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Notes on the intraspecific variability of *Cirolanides texensis* BENEDICT, 1896 (Isopoda: Cirolanidae) from Texas and Mexico

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Abstract

The stygobitic cirolanid isopod *Cirolanides texensis* has been widely reported from caves and phreatic groundwaters of the southern Edwards Plateau of Texas. Recent collections from caves in the states of Coahuila and Nuevo León in northern Mexico have resulted in a significant range extension and the description here of a new subspecies (geographic race): *Cirolanides texensis mexicensis* n.ssp. Additionally, an updated list of distribution localities is given for *Cirolanides texensis texensis*.

Key words: Isopoda, Cirolanidae, *Cirolanides*, taxonomy, Texas, Mexico

Résumé

L'isopode cirolanide stygobie *Cirolanides texensis* est connu de nombreuses localités (grottes et eau phréatique) de la partie S du Edwards Plateau, Texas. Des captures récentes réalisées dans des grottes du Mexique du N (états Coahuila et Nuevo León) permettent une importante extension de l'areal connu de l'espèce, ainsi que la description d'une sous-espèce (race géographique) nouvelle: *Cirolanides texensis mexicensis* n.ssp. De plus, on donne une liste mise à jour des localités d'où *C. texensis texensis* est connu.

Mots-clés: Isopoda, Cirolanidae, *Cirolanides*, taxonomie, Texas, Mexique.

Introduction

Cirolanides texensis was described more than a century ago (BENEDICT, 1896) from an artesian well at San Marcos, Texas. Unfortunately, the original description as well as several others (e.g., RICHARDSON, 1905; VAN NAME, 1936) were poorly illustrated (BOWMAN, 1964, provided a complete list of references). Having rightly concluded that a well-illustrated redescription was necessary, Thomas BOWMAN provided it in his 1964 publication that included information on the known distribution and relationships. BOWMAN (1972) updated distributional notes on *C. texensis* and commented on the curious «precocious gnathopod development» in this species. No study of variability is currently available for this stygobitic cirolanid which is widely distributed in caves and phreatic waters of south central Texas, from the vicinity of Del Rio in the west to San Marcos in the east, which in general represents the southern limits of the Edwards Plateau.

For the present study, we have examined Texan specimens from an artesian well at San Marcos (2 males, 1 female; Feb.-Apr. 1896; USNM Cat. no. 20448; in coll. Zoological Museum Amsterdam; although not labelled as such, these specimens almost certainly belong to the type series) and from two localities in Bexar Country (Verstraeten Well, 2 Aug. 1977, 1 male, 1 female, collected by H. KARNEI; and Isopit, 15 June 1993, 11 male and female specimens, collected by J. LOFTIN, J. REDDELL & M. REYES).

During recent exploration of caves in northern Mexico (Coahuila and Nuevo León), *Cirolanides texensis* was for the first time discovered in that country (BOTOSANEANU *et al.*, 1998: 133; BOTOSANEANU & ILIFFE, 1999: 97). An account of the Mexican localities and examined material is given below, with the description of a new subspecies.

Variability of *Cirolanides texensis*

In all available specimens, examination was made of body shape and size, shape of cephalon and pleotelson, armature of the gnathopod, all pleopods, development and armature of the uropod rami. All published information was also examined.

No variability was observed in the shape of body, cephalon, or pleotelson, nor in pleopod structure.

In general, specimens from Mexican populations are distinctly smaller than those from Texan populations. Male specimens from Texas examined for this study measured 11-13 mm, with the notable exception of a male from Isopit, which was only 6.8 mm; and females measured 9.8-14mm. However in several publications it has been noted that the largest recorded specimens had a length of not less than 17 mm. In contrast, our Mexican specimens measure 6-9 mm (males) and 6.5-10 mm (females).

The only published description and illustration of the uropods is that in BOWMAN (1964:233, fig. 60). In no specimen examined during this study, either Texan or Mexican, is the exopodite so extremely narrow as illustrated by BOWMAN («about 8 times as long as broad»), or longer than the

endopodite – the width of the latter being rather variable (compare our figs. 2a-c). Study of the spine armature of the rami has failed to detect consistent differences between Texan and Mexican specimens. The only conclusion is that there is extreme individual variability. The exopodite external margin most often has only 1 spine, but sometimes 2, 3, or 4; the internal margin more often lacks spines, but is sometimes armed with 1, 2, 3, or 4; endopodite with external margin very often devoid of spines, but sometimes with 1 or 2; the internal margin with strongly variable number of spines: from one to six; the armature is sometimes different in the two uropods of the same specimen. The only generalization which could be cautiosly formulated is that the spine armature seems to be richer in Texan than in Mexican specimens. A clear difference in the armature of the propodial palm of the gnathopod between specimens from all Texan and all Mexican populations enables description of a geographic race for the southernmost known population of the species.

Cirolanides texensis mexicensis n.subsp.
Figs. 1-2, 4-5

TYPE MATERIAL

The following specimens are kept in the Zoological Museum of the University of Amsterdam. Female holotype and 2 male paratypes (Is 204402) from Cueva de El Tule, Lampazos, Nuevo León (coll. 20.11.1999 by T.M. ILIFFE from 10-15 m. water depths, on silt and rock bottom; holotype with 10 eggs in the marsupium – one of the highest reliable figures ever recorded for a stygobitic cirolanid). Seven female paratypes (Is 204404) from Cueva de la Espantosa, 11 km SW Rio Cerro Colorado, Lampazos, Nuevo León (coll. 23.01.1998 by K. STAFFORD; description of this locality in BOTOSANEANU & ILIFFE, 1999). Male allotype (Is 204403) from Sotano de Amezcua, 35 miles W and 8 miles N from Ciudad Acuña, Coahuila (coll. 15-17.06.1998 by Jean KREJCA; description of this locality in BOTOSANEANU *et al.*, 1998).
Several paratypes from these localities have been deposited in the Collección Nacional de Crustáceos, Instituto de Biologia, U.N.A.M., México.

TYPE LOCALITY

Cueva de El Tule is a cave spring situated at the western base of the Sierra Lampazos, south of Lampazos and about 5 km north of Cueva de la Espantosa. A stream passage, 2-3 m wide by 1 m high extends for 40 m to a sump (permanently flooded section of the cave). This underwater passage was explored with scuba for a further 150 m, reaching a depth of 14 m. Isopods were collected from the surface of silty sediments in 10-14 m water depths. No other aquatic fauna was observed.

DESCRIPTION

As already noted, the body size is generally smaller in specimens of the new subspecies than in those of the nominative one.

In all cases, the character clearly distinguishing both male and female specimens of the new subspecies from those of *C. texensis texensis* is the presence of four (instead of three) strong spines (figs. 1 & 2) on the palm of the gnathopod propodus. In all published information on *C. texensis* from Texas (i.e., BENEDICT, 1896; RICHARDSON, 1905; VAN NAME, 1936; BOWMAN, 1964), as well as in all Texan specimens examined for the present study, only 3 such spines were mentioned/found. In both subspecies, these spines have a peculiar, annulated structure. The spine armature of the rami of the uropods in all specimens examined appears to be very variable, but in general it appears to be noticeably reduced in specimens from Mexico.

Updated distribution for *C. texensis texensis*

Courtesy of James REDDELL's cave fauna database at the Texas Memorial Museum, 36 records for *Cirolanides texensis texensis* include:
Bexar County: Artesia Pump Station Well; Isopit; Leon Creek Powerplant Well No. 1; O.R. Mitchell Well; Twin Pits; Verstraeten Well No. 1; Verstraeten Well No. 2. Burnet County: Longhorn Caverns. Comal County: Honey Creek Cave; Klar Well; LCRA Well; Python Pit. Crockett County: 0-9 Well. Edwards County: Devil's Sinkhole. Hays County: Artesian well at San Marcos; Ezell's Cave; Frank Johnson's Well; Marcia's Well; Wonder Cave. Kendall County: Bufo Cave. Kerr County: Boxed Spring; Stowers Cave. Medina County: Valdina Farms Sinkhole. Real County: Bonner Fallout Shelter Cave. Schleicher County: Cave Y. Terrell County: Sorcerer's Cave. Uvalde County: Carson Cave; Indian Creek Cave; McNair Cave; Rambie's Cave. Val Verde County: Unnamed spring on east side of Devils River, ca. 32 km N of Del Rio; Diablo Cave; Four-Mile Cave; H.T. Miers Cave; Little Diablo Cave; Slaughter Bend Springs.

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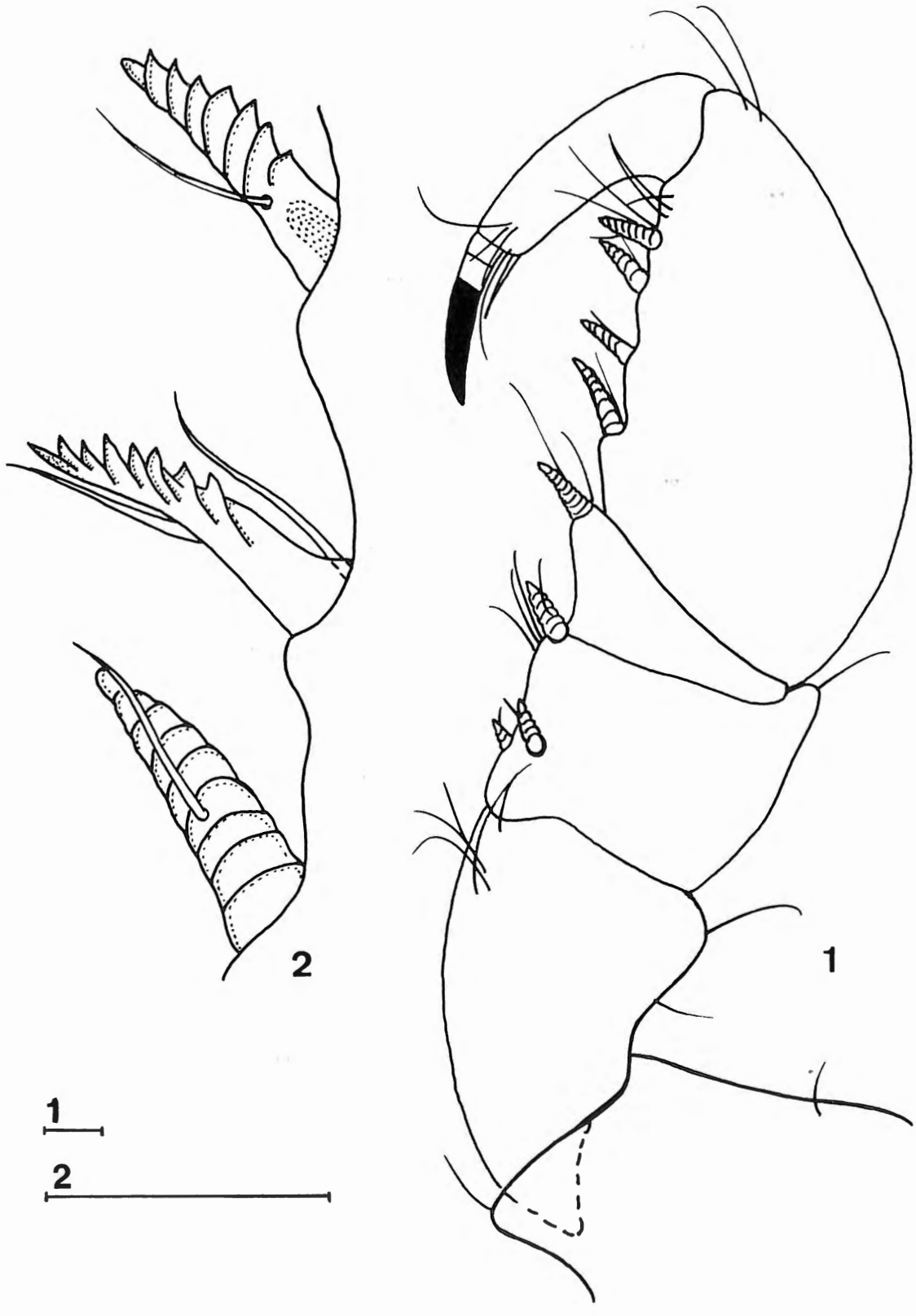

Figs 1 & 2. *Cirolanides texensis mexicensis* n.ssp., right gnathopod of a female paratype (length: 10 mm) from Cueva de la Espantosa; and 3 of the 4 spines on the propodial palm, more strongly magnified (scales = 0.1 mm).

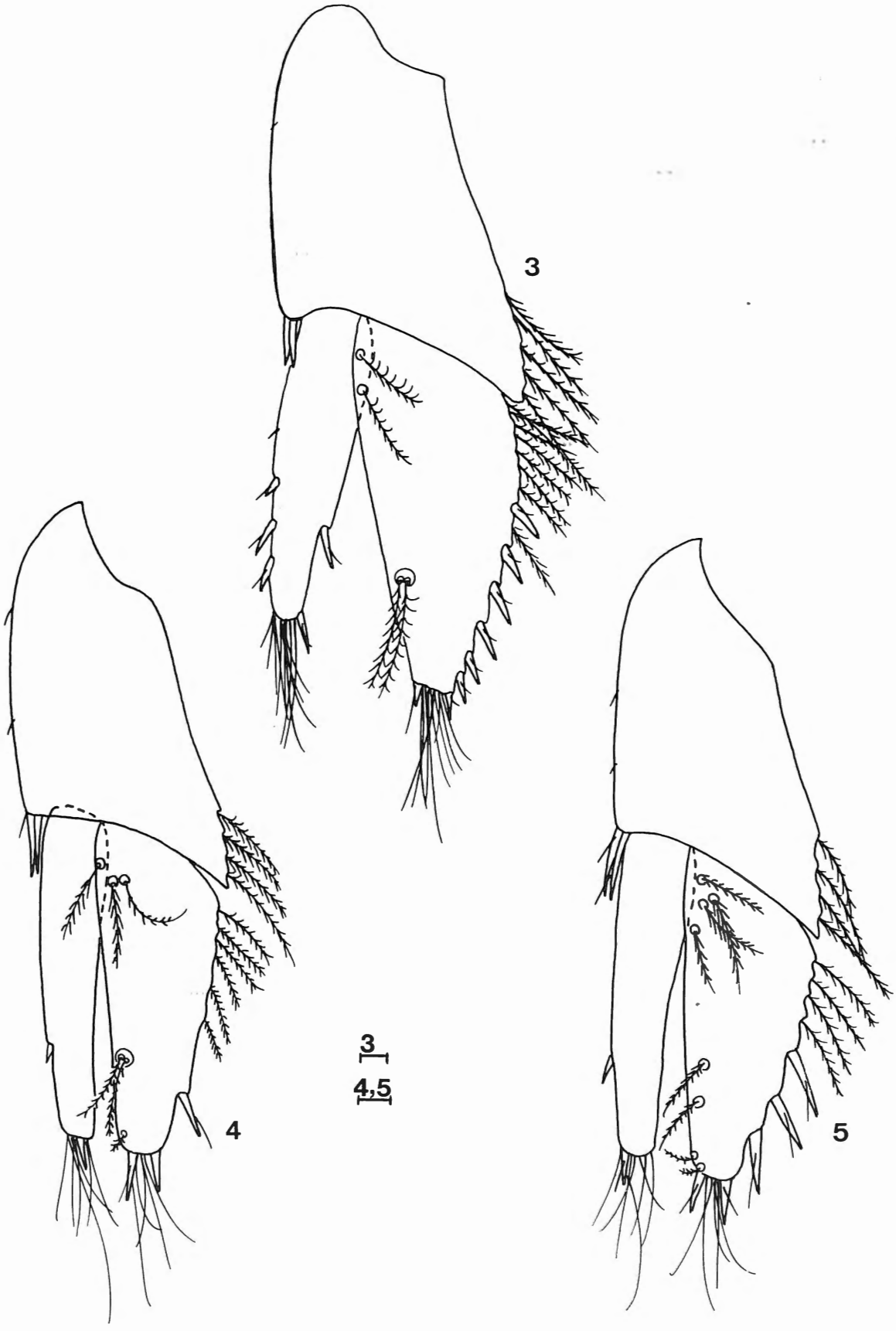

Fig. 3. *Cirolanides texensis texensis* BENEDICT, left uropod, dorsal, of a female (length: 14 mm) from terra typica: artesian well, San Marcos,Texas (scale = 0.1 mm).

Figs 4 & 5. *Cirolanides texensis mexicensis* n.ssp., left uropod, dorsal, of two female paratypes from Cueva de la Espantosa (specimen in fig. 4 larger than that in fig. 5) (scale = 0.1 mm).

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