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THE MILLIPED GENUS *UTADESMUS* CHAMBERLIN & HOFFMAN (POLYDESMIDA: POLYDESMIDAE)

Rowland M. Shelley

ABSTRACT

The milliped genus *Utadesmus* Chamberlin & Hoffman, superficially similar to the southeast Asian genus *Pacidesmus* Golovatch in the general telopodal configuration, consists of two allopatric species, *U. henriensis* (Chamberlin), the type species, known only from the Henry Mountains, Utah, and *U. hoffi* Chamberlin & Hoffman, occurring some 250-345 mi (400-552 km) to the southeast in the San Mateo, Sandia, Manzano, Jimenez, and Sangre de Cristo Mountains and upper Rio Grande Valley, New Mexico. Populations primarily inhabit forests at high elevations on inselberg mountain ranges; they are absent from the intervening desert lowlands. The species differ only in the configuration of the short endomerite, which is apically subacuminate in *U. hoffi* and sublinear in *U. henriensis*.

The deserts of the southwestern United States are inhospitable to most millipeds, which require moisture and shelter for survival. Excepting the species of *Orthoporus* (Spirostreptida: Spirostreptidae) (Causey 1975) and representatives of the families Atopetholidae (Spirobolida) and Schizopetalidae (Callipodida) (Loomis 1937, Hoffman & Orcutt 1960), few diplopods can survive the searing summer heat and aridity characteristic of American deserts. Other southwestern millipeds inhabit the cool, moist forests that occur chiefly at high elevations on inselberg mountain ranges. These woodlands constitute scattered "island" communities, as the intervening desert lowlands form impervious barriers to gene flow between the isolated montane populations. Numerous inselbergs occur in the southwest, and they are particularly abundant in the Colorado Plateau and Basin and Range Physiographic Provinces. The xystodesmid, *Stenodesmus tuobitus* (Chamberlin), in the Guadalupe of west Texas and the Sacramento, Capitan, and Black Mountains of southern New Mexico, exemplifies an inselberg milliped species (Shelley 1987, 1992), and the polydesmids, *Utadesmus henriensis* (Chamberlin) and *U. hoffi* Chamberlin & Hoffman, inhabit more northerly inselbergs, from the Henry Mountains of Utah to the Manzanos of New Mexico.

Brachydesmus henriensis was proposed by Chamberlin (1930) for specimens collected on Mt. Ellen in the Henry Mountains and was subsequently recorded by Attems (1940). Recognizing that the species did not belong in *Brachydesmus*, a European polydesmid genus, Chamberlin & Hoffman (1950) erected *Utadesmus* and designated *B. henriensis* as the type species. They also proposed *U. hoffi* for a form in the Sandia Mountains, New Mexico, and provided a key to the three 19-segmented polydesmid genera then known from the Nearctic - *Scytonotus*, *Utadesmus*, and *Brachydesmus* - as the Palearctic species, *B. superus* Latzel, had

been introduced into North American cities. Chamberlin & Hoffman (1958) published brief accounts of the genus and both species, which still are known only from the vicinities of their type localities. Hoffman (1980) included *Utadesmus* among 22 genera in the Polydesmidae and indicated that it contained two species in Utah and New Mexico. Several additional samples are now available, and I therefore rediagnose the taxa and cite the new records. Acronyms of sources of preserved study material are as follows:

FSCA - Florida State Collection of Arthropods, Gainesville.

NCSM - North Carolina State Museum of Natural Sciences, Raleigh.

NMNH - National Museum of Natural History, Smithsonian Institution, Washington, DC.

WAS - Private collection of William A. Shear, Hampden-Sydney, Virginia.

Genus *Utadesmus* Chamberlin & Hoffman

Utadesmus Chamberlin & Hoffman, 1950: 2; 1958: 75. Jeekel, 1971: 359. Hoffman, 1980: 174.

Type species: *Brachydesmus henriensis* Chamberlin, by original designation.

Diagnosis: A genus of minute polydesmids, adults ca. 9.5 mm long and 1.2 mm wide with 19 segments; dorsum relatively flattened, paranota present on all segments of both sexes, subparallel to substrate, margins deeply notched, dentate; metatergites with 3 rows (collum with 4 rows) of flattened, setose elevations; podomeres normal on all legs in both sexes, without lobes or other modifications; telopodite long, slender, and sublinear, with a setose, cupulate, caudomedial projection distal to midlength; endomerite a short, laminate distolateral projection, much shorter than tibiotarsus, apically subacuminate or sublinear; tibiotarsus arising distomedial, an elongated, sinuate projection, apically subacuminate and recurved medial; prostatic duct sublinear, running through center of telopodite, curving slightly distad, but without distal loop or chamber, opening just below (proximal to) setose projection.

Distribution: Southcentral Utah to northcentral New Mexico, spanning the Continental Divide and the Rio Grande, Colorado, and San Juan Rivers (Fig. 7).

Species: Two, one on each side of the Continental Divide. They are nearly indistinguishable, but close inspection reveals a slight but consistent difference in the configuration of the endomerite, which is apically sublinear in *U. henriensis* and subacuminate in *U. hoffi*. The process therefore appears somewhat subquadrate in the former and subtriangular in the latter. Genetic exchange between these forms is precluded by the sizeable geographic hiatus, approximately 250 mi (400 km), and recognition of the New Mexico form at the specific level is justified.

Relationships: Judging from its isolated occurrence well in the interior of the western United States and the wide separation of its two species, *Utadesmus* is an old entity and the product of an early invasion of what is now the western Nearctic. Its affinities are obscure and have never been addressed by a previous author. I believe *Utadesmus* is related to other west-Nearctic polydesmid genera, but definitive statements are deferred until this fauna is better known.

Remarks: In *Utadesmus*, the characteristic polydesmid pulvillus is enlarged into an elongate, flange-like projection with upturned edges and a cupped ventral surface. The structure is sparsely setose with very short setae, and the prostatic duct opens just below or proximal to it.

The telopodite of *Utadesmus* is superficially similar to that of *Pacidesmus*, as represented by *P. shelleyi* Golovatch (compare figs. 1-6 with figs. 12-13, 17-18 in Golovatch (1991)). Both

are sublinear with elongated tibiotarsi and shortened endomerites (= acropodite and solenomerite branch/process, respectively, in Golovatch's terminology), and the *in situ* configuration of the latter, with the apices overlapping and the telopodites arising caudad and leaning over the anterior margin of the aperture and the 6th sternum (Golovatch 1991, fig. 16), is identical to that in *Utadesmus*.

Utadesmus henriensis (Chamberlin)

Figs. 1-3

Brachydesmus henriensis Chamberlin, 1930: 118, 121, unnumbered fig. at bottom left of p. 120. Attems, 1940: 139.

Utadesmus henriensis Chamberlin & Hoffman, 1950: 2; 1958: 75.

Type specimens: Male holotype and one male, one female, and approximately 3 juvenile paratypes (NMNH) collected by R. V. Chamberlin, 11 September 1929, in the vicinity of Mt. Ellen in the Henry Mountains, Garfield County, Utah. The literature account (Chamberlin 1930) specifies that the specimens were collected "above King's ranch" on the slopes of Mt. Ellen, but the label with the holotype only states, "Henry Mountains." An additional label in the paratype vial states, "Small Lake, Henry Mountains," exact location unknown. Suffice it to say that the samples were taken in the general vicinity of Mt. Ellen, ca. 17 mi (27.2 km) south-southwest of Hanksville.

Diagnosis: Endomerite apically sublinear, corners slightly elevated, appearing generally subquadrate in configuration.

Description: Caudal half of epicranium glabrous, head otherwise densely covered with short, fine, parallel-sided setae; epicranial suture indistinct; genae not extending beyond adjacent cranial margins.

Collum much narrower than succeeding tergites, not covering epicranium, with four transverse rows of low, flattened, setose elevations, caudal margin smooth, lateral margins indented caudad. Remaining tergites with three rows of setose, flattened elevations, only slightly elevated above metatergal surfaces, clearly demarcated from each other; setae moderately long, stout, and linear, slightly clavate. Paranota present on all segments in both sexes, broad and flattened, subparallel to substrate, margins strongly dentate, with two to four distinct teeth, caudal paranotal margins also notched, teeth extending onto margins of interparanotal regions; ozopores present on distinct swellings, opening dorsad. Epiproct moderately long, subtriangular, overhanging and extending well beyond margins of paraprocts.

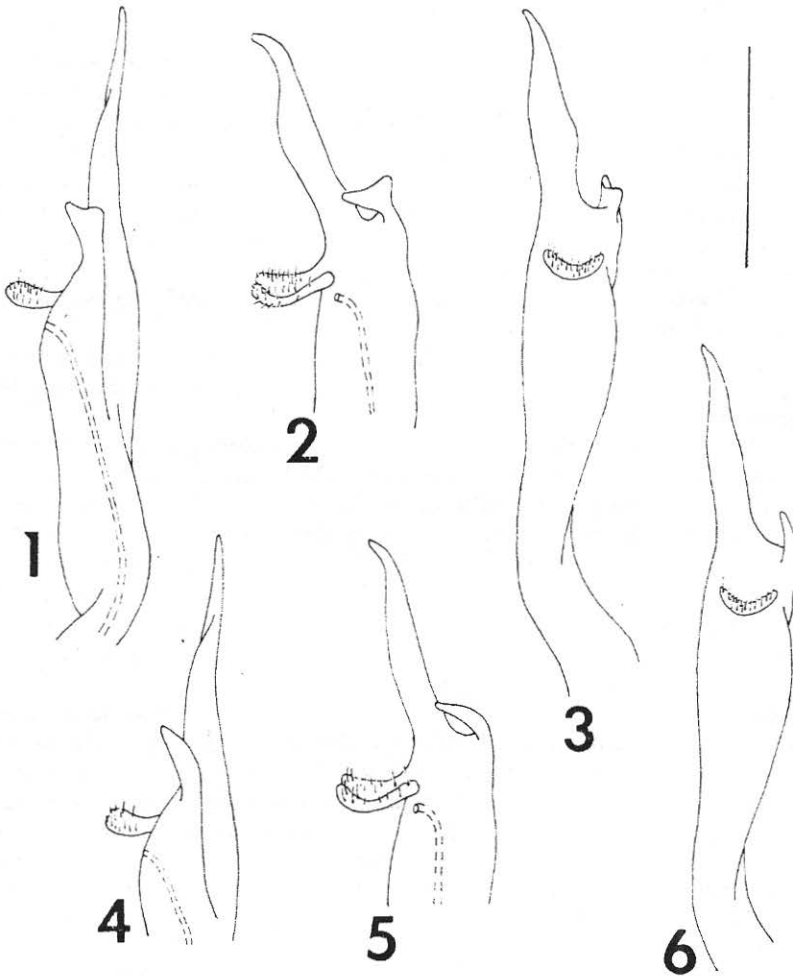
Sterna generally granular in appearance, 6th sternum strongly depressed to accommodate gonopodal telopodites, sterna otherwise without modifications, postgonopodal sterna with faint bicruciform impressions. 9th legs set far apart to accommodate caudal extension of aperture; podomeres normal on all legs in both sexes, without lobes, projections, or swellings.

Gonopodal aperture broad, obcordate, caudal margin extending strongly caudad, displacing 9th legs, sides flush with metazonal surface. Gonopods *in situ* with coxae narrowly segregated, telopodites arising from caudal margins, leaning anteriorly over anterior margin of aperture and 6th sternum, apices crossing. Gonopod structure as follows (Figs. 1-3). Coxa massive, without lobes or projections. Telopodite long and narrow, with slight basal curve but generally linear, suberect, with slight swelling distal to midlength and cupulate, horizontal, setose projection, perpendicular to stem, arising caudomedial at 3/4 length, setae short and stout, scattered on surface of projection; endomerite short, arising from distolateral corner, apically long and sublinear, corners slightly elevated, configuration generally subquadrate; tibiotarsus arising from distomedial corner, greatly prolonged and gently sinuate, much longer than endomerite, angling slightly medial, sides narrowing smoothly and continuously to subacuminate tip, latter recurved and directed medial.

Variation: The few available gonopods agree closely, with no discernable variation.

Ecology: According to Chamberlin (1930) the types were discovered beneath rocks under aspen trees; the second sample was collected at an elevation of 11,000 ft (3,300 m).

Distribution: Known only from the general area of Mt. Ellen in the northern Henry Mountains, approximately 160 mi (256 km) west of the Continental Divide and 250 mi (400 km) northwest of the most proximate locality of *U. hoffi* in New Mexico (Fig. 7). *Utadesmus henriensis* may be expected at high elevations throughout the Henry Mountains, but I did not find it at suitable sites in the LaSal and Abajo Mountains in southeastern Utah in August-September 1994, an unusually hot, dry summer when there was little moisture in



Figs. 1-3, *U. henriensis*. 1, telopodite of left gonopod, lateral view. 2, the same, caudal view. 3, the same, oblique caudomedial view. Figs. 4-6, *U. hoffi*. 4, telopodite of left gonopod, lateral view. 5, the same, caudal view. 6, the same, oblique caudomedial view. Scale line = 1.00 mm for each figure.

the soil and litter. However, these are plausible areas for additional populations or an undescribed congener, as are Navajo Mountain, Utah; the Ute Mountain area in the southwestern corner of Colorado; and the Chuska Mountains on the northern Arizona/New Mexico state line. Specimens were examined as follows:

UTAH: *Garfield Co*; Mt. Ellen vicinity, Henry Mts., 2M, F, 3 juvs., 11 September 1929, R. V. Chamberlin (NMNH) TYPE LOCALITY; and North Summit Ridge between Bull Cr. Pass and Mt. Ellen, 11,000 ft (3,300 m), M, F, 18 August 1979, A. K. Johnson (NCSM).

Remarks: The gonopods of the holotype are missing, and a label in the vial states, "see mount," indicating that Chamberlin dissected and mounted the gonopods for the illustration accompanying his original description. The location of this slide is unknown. One gonopod, which I transferred to a microvial, was loose in the paratype vial.

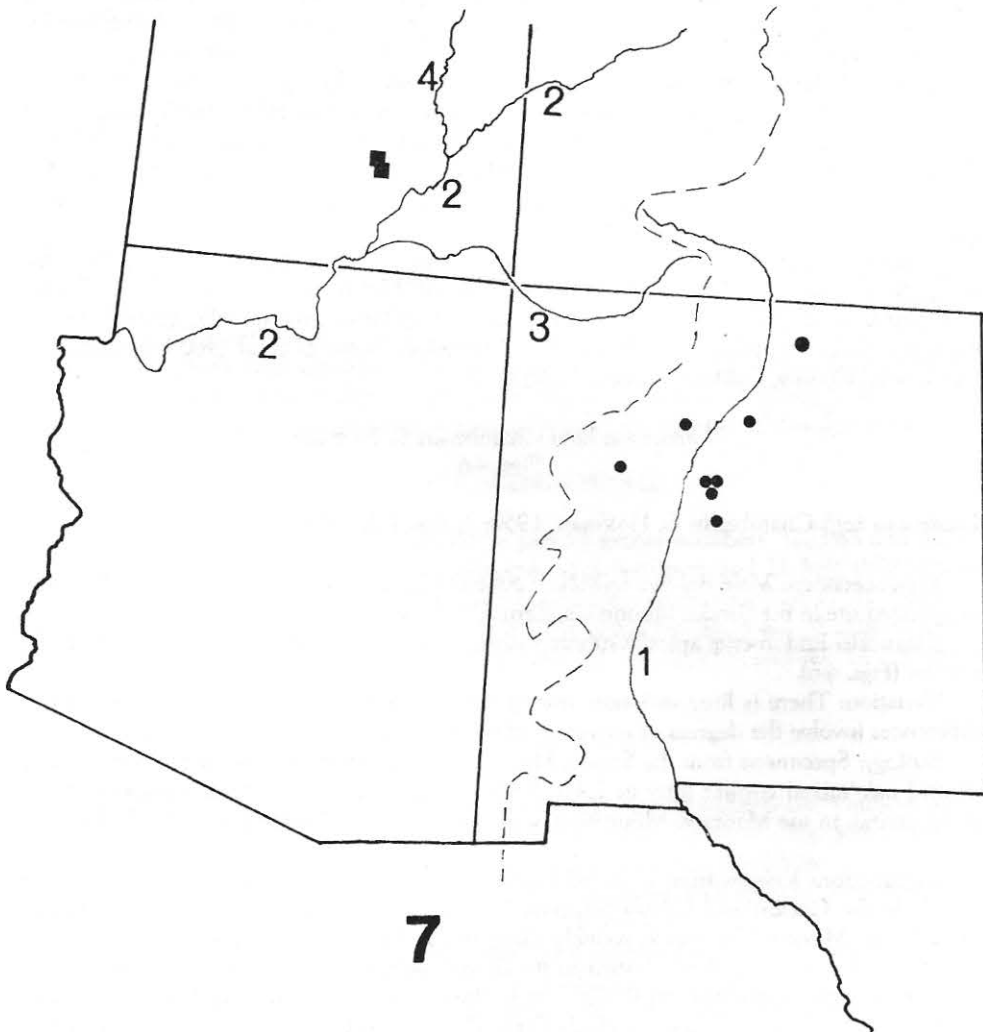


Fig. 7. Distribution of *Utadesmus*. Squares, *U. henriensis*. Dots, *U. hoffi*. The dashed line marks the approximate course of the Continental Divide. River numbers as follows: 1, Rio Grande; 2, Colorado; 3, San Juan; 4, Green.

In assigning *henriensis* to *Brachydesmus*, Chamberlin (1930) followed the pattern he (Chamberlin 1918) established for another small-bodied polydesmid of uncertain generic position, *B. californicus* Chamberlin, from Stanford, Santa Clara County, California. Shear (1972) transferred this species to *Bidentogon*, erected by Buckett & Gardner (1968) for a northern California polydesmid. Additionally, Chamberlin (1941) described *Brachydesmus hastingsus* from the Hastings Reservation, Monterey County, California; Causey (1954) proposed *Brachydesmus (Brachydesmus) yosemitensis*, from Yosemite National Park; and Loomis (1960) diagnosed *Brachydesmus bituberculatus* from Altamont Pass, Alameda County, California. Today, *hastingsus*, *yosemitensis*, and *bituberculatus* remain in *Brachydesmus* even though they clearly are not congeneric with the European species and require one or more new genera. The millipeds may not even be polydesmids; they may belong in the Trichopolydesmidae and/or Nearctodesmidae, possibly constituting some of the "micronearctodesmids" that inhabit the southwestern states (Shelley 1994a). Elucidating the systematic positions of these minute polydesmoids is a difficult task facing diplopod systematists. Judging from published illustrations (Causey 1954, fig. 5; Loomis 1960, fig. 2), *yosemitensis* and *bituberculatus* are congeneric in a new genus of uncertain family assignment, but the genus erected by Withrow (1988) and subsequently cited by Simonsen (1990) and Golovatch (1991) is an invalid, unavailable, manuscript name because it was not proposed in a work that complies with the publication requirements of the International Code of Zoological Nomenclature (Shelley 1996).

Utadesmus henriensis is one of two indigenous polydesmid species in Utah, the other being *Scytonotus piger* Chamberlin in the Wasatch Mountains from Salt Lake County northward, some 190 mi (304 km) north of the Henry Mountains (Shelley 1994b). To the west, the closest polydesmid is *Bidentogon californicus*, some 600 mi (960 km) distant in Sacramento County, California (Shear 1972).

Utadesmus hoffi Chamberlin & Hoffman
Figs. 4-6

Utadesmus hoffi Chamberlin & Hoffman, 1950: 3, figs. 1-2; 1958: 75.

Type specimen: Male holotype (NMNH) collected by C. C. Hoff, 22 October 1948, at an unspecified site in the Sandia Mountains, Bernalillo County, New Mexico.

Diagnosis: Endomerite apically subacuminate, appearing generally subtriangular in configuration (Figs. 4-6).

Variation: There is little variation among the gonopods of *U. hoffi*; the only noticeable differences involve the degrees of curvature of the telopodite stem and the tibiotarsus.

Ecology: Specimens from the Sandia Mountains were recovered from pitfall traps among fir and oak/mixed conifer litter at 7,400-8,800 ft (2,220-2,640 m); those from 4th of July campground, in the Manzano Mountains, were encountered in maple litter at 7,500 ft (2,250 m).

Distribution: Known from scattered localities at high elevations east of the Continental Divide in the Carson and Cibola National Forests, and the Rio Grande Valley, of north-central New Mexico. The area is roughly triangular and extends from the San Mateo to the Manzano Mountains, and northward to the Sangre de Cristo Mountains. It spans the Rio Grande, is approximately 96 mi (153.6 km) in the east-west dimension and 90 mi (144 km) in the north-south (Fig. 7), and lies closer to the Continental Divide than that of *U. henriensis*, the westernmost site being only 40 mi (64 km) from this physiographic feature. In addition to the type, specimens were examined from the following localities:

NEW MEXICO: Cibola Co.; San Mateo Mts., Mt. Taylor, San Mateo Spg., 8,500 ft (2,550 m), M, F, 6-12 August 1977, S. B. Peck (WAS). Taos Co.; Sangre de Cristo Mts.,

Twining, in Carson Nat. For. ca. 15 mi (24 km) NE Taos on NM hwy. 230, along trail to Williams L., 10,000 ft., M, 2F, 3 July 1967, R. W. Mitchell (FSCA). Sandoval Co.; Jemez Mts., exact locality unknown, M, 25 October 1987, B. B. Edeskuty (NCSM). Santa Fe Co., Rio Grande Valley, San Ildefonso, 2F, date and collector unknown (NMNH). Bernalillo Co., Sandia Mts., along NM hwy. 44 at Cienega Cyn., ca. 7.8 mi (12.5 km) NE Albuquerque [17 mi (27.2 km) SE Bernalillo], F, 17 August 1946, S. & D. Mulaik (FSCA), and 2F, 15 June 1987, 3F, 27 July 1987, and 2F, 16 August 1987, C. S. Crawford (NCSM); across NM hwy. 536 from Capulin Spg., F, 13 July 1987, and M, F, 10 August 1987, C. S. Crawford (NCSM); and 13 mi (20.8 km) SE Bernalillo [ca. 8.8 mi (14.1 km) NE Albuquerque], 4 F, 4 juvs., 17 August 1946, S. & D. Mulaik (FSCA). Tarrant Co., Manzano Mts., ca. 6 mi (9.6 km) W Tajiue, 4th of July Cpgd., 3M, 2F, 28 September 1986, R. M. Shelley (NCSM).

Remarks: San Ildefonso, the locality in Santa Fe County, is the only record of *Utadesmus* not from an inselberg.

Utadesmus hoffi is also one of two indigenous polydesmids in its state, the other being the troglobite, *Speodesmus tujanbius* (Chamberlin), in caves in southern New Mexico. Its type locality is Carlsbad Caverns, Eddy County, and *S. tujanbius* also occurs in caves in west Texas and Lincoln, De Baca, and Socorro counties, New Mexico (Shear 1969, 1974), the latter being some 58 mi (92.8 km) south of the Tarrant County site of *U. hoffi*. Shear (1974) predicted that *S. tujanbius* would eventually be found in caves throughout the eastern New Mexico gypsum plain and karst areas of the Capitan, Sacramento, and Guadalupe Mountain Ranges, and I now report it from Lechugilla Cave, Eddy County, based on a male collected in 1991 and deposited in the NCSM. An epigeal polydesmoid occurs in the Organ Mountains, Dona Ana County, as two unidentifiable females (NMNH) were collected at "Dripping Spring" on an unknown date by T. D. A. Cockerell. Sampling is needed in the Organ Mountains to obtain an adult male to determine the identity of this diplopod.

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Address of the author:

North Carolina State Museum of Natural Sciences
P.O. Box 29555
Raleigh, North Carolina 27626-0555