

The milliped genus *Orophe* Chamberlin (Polydesmida: Xystodesmidae)

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Abstract

The milliped genus *Orophe*, characterized by long, twisted gonopodal telopodites with short, subequal distal elements, is comprised of two allopatric species, *O. cabinetus* Chamberlin, in western Montana, and *O. unicus* (Loomis), in northern Idaho; the latter name is revived from synonymy with the former. They are distinguished by the orientation of the solenomerite, which is coaxial with the telopodite stem in *O. cabinetus* and perpendicular to it in *O. unicus*. Although this distinction is slight, it manifests itself geographically, and the forms occupy mutually exclusive areas; hence they warrant specific recognition. Modern descriptions are provided for the genus and species, and new localities are reported. Gonopodal illustrations and a distribution map are presented.

Introduction

In western North America, the milliped family Xystodesmidae, the dominant Nearctic representative of the order Polydesmida, ranges along the Pacific Coast west of the crest of the Sierra Nevada and Cascade Mountains from Los Angeles/Riverside, California, to southern Alaska, with an eastward extension into Montana west of the Continental Divide (Shelley 1987). In western Washington and Oregon, the fauna is dominated by representatives of the tribes Harpaphini and Chonaphini. The ubiquitous *Harpaphe haydeniana haydeniana* (Wood) (Harpaphini) occurs in nearly every woodland, and the Chonaphini is represented by *Tubaphe levii* Causey (Causey 1954, Shelley 1993), in rain forests on the western slope of the Olympic Mountains, and by sporadic populations of *Chonaphe armata* (Harger) (Shelley 1990). The situation is reversed in the eastward extension, as the Chonaphini is more abundant and represented by three species -- *C. armata*, *Montaphe elrodi* (Chamberlin), and *Metaxycheir prolata* Buckett and Gardner (Buckett and Gardner 1969, Loomis and Schmitt 1971, Shelley 1990) -- while the Harpaphini is represented by *Isaphe convexa* Cook and *Hybaphe tersa* Cook (Cook 1904, Loomis and Schmitt 1971).

The western region also harbors another tribe, the Orophini, which occurs in northern Idaho and western Montana, and is represented by two species of *Orophe* Chamberlin. A trans-Pacific taxon, the other component genera being *Pamelaphe* Hoffman

and *Kiulinga* Hoffman, both occurring in China (Hoffman 1956, 1964, 1979), the Orophini is unique among west-Nearctic xystodesmids in that males have extremely long gonopods that cross *in situ*, overlie the legs of segment 6, and extend slightly beyond the lateral segmental margins (Fig. 4). Males of *Orophe* are therefore recognizable in the field by this feature, and the two species differ in the angle of the gonopodal solenomerite, coaxial with the telopodite stem in *O. cabinetus* Chamberlin and perpendicular to it in *O. unicus* (Loomis) (Figs. 1, 6). Stating that the entities might be only subspecifically related, Hoffman (1964) questioned the significance of this feature, and Loomis and Schmitt (1971) and Kevan (1983) synonymized *O. unicus* under *O. cabinetus*. Hoffman (1979) also recognized only one species in *Orophe*, but the greater material available to me shows that the forms occupy mutually exclusive areas and exhibit an allopatric spatial relationship. Shelley and Whitehead (1986) considered allopatry as evidence of reproductive isolation in the eastern genus *Sigmoria*, and specific status is similarly justified for the two forms of *Orophe* because the gap between their ranges precludes genetic interchange.

Consequently, I reinstate *O. unicus* as a valid species. Hoffman (1964) supplemented the brief original generic and specific accounts, but the taxa have yet to be fully characterized in accordance with modern standards. This contribution therefore provides complete descriptions and new locality records of

Orophe and its two component species. Acronyms of sources of preserved study material are as follows:

CIS - California Insect Survey, University of California at Berkeley.

CMN - Canadian Museum of Nature, Ottawa, Ontario.

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.

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

UWBM - Thomas Burke Memorial Washington State Museum, University of Washington, Seattle.

Genus *Orophe* Chamberlin

Orophe Chamberlin, 1951:2-4. Chamberlin and Hoffman, 1958:42. Hoffman, 1964:303-304; 1979:157. Jeekel, 1971:276. Kevan, 1983:2968.

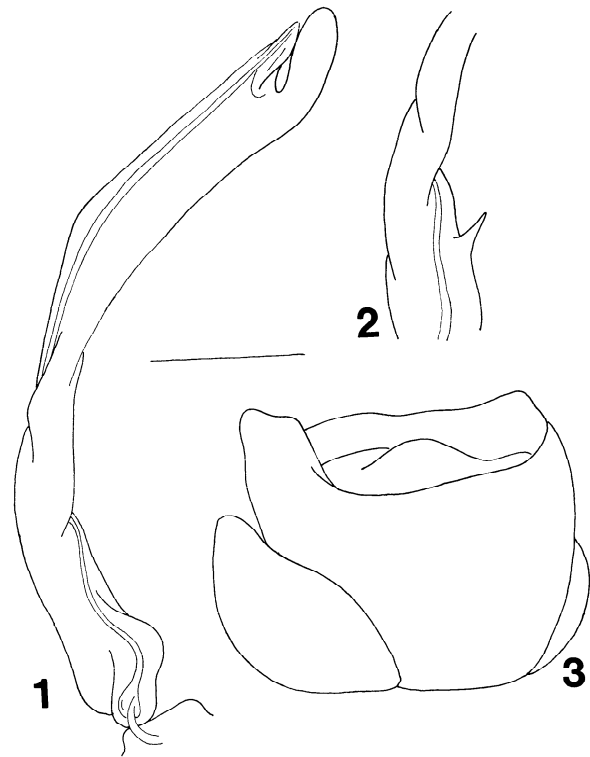
Chipus Loomis, 1953:421. Chamberlin and Hoffman, 1958:26. Jeekel, 1971:253.

Type species. Of *Orophe*, *O. cabinetus* Chamberlin, 1951, by original designation; of *Chipus*, *C. unicus* Loomis, 1953, by original designation.

Diagnosis. Gonopodal telopodite twisted and constricted into cingulum at juncture of acropodite and prefemur, long and slender, divided distad, well beyond midlength, into short, subequal distal elements, a short, plate-like, broadly triangular solenomerite, overhung by a short terminal portion of the acropodite, latter not redivided.

Description. A genus of large orophine Xystodesminae with the following characteristics: Body composed of head and 20 segments in both sexes, appearing essentially parallel sided but actually tapering caudad.

Head of normal appearance, smooth, polished. Epicranial suture thin, distinct, terminating above interantennal region, not bifid. Antennae moderately long and slender, becoming progressively more hirsute distad, with 4 conical sensory cones terminally on ultimate article and small, ovoid microsensilla on distal margin of penultimate antennomere. Genae not margined laterally, with faint central impressions, ends narrowly rounded and projecting well beyond adjacent cranial margins. Facial setae promi-



Figures 1-3. *O. cabinetus*. 1, telopodite of right gonopod of holotype, medial view. 2, prefemur of right gonopod of male from Sanders Co., MT, medial view. 3, left cyphopod of female from Mineral Co., MT, caudal view. Setation omitted from all drawings. Scale line = 1.0 mm for fig. 1, 1.14 mm for fig. 2, and 0.5 mm for fig. 3.

nent; epicranial, interantennal, subantennal, frontal, genal, clypeal, and labral series present.

Terga smooth, polished. Collum moderately broad. Paranota moderately to strongly depressed, relatively narrow, widest on anteriormost segments, narrowing after segment 4 and becoming progressively narrower caudad, anteriolateral corners rounded on all tergites, caudolateral corners rounded on anteriormost segments, blunt on most segments, becoming progressively more acute caudad. Peritremata distinct, moderately to strongly elevated above metatergal surface; ozopores located caudal to midlength, opening sublateral. Prozonites smaller than metazonites, exposed at maximal compression on most segments; strictures sharp, distinct. Epiproct subtriangular, narrowing strongly, tip blunt.

Sides of metazonites generally smooth, without grooves or impressions, with or without low ridges above coxae on segments 2-4 of males. Sterna gener-

ally unmodified; 6th sternum with moderate depression and postgonopodal sterna with transverse linear impressions originating between leg pairs. Gonapophyses moderately long, apically rounded. Coxae of 3rd legs with short, subconical, hirsute lobes, directed anteriorly; prefemora with very faint ventrodorsal lobes; remaining podomeres without modifications; tarsal claws slightly unciniate. Hypoproct broadly rounded; paraprocts with margins moderately thickened.

Gonopodal aperture ovoid to subtrapezoidal, sides becoming progressively more elevated caudad, elevations continuing around caudolateral corners onto caudal margin, dropping suddenly or tapering to metazonal surface in midline. Gonopods in situ with prefemoral regions of telopodites crossing in midline, acropodites angling anteriolaterad over legs of segment 6 and extending beyond lateral segmental margins, apices visibly projecting between legs in lateral view in most males, even when tightly curled. Coxae moderate-size, separated by prominent, fully sclerotized sternum and strong connective tissue, with 2 to 8 variably short to long setae on outer surface above origin of cannula (Fig. 5). Prefemur relatively long and slender, about 1/3 of length of telopodite, narrowing distad, with or without variable prefemoral process on ridge above prostatic groove, ranging from small, nubbin-like vestige to subtriangular spur to short spine. Acropodite narrower than prefemur, forming cingulum at juncture, twisted basally and lending torsion to telopodite, curving and recurving gently, divided distad into short, subequal "distal elements," a terminal part overhanging and shielding a plate-like, subtriangular solenomerite, latter either coaxial with or perpendicular to telopodite stem. Prostatic groove arising in pit in base of prefemur, running along medial side of latter, passing to lateral surface at base of acropodite, encircling latter and returning to medial surface proximally, passing onto solenomerite basally, opening terminally.

Cyphopodal aperture short and broad, encircling 2nd legs, sides and caudal margin slightly elevated above metazonal surface. Cyphopods in situ located caudal to 2nd legs, oriented transversely in aperture. Receptacle glabrous, relatively narrow, located dorsomedial with respect to valves, cupped around latter. Valves unequal with either one larger, anterior valve curving around distal extremity of caudal one or not, caudal valves with or without short ventral lobe laterally. Operculum moderate-size, located under dorsolateral side of valves.

Distribution. Covering a total area about 132 miles long in the east/west dimension and 136 miles long in the north/south, extending from Lake County, Montana, to central Latah County, Idaho (Fig. 9).

Species. Two, segregated by a hiatus of approximately 45 miles.

Remarks. As noted by Hoffman (1964), the sternum separating the gonocoxae, shown in figure 5 in *O. unicus*, merges into the adjoining connective tissue. Such a sclerotized sternum is also found in other western Nearctic xystodesmids, most notably representatives of the Xystocheirini (Hoffman 1979).

Casey (1955) included *Orophe* with *Sigmocheir* in her new family Sigmocheiridae, now reduced to tribal status (Hoffman 1979). However, as noted by Hoffman (1964) when he transferred *Orophe* into his new subfamily Orophinae, the genus lacks practically every character cited as diagnostic of this family and is clearly only remotely related to *Sigmocheir*. Buckett and Gardner (1969) expanded the concept of the Orophinae by adding *Chonaphe*, *Harpaphe*, and *Hybaphe*, all authored by Cook, and *Metaxycheir* Buckett and Gardner. As such the subfamily was clearly heterogeneous, so when he reduced the taxon to tribal status, Hoffman (1979) transferred *Harpaphe* and *Hybaphe* to the new tribe Harpaphini and *Chonaphe* and *Metaxycheir* to the Chonaphini, proposed as a subfamily by Verhoeff (1941).

Hoffman (1964) considered the anteriorly directed lobes on the 3rd male coxae as diagnostic for *Orophe* because they are absent from *Pamelaphe*. I consider these structures too inconsequential to be able to distinguish *Orophe* from sympatric xystodesmid genera and hence omit them from the generic diagnosis. I also think that there is too little of a spine on the ambulatory prefemora to even mention. Hoffman (1964) considered it vestigial, but even this characterization seems overly generous.

I have not seen specimens of *P. lacustris* (Pocock), the type species of *Pamelaphe*, but according to Hoffman's redescription (1964), it is similar in body dimensions to the two species of *Orophe*. However, I have seen the holotype of *Kiulingajeekeli* Hoffman, at the NMNH (its gonopods are lost), which is much smaller than representatives of *Orophe*. Consequently, body size of representative individuals appears useful in distinguishing genera of the Orophini. This observation will have to be developed in the future as more material becomes available from China, so for now, I characterize *Orophe* as a genus of large-bodied orophine xystodesmid millipeds.

Orophe cabinetus Chamberlin

Figs. 1-3

Orophe cabinetus Chamberlin, 1951:4, figs. 8-9. Chamberlin and Hoffman, 1958:42. Hoffman, 1964:304, figs. 1-2. Loomis and Schmitt, 1971:114 (in part). Kevan, 1983:2968.

Type specimens. Male holotype and 2 male and one female paratypes (NMNH) collected by B. Malkin, 5 July 1950, at Clark's Mtn. (Peak), ca. 3 mi. SSE Thompson Falls, Lolo Natl. For., Sanders Co., MT.

Diagnosis. Solenomerite coaxial with stem of telopodite, directed toward distal extremity of latter.

Holotype. Length 21.3 mm, maximum width 4.1 mm, W/L ratio 18.7%, depth/width ratio 82.9%. Color in life unknown.

Description: Width across genal apices 2.7 mm, interantennal isthmus 0.7 mm, smooth. Antennae reaching back just beyond caudal margin of 2nd tergite, with four terminal cones and ovoid microsensilla on distal margin of 6th antennomere, relative lengths of antennomeres 3>6>2>4>5>1>7, 1 subglobose, 2-6 clavate, 7 short and truncate. Facial setae as follows: epicranial 2-2, interantennal 1-1, subantennal 1-1, frontal 1-1, genal 5-5, clypeal about 14-14, labral about 10-10.

Collum with ends terminating slightly above those of following tergite, caudal margin relatively straight. Paranota strongly depressed, angling strongly ventrad and imparting convex appearance to segments; anterior corners rounded; caudolateral corners rounded on 2nd tergite, blunt on 3-14, becoming progressively narrower and more acute on remaining segments. Peritremata narrow, moderately distinct, moderately elevated above paranotal surface.

Sides of metazonites smooth, with slight ridges above coxae on segments 2-4. Sternum of segment 5 with minute lobes subtending 4th coxae; that of segment 6 moderately depressed. Postgonopodal sterna glabrous, with slight transverse linear impressions originating between leg pairs, caudal margins gently curved, without modifications. Coxae of 3rd legs with short, subconical, hirsute lobes, directed anteriorly, remaining coxae without modifications; ventrodiscal margins of prefemora with very faint, rounded lobes.

Gonopodal aperture subtrapezoidal, 1.6 mm wide and 0.8 mm long at midpoint, anterior margin flush with metazonal surface, sides becoming progressively

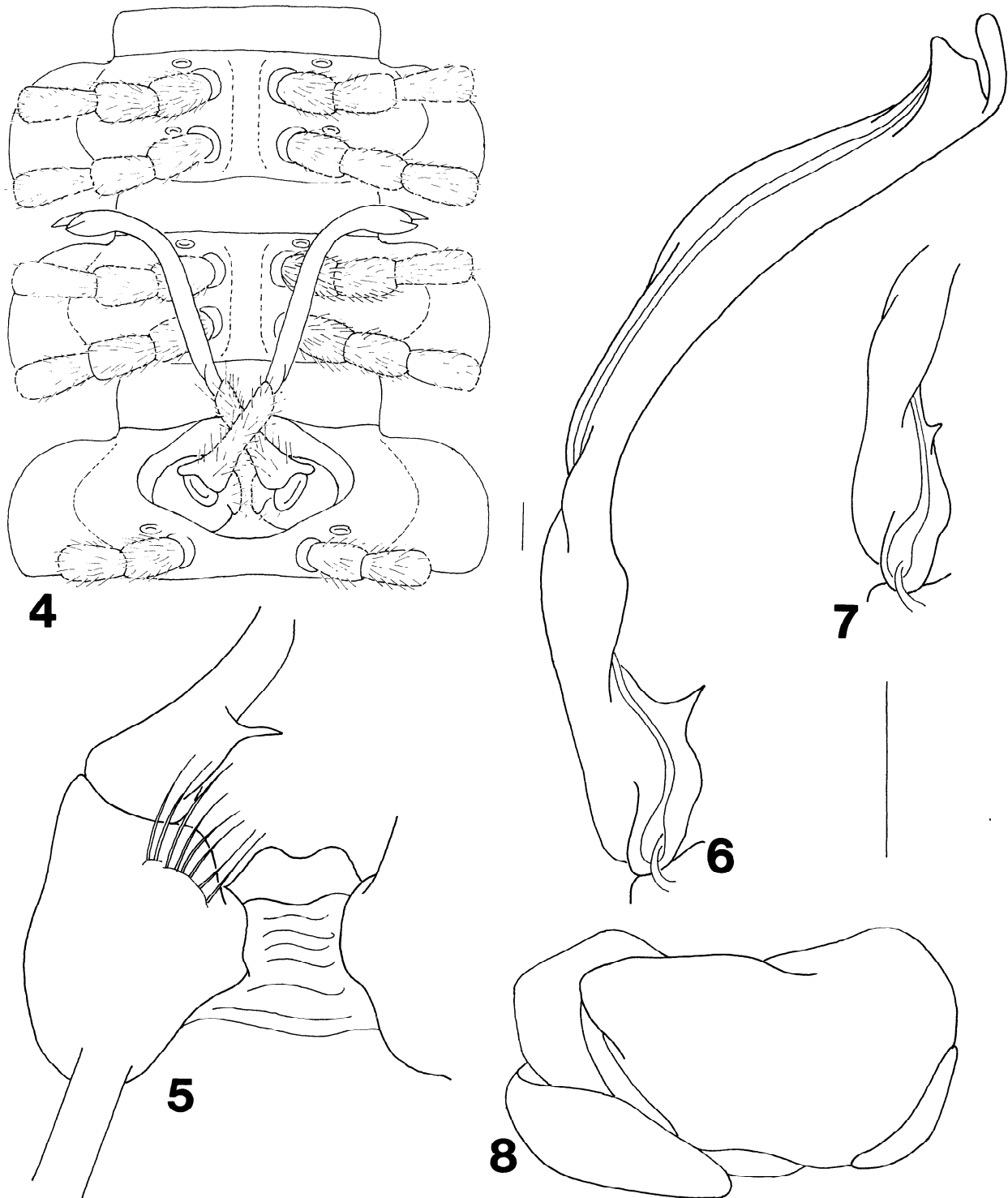
more elevated caudad and extending onto caudal margin, latter dropping sharply to metazonal surface in midline. Gonopods in situ not observed but configuration probably similar to that of *O. unicus*. Gonopod structure as follows (Fig. 1): coxa moderately large, with 2 setae on anterior surface above origin of cannula. Prefemoral process absent. Acropodite narrow basally and twisted at juncture with prefemur, thereby imparting torsion and a cingulum at this point, leaning dorsad and curving mediad, narrowing proximad and expanding progressively distad beginning near midlength, terminal portion clavate, broadly rounded apically, overhanging and slightly longer than subtriangular (in profile) solenomerite, latter expanding into subtriangular basal lobe on medial side, directed toward distal extremity of acropodite and coaxial with stem.

Female from Mineral Co., MT. Length 28.7 mm, maximum width 4.5 mm, W/L ratio 15.7%, depth/width ratio 80.0%. Agreeing closely with holotype in structural details, except caudal paranota much narrower, imparting nearly subcylindrical appearance to caudal half of body. Receptacle (Fig. 3) glabrous, cupped around medial side of valves. Latter large, unequal, caudal valve slightly larger, with small ventrolateral lobe.

Variation. Hoffman correctly observed that the prefemoral process is subject to variation. It is absent from the holotype but present on the male from Mineral County and others from Sanders County, where it varies from a short, inconspicuous spur to a prominent spine (Fig. 2). As the projections can vary considerably between the left and right gonopods in individuals of *O. unicus* and is even present on one gonopod and absent from the other in a male from Idaho County, Idaho, it could be present on one gonopod of the holotype of *O. cabinetus* and absent from the other, as Hoffman (1964) thought must be the case. Unfortunately, I too did not confirm this when I examined this specimen.

The coxal setae vary from two macrosetae, as in the holotype, to a field of 6-8 regular setae of varying lengths, as in the male from Mineral County. Consequently, two macrosetae, mentioned as characteristic of *O. cabinetus* by Hoffman (1964), is not diagnostic of this species.

Ecology. I have not personally collected *O. cabinetus*, and none of the preserved samples has habitat information on the vial labels. However, Loomis and Schmitt (1971) encountered the milliped under moss and humus, under red cedar and devil's club, and



Figures 4-8. *O. unicus*. 4, gonopods in situ, ventral view of male from Latah Co., ID. 5, sternum and left gonocoxa of male from Clearwater Co., ID, dorsal view. 6, right gonopod of holotype, medial view. 7, prefemur of right gonopod of male from Latah Co., medial view. 8, left cyphopod of female paratype, caudal view. Setation omitted except for that on the coxa. Scale line for fig. 4 = 1.0 mm; that for other figs. = 0.8 mm for fig. 5, 1.0 mm for fig. 6, 1.6 mm for fig. 7, and 0.5 mm for fig. 8.

crawling on the surface under red cedar and larch trees.

Distribution. Known only from Sanders, Mineral, and Lake counties in western Montana, an area approximately 82 miles long in the east/west dimension and 58 miles long in the north/south (Fig. 9). In this and the succeeding account, the initials AKJ denote specimens collected by A. K. Johnson and deposited in the NCSM. Specimens were examined as follows: MONTANA: **Sanders Co.**, 3 mi. SSE Thompson Falls, Clark's Mtn. Lolo Natl. For., 2M, F, 4 July 1950, B. Malkin (NMNH) TYPE LOCALITY; Koo-Koo-Sint Ridge, Lolo Natl. For., ca. 5.3 mi. E Thompson Falls, M, 5 July 1950, B. Malkin (NMNH); and 1 mi. W Noxon, M, F, 2 May 1965, R. Schmitt (FSCA). **Mineral Co.**, 3.3 mi. W Superior, along Trout Cr., M, F, 3 September 1978, A. K. J.

The following literature records from Loomis and Schmitt (1971) are deemed valid: MONTANA: **Lake Co.**, Lake Mary Ronan and Methodist Camp near Rollins. **Sanders Co.**, 2 mi. W Noxon and 4 mi. W Thompson Falls.

Remarks. The Cabinet National Forest, Montana, cited in all previous works as containing Clark's Mountain, was divided in 1954 into the Kootenay, Kaniksu, and Lolo National Forests. There is still a Cabinet Mountains Wilderness Area in the Kootenay National Forest along the border between Sanders and Lincoln counties, but the Cabinet National Forest no longer exists. Clark's Mountain is located south of Clark Fork River about 3 miles SSE of Thompson Falls, in what is now the Lolo National Forest, and Koo-Koo-Sint Ridge is located in the same national forest off Montana highway 200 north of this river, about 5.3 miles E of Thompson Falls.

Orophe unicus (Loomis)

Figs. 4-8

Chipus unicus Loomis, 1953:421-422, fig. 18.

Chamberlin and Hoffman, 1958:26-27.

Orophe unicus: Hoffman, 1964:307-308, figs. 3-9.

Orophe cabinetus (in part): Loomis and Schmitt, 1971:114.

Type specimens. Male holotype and one female paratype (NMNH) collected by A. Gibson, 20 July 1949, along the West Fork of Emerald Cr., off ID hwy. 3, ca. 3.8 mi. NW Clarkia, Idaho Panhandle Natl. For.,

Shoshone Co., ID. Hoffman (1964) incorrectly recorded the state as Oregon.

Diagnosis. Solenomerite perpendicular to stem of telopodite, directed away from distal extremity of latter.

Holotype. Length, 22.4 mm, maximum width 4.9 mm, W/L ratio 21.8%, depth/width ratio 69.4%. Color in life unknown.

Description: Somatic features similar to those of *O. cabinetus*, with following exceptions: Width across genal apices 2.8 mm, interantennal isthmus 0.6 mm. Antennae reaching back to midlength of 3rd tergite, relative lengths of antennomeres 6>2>5>3>4>1>7. Facial setae as follows: epicranial 2-2, interantennal 1-1, subantennal 1-1, frontal 1-1, genal 6-6, clypeal about 16-16, labral about 10-10, merging with clypeal series and continuing for short distance along genal margins.

Collum terminating above margins of 2nd tergite. Paranota moderately depressed, continuing slope of dorsum. Peritremata distinct, strongly elevated above metatergal surface, latter excavated at anteriolateral corners. Metazonites without ridges laterally.

Gonopodal aperture ovoid, 1.7 mm wide and 0.8 mm long at midpoint, anterior margin flush with metazonal surface, sides elevating smoothly and continuously to caudolateral corner and around onto caudal margin, tapering to metazonal surface at midline. Gonopods in situ (Fig. 4, not this specimen) with prefemora crossing in midline over anterior margin of aperture, angling anteriolaterad over legs of 6th segment, overhanging 6th prozonum, and extending slightly beyond lateral segmental margins. Gonopod structure as follows (Fig. 6): Coxa with field of setae above cannula. Prefemoral process a subtriangular spine. Acropodite narrow and twisted basally, forming a cingulum and torsion at juncture with prefemur, narrowing further, expanding broadly beyond midlength, then narrowing slightly to division point, terminal portion narrowing to subacuminate tip, solenomerite subtriangular in profile, with a few minute teeth on distal margin, directed away from tip of terminal part of acropodite and perpendicular to axis.

Female paratype. Length 29.3 mm, maximum width 4.8 mm, W/L ratio 16.4%, depth/width ratio 77.1%. Agreeing essentially with male in structural details except paranota much narrower caudal to segment 4, creating appearance of more highly arched body.

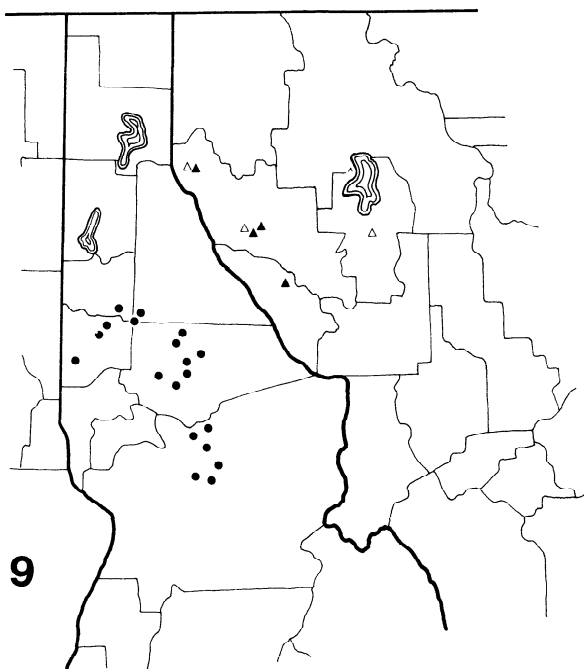


Figure 9. Distribution of *Orophe*. Triangles, *O. cabinetus*; dots, *O. unicus*. Open symbols denote literature records deemed reliable.

Receptacle (Fig. 8) glabrous, relatively narrow and curving broadly around medial corners of valves. Latter moderate-size, unequal, anterior one larger, medial corner curving over distal extremity of caudal valve, with long hairs arising from ventral surface, becoming progressively longer mediad.

Variation. The prefemoral process may be present or absent; when present, it varies in size from a small, nubbin-like vestige, to a moderate spur (Fig. 7), to a strong spine. The spiniform condition in the holotype is as large as the prefemoral process gets in either species of *Orophe*.

Ecology. According to Loomis (1953), the types were taken in a forest of western white pine, western fir, larch, cedar, and hemlock, but he did not mention the precise conditions at the spots where they were found and no such indications are written on labels with any of the preserved specimens.

Distribution. From southern Benewah and southwestern Shoshone counties, to northern Idaho County, Idaho, an area approximately 60 miles long in the east/west dimension and 75 miles long in the north/south (Fig. 9). Specimens were examined as follows: IDAHO: **Benewah Co.**, 3.3 mi. S, 2.8 mi. E Emida,

along East Fork of Charlie Cr., 2M, F, 17 September 1978, A. K. J. **Latah Co.**, 4 mi. N, 8 mi. E Harvard, Banks Gulch, 9M, 3F, 16 September 1978, A. K. J.; 5 mi. E Harvard, Laird Park at Palouse R., M, 3 August 1966, collector unknown (CIS); and 7 mi. NE Moscow, M, date unknown, D. S. Horning (UCD). **Latah/Shoshone cos.**, Idaho Panhandle Natl. For., exact location unknown, M, 26 April 1951, E. F. Dailey (UWBM). **Shoshone Co.**, ca. 3.8 mi. NW Clarkia, off ID hwy. 3 along West Fork of Emerald Cr., Idaho Panhandle Natl. For., M, F, 20 July 1949, A. Gibson (NMNH) TYPE LOCALITY. **Clearwater Co.**, 9 mi. E, 15 mi. N Pierce, 2M, F, 2 July 1978, A. K. J.; 8.7 mi. E, 5.7 mi. N Pierce, 2M, 7F, 14 July 1978, A. K. J.; 8 mi. E, 3 mi. N. Pierce, 2M, F, 2 July 1978, A. K. J.; 3.5 mi. N, 7 mi. W Pierce, 3M, 3F, 25 June 1978, A. K. J.; Pierce, 2M, 28 June 1978, A. K. J.; 5.2 mi. N, 5 mi. E Headquarters, 3M, 2F, 9 July 1978, A. K. J.; and 3.5 mi. N, 4 mi. E Headquarters, 6M, 2F, 13 August 1978, A. K. J. **Idaho Co.**, 6 mi. E, 9 mi. S Pierce, M, 30 June 1978, A. K. J.; 10 mi. E, 6 mi. S Pierce, M, F, 18 August 1978, A. K. J.; 13 mi. SSE Pierce, 4M, F, 12 July 1978, A. K. J.; 3.3 mi. E Lowell, along Selway R. at US hwy. 12, M, F, 17 May 1975, F. W. Grimm (CMN); 6.5 mi. ESE Lowell, 3M, F, 17 May 1975, F. W. Grimm (CMN); and 1.3 mi. E Sylvania, M, F, 17 May 1975, F. W. Grimm (CMN).

Remarks. The coxal setae in *O. unicus* always constitute a field, usually linear, of as many as 10-12 regular setae of varying lengths. I have not observed as few as two, as in the holotype of *O. cabinetus*.

The St. Joe National Forest, cited in all previous works as the site of the type locality of *O. unicus*, is now a division of the Idaho Panhandle National Forest. The West Fork of Emerald Creek, where the types were collected (Loomis 1953, Chamberlin and Hoffman 1958, Hoffman 1964, Loomis and Schmitt 1971), arises in eastern Latah County and flows to its confluence with Emerald Creek in the southwestern corner of Shoshone County, so very little of the "West Fork" is in Shoshone County. Consequently, the collector almost had to be working up intersecting water-courses while traveling along Idaho highway 3, which parallels Emerald Creek in this area. The precise site on the "West Fork" is unknown, but the specimens were probably taken approximately 3.8 miles NW of the town of Clarkia.

Acknowledgments

For the privilege of examining the holotypes of *O. cabinetus*, *C. unicus*, and *K. jeekeli*, and non-typical

material in the NMNH, I thank J. A. Coddington. Specimens from other collections were examined through the courtesy of the following curators; CIS, J. A. Chemsak; CMN, P. F. Frank and J. A. Fournier; FSCA, G. B. Edwards; UCD, the late R. O. Schuster; and UWBM, R. Crawford. Examination of the specimens occurred in January 1992, while I was working at the NMNH on a mid-career fellowship from the National Science Foundation. Figures 1-8 were prepared by R. G. Kuhler, NCSM scientific illustrator.

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