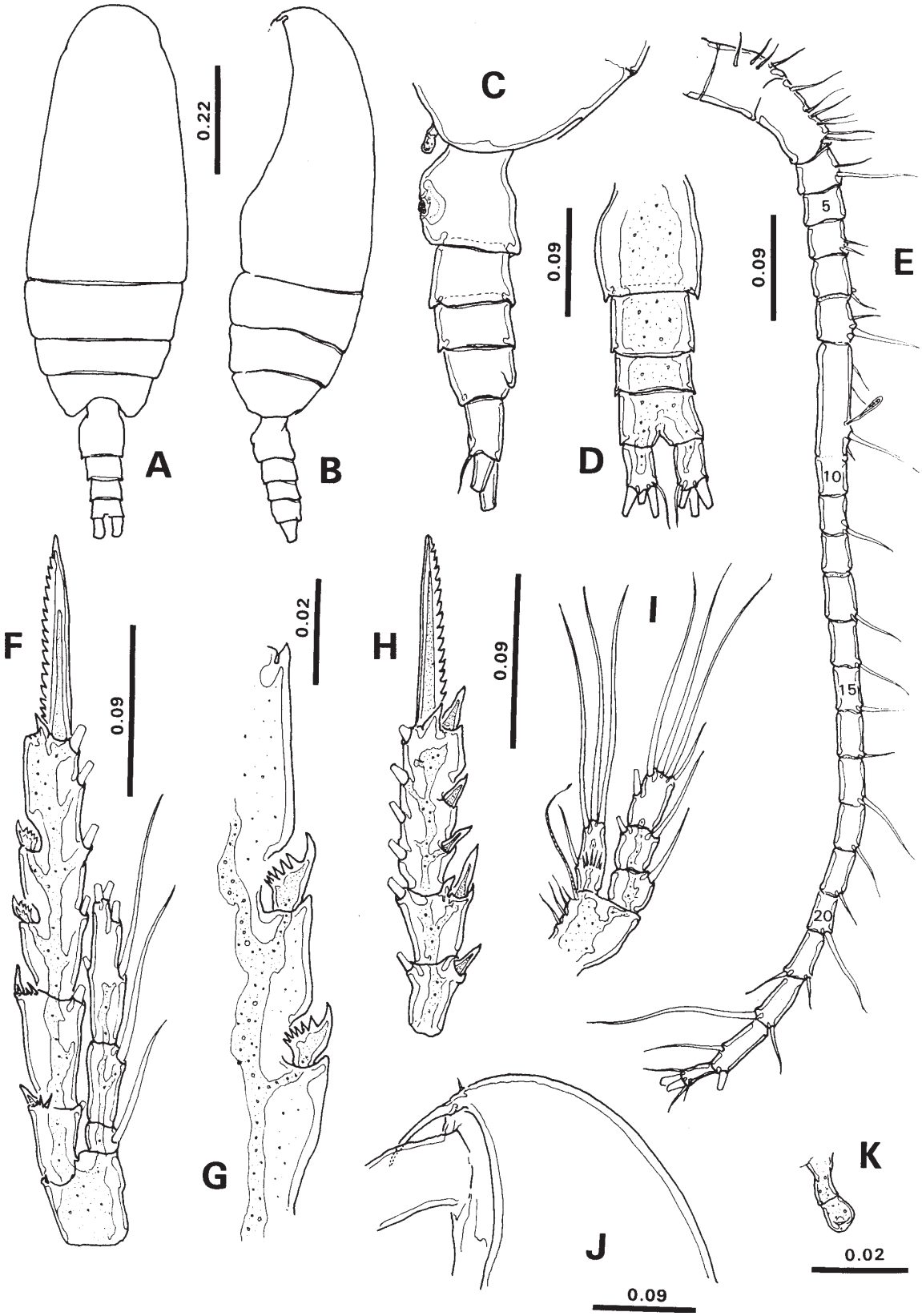

Figure 1. ***Ctenocalanus heronae*** **Vega-Pérez and Bowman, 1992. Adult female: A. Habitus, dorsal; B. habitus, lateral; C. urosome, lateral view; D. urosome, dorsal view; E. right antennule; F. third leg; G. detail of third leg ctenospines; H. second leg exopodite; I. first leg. J. head, lateral view; K. fifth leg. All scales are in mm.**

Table 1

Characters used to separate the known species of *Ctenocalanus*. c/u ratio = cephalosome/urosome length ratio.

	Ctenocalanus campaneri	*C. tageae*	*C. citer*	*C. vanus*	*C. heronae*	our specimen
body length (mm)	1.12	1.10	1.17	1.35	1.2–1.3	1.17
forehead	blunt	prominent	blunt	blunt	prominent	prominent
rostral points	undescribed	undescribed	long	short	long	long
genital somite	assymmetrical	symmetrical	symmetrical	symmetrical	assymmetical	asymmetrical
assymmetry	laterally (right side)	—	—	—	laterally (left side)	laterally (left side)
c/u ratio	3.58	3.96	3.80	3.98	3.37	3.43
antennular length (reach of)	anal somite distal end	beyond caudal rami	anal somite distal end	anal somite distal end	anal somite distal end	anal somite distal end
antennular articles 9–10	partially fused	separated	separated	fused	separated	partially fused
points on ctenospines	4–5	7–8	4–5	6–7	6–7	6–7
angle of ctenospines	moderately open	closed	closed	wide open	moderately open	closed
spines on leg 1 endopod	undescribed	undescribed	absent	undescribed	present	present
leg 5 (female)	uniarticulated	uniarticulated	uni- or biarticulated	biarticulated	uniarticulated	uniarticulated
shape of leg 5	blunt	mammiliform	subtriangular	assymmetrical subtriangular	rounded	rounded

because specific differences are based on a limited number of subtle characters (Vega-Pérez and Bowman 1992). The most widely used characters are the structure and orientation of the ctenospines of legs 3 and 4, and in some instances, the length of the antennules or the shape of the head (Björnberg 1981, Almeida Prado-Por 1984, Vega-Pérez and Bowman 1992). The taxonomic value of the orientation of the ctenospines was questioned by Almeida Prado-Por (1984), who pointed out that these spines are articulated at their bases, and thus, their alignment in relation with the axis of the segment is not a relevant character.

The evidence used by Almeida Prado-Por (1984) to define *C. campaneri* and *C. tageae* as new species included a set of characters which only considers the number of spines on the ctenospines, not their alignment. However, there has not been a comparative analysis of these characters for the 5 known species. The characters used by previous authors to clarify the taxonomy of the genus are presented for each species (Table 1). We examined other features such as the cephalic/urosome ratio (C/U) and the shape of the female 5th leg.

The above noted characters allow clear separation of a number of these species. For example, it is relatively easy to separate *C. heronae* from *C. campaneri* by the number of points on the ctenospines, the assymmetry of the genital somite on the right margin, the shape of the female 5th leg (Almeida Prado-Por 1984, page 86), and by the C/U ratio. *Ctenocalanus heronae* differs from *C. tageae* in the length of the antennules, which is a major difference (Vega-Pérez and Bowman 1992), in the C/U ratio, and in the shape of female leg 5 (Almeida Prado-Por 1984, page 88). It can be distinguished from *C. vanus* by its size, a genital somite which is not prominent ventrally, the C/U ratio and the biarticulated and distally subtriangular female leg 5 (Table 1). Differences become more subtle when we want to separate *C. citer* from *C. heronae*. Vega-Pérez and Bowman (1992) separated these 2 species by indicating that *C. heronae* has a wider angle of orientation of the ctenospines than *C. citer*. This difference is not valid following arguments in Almeida Prado-Por (1984) and was not considered here. We therefore analyzed other characters which might turn out to be useful to separate at least these 2 closely related species.

C/U ratio. *Ctenocalanus heronae* diverges from the other 4 species of the genus with a C/U ratio of 3.37; our specimen showed a 3.43 value (Table 1). This character might be useful to separate some of the other species as well.

First leg. In *C. heronae*, a group of spines is present on the first endopodal segment which is also observed in the Gulf of Mexico specimen. These spines are absent in *C. citer* (Heron andBowman 1971). In *C. heronae* and our specimen (Figure 1I), the outer seta on the first exopodal segment reaches more than 2/3 the margin of the succeeding segment, whereas in *C. citer* this seta barely reaches half the length of the next segment. Our specimen differs from the setation pattern described for *C. heronae* in having a relatively longer seta on the 2nd exopodal segment.

Second leg. The structure and size of the outer spines of exopodal segments 1–3 differ in both species. In *C. citer* the spine on the first exopodal segment is small and thin, whereas, it is stronger and wider at its base in *C. heronae* and in our specimen (Figure 1 H). Similarly, the spine on the 2nd segment is noticeably large in *C. heronae* and our specimen, but is distinctly smaller in *C. citer*. This spine in *C. citer* does not reach the base of the first spine of the succeeding segment, whereas, in *C. heronae* it reaches the midpoint of the spine. In *C. citer*, the proximal spine of the 3 outer spine series of the 3rd exopodal segment is very small, not reaching midway to the base of next spine. The other 2 are subequal. In *C. heronae* and in our specimen, the proximal spine is relatively larger than in *C. citer*, almost reaching the base of next spine.

Third legs. Spines on the base of the first and 2nd outer exopod segments are present, but are small in *C. citer* and well developed in *C. heronae* and in our specimen (Figure 1 F).

Number of points on ctenospines. *Ctenocalanus citer* and *C. campaneri* each have 4 or 5 points, with *C. tageae* having up to 8 points. *Ctenocalanus heronae* and our specimen has a 6–7 point pattern (Figure 1 G).

Based on these alternative characters and on the data presented in Table 1, we concluded that our specimen can be identified as *C. heronae* even though some taxonomic keys or the available descriptions and comparisons would have led us to *C. citer*. The orientation of the ctenospines is variable. For instance, in the 3rd leg these structures appear at a widely open angle (65°) in the original description of *C. heronae* (Vega-Pérez and Bowman 1992), but the angle is reduced (40–45°) in our specimen of the same species. The armature of the antennules in our specimen shows variations when compared with the *C. heronae* pattern (mainly missing setae), but those could have been lost during preservation.

Ctenocalanus heronae has been reported from the coast of Southern Brazil only (*ca*. 24°S), in a water column sample collected from the shelf of this subtropical area (Vega-Pérez and Bowman 1992). Therefore, our record in the Campeche Sound (18°N) allows a relevant northwards extension of this species from the temperate zone of the Atlantic Ocean into the tropical zone of the Northwestern Atlantic. This is also the first record of the genus in the Northwestern Tropical Atlantic.

The Surface Subtropical Water and the Surface Tropical Water comprise the upper 100m in the 0–10°S zone of the south Atlantic. While extending into lower latitudes, both layers are found in the Caribbean zone (Wüst 1964) when waters of the South Equatorial system flow into the Caribbean Basin and then into the Gulf through the Yucatan Channel. The presence of *C. heronae* could be related with this hydrologic system. This species seems to be an eurythermic tropical-subtropical form that has been recorded at 15°C in Brazil and at more than 20°C in the Gulf of Mexico.

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LITERATURE CITED

Almeida Prado-Por, M. 1984. Two new sympatric species of *Ctenocalanus* (Calanoida) from the Gulf of Elat (Aqaba). Crustaceana, Supplement 7:85–90.

Björnberg, T.K.S. 1981. Copepoda. In: D. Boltovskoy, ed. Atlas del Zooplancton del Atlántico Sudoccidental y métodos de trabajo con el zooplancton marino. Publicación Especial INIDEP, Mar del Plata, Argentina, p. 587–679.

Campos, A. and E. Suárez-Morales. 1994. Copépodos pelágicos del Golfo de México y Mar Caribe. I. Sistemática y Biología. CONACYT/ CIQRO, Mexico, 368 p.

Fransz, H.G. 1988. Vernal abundance, structure and development of epipelagic copepod populations of the eastern Weddell Sea (Antarctica). Polar Biology 9:107–114.

Heron, G.A. and T.E. Bowman. 1971. Postnaupliar developmental stages of the copepod crustaceans *Clausocalanus laticeps*, *C. brevipes*, and *Ctenocalanus citer* (Calanoida: Pseudocalanidae). Antarctic Research Series 17:141–165.

Mauchline, J. 1998. The Biology of Calanoid Copepods. Advances in Marine Biology 33:5–710.

Owre, H.B. and M. Foyo. 1967. Copepods of the Florida Current. Fauna Caribaea 1. Crustacea, I. Copepoda. Institute of Marine Science, University of Miami, Miami, USA, 137 p.

Razouls, C. 1996. Diversité et répartition géographique chez les copépodes pélagiques. 2. Platycopioida, Misophrioida, Mormonilloida, Cyclopoida, Poecilostomatoida, Siphonostomatoida, Harpacticoida, Monstrilloida. Annales de l' Institute Océanographique 71:1–149.

Reid, J.W. 1990. Continental and coastal free-living Copepoda (Crustacea) of Mexico, Central America and the Caribbean region. In: D. Navarro and J.G. Robinson, eds. Diversidad Biológica en la Reserva de la Biosfera de Sian Ka'an, Quintana Roo, México. CIQRO/University of Florida, Mexico, p. 175–213.

Suárez-Morales, E. and R. Gasca. 1998. Updated checklist of the free-living marine Copepoda (Crustacea) of Mexico. Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología 69:105–119.

Vega-Pérez, L.A. and T.E. Bowman. 1992. Description of the pelagic copepod, *Ctenocalanus heronae* Vega-Pérez and Bowman from off Sao Paulo, Brazil. Proceedings of the Biological Society of Washington 105:97–101.

Wüst, G. 1964. Stratification and circulation in the Antillean-Caribbean Basins. Part One. Spreading and mixing of the water types with an oceanographic atlas. Columbia University Press, New York, NY, 201 p.