

# NEW LOCALITY RECORDS FOR RHAGIDIA FROM MEXICAN AND AMERICAN CAVES<sup>1</sup>

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## ABSTRACT

New cave locality records are: *Rhagidia weyerensis* (Packard), El Sótano de la Tinaja, San Luis Potosí, Mexico; Old Spanish Cave, Stone Co., Mo., U.S.A.; Carlsbad Caverns, New Mexico, U.S.A. *R. trisetatus* n. sp., El Sótano de la Tinaja, San Luis Potosí, Mexico. *R. longisensilla* Shiba, Diamond Cave, Newton Co., Arkansas, U.S.A.

In January and February of 1970 one of us (W. R. E.) made two trips to the Sierra de El Abra, which lies in the states of Tamaulipas and San Luis Potosí, Mexico, about eighty miles inland from the Gulf of Mexico. The purpose of these trips was to continue collecting the cave fauna of this cave-rich area. Several new caves were found on the January trip, including El Sótano de Santa Elena, about 18 kilometers southwest of Ciudad Mante, Tamaulipas, in which Mr. William Russell and W. R. Elliott collected some large trombiculid mites. On the February trip we collected in several caves, including El Sótano de la Tinaja, 11 kilometers northeast of Ciudad Valles, San Luis Potosí. In this cave we found some Rhagidiid mites and one larva of the family Erythraeidae. No mites have been described or identified from the El Abra caves before now (Reddell, 1967), and to our knowledge, this is the first record of Rhagidiidae from Mexican caves and from Mexico.

We have also included a small collection of *Rhagidia* made by Thomas C. Barr from caves in Arkansas, Missouri, and New Mexico.

The genus *Rhagidia* is cosmopolitan, but records from the New World are extremely rare. This reflects the lack of interest in this group by American acarologists and not the actual state of distribution. Holsinger (1965a) has stated that he has several species awaiting description, and one of us (R. W. S.) has numerous epigeal species collected in Texas and elsewhere not yet reported on. The genus, then, is not so rare in the Americas as published records indicate.

*Rhagidia* are commonly found in moist, cool, dark habitats, and they are predaceous. This makes them admirably adapted for cave-living, and it is, therefore, difficult to say whether a species found in caves is truly troglobitic or only cave tolerant. However, epigeal forms are colored (red, orange, or yellow) and have eye-spots (but no cornea), whereas forms thus far found in caves are colorless and lack eyespots.

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About 50 species of *Rhagidia* are known. Of this number, 14 species are associated with caves (Wolf, 1934-1938; and Holsinger, 1965a).

The specimens here reported include one new species and two previously described forms. Holsinger (1965b) has given the synonymy of *weyerensis* as well as a redescription. However, his description did not point up all the characters we think are important for diagnosis and we are, therefore, offering new illustrations and descriptions.

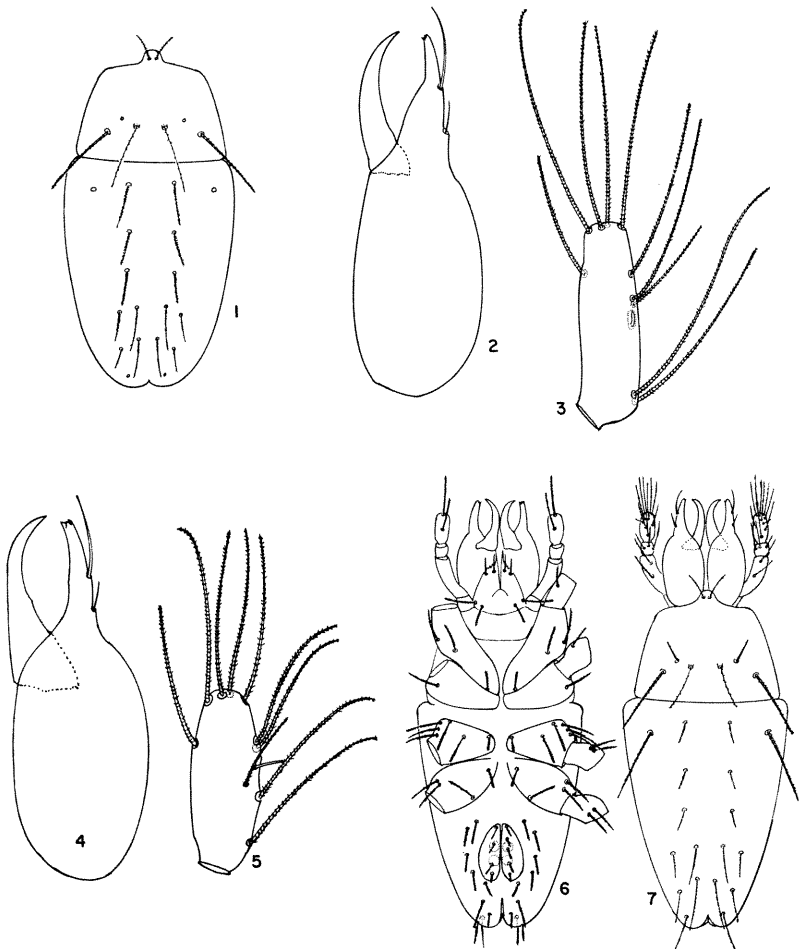
*Rhagidia weyerensis* (Packard)  
(Figs. 4-7, 17-24)

FEMALE. 666  $\mu$  (650-700). Venter. Coxal formula 3-1-6-4. Genital setae, 5 pairs; paragenital setae, 5 pairs; numerous internal genital setae. All setae very finely ciliated, appearing almost smooth. Medial coxal setae narrowly clavate. Four pairs of anal setae, of which  $A_3$  is longest and  $A_4$  shortest. Dorsum. All setae fine, with short, close pubescence. Scapulars and external humerals exceptionally long, about 3 $\times$  as long as internal humerals. Setae e.v., e.h., and  $d_1$  and  $d_2$  essentially equal; lumbar and sacral longer. The e.l. and e.s. setae about  $\frac{2}{3}$  length of i.l. and i.s. setae, respectively. The trichobothria about  $\frac{2}{3}$  as long as scapulars. Gnathosoma. About as wide as long, the medial basal setae noticeably shorter than the outer. Chelicerae: shears about  $\frac{1}{2}$  total length of chelicera. Movable digit slender and without serrations. Fixed digit tri-cusped, cusps quite deep. Cheliceral setae well forward, the basal barely reaching the apical. Pedipalp with 2, 3, and 10 setae. The 10 setae of apical segment placed as follows: 4 at apex, 2 dorsal subapical, 2 dorsal medial, 1 dorsobasal, and 1 subapical ventrally. The *solenidion* on mid dorsal side *slender, erect, and exceptionally long*.

Legs: Legs I longer than body, about 750  $\mu$ . Leg IV a bit longer. Trochanters, 1-1-2-2. Tarsus I with 4 oblique rhagidial organs, a stellate seta between the 2 basal, and a prominent solenidion dorsobasally. Tibia I with usual dorso-apical r.o. and a small solenidion dorsomedially. Genu I with a very small solenidion ventri-apical. Tarsus II with 3 rhagidial organs tandem in a common field; apparently no associated spiniform. Tibia II with usual apical sensory pit, and a dorsobasal solenidion. Genu II with a tiny ventri-apical solenidion. Tibia III with 2 dorsobasal solenidia, small and well separated. Apparently no solenidion on genu III. Tibia IV with a single dorsobasal solenidion. Tarsal claws without clawlets.

Previously known only from Grand Caverns, Augusta Co., Virginia. New locality records are: 3 ♀♀, El Sótano de la Tinaja, 11 km NE of Cd. Valles, San Luis Potosí, Mexico; 1 ♀, Carlsbad Caverns, May 9, 1958 by T. C. Barr; 1 ♀, Old Spanish Cave, Stone Co., Missouri, Jan. 1, 1958, T. C. Barr, collector.

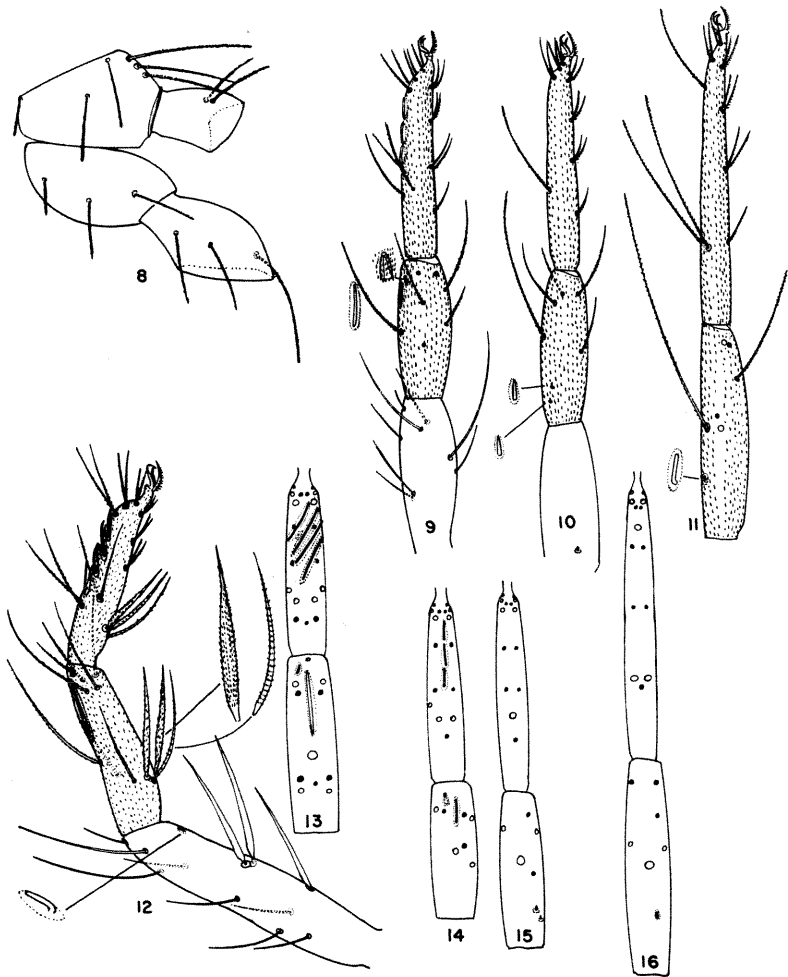
The specimens from El Sótano de la Tinaja were collected from the surface of, and just underneath, a thin layer of damp leaves and humus



FIGS. 1-7. Fig. 1, *Rhagidia trisetatus*, dorsum; Fig. 2, *R. trisetatus*, chela; Fig. 3, *R. trisetatus*, apical segment of pedipalp; Fig. 4, *R. weyerensis*, chela; Fig. 5, *R. weyerensis*, apical segment of pedipalp; Fig. 6, *R. weyerensis*, venter; Fig. 7, *R. weyerensis*, dorsum.

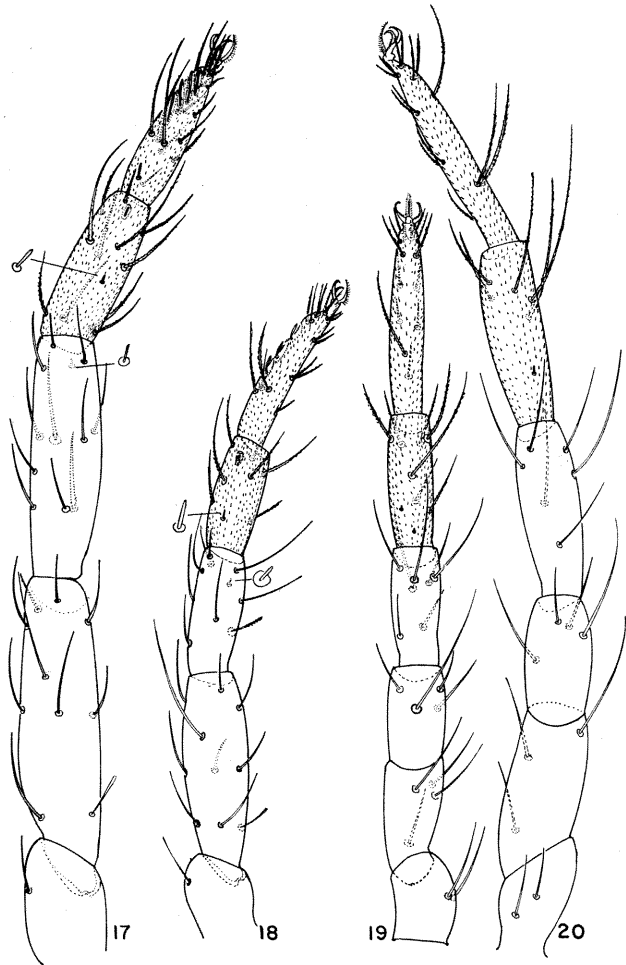
which covers mud slopes 100 to 400 m from the entrance, in the dark zone. This debris is carried into the cave by flood waters during the rainy season. The cave is quite humid (probably 100% humidity) and the air temperature is about 25.5°C. The temperature may fluctuate during flooding.

Remarks. Body size is a poor criterion on which to base species



FIGS. 8-16. Leg chaetotaxy of *Rhagidia trisetatus*. Fig. 8, coxa and trochanter of legs III and IV; Figs. 9, 10, 11, 12, lateral view of tarsi and tibia of legs I-IV, respectively; Figs. 13, 14, 15, 16, chaetotaxy of tarsi and tibia I-IV, respectively, dorsal side.

differentiation. Nevertheless, some otherwise excellent acarologists do occasionally resort to just that, including Strandtmann in his key to the species of *Rhagidia* (1971). If it is keyed as a small species, *weyerensis* as here described will run out at *shibai* Str. but differs from that species in coxal formula (3-1-6-3 for *shibai*) and in possessing a



FIGS. 17-20. Figs. 17, 18, 19, 20, lateral view of legs I-IV respectively of *R. weyerensis*. All segments are actually pubescent, but pubescence is shown only for the tarsi and tibiae.

solenidion on tarsus I. If it is keyed as a larger species—and, indeed, the size varies from 650 to 1050  $\mu$ —then it keys nicely to the couplet containing *weyerensis* and *whartoni* Str. At the time the key was written, Strandtmann had insufficient information on *weyerensis*, and the separation was made on a false character (the position of the solenidion on genu I). We can now say that *whartoni* differs by having longer

dorsal setae, trichobothria as long as the scapulars, serrations on the inner margin of the movable digit of the chela, and the rhagidial organs of tarsus II subtended by a small spiniform.

*Rhagidia trisetatus* n. sp. Elliott & Strandtmann  
(Figs. 1-3, 8-16)

FEMALE. 650  $\mu$ . Legs: I, 900  $\mu$ ; II, 730  $\mu$ ; III, 750  $\mu$ ; IV, 1000  $\mu$ .

Venter. Coxal formula, 3-1-6-3. Genital setae, 5 pairs; paragenital setae, 5 pairs, all setae long, slender, very closely ciliated; the medial coxal, and the paragenitals narrowly clavate.

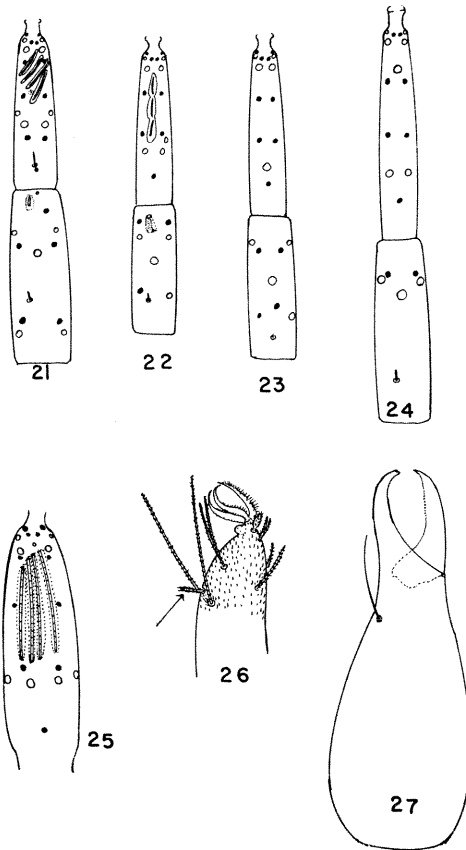
Dorsum. Dorsal setae thin, closely ciliated, longer than in *weyerensis*. The setae i.h.,  $d_1$  and  $d_2$  almost as long as distances from one to the other (Fig. 1). The trichobothria about as long as scapulars.

Gnathosoma. Hypostoma about as broad as long, with usual 8 setae, 4 ciliated posteriors, 4 nude anteriors. Chelicera with shears a bit less than  $\frac{1}{2}$  total; fixed digit slender, without apparent denticles, or serrations; fixed digit bicusped, cusps acute and fairly deep. Cheliceral setae about medial on digit, posterior seta about  $\frac{1}{3}$  length of the anterior and just reaching its base. Fourth segment of palp (Fig. 3) with 10 setae: 4 apical, 3 dorsal subapical, 2 dorsobasal, 1 ventral subapical. *Solenidion small and recumbent in a slight depression* medially on outer dorsal side.

Legs. All longer than body (measurements given at beginning of description). Trochanters, 1-1-2-3. Tarsus I with 4 long, oblique rhagidial organs; the stellate seta between the 2 *apical*. Tibia I with usual small apical r.o. and a long, narrow r.o. dorso-apically nearly  $\frac{1}{2}$  length of tibia (Figs. 12, 13). Genu I with a small ventri-apical solenidion recumbent in a slight depression. Tarsus II with 3 rhagidial organs tandem in a common field; apparently no spiniform. Tibia II with usual sensory pit at apex, and a r.o. of medium length dorso-apically (Figs. 9, 13). Genu II with a tiny, cryptic solenidion ventri-apically. Tibia III with 2 recumbent solenidia dorsobasally; genu III with 1 recumbent solenidion dorsobasally; tibia IV with a single, recumbent, dorsobasal solenidion. Tarsal claws without clawlets.

Type: ♀, El Sótano de la Tinaja, San Luis Potosí, Mexico; 18 February 1970, in flood debris; W. R. Elliott collector. Monotypic. The mite was associated with *R. weyerensis*, above.

Remarks: Although a unique specimen, it is so unusual in so many respects that we do not hesitate to describe it as a new species. It differs from all other species of the genus in having 3 setae on trochanter IV, and a recumbent solenidion on the palp tarsus. It differs from all species except *longisensilla* Shiba in having rhagidial organs rather than erect solenidia on tibiae I and II. Some of the ventral setae on leg I are distinctive, i.e., near the base, ventrally, on both the tarsus and the tibia, is a cluster of 3 setae, two of which are broad and uniformly ciliated, the



FIGS. 21-27. Figs. 21, 22, 23, 24, chaetotaxy of tarsi and tibia I-V respectively of *R. weyerensis*; Fig. 25, chaetotaxy of tarsus I of *R. longisensilla*; Fig. 26, lateral view of tip of tarsus I of *R. longisensilla*, showing the unique dorso-apical seta; Fig. 27, chela of *R. longisensilla*.

third much narrower and the ciliations are in rings (see Fig. 2a). Having the ciliations in rings is, incidentally, characteristic of most of the body and leg setae.

*R. trisetatus* will key to couplet 14 in Strandtmann's key (1971), but may be distinguished from the species there given by the characters given above. If keyed as a large species it will run to *crenata* Shiba, from which it may readily be separated on the basis of the unique leg chaetotaxy.

The name *trisetatus* is in reference to the 3 setae on trochanter IV.

*Rhagidia longisensilla* Shiba  
(Figs. 25-27)

This mite was described from Japan in 1969. Subsequently, 2 specimens were found in Alaska by Strandtmann (1971). Now a third locality may be added: Diamond Cave, Newton Co., Arkansas, 26 January 1958, T. C. Barr, collector. No further data are available to us.

The distribution of this mite is highly unusual and at this time defies explanation. The chaetotaxy of this mite is so unusual that we have no doubt at all about its proper identification.

Faunal note on El Sótano de la Tinaja. The habitat where the mites were found in El Sótano de la Tinaja is shared by many species of arthropods and oligochaete worms. Among the arthropods there are at least eight millipedes, one centipede, one terrestrial isopod, campodeid and japygid diplurans, a thysanuran, collembolans, a cricket, six species of beetles, a moth, an ant, a palpi-grade, two species of schizomids, an opilionid, three species of spiders, and one unidentified mite of the family Erythraeidae. Only two of these species are considered to be troglobites. Some of the rest may be habitual cave dwellers, or they may be repeatedly introduced into the cave by flood waters. The great abundance of small arthropods in the cave offers a rich food source for the rhagidiid mites.

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