

MYRIAPODOLOGICA



Virginia Museum of Natural History

Vol. 4, No. 8

ISSN 0163-5395

April 15, 1997

THE IDENTITY OF POLYDESMUS SASTIANUS CHAMBERLIN, PROPOSAL OF A NEW MILLIPED GENUS, AND REMARKS ON THE IDENTITY OF PHREATODESMUS HASTINGSUS (CHAMBERLIN) (POLYDESMIDA: POLYDESMIDAE)

by Rowland M. Shelley

ABSTRACT

Calianotus, n. gen., is proposed for three small California polydesmids in which the gonopodal tibiotarsus arises basally and the endomerite possesses a lateral branch and two shorter distal projections. *Brachydesmus* (*Brachydesmus*) *yosemitensis* Causey, occurring in the Sierra Nevada from Calaveras to Tulare counties, is the type species; *Polydesmus sastianus* Chamberlin is assigned to the representative occurring in the upper Sacramento River Valley, in the Mt. Shasta area of Shasta and Siskiyou counties; and *Brachydesmus bituberculatus* Loomis, occurring east of San Francisco Bay in Contra Costa and Alameda counties, is transferred into the genus. *Calianotus* is related to *Scytonotus* Koch; relationships within the genus are *sastianus* + (*bituberculatus* + *yosemitensis*). The identity of *Phreatodesmus hastingsus* (Chamberlin), plausibly referable to *Calianotus*, cannot be assumed because the original illustrations are meaningless and the vial with the holotype now contains two different polydesmids, one of which occurs in Idaho. Topotypes are needed to determine its identity and generic placement.

One of the more inscrutable names proposed for western North American diplopods is *Polydesmus sastianus* Chamberlin (1910). Established for one female and two juvenile males from Shasta Springs, Siskiyou County, California, the name fell into immediate obscurity and has been mentioned only three times since; Attems (1940) listed it under "Unsichere Arten" of *Polydesmus* Latreille, and Chamberlin & Hoffman (1958) and Buckett (1964) cited it under "Polydesmidae of uncertain systematic position." The type specimens are lost, and there is nothing in the original description that provides a clue to the species' identity. However, the types were dorsally setose and tuberculate, and measured 10-11 mm in length (Chamberlin 1910).

While recently perusing unsorted millipeds at the Essig Museum of Entomology, University of California at Berkeley, I discovered a sample of unknown polydesmids from Shasta County, California, about 9 mi (14.4 km) south of Shasta Springs. The animals are 9+ mm long and have the requisite dorsal setae and tubercles, so I assign *P. sastianus* to this form and designate one male as the neotype. The gonopodal telopodite is comprised of a long tibiotarsus and a complex, divided endomerite, with a lateral branch and variable lobes on the stem. This arrangement occurs in two other California polydesmids, *Brachydesmus*

yosemiteensis Causey and *B. bituberculatus* Loomis; I therefore propose *Calianotus*, n. gen., to accommodate these three species. Several new localities are available for the latter two, which I record herein along with modern diagnoses. As it occurs only about 65 mi (104 km) south of *C. bituberculatus* and plausibly belongs in *Calianotus*, I append comments on *Phreatodesmus hastingsus* (Chamberlin), whose identity cannot be inferred. Acronyms of sources of preserved study material are as follows:

CAS - California Academy of Sciences, San Francisco.

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.

UCB - Essig Museum of Entomology, University of California at Berkeley.

UCD - Bohart Entomological Museum, University of California at Davis.

Calianotus, new genus

Type species. *Brachydesmus* (*Brachydesmus*) *yosemiteensis* Causey, 1954.



Fig. 1. Distribution of *Calianotus*. Dots, *C. yosemiteensis*; stars, *C. bituberculatus*; squares, *C. sastianus*; triangle, type locality of *Phreatodesmus hastingsus*. Open symbols denote literature records.

Diagnosis. A genus of small polydesmids with two or three rows of subconical tubercles dorsally on metatergites, setae noticeably clavate; adults with 19 segments; dorsum moderately convex; paranota present and well developed on all segments of both sexes, margins deeply dentate, particularly on anterior tergites; femora of anterior and midbody legs of males slightly swollen but podomeres otherwise without modifications, tibia of legs 13-20/22 without lobes; 9th sternum of males with or without short, diverging caudal lobes; 10th sternum of males with or without long, parallel caudal lobes; gonopodal telopodite without basal acicular projection, with elongate tibiotarsus arising subbasally mediad to endomerite, latter with smooth to variably jagged lateral projection, stem of variable configuration distal to division point, either extending distad or curving or bending caudad, with two variable projections, "A" and "B", arising sequentially from anterior or ventral (outer) margin, termination variable, either as broad, flattened, hirsute pulvillus, or short, hirsute projection, or long, glabrous solenomere; prostatic groove internal, with distal loop.

Distribution. Three areas of California (Fig. 1): the Sacramento River Valley in the southern Cascades/Mt. Shasta region of Shasta and Siskiyou counties, along the eastern side of San Francisco Bay in Contra Costa and Alameda counties, and along the western slope of the Sierra Nevada from central Calaveras to southern Tulare counties.

Species. Three are known and are distinguished by the following diagnoses. Other species may exist, particularly in northern California and southern Oregon.

Remarks. The proximal divisions of the gonopodal telopodite into tibiotarsus and endomerite indicate affinity between *Calianotus* and *Scytonotus* Koch, which appear to derive from a common ancestor in the general area of the present border between California and Oregon; the new generic name denotes this affinity and the occurrence in California. Shelley (1994) noted the evolutionary significance of this region, and *sastianus*, the northernmost known species of *Calianotus*, occurs only about 50 mi (80 km) south of this boundary.

Calianotus yosemitensis (Causey), new combination

Figs. 2-4

Brachydesmus (*Brachydesmus*) *yosemitensis* Causey, 1954: 224, fig. 5.

Brachydesmus yosemitensis: Chamberlin & Hoffman, 1958: 65. Buckett, 1964: 11.

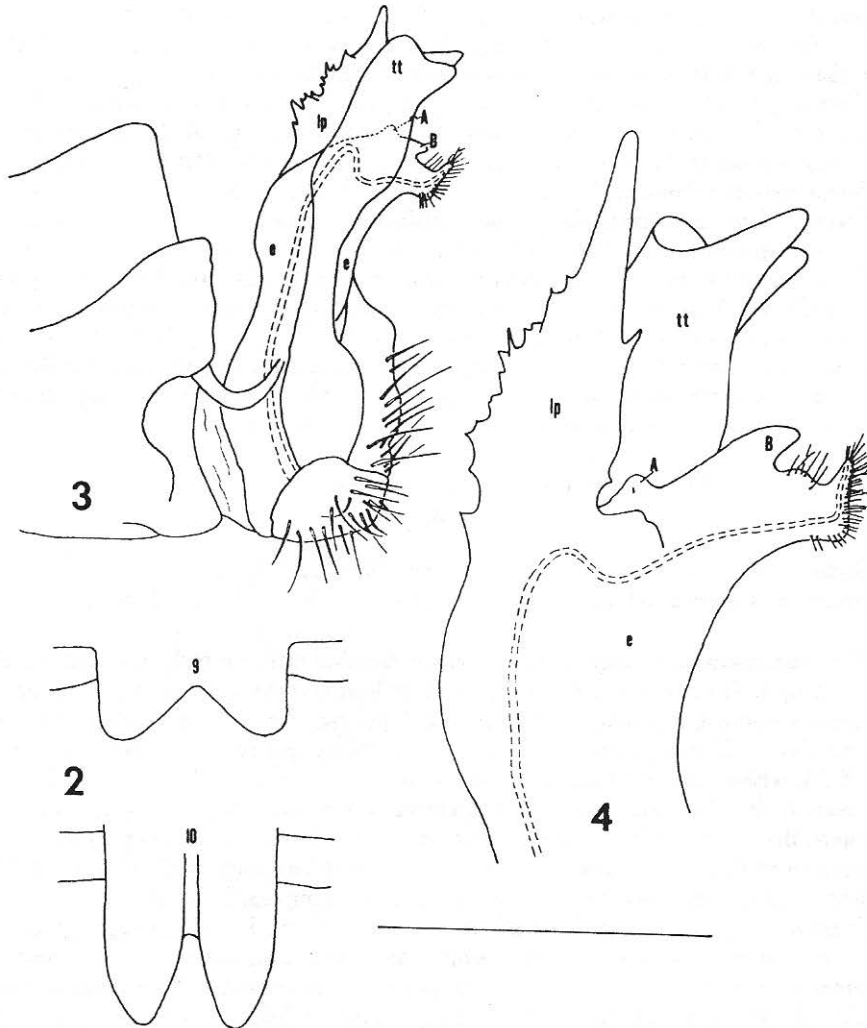
Type specimens. The original type series consisted of only the male holotype, which was collected by J. Gordon on 2 February 1952 at Vernal Falls in Yosemite National Park, Mariposa County, California. Deposition was supposed to be in the American Museum of Natural History (Causey 1954), but the specimen never was sent there nor is it present at the FSCA, where Causey's personal collection was transferred after her death in 1979. This specimen is thus lost, and neotype designation is necessary. Another sample exists from Yosemite, that from north of Badger, Mariposa County, in the ensuing locality listing, which contains an adult male and three females. It cannot now be located in the enormous NMNH holdings, and neotype designation is deferred until this sample is rediscovered.

Diagnosis. Caudal margin of 9th sternum with short, broad, diverging lobes; 10th sternum with long, apically narrow, subparallel lobes; tibiotarsus much narrower than endomerite, narrowing abruptly at midlength then expanding with somewhat sinusoid margins, divided distad, caudal corners prolonged and rounded, anteriodistal margin expanded and rounded; endomerite largely visible in medial view, only slightly obscured by tibiotarsus, lateral projection arising distad, extending just beyond level of distal extremity of tibiotarsus, anterior margin jagged, caudal margin with two teeth; endomerite bending abruptly caudad at division point; projection "A" in form of short, broad basal lobe; projection "B" a broad, ventral lobe at midlength, directed caudad; endomerite terminating in apically flattened pulvillus with ventral corner extended, hairs originating proximad on ventral surface, between

"B" and pulvillus, prostatic groove opening on extended ventral corner (Figs. 2-4).

Distribution. Occurring along the western slope of the Sierra Nevada from central Calaveras to southern Tulare counties (Fig. 1), a distance of some 165 mi (264 km). In addition to the neotype sample, specimens were examined as follows:

CALIFORNIA: *Calaveras Co.*, Cave of the Catacombs, Mountain Ranch, F, 22 August 1963, R. E. Graham (FSCA); Sink Cave, Mountain Ranch, ca. 30 juvs., 3 September 1961, R. E. Graham, Kaplan (FSCA); Cave City Cave, ca. 2 mi (3.2 km) E Mountain Ranch, ca. 30 juvs., 29 August 1961, R. E. Graham (FSCA); and Bobcat (Buckeye) Cave in Grapevine



Figs. 24. *Calianotus yosemitensis*, specimen from Fresno County. 2, caudal sternal lobes of segments 9 & 10, ventral view. 3, left gonopod, medial view, cannula displaced during dissection. 4, distal half of telopodite of right gonopod, lateral view. A, projection "A"; B, projection "B"; e, endomerite; lp, lateral projection; tt, tibiotarsus. Scale line = .50 mm for fig. 2, 1.00 mm for fig. 3, 1.50 mm for fig. 4.

Gulch, ca. 3.25 mi (5.2 km) W Columbia on north bank of Stanislaus R., M, November 1959, R. E. Graham (FSCA). Tuolumne Co., Tank Cave, along Stanislaus R., ca. 8 mi (12.8 km) N Columbia, juv., 12 August 1962, R. E. Graham (FSCA). Mariposa Co., Yosemite Nat. Pk., 4-7 mi (6.4-11.2 km) N Badger, M, 3F, 23 March 1941, S. & D. Mulaik (NMNH). Madera Co., 3.5 mi (5.6 km) NE Oakhurst, 2F, 18 November 1970, M. R. Gardner, T. Slay (UCD). Fresno Co., along Dinkey Cr., Sierra Nat. For., ca. 14 mi (22.4 km) ENE Tollhouse, M, 5 April 1970, R. F. Wilkey (UCD). Tulare Co., Sequoia Nat. For. ca. 5 mi (8 km) N Lost Grove Ck. Sta., off CA hwy. 180 between Kings Canyon and Sequoia Nat. Pks., juv., 30 June 1946, collector unknown (NMNH); Sequoia Nat. Pk., 3 mi (4.8 km) N Hospital Rock Cpgd., 3M, 2F, 12 February 1967, J. S. Buckett, M. R. Gardner (UCD); and Cold Springs Area, Sequoia Nat. For., ca. 6.4 mi (10.2 km) SW Johnsondale, M, 20 March 1941, collector unknown (NMNH).

Calianotus bituberculatus (Loomis), new combination

Figs. 5-7

Brachydesmus bituberculatus Loomis, 1960: 57-58, figs. 1-3. Buckett, 1964: 11.

Type specimens. Male holotype and 2 male and 2 female paratypes (NMNH) collected by O. F. Cook, 1 December 1926, in Altamont Pass along California highway 84 in Niles Canyon ("above Niles"), Alameda County, California.

· Diagnosis. Caudal margin of 9th sternum with short, broad, lobes; 10th sternum with long, apically narrow, subparallel lobes; tibiotarsus only slightly narrower than endomerite, narrowing slightly at midlength then expanding with gently sinusoid margins, not divided, caudal corner moderately prolonged and narrowly rounded, anteriodistal margin not expanded, gently curved; endomerite largely obscured in medial view by tibiotarsus, lateral projection arising distad, extending just beyond distal extremity of tibiotarsus, anterior margin jagged, caudal margin with 5-7 teeth; endomerite curving broadly caudad at division point; projection "A" long and narrow, narrowly rounded apically, directed caudad, overhanging projection "B" and distal extremity of endomerite, longer than former, subequal in length to latter, dorsal margin slightly expanded distad, narrowing apically; projection "B" moderately long and subtriangular, apically acuminate, directed caudad and lying parallel to "A" and distal extremity of endomerite; latter long and narrow, in form of glabrous solenomere, curving slightly dorsad but directed caudad, prostatic groove opening centrally (Figs. 5-7).

Distribution. Along the eastern side of San Francisco Bay from southern Contra Costa to southern Alameda counties (Fig. 1), a distance of around 23 mi (37 km). In addition to the types, specimens were examined as follows:

CALIFORNIA: Contra Costa Co., ca. 1 mi (1.6 km) E Moraga, along Bollinger Canyon Rd. nr. St. Mary's College, M, 14 December 1974, A. K. Johnson (NCSM). Alameda Co., 1 mi (1.6 km) E Berkeley, along Claremont Ave., M, 22 December 1963, P. R. & D. L. Craig (CAS).

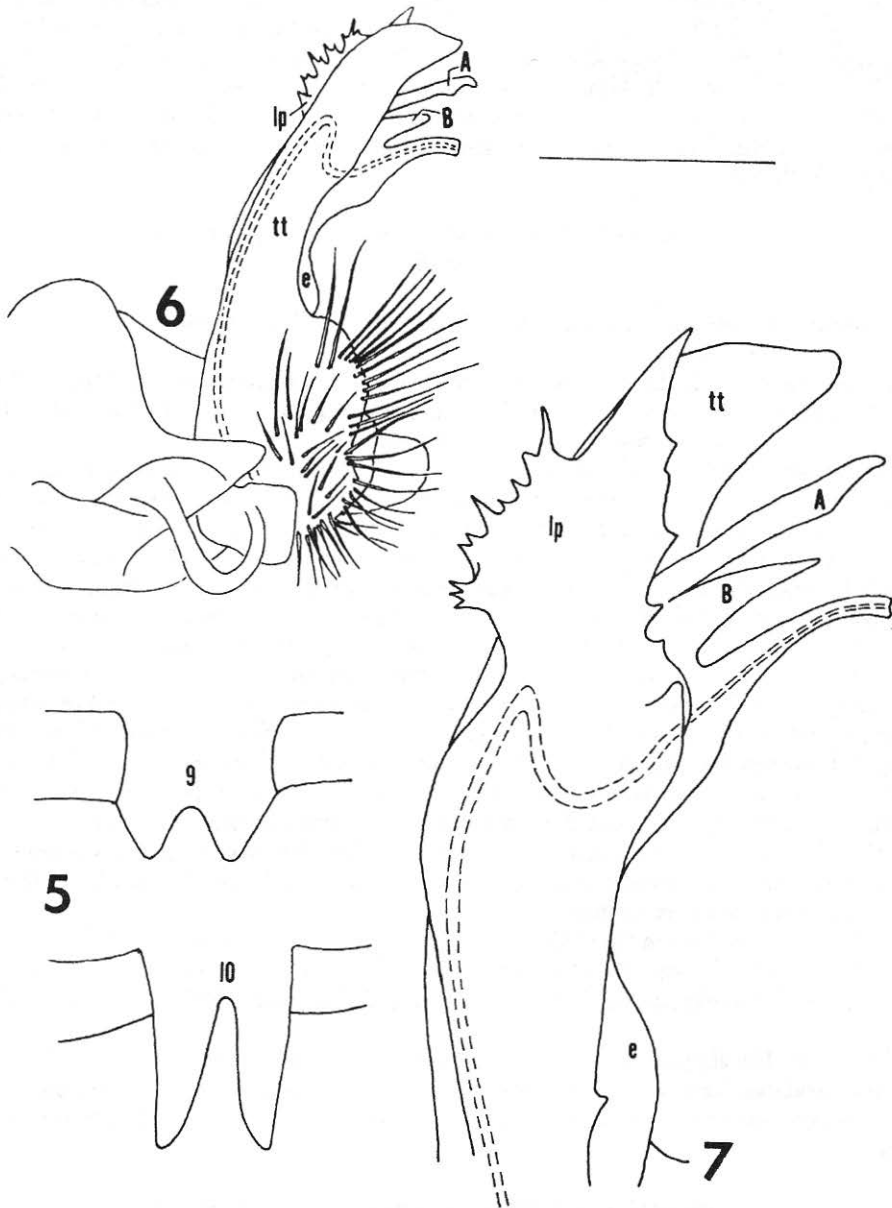
Remarks. The absence of a hirsute opening to the prostatic groove is a unique feature of *C. bituberculatus*. Very few polydesmids are so characterized, but two others are the species of *Bidentogon* Buckett & Gardner (Shear 1972), which also occur in the San Francisco Bay area.

Calianotus sastianus (Chamberlin), new combination

Figs. 8-9

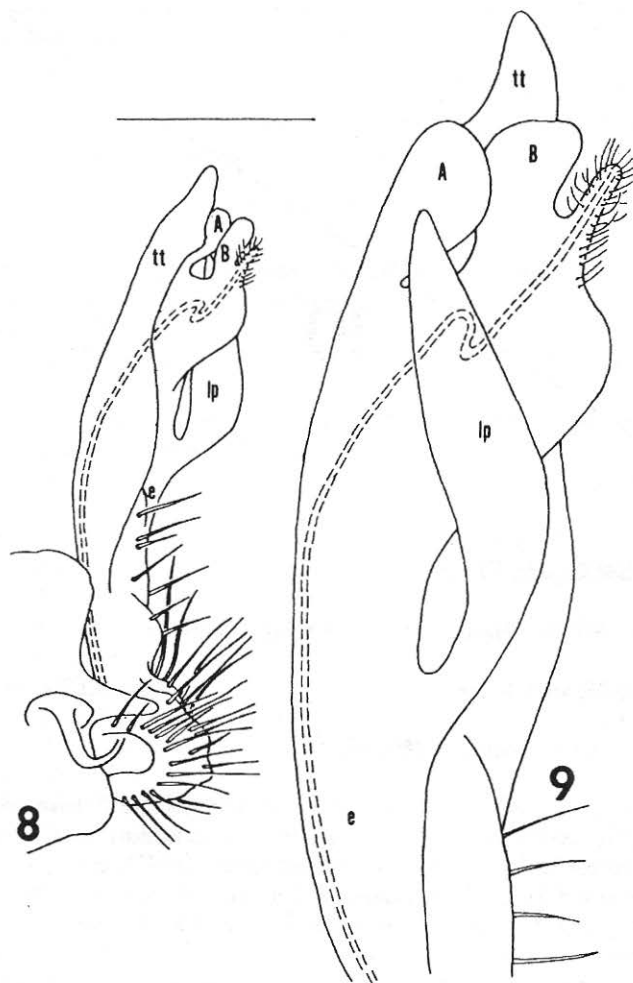
Polydesmus sastianus Chamberlin, 1910: 251, pl. 39, figs. 2-3. Attems, 1940: 80. Chamberlin & Hoffman, 1958: 76. Buckett, 1964: 12.

Type specimens. Male neotype and 2 male and 4 female paraneotypes (UCB) and 1 male paraneotype (FSCA) collected by E. E. Gilbert and R. O. Schuster, 23 November 1954, 8 mi (12.8 km) S Dunsmuir, Shasta County, California. The original type series, from Shasta Springs, Siskiyou County, is lost.



Figs. 5-7. *Calianotus bituberculatus* holotype. 5, caudal sternal lobes of segments 9 & 10, ventral view. 6, left gonopod, medial view. 7, distal half of telopodite of right gonopod, lateral view. Abbreviations as in figs. 2-4. Scale line = 1.00 mm for fig. 5, .50 mm for fig. 6, .33 mm for fig. 7.

Diagnosis. 9th and 10th sterna without lobes, caudal margins gently curved; tibiotarsus narrow basally, expanding broadly near midlength then narrowing and slightly expanded distad, not divided, distal extremity narrowly rounded, caudal margin with broad, subterminal tooth; endomerite moderately visible in medial view, moderately obscured by tibiotarsus, lateral projection arising proximad, terminating well short of distal extremities of stem and tibiotarsus, margins smooth, without teeth; endomerite with broad lobe on caudal margin, extending generally distad beyond division point; projection "A" a broadly rounded lobe subequal in length to "B", inner margin slightly expanded; projection "B" a broad, apically flattened lobe, subequal in length to "A", longer than distal extremity of endomerite; latter hirsute, relatively short and narrow, sides generally parallel, hairs arising basally on anterior margin, extending proximad along caudal margin, prostatic groove opening apically (Figs. 8-9).



Figs. 8-9. *Calianotus sastianus* neotype. 8, left gonopod, medial view. 9, distal half of telopodite of right gonopod, lateral view. Abbreviations as in figs. 2-4. Scale line = .50 mm for fig. 8, .33 mm for fig. 9.

Distribution. Known only from the type and neotype localities, which straddle the border between Siskiyou and Shasta counties in northern California (Fig. 1). These sites are in the Sacramento River Valley near the source of the River in the Mt. Shasta/Castle Crags Wilderness area of the southern Cascade Mountains. *Calianotus sastianus* is probably endemic to this valley, which lies between Mt. Shasta and Shasta Lake, in the Whiskeytown-Shasta-Trinity Recreation Area north of Redding.

Remarks. *Calianotus sastianus* is the sister group to *C. bituberculatus* + *C. yosemitensis* (Fig. 10), which share the caudally directed endomerite and the jagged margination of the lateral projection.

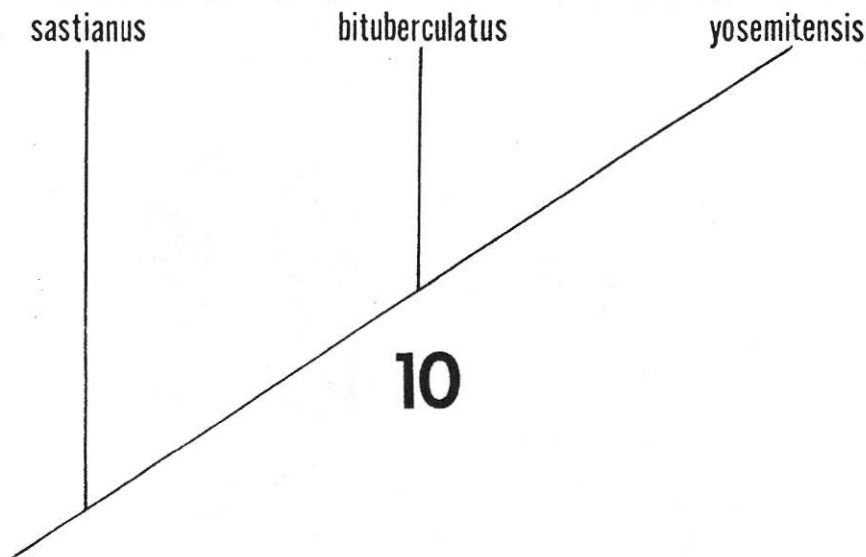


Fig. 10. Relationships in *Calianotus*.

Phreatodesmus hastingsus (Chamberlin)

Brachydesmus hastingsus Chamberlin, 1941: 27, pl. 5, figs. 48-49.62 Chamberlin & Hoffman, 1958: 64.

Phreatodesmus hastingsus: Loomis, 1960: 65-66. Buckett, 1964: 12.

Causey (1954) suggested affinity between *C. yosemitensis* and *P. hastingsus*, which occurs some 65 mi (104 km) south of the most proximate locality of *C. bituberculatus* and plausibly could be congeneric. According to Chamberlin (1941), the type series consisted of a single male collected by D. D. Linsdale, 20 February 1941, at the Hastings Reservation, Monterey County (Fig. 1), but this vial, housed at the NMNH, now contains three males with two different gonopods. Two of these males closely resemble an undescribed polydesmid genus and species with very complex gonopods that occurs in Idaho, some 740 mi (1,184 km) to the northeast. Unfortunately, Chamberlin's gonopod illustrations are among the worst in all his publications, and it is impossible to gain an impression of their structure from these drawings. It is difficult to believe that the Idaho genus and species could also occur in central California, but *Scytonotus* and *Utadesmus* show that widely distributed polydesmid taxa can occur in North America (Shelley 1993, 1996). However, the

heterogeneity of the sample and its incompatibility with the original description are unresolvable obstacles. Obviously, a previous worker carelessly mixed specimens and destroyed the integrity of the type sample, and resolution of the identity of *P. hastingsus* must await collection of topotypes. Citing aspects of Chamberlin's illustrations, Loomis (1960) assigned *hastingsus* to his new genus, *Phreatodesmus*, and Buckett (1964) accepted this action. Loomis did not reexamine the type specimen, and this assignment is little more than a guess, but I too accept it because *hastingsus* clearly does not belong in *Brachydesmus* Heller, an indigenous European genus. Until topotypes are available, the identity and correct generic placement of *P. hastingsus* must remain unknown.

ACKNOWLEDGMENTS

I thank Jonathan Coddington (NMNH) for loans of non-typical specimens and the types of *B. bituberculatus* and *hastingsus*. Material from other collections was loaned by the indicated curator or collection manager: CAS, W. J. Pulawski; FSCA, G. B. Edwards; UCB, C. B. Barr; and UCD, L. S. Kimsey. R. G. Kuhler, NCSM Scientific Illustrator assisted in preparation of the figures; Bruce W. Rogers advised on locations of the California caves; and Betsy Randall-Schadel provided access to her compound microscope.

LITERATURE CITED

- Attems, C. 1940. Myriapoda 3. Polydesmoidea III. Fam. Polydesmidae, Vanhoeffeniidae, Cryptodesmidae, Oniscodesmidae, Sphaerotrichopidae, Peridontodesmidae, Rhachidesmidae, Macellophidae, Pandirodesmidae. *Das Tierreich*, 70: 1-576.
- Buckett, J. S. 1964. Annotated list of the Diplopoda of California. Simmons Publ. Co., Davis, CA, 34 pp.
- Causey, N. B. 1954. New records and species of millipeds from the western United States and Canada. *Pan-Pacific Entomol.*, 30: 221-227.
- Chamberlin, R. V. 1910. Diplopoda from the western states. *Ann. Entomol. Soc. America*, 3: 233-262.
- . 1941. New American millipeds. *Bull. Univ. Utah*, 31(11)[Biol. Ser., 6(4)]: 1-39.
- & R. L. Hoffman. 1958. Checklist of the millipeds of North America. *United States Natl. Mus. Bull. No. 212*: 1-236.
- Loomis, H. F. 1960. Millipeds of the order Polydesmida from the western states and Baja California. *J. Kansas Entomol. Soc.*, 33: 57-68.
- Shear, W. A. 1972. The milliped genus *Bidentogon* (Diplopoda, Polydesmida, Trichopolydesmidae). *Proc. Biol. Soc. Wash.*, 85: 489-492.
- Shelley, R. M. 1993. Revision of the milliped genus *Scytonotus* Koch (Polydesmida: Polydesmidae). *Brimleyana*, 19: 1-60.
- . 1994. Revision of the milliped family Paeromopodidae, and elevation of the Aprophylosomatinae to family status (Julida: Paeromopodidae). *Ent. Scand.*, 25: 169-214.
- . 1996. The milliped genus *Utadesmus* Chamberlin & Hoffman (Polydesmida: Polydesmidae). *Myriapodologica*, 4: 9-16.

Address of the author:

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