

***CHAETASPIS ATTENUATUS*, A NEW SPECIES OF CAVERNICOLOUS MILLIPED FROM ARKANSAS (DIPLOPODA: POLYDESMIDA: MACROSTERNODESMIDAE)**

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Abstract: This description of *Chaetaspis attenuatus*, new species, from two caves in northern Arkansas brings the total species assigned to the genus to six. *Chaetaspis attenuatus* occurs approximately 100 kilometers to the southeast of its sister species *C. aleyorum* that occurs in southwestern Missouri.

INTRODUCTION

Five species have been assigned to the genus *Chaetaspis*, a group of minute millipeds occurring in caves and edaphic habitats in the eastern United States (Lewis, 2002). The genus was erected by Bollman (1887) for *Chaetaspis albus*, which he described from an unspecified locality in Bloomington, Monroe County, Indiana, and subsequently reported from a locality in Little Rock, Arkansas (Bollman 1888). Bollman's description did not include illustrations of the gonopods, a deficiency that was rectified by Lewis (2002), who examined material from Indiana, Kentucky, Tennessee, Alabama, Mississippi, and Virginia.

Antriadesmus fragilis was described by Loomis (1943) from a female specimen collected in White's Cave, Mammoth Cave National Park, Kentucky. Causey (1959) described *A. debilis* from material collected in Walker Spring Cave, Wayne County, Tennessee, and *A. mollis* from Cumberland Caverns, Warren County, Tennessee. Hoffman (1979) synonymized *Antriadesmus* with *Chaetaspis* and placed the genus in the family Macrosternodesmidae based on gonopod similarities. These cavernicolous species remain poorly known, although *C. mollis* was found in Camps Gulf Cave, Van Buren County (Lewis, 2002), and *C. fragilis* was reported from a cave in Pulaski County, Kentucky (Lewis and Lewis, 2005).

Causey (1950) also described *Chaetaspis ohionis*, but this species remains somewhat of a mystery. The type material was apparently lost and Hoffman (1999) stated that the species was not a *Chaetaspis*, and possibly not even correctly placed in the same family.

Lewis (2002) described the first cavernicolous species of the genus from the Ozarks, *Chaetaspis aleyorum*, from Tumbling Creek Cave, Taney County, Missouri.

In this paper the term *exomere* adopted by Shear et al. (2009) from Djursvoll (2008) is followed and applied to the part of the gonopod called the "posterior prefemoral process" by Lewis (2002) and "process B" of Shear and Shelley (2007, 2008).

The species below from northern Arkansas is the second cavernicolous *Chaetaspis* species described from the Ozark Plateau physiographic province.

Order Polydesmida Pocock, 1887

Family Macrosternodesmidae Brölemann, 1916

Chaetaspis attenuatus Lewis, new species

Figs. 1–5

Antriadesmus sp.—McDaniel and Smith, 1976: 59.

Chaetaspis undescribed species 1.—Lewis, 2002: 105, 108.

Material examined—Arkansas: Independence Co., Cushman Cave, approximately 2 km west of Cushman, 5 October 1974, G.L. Harp; same locality, 19 October 1974, V.R. McDaniel; same locality, 9 July 2008, M. Slay, M. D. Kottmyer; IZARD Co., Clay Cave, approximately 10 km southwest of Melbourne, 10 July 2008, M. Slay, M. D. Kottmyer. A dissected male from Cushman Cave is the holotype, the other specimens from that locality are paratypes. All specimens deposited in the Florida State Collection of Arthropods, Gainesville.

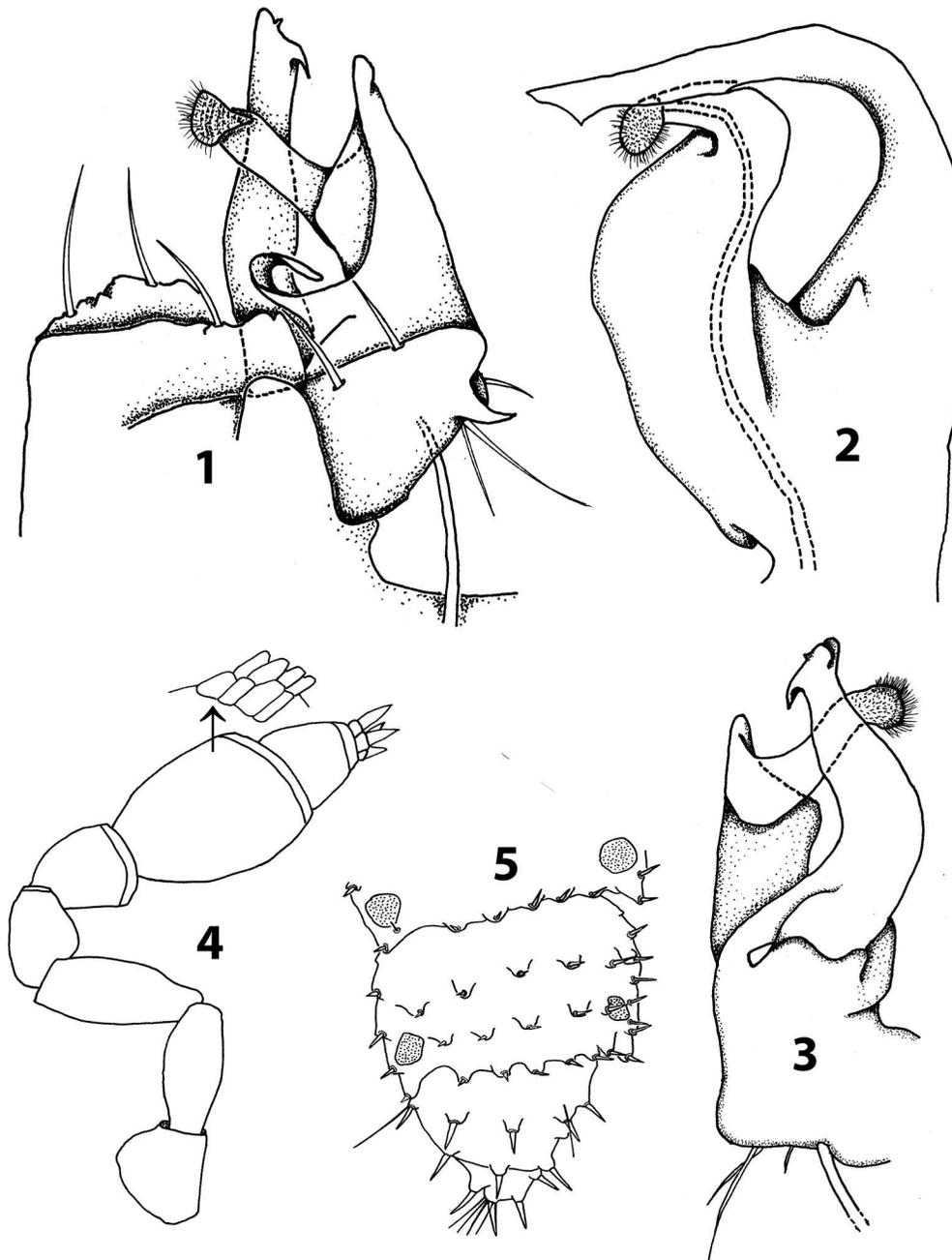
Diagnosis—Separable from all species assigned to *Chaetaspis*, except *C. aleyorum*, by the solenomere of acropodite tapering to a terminal disc covered with setules and denticles. The gonopod exomere of *C. attenuatus* tapers to a single point in lateral aspect, in contrast to the club-like shape in *C. aleyorum* that increases in size, then is slightly bifurcate apically. The proximal acropodite is lower, non-alate in anterior or posterior aspect in comparison to the distinctly alate structure in *C. aleyorum*.

Description—Holotype approximately 5.3 mm long, 0.45mm wide, unpigmented, white in appearance, body filiform, approximately 12× as long as wide. Head wider than collum, epicranial suture distinct. Antenna densely setose, article 6 longest, clavate, with row of microsensilla along distal margin, articles 2–4 subequal, about 0.70× as long as article 6, article 7 tapering to apical disc, 4 sensory cones present.

Collum broadly rounded anteriorly (almost semi-circular), subequal in width to segment 2, with transverse rows of setae; segments 3 and 4 slightly smaller than 2 and 5; segment 7 approximately 1.7× length of preceding segment; metatergites with three rows of setae; lateral margins of pregonopodal paranota slightly undulate,

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Figures 1–5. *Chaetaspis attenuatus*, holotype, Cushman Cave, Independence County, Arkansas: (1) gonopod, posterior; (2) gonopod, lateral; (3) gonopod, anterior; (4) antenna, setae omitted; (5) ornamentation of terminal segments (specimen bent to left).

post-gonopodal paranota slightly dentate; posterior lateral corners of anterior segments rounded, becoming progressively more produced on posterior segments, becoming a distinct tooth-like lobe directed posteriad in segments 17–19. Posterior margin of segments unmodified on anterior segments except for row of setae along margin, in segments 18–19 with a row of produced, rounded projections directed posteriad, each bearing a seta.

Gonopod, coxae subglobose, cannula prominent, prefemur setose. Acropodite with solenomere slender, cylindrical, apical disc with numerous minute denticles and setules,

anterior to proximally broad process that terminates in mesial and lateral lobes; exomere tapering distally to an acute point.

Females to approximately 6.5 mm, width approximately 0.55 mm. Nonsexual characters as in male.

Distribution—*Chaetaspis attenuatus* is known from Cushman and Clay Caves in northeastern Arkansas (Fig. 6). These caves were formed in limestone of Ordovician age that occurs along the southern margin of the Salem Plateau section of the Ozark Plateau physiographic province. The caves occur along the northeastern side of the White River, separated by approximately 100 km from the

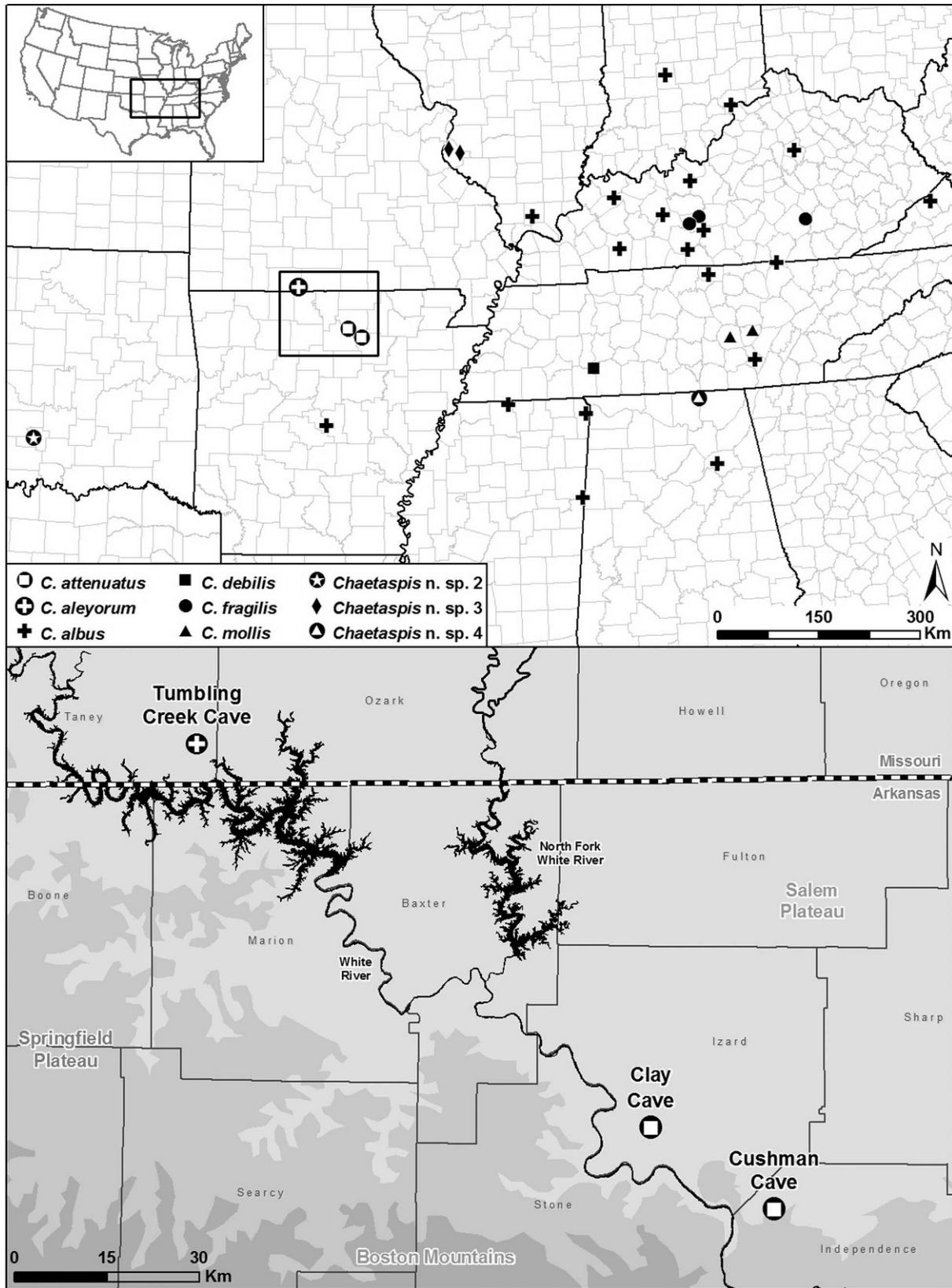


Figure 6. Distribution of *Chaetaspis* species (top) and detail for *C. attenuatus* and *C. aleyorum* (below).

only known locality of the sister species *C. aleyorum* in Tumbling Creek Cave, Taney County, Missouri.

Ecology—Cushman Cave is notable for its large entrance from which emerges a perennial stream. The cave has 2100 meters of mapped passages. In Cushman Cave the millipeds were collected in the dark zone, mostly under rocks lying in undisturbed soil or in woody organic debris. On 9 July 2008 the air temperature 2 cm above the substrate varied from 14.6 to 15.3 °C at four stations measured in the dark zone; *Chaetaspis attenuatus* occurred at three of these stations. Relative humidity at the same sites ranged from 88 to 94%. Other troglobionts observed in proximity to *C. attenuatus* included the milliped *Causyella causeyae* Shear, a pseudoscorpion *Apoththonius* sp., the isopod *Brackenridgia ashleyi* Lewis, unidentified linyphiid spiders, and rhagidiid mites.

Clay Cave receives a great deal of water during heavy precipitation, but there is not a perennial stream. Approximately 300 meters of passage are known in the cave. *Chaetaspis attenuatus* was found in the dark zone under leaf litter and associated with rotting wood. The millipeds occurred at all four stations for which temperature and humidity data were recorded on 10 July 2008. Temperature 2 cm above the floor varied from 56.0–59.5 degrees F. and relative humidity ranged from 86 to 95%. Other terrestrial taxa included the milliped *Causyella causeyae*, the isopod *Brackenridgia ashleyi*, the beetle *Ptomaphagus cavernicola* Schwarz, a harvestman *Crosbyella* sp., a collembolan *Tomocerus* sp., and rhagidiid mites.

Etymology—The name *attenuatus* is from Latin referring to the tapering gonopod exomere.

Chaetaspis sp.

Material examined—Arkansas: Marion County, Forest Trail Ridge Cave, Buffalo National River, National Park Service, 12 June 2008, Michael E. Slay, D. Fong, and M. Kottmyer; Stone County, Double Barrel Cave, Ozark-St. Francis National Forest, U.S. Forest Service, 31 March 2002, G. Graening, D. Fenolio, and C. Brickey. Oklahoma: Cherokee County, cave identified as CZ-18, 29 January 2002, G. Graening, D. Fenolio, and S. Hensley.

Notes—These records represent localities for *Chaetaspis* populations from which males, necessary for identification, have not yet been found. The Forest Trail Ridge Cave and Double Barrel Cave localities are zoogeographically interesting since they occur on the southwestern side of the White River, whereas *C. aleyorum* and *C. attenuatus* are only known from caves on the northeastern side.

Lewis (2002) reported an undescribed *Chaetaspis* collected by R. C. Harrel on 3 July 1959 from an unspecified cave in Murray County, Oklahoma. It is likely that this “unspecified cave” is actually Wild Woman Cave, where Harrel (1960, 1963) was investigating the invertebrate community. Indeed, Harrel (1963) reported on a new species of *Antridiadasmus* (= *Chaetaspis*) from Wild Woman Cave that was being studied by Nell Causey. This is postulated should the need arise to

collect additional material of the undescribed Oklahoma *Chaetaspis* reported in Lewis (2002). Wild Woman Cave occurs in the Arbuckle Mountains, a geographically isolated karst region of Oklahoma, and represents the only known location of *Chaetaspis* in Oklahoma, as well as the most westerly population of the group.

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