SPEOCIROLANA THERMYDRONIS, A NEW SPECIES OF CIROLANID ISOPOD CRUSTACEAN FROM CENTRAL COAHUILA, MÉXICO

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ABSTRACT

Speocirolana **thermydronis** is described from a single specimen taken in thermal waters of an isolated bolson in northern Mexico. The type locality is high in the Sierra Madre Oriental, suggesting that the genus *Speocirolana* may be of pre-Tertiary origin. The species occurs in an area of high endemism where special habitats afforded by springs permit an ancient fauna to persist.

Extensive spring-fed marshes, lakes and streams occur in the intermontane basin surrounding the town of Cuatro Ciénegas in central Coahuila, México. This bolson, located in the structural axis of the Sierra Madre Oriental, has long been isolated, and evidence exists for a number of faunal invasions, resulting in marked endemism in aquatic, and to a lesser extent in terrestrial, organisms (Webb, *et al.*, 1963; Hubbs and Miller, 1965). In April 1964, a field party from the University of Colorado Museum visited the area. Their collections included a single cirolanid isopod, which is here described as a new species.

We are prompted to describe this form on the basis of a single specimen for a number of reasons. First, extensive field work in the basin since 1958, including three expeditions since 1964 with unsuccessful searching for additional isopod material, indicates the rarity (or difficulty in finding) more specimens of this species. Second, the area of original discovery has been severely modified and may soon be destroyed. Third, description of the isopod may stimulate additional work in the largely-unexplored bolson region of northern México. And, fourth, its description further emphasizes the unique, endemic nature of the biota of that region.

Speocirolana **thermydronis,** n. sp.

Figs. 1-21

The new species is assigned to *Speocirolana* Bolivar (1950), a name originally proposed as a subgenus of *Cirolana* Leach, but elevated to generic rank by Bowman (1964). Generic characters of the new species agree with those given by Bolivar, with minor exceptions. The major character of the genus is the first three pairs of pereopods prehensile and pereopods 4-7 ambulatory. These features are otherwise unknown in North American troglobitic cirolanids, except in the poorly-known *Conilera stygia* Packard (1900) from near Monterrey, Nuevo Leon, México. The last form, when rediscovered, may prove to be a species of *Speocirolana.*

Type Material and Etymology.—The type material of *Speocirolana thermydronis* consists of a single female specimen, measuring 15 mm from the tip of the head to the end of the telson. It was collected on 12 April 1964, in the complex habitat associated with Pozos de la Becerra, a large warm spring with its source lying 9.8 miles (13.7 km) south-southwest of Cuatro Ciénegas. The specimen was collected by Mary L. Allesio of the University of Colorado, and was referred to us for study by Clarence J. McCoy, now of the Carnegie Museum. The specimen now is housed in the United

States National Museum, catalog number 113054.

The name is derived from the Greek *"thermydron,"* a warm spring, and alludes to the habitat of the animal in thermal waters of the Cuatro Ciénegas basin.

Diagnosis.—Characters that separate *Speocirolana thermydronis* from S. pelaezi (Bolivar) and from *S. bolivari* (Rioja) are as follows: clypeus of head with posterior ends rounded, shaped in gentle bow, and without deep notch anteriorly; labrum with mandibular margin almost straight; first antennal flagellum with 14 articles, with length of peduncle divided by length of flagellum 0.9; second antenna with 35 flagellar articles, extending posteriorly to seventh pereon segment when deflected; palp relatively short; lacinia of maxilliped paddle-shaped, bearing 12 plumose setae; pleopods with all endopods lacking terminal setae; inner surfaces of endopods of uropods spineless; and, telson shaped as a broad shield, terminating in acute point.

Description and Comparisons.—Our comparisons of *Speocirolana thermydronis* with *S. pelaezi* and *S. bolivari* are based on illustrations and data given by Bolivar (1950) and by Rioja (1953); some additional data were graciously provided by Thomas E. Bowman. All three forms are eyeless and unpigmented except for brown masticatory surfaces on the mandibles and darkened tips on the claws of the pereopods. The ratio of body length to greatest body width is 3.5 for *thermydronis* and near 2.7 for the other two species. The head of *thermydronis* is sub-pentagonal in shape, rounded anteriorly (Fig. 1); *bolivari* has a similar head, while that of *pelaezi* is broader and shorter. The inferior frontal lamina of the head of *thermydronis* is similar to that of *pelaezi* in projecting forward between the antennal bases to a rounded terminus (Fig. 3). The lamina of *bolivari* is long and pointed. The clypeus and the labrum of *thermydronis* are distinctive (Fig. 3). The former is bow-shaped, gently rounded to its smooth posterior terminations, and the latter has an almost-straight mandibular margin.

The first pereonite lacks epimera in all three forms. Epimera also appears absent from the second and third pereonite of *thermydronis* (Fig. 1); they probably were lost in preservation or in preparation of the specimen for study, are not visible from dorsal view, or are fused to the segments. Epimera on pereonites 4-7 are well developed in all three species, with strong, acute, postero-lateral angles.

Five segments are visible in the pleon of all three species anterior to the pleotelson. The first two segments are sub-equal in length and twice as long as the third segment. The fourth and fifth visible segments are abruptly shorter and narrower than the first three. Pleon segments 1-3 have acute postero-lateral angles.

The telson of *thermydronis* is slightly longer than broad and ends in an acute posterior tip (Figs. 1, 7). In *pelaezi* the telson is broadly rounded and that of *bolivari* is truncate.

The first antenna is about the length of the peduncle of the second antenna in *thermydronis* (Figs. 1, 14) and in *pelaezi;* it appears shorter than that of *bolivari.* The first antenna has three peduncular joints in all three species, but in *thermydronis* it has 14 flagellar articles (Fig. 14) as opposed to about 20 articles in *pelaezi* and 22-28 in *bolivari.* The ratio of length of the antennal peduncle to length of the flagellum is about 0.9 in *thermydronis.* In *pelaezi* and *bolivari* this ratio is nearly 1.3. *S. thermydronis* resembles *pelaezi* in having the terminal setae of the first antenna relatively uniform in length; *bolivari* bears a number of short setae on the terminal flagellar article and a single elongate seta. The distal flagellar articles of all three species are invested with aesthetases.

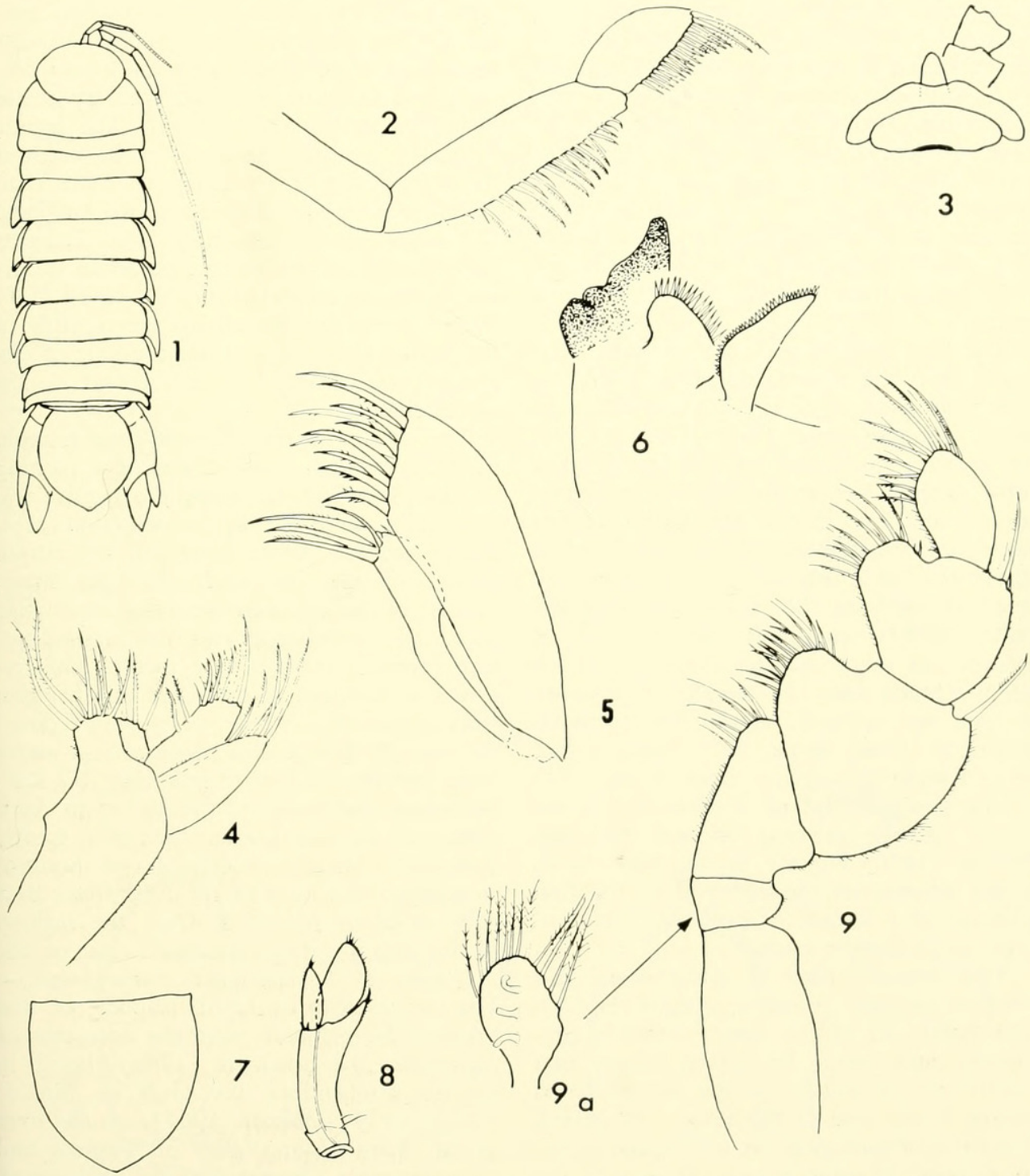
The second antenna of *thermydronis* is elongate, reaching back to the seventh pereonite when deflected (Fig. 1). This condition prevails also in *bolivari,* but the second antenna of *pelaezi* reaches only to the fifth peronite. There are 35 articles in the flagellum of *thermydronis,* 48-52 in *bolivari,* and 30 in *pelaezi.* The terminal articles of the flagellum in *thermydronis* (Fig. 10) and *bolivari* are elongate, whereas those of *pelaezi* are shortened. The antennal peduncle of *thermydronis* comprises five clearly delimited joints.

In *S. thermydronis* the mandibles (Fig. 6) are asymmetrcial, with the right incisive process overlapping the left ventrally. The lacinia mobilis of the mandible is subtriangular, bearing on its margin about 34 short, cone-shaped teeth. The second seg-

ment of the mandibular palp in *thermydronis* is invested with setae on its distal two-thirds (Fig. 2); in the other two species setae occur on the distal half to two-fifths of this segment.

The first and second maxillae are similar in all three species. The outer lamina of the first maxilla bears 10 toothed distal spines (Fig. 5). The inner lamina has three sparsely-plumose spines and two setae (one long, one short). The second maxilla (Fig. 4) has three conspicuous endites. The outer two are provided with large, incurved spines on their distal margins. The inner endite has numerous setae of differing sizes, some of which are plumose.

The maxilliped of *thermydronis* (Fig. 9) differs from that of *bolivari* and *pelaezi*. The four distal articles of the palp are armed on their inner surfaces with strong setae.



Figures 1-9. *Speocircolana* **thermydronis,** female holotype. **1.** dorsal aspect; **2.** mandibular palp; **3.** inferior frontal lamina, labrum, clypeus; **4.** second maxilla; **5.** first maxilla; **6.** mandible, lacina mobilis, pars molaris; **7.** telson; **8.** left uropod, ventral aspect; **9.** maxilliped; **9a.** lacinia of maxilliped.

There are stout spines on the distal outer corners of the second and third articles of the palp segments, but only fine, hair-like setae occur on the lateral margins of all but the terminal article (which is naked). The outer surface of the fourth joint of the palp in *bolivari* and *pelaezi* is setose. The lacinia (Fig. 9a) is ovoid, with 12 plumose setae and three coupling hooks.

The pereopods (Figs. 11-13, 15, 16) are dimorphic in all three species. The first three pairs are prehensile and sub-cheliform, perhaps more so in *thermydronis* than in the others. The last four pairs are ambulatory, without obvious morphological specialization. Pereopods 1-3 in *thermydronis* have the palmar margins of the propodus armed with two, three, and four stout spines, respectively; however, this character seems variable, in *pelaezi* at least, and may be of little worth. Pereopods 4-7 become progressively longer from front to back in all three forms.

The first pleopod of *thermydronis* is narrower than the succeeding ones (Fig. 17). The expodites of all the pleopods have distal, plumose setae (Figs. 17-21); these are sparsely developed on the fourth. The third exopod has an incomplete transverse suture, and the fourth and fifth exopods have complete sutures. All endopodites lack distal setae; thus Bowman (1964) may have erred in implying that setose first and second pleopodal endopods and the lack of setation on the remainder characterizes the genus *Speocirolana.* In females of *bolivari,* at least the endopods of the first pleopods lack setae (*fide,* Rioja, 1953: lam. 3, Fig. 31). Rioja's illustration (lam. 3, Fig. 30) of the first pleopod of a male of *bolivari* shows profuse setation on the endopod. Bolivar (1950: Fig. 9), on the other hand, shows setation on the endopod of the first pleopod of a female of *pelaezi.* The character needs further study.

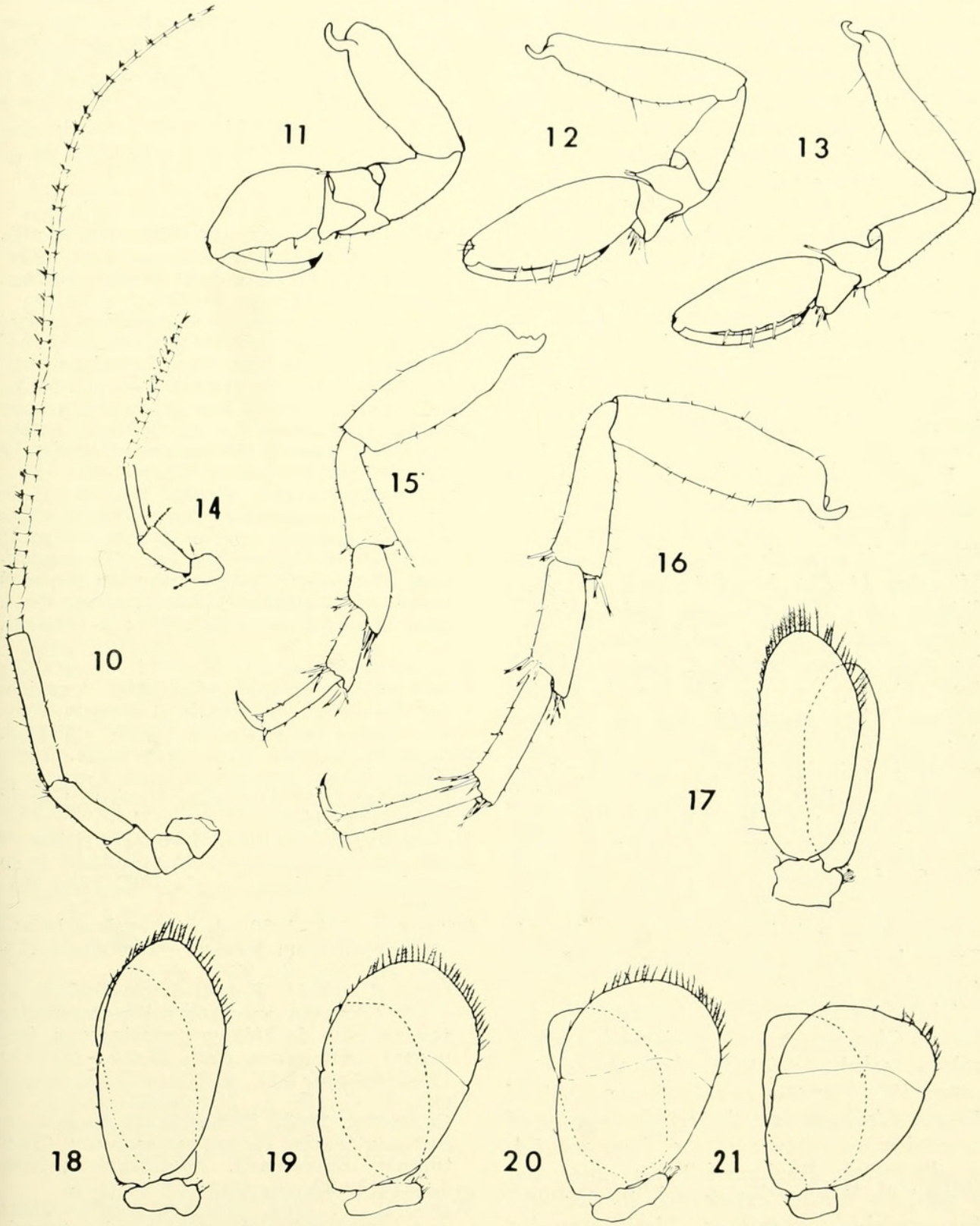
The uropodal base of *thermydronis* has setae on its inner, proximal margin (Fig. 8). The distal part of the inner margin is prolonged, and bears an apical spine that reaches to the middle of the endopod and almost to the end of the telson. In *pelaezi* this spine etxends past the end of the telson. In *bolivari,* it extends only about half the length of that structure. The inner surface of the endopodite of *thermydronis* bears a few scattered, short setae; in *pelaezi* there are three stout spines on this surface and *bolivari* has five such spines. The uropodal exopods and endopods of all three forms have their apices armed with short terminal setae.

Type Locality.—Prior to December 1964, Pozos de la Becerra was one of the largest and most complex aquatic habitats in the Cuatro Cíenegas basin. The laguna was elongate and irregular in shape, with depths ranging to more than 10 m at the largest spring inflows. In areas of inflow the bottoms were of gravel and rubble. Other areas had bottoms of deep calcareous silt; most silt bottoms were covered by dense beds of waterlily (*Nymphaea).* The laguna originally measured about 25 m in width at its narrowest place, ranging to more than 150 m wide, and was perhaps two km long. Water was always extremely clear. Temperatures taken in the sources on seven different occasions ranged from 29.4 to 32.2° C. Water levels did not change perceptibly in the period 1960-64, and one estimate of discharge was about 1.34 m^3/second at the outlet channel.

The laguna suffered some modification in 1961 through construction of a bathing facility. In 1964, however, the laguna was drastically modified by construction of a canal, and the water level fell 46 cm in about two days. In April 1965, the downcutting of the uncontrolled canal outlet had apparently stabilized, with the laguna surface lowered more than a meter. This resulted in drainage of extensive marshes that were associated with the spring, and reduced the over-all surface area of water and marsh from perhaps 10 km^2 to less than 0.2 km^2. Swimmers had muddied the laguna in April 1965, and the silty bottoms had been greatly disturbed. Many formerly gravel bottoms were silted and most of the *Nymphaea* beds were dried or uprooted. Only the inflows of the largest springs remained clear of silt.

Origin of Speocirolana thermydronis.—The troglobitic cirolanid isopods of the Western Hemisphere, with the exception of *Antrolana lira* Bowman (1964), occur in an arc surrounding the Gulf of México (Rioja, 1953; Bowman, 1964). *A. lira* lives in the Appalachian Valley of Virginia and does not enter directly into the problem of origin for *S. thermydronis.* The distribution of the species of *Speocirolana* in Cuatro Cíenegas and in the Valles-Mante area of San

Luis Potosí and Tamaulipas, and the poorly-known *Conilera stygia* (also with the first three pairs of pleopods prehensile), from Monterrey, Nuevo Leon, form a compact triangle in the northeast of México. These, and *Cirolanides texensis* Benedict from the San Marcos area of Texas, all are in the area inundated by the sea that filled the mid-Cretaceous Mexican Geosyncline (Maldondo-Koerdell, 1964). *S. bolivari, S. pelaezi,* and *C. stygia* all occur near the edge of the Gulf Coastal Plain, slightly inland from areas of



Figures 10-21. *Speocirolana* **thermydronis**, female holotype. **10.** second antenna; **11.** first pereopod; **12.** second pereopod; **13.** third pereopod; **14.** first antenna; **15.** fourth periopod; **16.** seventh pereopod; **17.** first pleopod; **18.** second pleopod; **19.** third pleopod; **20.** fourth pleopod; **21.** fifth pleopod.

mid-Tertiary inundations (West, 1964). The transgressions by the sea in Oligocene may have affected the last three species, but undoubtedly excluded the Sierra Madre Oriental Axis in which *S. thermydronis* occurs.

The Cuatro Cíenegas basin, in addition to a number of endemic vertebrates (Hubbs and Miller, 1965), holds a unique molluscan fauna. This includes a number of genera and species, yet to be described, that show few relationships to other living forms of México, or elsewhere (Dwight W. Taylor, *pers. comm.*), and therefore indicate a great age for aquatic habitats of the area. Cirolanid isopods in freshwater cave habitats are generally thought to be derived from populations of marine forms that are relicted by marine regressions (Bowman, 1964). The discovery of *S. thermydronis* high in the Sierra Madre Oriental may indicate a pre-Tertiary origin of the genus; as part of an ancient plateau fauna it has been able to persist in the special habitats afforded by the springs.

It seems doubtful that distributions of epigean animals, such as fishes, will shed much light on the origins of *S. thermydronis*. However, it is worth noting that Miller and Minckley (1963) found the endemic platyfish of the Cuatro Cíenegas basin (*Xiphophorus gordoni* Miller and Minckley) sharing many characters with *X. variatus xiphidium* (Gordon) of the Río Soto la Marina system. They suggested that an overland dispersal of the aquatic animals might have occurred, utilizing stream captures, from southeast, to the Cuatro Cíenegas area. This is substantiated by the presence of *Gambusia marshi* Minckley and Craddock in the Río Salado system (the stream that now drains the Cuatro Cíenegas basin), a species whose closest relatives also are in the Río Soto la Marina-Río Panuco complex (Minckley, 1962).

The presence of a new cirolanid in the Cuatro Cíenegas basin, a specialized, cavernicolous catfish (*Priatella phreatophila* Carranza, 1954) at Muzquiz, Coahuila, north of Cuatro Cíenegas, and the relative wealth of cavernicolous animals in the limestone Edward's Plateau Region of Texas, points out a need for further exploration in that area for troglobitic organisms. Until extensive surveys are made and additional collections are obtained little can be done in synthesis of the over-all fauna of the region. We defer speculation on the intra-generic relationships of *S. thermydronis* until additional material can be obtained.

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