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Cave millipedes of the United States. XIV. Revalidation of the genus *Speorthus* Chamberlin, 1952 (Diplopoda, Polydesmida, Macrosternodesmidae), with a description of a new species from Texas and remarks on the families Polydesmidae and Macrosternodesmidae in North America

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Cave millipedes of the United States. XIV. Revalidation of the genus *Speorthus* Chamberlin, 1952 (Diplopoda, Polydesmida, Macrosternodesmidae), with a description of a new species from Texas and remarks on the families Polydesmidae and Macrosternodesmidae in North America

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Abstract. The genus *Speorthus* Chamberlin is revalidated for *S. tuganbius* Chamberlin and ***S. reyesi*, new species** (Diplopoda, Polydesmida, Macrosternodesmidae). The families Polydesmidae and Macrosternodesmidae (as they occur in North America) are briefly discussed, and their component North American genera listed. The validity of Macrosternodesmidae is reaffirmed; the family is predominantly North American. **Nearctodesminae, new status,** is formally designated as a subfamily of Macrosternodesmidae. The superfamily Trichopolydesmoidea is synonymized with the superfamily **Polydesmoidea, new combination.**

Key Words. Troglobiont, Texas caves, gypsum karst, Nearctodesminae, Polydesmoidea, Trichopolydesmoidea.

Introduction

In 1974, Shear synonymized the genus *Speorthus* Chamberlin with *Speodesmus* Loomis. The former genus consisted of a single species, *Speorthus tuganbius* Chamberlin, described from Carlsbad Caverns, Eddy Co., New Mexico, while the latter was comprised at the time of two species described from caves in central Texas, *Speodesmus echinourus* Loomis and *S. bicornourus* Causey.

Elliott (2004) named four new species of *Speodesmus* from the central Texas karst north of San Antonio, and Elliott and Reddell (2009) provided many new distributional records. Shear (1984) described *Speodesmus aquilensis* Shear from Eagle Cave, Colorado. While Shear's 1974 paper redescribed *Speorthus tuganbius* (as *Speodesmus tuganbius*) and gave numbers of new records from central and southeastern New Mexico, no additional information about *S. tuganbius* has appeared in the intervening 42 years. Since 1974 much has been learned about the polydesmidan millipede fauna of the southwestern United States, particularly its diversity and taxonomic composition (for general summaries, see Shear and Shelley 2007, 2008; Shear et al. 2009; Shear 2012).

After more carefully studying a range of cave-inhabiting small polydesmidan millipedes from Texas, Arizona, California, New Mexico, Utah and Colorado, we have concluded that the taxonomy of these interesting animals requires revision. As a first step in the process, the genus *Speorthus* is here resurrected from what now appears to be an unwarranted relegation to synonymy, and a second species in the genus is described. The synonymy of the family Macrosternodesmidae Brölemann, with Trichopolydesmidae Verhoeff (Golovatch 2013; Golovatch and Enghoff 2015) is revisited and reversed, since Macrosternodesmidae is a clearly diagnosable family, which has its center of diversity in western North America, not in Europe, from whence the type genus was described.

Materials and Methods

All specimens are in the Biodiversity Collections, Department of Integrative Biology, University of Texas. Line drawings were made with the aid of a *camera lucida* mounted on an Olympus BX50

microscope. Specimens for scanning electron microscopy were air-dried and coated with an Emitech SC 7620 sputter coater operating at 20 mA for 90 seconds, which typically results in a coating of 240 Å of gold/palladium. Scanning electron micrographs were taken using a JEOL Neoscope JCM-5000 operating at 10 kV, and the images were refined using the open-source image-editing program GIMP. Plates were assembled in Inkscape. Maps were composed in SimpleMappr; localities were georeferenced using Google Earth.

Taxonomy

Family Macrosternodesmidae Brolemann
Genus *Speorthus* Chamberlin
Speorthus Chamberlin 1952, p. 12. Loomis, 1960, p. 66. Shear, 1969, p. 134. Not *Speodesmus,* Shear, 1974, p. 5.

Type species. *Speorthus tuganbius* Chamberlin.

Diagnosis. *Speorthus* is close to the related genus *Speodesmus* (six described species, five troglobionts of central Texas and one in Colorado), differing in the large, but simple, arcuate, prefemoral process of the gonopod. In *Speodesmus* this process is either reduced (echinourus group) or much enlarged with a strong, retrorse branch (bicornourus group). *Speodesmus* also appears to lack a fimbriate region (pulvillus) around the distal opening of the prostatic or seminal channel, present in *Speorthus*.

Notes. The gonopods of *Speorthus tuganbius* were misinterpreted by Shear (1974) in the light of the erroneous *a priori* assumption that the species belonged to the family Trichopolydesmidae. Scanning electron microscopy has revealed that the two readily visible distal branches of the gonopod are not divisions of the acropodite, but instead represent the acropodite itself, and a strong process arising from the prefemur near and posteriomesal to the base of the acropodite (see Fig. 4). This is an important character of the family Macrosternodesmidae. Shear (2012) termed this prefemoral process the endomerite, which term is used by Golovatch (2013) and others to refer to a usually small process originating next to the opening of the seminal pore. To avoid even more confusion, we will refer to the large basal branch from now on as the prefemoral process, and use the term endomerite in the sense of Golovatch (2013).

Speorthus tuganbius Chamberlin, 1952

Fig. 1–6, 15, 16, 19, 20, 21

S. tuganbius Chamberlin 1952, p. 12.
Speodesmus tuganbius, Shear 1974, p. 6.

The redescription by Shear (1974) is accurate with respect to the nonsexual and gonopodal characters of the species, but to supplement the 1974 redescription, we provide additional illustrations here (Fig. 1–6, 15, 16, 19, 20) from topotypical specimens collected in Carlsbad Caverns, Eddy Co., New Mexico. The species has been collected many times at the type locality since its description in 1952. Shear (1974) gives a number of locality records from Socorro, Lincoln and De Baca Counties, New Mexico, and additional records from Eddy and Chaves Counties are presented here (Fig. 21). The records from Chaves, Eddy, Socorro, Lincoln, and De Baca Counties suggest that the surface-dwelling ancestor of this species had a wide distribution in central and southeastern New Mexico and far western Texas. The lack of significant variation over the range indicates that the apparent extinction of surface-dwelling populations was relatively recent. But at least in some regions, such as the gypsum plains of southeastern New Mexico and far western Texas, genetic exchange could be taking place via movement through loosely consolidated alluvium overlying the gypsum in which the caves are found and which, via arroyos, even provides a potential conduit between the Guadalupe Mountains and the gypsum plains.

All specimens are in the Biodiversity Collections, Department of Integrative Biology, University of Texas. Exact coordinates of cave locations are not given due to conservation concerns, but were used to produce our map.

NEW MEXICO: *Chaves Co*.: Gypsum Cave, near Roswell, 1 July 1967, T. Rossen. *Eddy Co*.: Adobe Cave, 30 November 1991, D. Pate; Barbed Wire Cave, Sinkhole Flat, 23 mi. SW of Artesia, 6 June 1992, J. Cokendolpher et. al; Batman Cave, Sinkhole Flat, 22 June 1993, J. Cokendopher et al.; Crumble Cave, Sinkhole Flat, 23 January 1993, J. Cokendolpher et al.; Oasis Cave, Sinkhole Flat, 6 June 1992, J. Cokendolpher et al.; Beetle Cave, 30 December 1964, J. Redell et al.; Cave Tree Cave, 19 October 1974, W. C. Wellbourn; Cottonwood Cave, 27 mi SW of Carlsbad Caverns National Park, 18 April 1963, J. Russell; Dry Cave, 24 May 1971, W. R. Smartt; Hell Below Cave, 19 October 1974, W. C. Wellbourn; Hermit Cave (also called Gunsight Cave), 2 September 1973; Hidden Cave, numerous collections from 1963-1992; Isinglass Cave, near Carlsbad, June 1961, R. Ballinger; Millipede Cave, 31 December 1964, J. Reddell; New Cave, Carlsbad Caverns National Park, 26 May 1973, W. C. Wellbourn; Ogle Cave, Carlsbad Caverns National Park, 27 May 1973, W. C. Wellbourn; Pink Dragon Cave, 17 January 1967, D. McKenzie; Rainbow Cave, Carlsbad Caverns National Park, 27 May 1973, W. C. Wellbourn; Run Away Cave, 16 Febuary 1972, D. Pate; Russell's Slush Pit, 30 December 1964, J. Reddell et al.; Sentinal Cave, 1 September 1973, W. C. Wellbourn; unnamed pit on Lonesome Ridge, 6 mi S of Cottonwood Cave, 14 April 1963, J. Reddell; Wind Cave, 30 August 1973, W. C. Wellbourn. *Lincoln Co*.: Serpentine Root Cave, April 1973, W. C. Wellbourn.TEXAS: *Culberson Co.:* Bee Line Cave, 1 September 2008, C. Savvas; Cataract Cave, 10 July 1970, J. Reddell; Popcorn Cave, 25 mi. NW of Orla, 28 March 1969, J. Reddell, A. Smith; Hill Sink Cave, 10 May 1986, J. Reddell, M. Reyes; Decent Cave, 10 May 1986, J. Reddell, M. Reyes; Border Cave, 10 October 1962, 30 November 1962, K. Baker, 23 May 2002, J. Krejca, C. Lee; cave 100 m WNW of Border Cave, 23 May 2002, J. Krejca, C. Lee; Den Cave, 32 mi. WNW of Orla, 16 July 1968, no collector named; Dead Bunny Hole, 3 September 2006, V. Siegel, B. Shade; Crystal Cave, 11 May 1988. J. Reddell, M. Reyes; Hully Gully Cave, 18 July 1970, J. Reddell; Cataract Cave, 10 July 1970, J. Reddell; Porcupine Fissure, 8 July 1970, J. Reddell, A. R. Smith; Cutoff Cave, 29 June 1967, J. Reddell; New Cave, 28 June 1967, J. Reddell; Olive's Cave, 25 June 1967, J. Reddell et al.

***Speorthus reyesi,* n. sp.**

Fig. 7–14, 18, 19, 21

Types. Male holotype and male and female paratypes from Rattlesnake Cave, Ward Co., Texas, collected 12 May 1986 by J. Reddell, M. Reyes and A. R. Smith; deposited in the Virginia Museum of Natural History, Martinsville, VA.

Etymology. The new species is named for Marcelino Reyes, in recognition of his many collections of millipedes from west Texas caves, including Rattlesnake Cave.

Diagnosis. Differs from *S. tuganbius* in details of the male gonopod: in *S. reyesi* the prefemoral process is broader than in *S. tuganbius,* and somewhat scoop-shaped (**pfp**, Fig. 12, 13), while the endomerite (**e**, Fig. 14; process near the pulvillus, **p**) is shorter than that of *S. tuganbius*. In nonsexual characters, the two species of *Speorthus* are nearly identical.

Description. Male holotype. Length, 9.6 mm, greatest width 0.9 mm; 19 + t rings. Head subglobular, densely setose. Antennae clavate, sixth antennomere enlarged; when fully extended, antennae reaching midpoint of third trunk segment. Collum (Fig. 7) suboval, without acute posteriolateral corners. Anterior metazonites (Fig. 7) with three rows (including posterior marginal row) of 12–14 small, acute setae arising from distinct pustules; lateral margins of metazonites strongly toothed, with three distinct, posterior-pointing teeth, posteriolateral angle drawn out to at least twice size of more anterior teeth; posteriorly, transition to five rows of setae (Fig. 8), rows becoming progressively more irregular, with five marginal teeth. Ozopores opening from well-developed calluses just anterior to extended

posteriolateral corners (Fig. 8). Epiproct (Fig. 9) rounded. Anterior legs with irregularly distributed sphaerotrichomes ventrally (Fig.10, 11). Gonopods (Fig. 12–14, 17, 18) set in broad, suboval aperture taking up entire width of seventh prozonite. Gonocoxae subglobular, tightly appressed in midline, not movable with respect to one another, anteriorly deeply excavate to receive telopodites (Fig. 12). Prefemora transverse, in posterior view extending across width of goncoxae (Fig. 13); prefemoral process originating laterally at base of acropodite, broad, scoop-shaped, cupping terminal process of acropodite, endomerite short, acute, sinuate (Fig. 14, 17, 18). Opening of seminal or prostatic groove large, slot-like, with few fimbriae (Fig. 14).

Female paratype. Length, 9.8 mm, greatest width 1.0 mm. Nonsexual characters as in male.

Distribution. Known only from the type locality, a cave in a small pocket of gypsum karst in Monahans, Ward County, Texas (Fig. 20).

Habitat Notes

Culberson County, Texas, and Eddy County, New Mexico, gypsum plain. The caves hosting *S. tuganbius* in the gypsum plain of Culberson County, Texas, and adjacent Eddy County, New Mexico, are formed in Permian gypsum of the Castile Formation. The area is arid, receiving about 11 inches of annual rainfall.

Five additional troglobites occur in the gypsum plain along with *S. tuganbius*, three of which also occur in caves in the Guadalupe Mountains. These three are the trichoniscid isopod *Brackenridgia* n. sp., the spider *Eidmannella bullata* Gertsch, and an undescribed genus and species of campodeid dipluran. The millipede *Cambala reddelli reddelli* Causey (Cambalidae) was described from the gypsum plain, but was synonymized with *Cambala speobia* (Chamberlin) by Shelley (1979), a species otherwise known from central Texas and the Edwards Plateau of Texas. Shelley (1981) has also reported *C. speobia* from Huerfano and Custer Counties, Colorado. The gypsum plain and Guadalupe Mountains do not share any other troglobite species with the Edwards Plateau. One other species known only from caves, the ground beetle *Rhadine longicollis* Benedict, was described from Carlsbad Caverns in the Guadalupe Mountains of New Mexico but also occurs in caves in the gypsum plain.

Rattlesnake Cave. This is the only known cave in Ward County and is about 100 km east of the caves in the Culberson County gypsum plain inhabited by *S. tuganbius*, with no caves known between the two areas (see Fig. 21). Rattlesnake Cave is a 215 m long, 17 m deep cave. The entrance is at the end of a shallow, 400 m long draw and receives some drainage. Rattlesnake Cave is only about 100 m from the City of Monahans landfill and is at the edge of an active oil field. At one point, the owner of the cave requested that the city fill the entrance and it is not known if this occurred. As the only locality for *S. reyesi* and the troglobitic silverfish mentioned below, both species should be considered highly endangered.

The cave is probably formed in Quaternary age gypsite lacustrine deposits, in contrast to the Permian gypsum of the Culberson County gypsum plain. The lakebed in which the gypsites were deposited was about 26 square kilometers in extent, but has not been mapped in detail. The environs of this lake would have provided the moist habitat in which the ancestral species of the troglobites now inhabiting the cave could have survived. As with Culberson County to the west, the area is now arid, receiving only about 12 inches of annual rainfall. Vegetation is scrub brush.

Much of the cave is quite shallow and extremely dry. Specimens of *S. reyesi* and the troglobitic silverfish *Texoreddellia occasus* Espinasa and Giribet were found beyond a 6 m deep pit in the lowest part of the cave where some moisture was present. On a later trip, the cave was extremely dry throughout and neither millipedes nor silverfish were found. Other species found in the cave included the spiders *Cicurina* (*Cicurusta*) ?*varians* Gertsch and Mulaik and *Eidmannella pallida* (Emerton), the cave crickets *Ceuthophilus* (*Ceuthophilus*) *isletae* Hubbell, *C.* (*Geotettix*) *polingi* Hubbell, and *C.* (*G.*) *umbratilis* Hubbell; the rove beetle *Orus* (*Leucorus*) *rubens* Casey; the hide beetle *Omorgus atrox* (LeConte); and the western diamondback rattlesnake *Crotalus atrox* Baird and Girard. With the exception of the rattlesnake, these are all troglophiles.

Remarks on the Families Macrosternodesmidae and Polydesmidae

North America appears to harbor two well-defined groups of indigenous polydesmoidean millipedes, which recent work (i.e., Shear and Shelley 2007; Shear 2012) has placed in the families Polydesmidae and Macrosternodesmidae. Polydesmids are common in the eastern half of the continent with an indeterminate number of species of two genera of relatively large millipedes, *Pseudopolydesmus* Attems and *Scytonotus* C. L. Koch. The latter genus also occurs in the Pacific Northwest, extending east to Idaho and Utah. In the southern Rocky Mountains and Pacific Coast ranges from California to Washington are found an array of small millipedes (micropolydesmids) typified by the genera *Utadesmus* Chamberlin and Hoffman, *Retrorsia* Shelley and *Snoqualmia* Shear, as well as a number of generic groups and at least a score of species yet to be described.

Macrosternodesmidae are sparsely represented in the eastern half of North America, only by tiny species of *Chaetaspis* Bollman (reviewed by Lewis 2002), but are far more diverse west of the Mississippi River, ranging from central Texas north to Colorado, and in the desert southwest from southern California to Arizona, New Mexico, Utah and Nevada. Like *Chaetaspis* species, these are small, almost minute millipedes, usually 4–10 mm long or less, and due to the aridity of the region are frequently known only from caves. *Pratherodesmus* Shear, *Nevadesmus* Shear, *Speodesmus* and *Speorthus* are typical genera, as well as *Tidesmus* Chamberlin, a genus of slightly larger forms, examples of which have been collected at epigean sites, often in riparian habitats. Coloration is pallid or brownish, and the metaterga bear rows of pustules with setae.

Most of the macrosternodesmid fauna in the Pacific Northwest is dominated by larger species formerly classed in the family Nearctodesmidae Chamberlin and Hoffman, now widely acknowledged (Golovatch 2013) to be a synonym of Macrosternodesmidae. Here we formally designate these genera as comprising a subfamily, **Nearctodesminae, new status.** The subfamily was revised by Shelley (1994; see also Shelley and Shear 2006). Species of nearctodesmines are distinct from other macrosternodesmids in their frequent aposematic coloration and smooth, asetose dorsa.

The family Macosternodesmidae was based on a monospecific genus containing only the species *Macrosternodesmus pallicola* Brölemann, a tiny millipede common in western Europe, and an evident synanthrope (H. Enghoff, pers. comm to WS, 2012). Aside from three other monotypic genera from Eastern Europe, this is the only macrosternodesmid from the Eurasian continent. The similarity in gonopod anatomy between *Macrosternodesmus pallicola* and North American species of *Chaetaspis* is so striking (Lewis 2002, Lewis and Slay 2013) that the latter genus is probably best regarded as a synonym of the former, and raises speculations that *M. pallicola,* with its synanthropic habits, may have originated in North America, where so many other similar species occur.

Recently, Golovatch (2013) and Golovatch and Enghoff (2015) synonymized Macrosternodesmidae (including Nearctodesmidae as a synonym), together with Mastigonodesmidae and Fuhrmannodesmidae, under Trichopolydesmidae. This brings about 80 genera, many of them tropical, monotypic and with highly diverse gonopod morphologies, under the same family name. Concerning at least Macrosternodesmidae, we cannot agree with this drastic step, since this family, almost completely endemic to North America, seems to us to be clearly diagnosable and distinct. The diagnosis provided by Golovatch (2013) for the new, expanded Trichopolydesmidae is extremely broad, and virtually any polydesmidean genus could be somehow shoehorned into it. The same argument also applies to the superfamily Trichopolydesmoidea as conceived of by Golovatch (2013), which under his system includes only Trichopolydesmidae and Opisotretidae, the latter family previously considered polydesmoidean (i.e., Hoffman 1979). It is our opinion that the superfamilies Polydesmoidea and Trichopolydesmoidea can no longer be maintained as separate taxa, and here we combine them under the older name, **Polydesmoidea, new combination** (see also Shear (2012) for a more detailed discussion). Clearly, this superfamily requires reexamination, possibly by means of molecular phylogenetics, before additional lines between families can be drawn with confidence.

As a note on morphology/terminology, Golovatch and Enghoff (2015) and others have repeatedly referred to polydesmoid gonocoxae as being "fused." While the gonocoxae of macrosternodemids in particular are tightly adjacent and not movable with respect to each other, they remain separate and easily are parted in dissection (see Fig. 12–13). In the case of some polydesmid species, the gonocoxae are readily movable. Truly fused gonocoxae occur only in some species of Dalodesmidae, where there

is no discernable suture between left and right gonocoxae, and the fusion sometimes extends to the prefemora and even the acropodites. We think the term "fused" should be reserved for the dalodesmid condition. Only two families of Polydesmoidea, Polydesmidae and Macrosternodesmidae, are found in North America, and they can be readily separated according to characters in Table 1.

Genera of Polydesmidae in North America North of Mexico (Keyed in Shear 2012)

Polydesmus Latrielle (4 species, all colonists from Europe), *Brachydesmus* Heller (1 species, native to Europe), *Bidentogon* Buckett and Gardner (2 species, California), *Calianotus* Shelley (3 species, California), *Pseudopolydesmus* (12 nominal species, eastern United States and southeastern Canada), *Scytonotus* (9 species, eastern United States, southeastern Canada, Pacific Coast from Alaska to northern California, northern Rocky Mountains), *Utadesmus* (2 species, Utah, New Mexico), *Snoqualmia* (2 species, Washington, Idaho) and *Retrorsia* (2 species, western Oregon and Washington). There are several undescribed genera ranging from Washington to northern California.

Genera of Macrosternodesmidae in North America North of Mexico

Nearctodesminae. *Nearctodesmus* Silvestri (3 species, British Columbia to northern California), *Bistulodesmus* Shelley (1 species, eastern Washington, northern Idaho), *Ergodesmus* Chamberlin (2 species, Washington to Montana, caves in southwestern Illinois), *Kepolydesmus* Chamberlin (1 species, Oregon, Washington, Idaho, Montana), *Leonardesmus* Shelley and Shear (1 species, Washington; perhaps 3 undescribed species, northern California).

Macrosternodesminae. *Ophiodesmus* (Cook) (1 species, introduced from northern Europe to Newfoundland), *Chaetaspis* (4 species, eastern United States), *Speorthus* (2 species, caves in New Mexico and Texas), *Speodesmus* (7 species, caves in Texas and Colorado), *Tidesmus* (5 species, California, Arizona, Nevada, Baja California Norte), *Sequoiadesmus* Shear and Shelley (1 species, caves in Sierra Nevada, California), *Pratherodesmus* (3 species, California, Arizona), and *Nevadesmus* (1 species, Nevada).

At least one undescribed genus of Macrosternodesmidae and several undescribed species of *Pratherodesmus* and *Nevadesmus* occur in Utah, Arizona and southern California.

The systematic position of *Harpogonopus confluentus* Loomis, from the Coast Ranges of southern California and Baja California Norte, Mexico, is not entirely clear (Shelley 1993). The gonopod has nearctodesmine affinities, but the metazonites have rows of setae.

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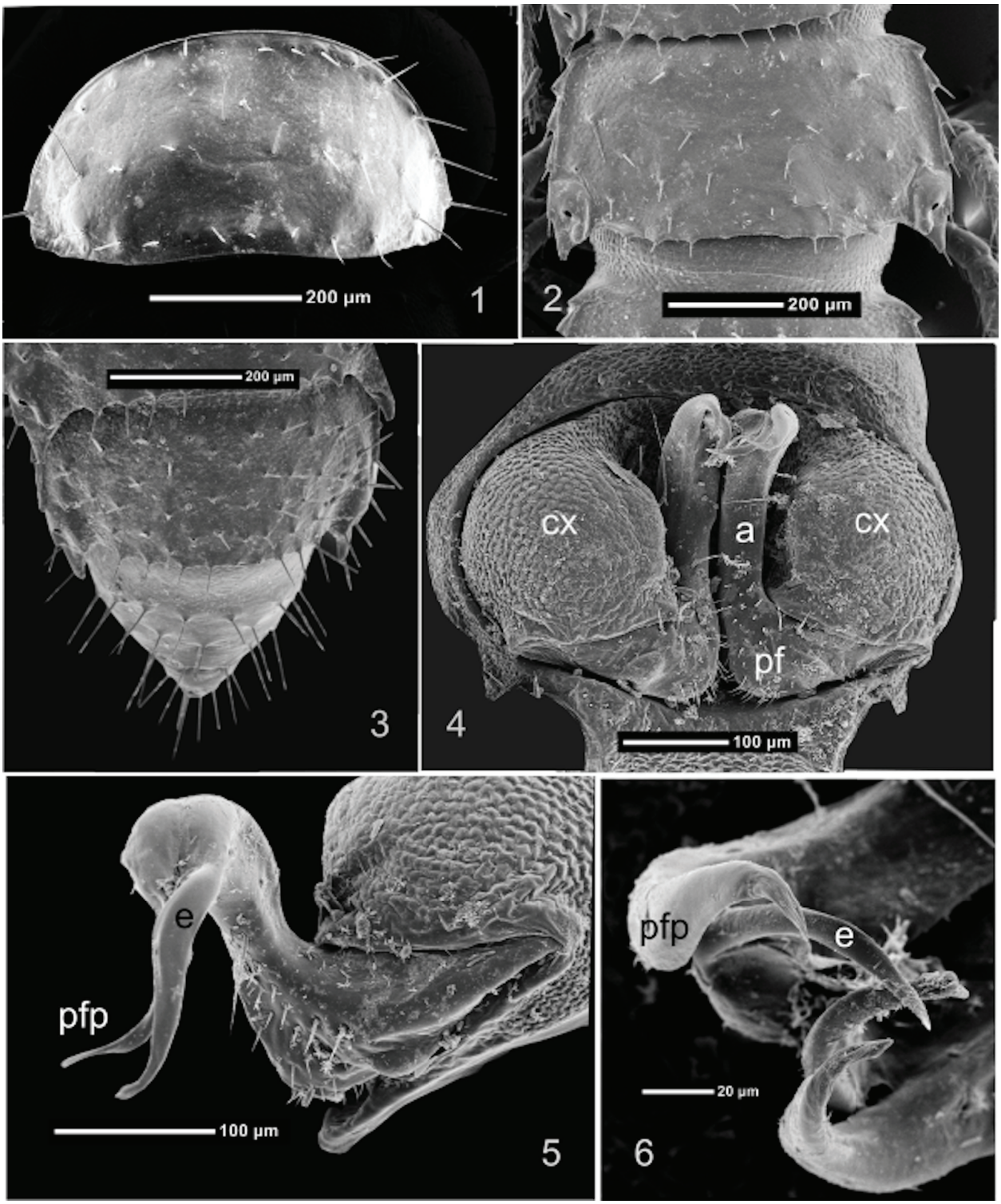
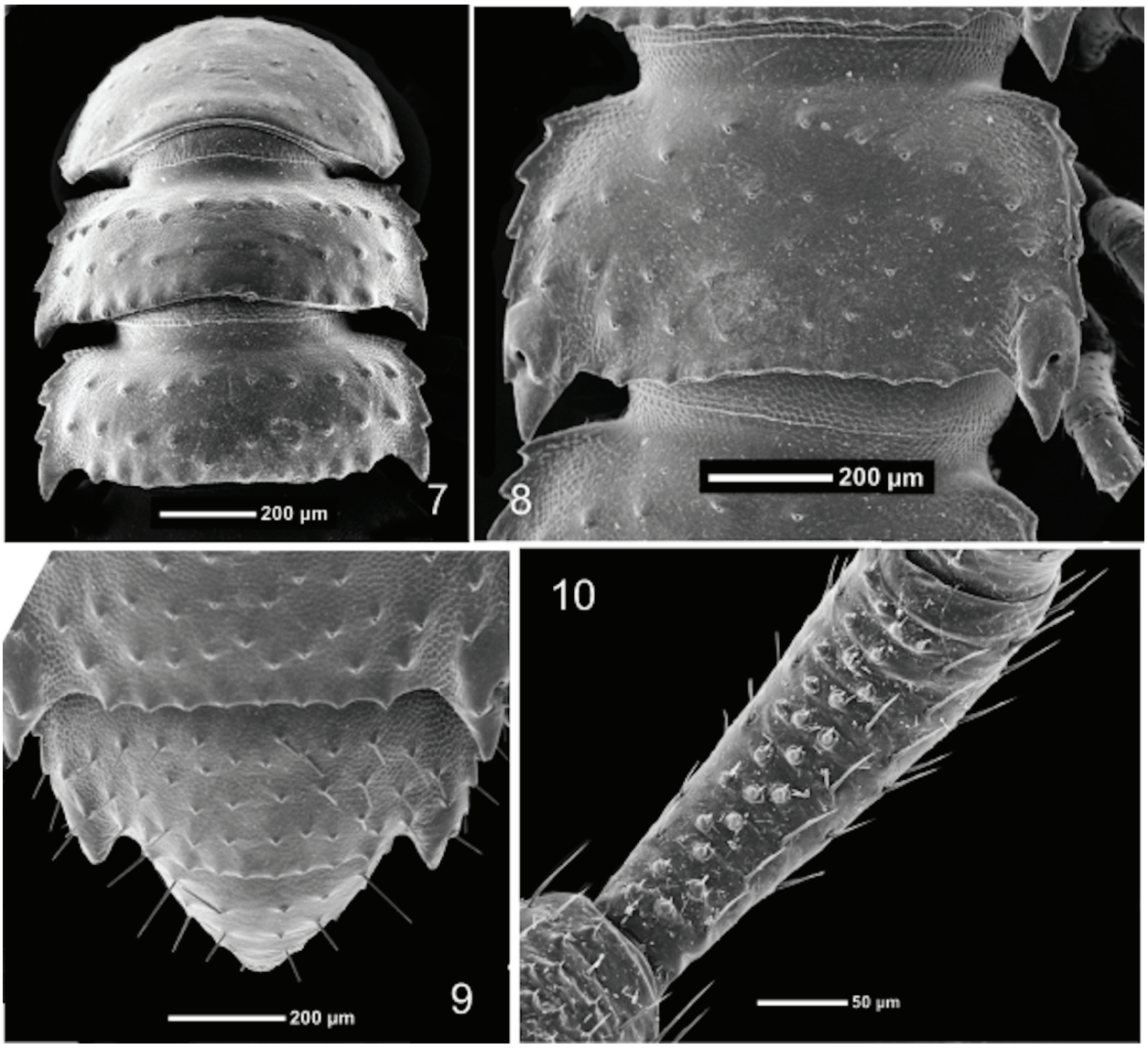
Table 1. Comparative diagnoses of Polydesmidae and Macrosternodesmidae; characters of the latter based on North American species.

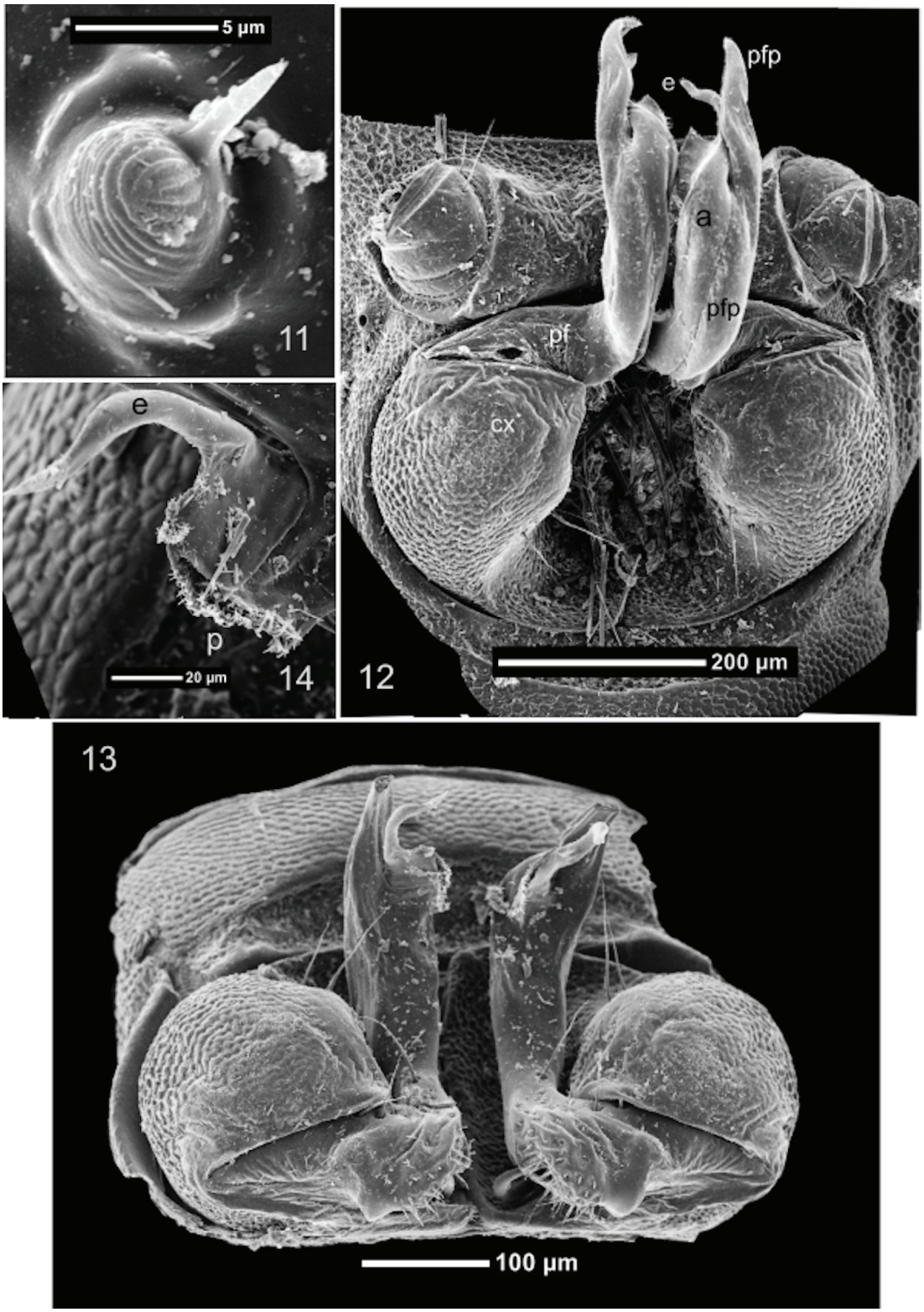
Character	Polydesmidae	Macrosternodesmidae
Length	10–30 mm	4–35 mm
Coloration	White to tan to reddish brown or black, some with red paranota	White to tan to brown or red, some with paler paranota
Collum	Small, transverse oval	Small, transverse oval
Paraterga	Usually well-developed, laterally dentate	Usually well-developed, laterally dentate or with even margin
Metatergal ornament	2 or 3 rows of contiguous polygonal areas; single seta may or may not arise from each area	Entirely smooth (Neactodesminae), or with 3–5 rows of seta-bearing tubercles
Limbus	Microspiculate	Microspiculate, lobed, or absent
Male prefemora	Often dorsally swollen	Often dorsally swollen
Sphaerotrichomes	Usually absent	Usually present
Gonocoxae	Subglobular to elongate, usually enclosed within aperture, sometimes movable with respect to one another, deeply excavate anteriomesally	Globular, usually enclosed within aperture, not movable with respect to one another, deeply excavate anteriomesally
Cannula	Present	Present
Gonopod prefemora	Small to moderate in size, not extending laterally across coxae	Large, mesal part swollen, with articulating processes that extend laterally across coxae
Prefemoral process	Absent	Present, may be bifurcate or reduced
Acropodite orientation	Parallel to prefemur	At right angles to prefemur
Acropodite	Entire or deeply divided distal to seminal pore	Entire, possibly elaborate distal to seminal pore
Seminal groove	Originates mesally, usually crosses to lateral side, with a distinct loop distally	Originates mesally, sometimes crosses to lateral side, distal loop absent
Subterminal seminal vesicle	Present	Absent
Pulvillus	Nearly always present	Rarely present (may not be homologous to polydesmid pulvillus)
Solenomere	Present in a few species, may bear pulvillus at tip	Present in most species, pulvillus never at tip



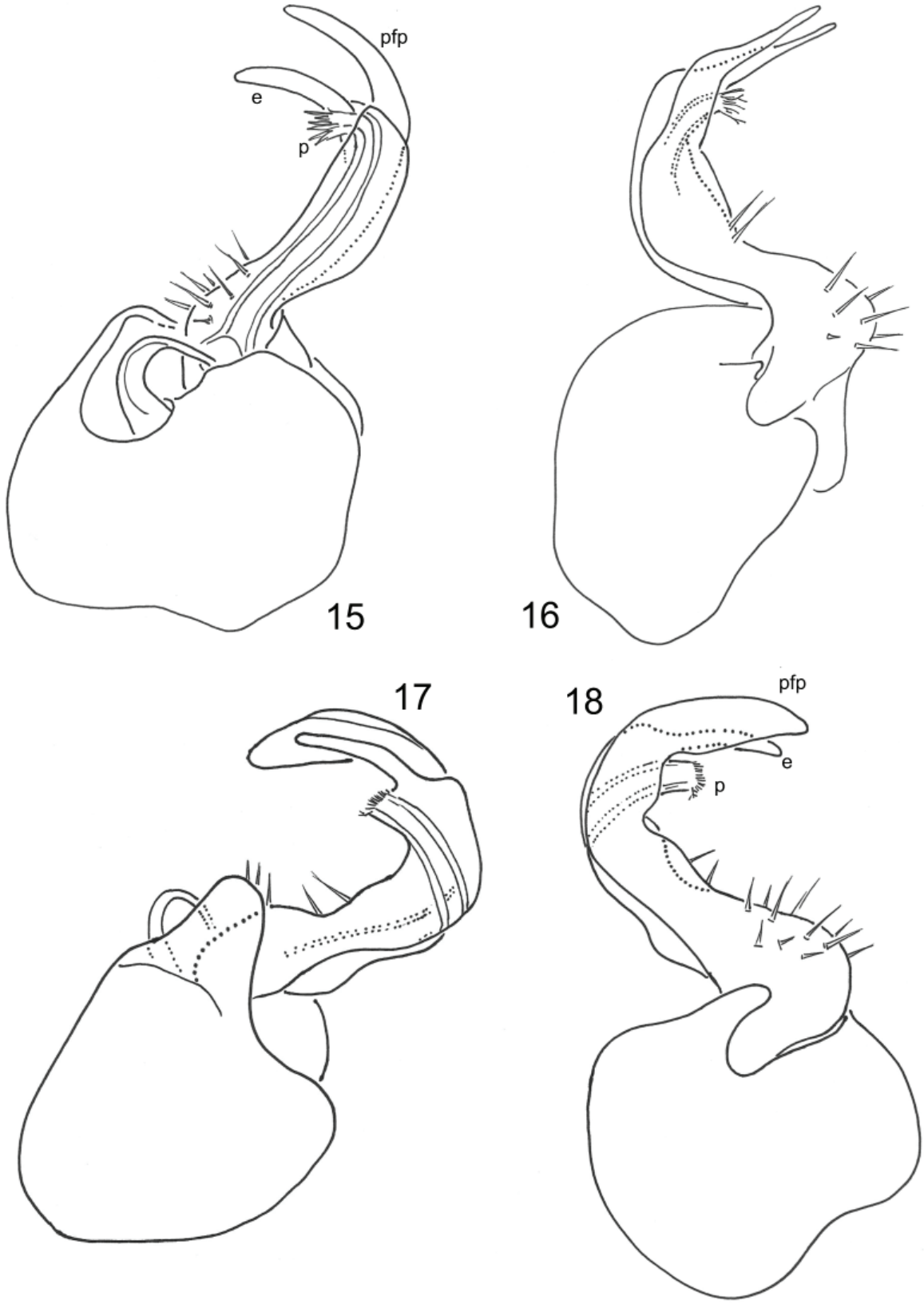
Figures 1–6. *Speorthus tuganbius* topotype male. **1)** Collum, dorsal view. **2)** Ninth ring, dorsal view. **3)** Epiproct, dorsal view. **4)** Gonopods, posterioventral view. **5)** Right gonopod, posterior view. **6)** Tips of gonopod telopodites, ventral view.



Figures 7–10. *Speorthus reyesi* male. **7)** Collum and trunk rings two and three, dorsal view. **8)** Ninth ring, dorsal view. **9)** Epiproct, dorsal view. **10)** Prefemur of left leg nine, ventral view.



Figures 11–14. *Speorthus reyesi* male. **11)** Sphaerotrichome from prefemur of left leg nine, ventral view. **12)** Gonopods, anterioventral view, gonopods extended for copulation (posterior above); **a**, acropodite, **cx**, coxa, **e**, endomerite, **pf**, prefemur, **pfp**, prefemoral process. **13)** Gonopods, posterioventral view, gonopods retracted into anterior coxal cavities (anterior above). **14)** Opening of seminal channel and endomerite, ventral view; **e,** endomerite, **p**, pore of seminal channel.



Figures 15–18. *Speorthus* gonopods. **15)** Right gonopod of *S. tuganbius,* mesal view. **16)** Same, lateral view. **17)** Right gonopod of *S. reyesi,* mesal view. **18)** Same, lateral view. Abbreviations as in Fig. 12.

Figures 19–20. *Speorthus tuganbius,* photographed in habitat at Carlsbad Caverns National Park, New Mexico. **19)** Male. **20)** Mating pair. Photographs courtesy of Jean Krejca.

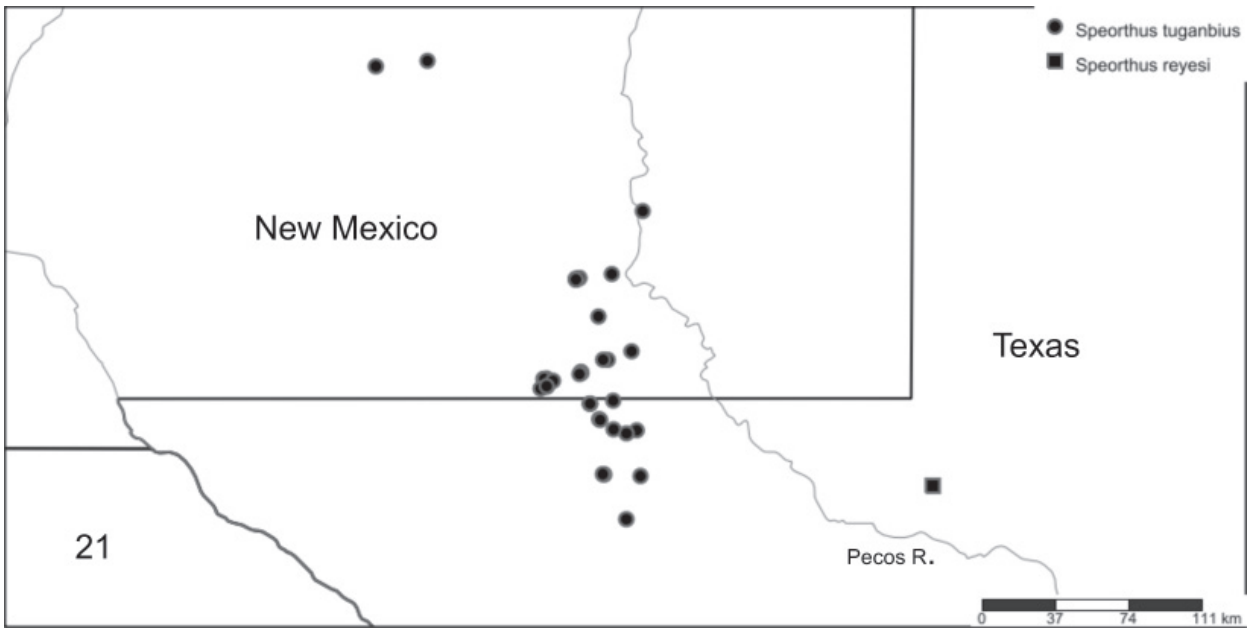


Figure 21. Southeastern New Mexico and western Texas, showing distribution of *Speorthus tuganbius* (dots; includes localities reported by Shear [1974]), and the type locality of *S. reyesi,* new species (square).