Ontogeny, variation, and synonymy in North American *Cybaeus* spiders (Araneae: Cybaeidae)[1]

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Abstract—Ontogeny, interspecific homogeneity, and intraspecific variability of female genitalic and other characters of North American *Cybaeus* L. Koch spiders are described and used to resolve taxonomic problems in the genus. Ontogenetic changes in spermathecal duct morphology occur as females mature and age. Three distinct ontogenetic stages are described: pre-epigynum/pre-vulva, subadult / teneral adult, and mature adult. Concordant with aspects of sexual selection theory, closely related females may be morphologically indistinguishable. Many *Cybaeus* species exhibit a wide range of body size. Within single species, ontogenetic stages and outlier size classes have been described as separate species. Species with similar females have been lumped under one name. Based on this, 10 new synonyms are proposed for North American *Cybaeus*: *C. adenoides* Schenkel = *C. grizzlyi* Schenkel; *C. chaudius* Exline and *C. hatchi* Exline = *C. shoshoneus* Chamberlin and Ivie; *C. exlineae* Chamberlin and Ivie = *C. bulbosus* Exline; *C. hystrix* Chamberlin and Ivie = *C. cribelloides* Chamberlin and Ivie; *C. janus* Chamberlin and Ivie = *C. eutypus* Chamberlin and Ivie; *C. marinensis* Chamberlin and Ivie and *C. angelus* Chamberlin and Ivie = *C. consocius* Chamberlin and Ivie; and *C. olympiae* Exline and *C. tius* Chamberlin and Ivie = *C. reticulatus* Simon. In addition, four old synonyms are rejected: *C. grizzlyi* Schenkel and *C. adenoides* Schenkel ≠ *C. adenes* Chamberlin and Ivie; *C. patritus* Bishop and Crosby and *C. silicis* Barrows ≠ *C. giganteus* Banks.

Résumé—La description de l'ontogénie, de l'homogénéité interspécifique et de la variabilité intraspécifique des génitalias et d'autres caractères chez les araignées femelles nord-américaines du genre *Cybaeus* L. Koch sert à résoudre certains problèmes taxonomiques. Il se produit des changements ontogéniques dans la morphologie du canal de la spermathèque durant la maturation et le vieillissement des femelles. On peut décrire trois stades ontogéniques distincts, pré-épygine/pré-vulvaire, subadulte / adulte nouvellement émergé et adulte mature. En accord avec certains aspects de la théorie de la sélection sexuelle, les femelles proches peuvent être impossibles à distinguer morphologiquement. Plusieurs *Cybaeus* ont des tailles très variables. Au sein d'une même espèce, les stades ontogéniques et les classes de tailles extrêmes ont été décrits comme des espèces différentes. Des espèces à femelles semblables ont été réunies sous un même nom. En conséquence, 10 nouvelles synonymies sont proposées chez les *Cybaeus* nord-américains : *C. adenoides* Schenkel = *C. grizzlyi* Schenkel, *C. chaudius* Exline et *C. hatchi* Exline = *C. shoshoneus* Chamberlin et Ivie, *C. exlineae* Chamberlin et Ivie = *C. bulbosus* Exline, *C. hystrix* Chamberlin et Ivie = *C. cribelloides* Chamberlin et Ivie, *C. janus* Chamberlin et Ivie = *C. eutypus* Chamberlin et Ivie, *C. marinensis* Chamberlin et Ivie et *C. angelus* Chamberlin et Ivie = *C. consocius* Chamberlin et Ivie, ainsi que *C. olympiae* Exline et *C. tius* Chamberlin et Ivie = *C. reticulatus* Simon. De plus, quatre synonymies plus anciennes doivent être rejetées : *C. grizzlyi* Schenkel et *C. adenoides* Schenkel ≠ *C. adenes* Chamberlin et Ivie, de même que *C. patritus* Bishop et Crosby et *C. silicis* Barrows ≠ *C. giganteus* Banks.

[Traduit par la Rédaction]

Introduction

Numerous species of the Holarctic genus *Cybaeus* L. Koch (Araneae: Cybaeidae) are found in the forests of North America. Most species occur in the west, where these spiders are often very common (Bennett 1991). Cybaeids are rather generalized brownish

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spiders that lack distinctive morphological features except in the secondary sexual characters of the male palpi and female epigyna and vulvae; *Cybaeus* species are all diagnosed by features of these characters. Most of the Nearctic species were described in the first half of the twentieth century in papers by Barrows (1919), Chamberlin (1919), Bishop and Crosby (1926), Chamberlin and Ivie (1932, 1937, 1942), Exline (1935*a*, 1935*b*), Fox (1937), Schenkel (1950), and Roth (1952). The current catalogue (Platnick 2005) of 34 North American *Cybaeus* species (one in the eastern United States, the others all in the west from Alaska to southern California) reflects the taxonomy established in these older papers.

During the latter half of the twentieth century, large numbers of new specimens accumulated in museum collections. Series of greater than two or three spiders of litter-inhabiting genera such as *Cybaeus* from one locale and date usually are fairly rare in collections. However, many "good" series of various species of *Cybaeus* are now preserved in museums. Where these series were collected in late summer or early fall (when new adults typically are reaching maturity), often there are penultimate, teneral, and fully matured females present, including a few comparatively very heavily sclerotized individuals. These latter spiders presumably are "grandmothers" that matured and mated the previous year and have already reproduced.

Based largely on these new museum specimens, within a thesis on cybaeid spiders, Bennett (1991) revised (but did not publish) the North American species of *Cybaeus*. Four old synonyms were rejected and 33 new species and 10 new synonyms were recognized, for a total of 61 North American species. The significant number of "good" series of individuals of single species ranging from penultimate adults to "grandmothers" from single localities and dates allowed the study of ontogeny and variation of female epigynal and vulval characters and of variability in other somatic characters. Bennett's (1991) unpublished synonymy changes were based on those findings and are presented and justified here.

Ontogenetic evidence provides valuable indications of homology and character polarization (Wiley 1981; Sierwald 1989) useful for phylogenetic analyses and basic taxonomy. Ontogeny of spider sexual characters is difficult to study, as the majority of these characters seemingly appear all at once. Coddington (1990) and Sierwald (1990) listed only eight studies (beginning in 1886) of male palpal ontogeny. Even fewer studies have been made of female epigynal and vulval ontogeny: Sierwald (1989) cited only three such studies and is the only worker to have recently provided new female ontogenetic data. She reared individual female pisaurid spiders from egg to maturity and, through the examination of cast skins, documented up to seven stages in the ontogeny of the copulatory organs. Through their ontogenetic studies, Sierwald (1989, 1990) and Coddington (1990) have made major efforts to standardize the terminology applied to spider copulatory organs and to identify homologous copulatory organ components among different families of spiders. Bennett (1991, 1992) applied Sierwald's terminology to female copulatory organs of amaurobioid and dictynoid spiders, including cybaeids.

Coyle (1985) and others (references in Coyle 1985) have documented minimal intraspecific variability in male palpal characters in *Hypochilus pococki* Platnick, 1987 (Araneae: Hypochilidae), *Nephila clavipes* (L., 1767) (Araneae: Nephilidae), and *Tetragnatha elongata* Walckenaer, 1805 (Araneae: Tetragnathidae), in spite of often great variability in body size. Higgins (1989), however, found substantial intraspecific variation in the vulva of female *N. clavipes*. In that species, the degree of sclerotization and the shape of the vulva change over time, apparently as a result of insemination. Furthermore, it is common in spiders to find closely related species in which the females share a similar but variable copulatory organ morphotype and are more or less indistinguishable even though the relevant males are relatively easily identified. Two examples follow. Bennett (1987) documented considerable intraspecific variation in the epigyna of the coelotine genus *Wadotes* Chamberlin (Araneae: Amaurobiidae) and noted that several species pairs have morphologically indistinguishable females. Platnick and Shadab (1975) noted that epigynal variability in the genus *Gnaphosa* Latr. (Araneae: Gnaphosidae) can cause identification problems.

Runaway, rapid evolution and consequent species specificity of copulatory structures in males as well as, conversely, their relatively more constant form in closely related females are common in organisms with internal fertilization (Eberhard 1985). Probably this is due to sexual selection by female choice, whereby

females direct genitalic evolution through differential selection of male genitalic form, most likely on the basis of tactile stimuli (Eberhard 1985). Under this scenario, selective pressures for interspecific differentiation and intraspecific continuity of copulatory organ form will be high for males and low to nonexistent for females. Therefore, the examples of low male (Coyle 1985 and references therein) and high female (Platnick and Shadab 1975; Bennett 1987; Higgins 1989) intraspecific copulatory character variability reported above are to be expected.

Considerable simple size variation is widespread in spiders and has resulted in the creation of synonyms when outlier size classes within a species are described as separate species. Following are a few examples. In a revision of *Phidippus* C.L. Koch (Araneae: Salticidae), Edwards (2004) recorded over threefold variation in body length in some species and noted various size-related synonyms. In the genera *Teminius* Keyserling (Araneae: Miturgidae) and *Gnaphosa*, twofold intraspecific size variation is commonly observed (Platnick and Shadab 1975, 1989). In *Teminius*, "this enormous size variation" is likely due to a variable number of instars and has been the cause of some synonyms in the genus (Platnick and Shadab 1989). *Araneus* Clerck spider species (Araneae: Araneidae) often exhibit similar size variation, some of which has been the cause of synonyms (Levi 1971).

The following account presents ontogenetic and variability argumentation in support of the proposed new and rejected synonyms identified in North American *Cybaeus* spiders (Bennett 1991) and summarizes the resultant nomenclature of the affected species.

Methods

About 3700 specimens collected by the author or borrowed from the following museums and individuals were examined during the course of this study: American Museum of Natural History, New York (N. Platnick); British Museum (Natural History), London (P. Hillyard); California Academy of Sciences, San Francisco, California (W. Pulawski); Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa, Ontario (C. Dondale); Field Museum of Natural History, Chicago, Illinois (P. Sierwald); R. Leech, Edmonton, Alberta; Milwaukee Public Museum, Milwaukee, Wisconsin (J. Jass); Muséum National d'Histoire Naturelle, Paris, France (J. Heurtault); Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts (H. Levi); National Museum of Natural History, Washington, D.C. (J. Coddington); Naturhistoriches Museum, Basel, Switzerland; Ohio State University, Columbus, Ohio (R. Bradley); Oregon State University, Corvallis, Oregon (J. McIver); W. Peck, McAllen, Texas; V. Roth, in California Academy of Sciences; Royal British Columbia Museum, Victoria, British Columbia (R. Cannings); Royal Ontario Museum, Toronto, Ontario (C. Darling); D. Ubick, San Francisco, California; University of Victoria, Victoria, British Columbia (Richard Ring); and Burke Museum, University of Washington, Seattle, Washington (R. Crawford).

Terminology follows Sierwald (1989) and Bennett (1992). Measurements are expressed in millimetres as sample range (mean ± SD). Specimen examination, data collection and analysis, and illustration methodologies are similar to those in Bennett (1987, 1988). Specimen data are presented for each species (complete data for poorly known species, generalized locality data only for common species) in the following format: **COUNTRY. State/Province:** county, locality, day.month.year (collector), numbers and sex (repository); next county, *etc*. The following abbreviations are used in the locality data and figures. Institutions (see above): AMNH, American Museum of Natural History; CAS, California Academy of Sciences; FMNH, Field Museum of Natural History; MPM, Milwaukee Public Museum; MCZ, Museum of Comparative Zoology; NMNH, National Museum of Natural History; UWBM, Burke Museum, University of Washington. Collectors: BM, B. Malkin; DU, D. Ubick; REL, R.E. Leech; VDR, V.D. Roth; WI, W. Ivie; WJG, W.J. Gertsch; WMB, W.M. Barrows. Morphological characters: AT, pre-atrium; BS, base of spermatheca; CD, copulatory duct; CL, carapace length; DK, dorsal keel of apical apophysis of male genital bulb; FD, fertilization duct; HS, head of spermatheca; PA, posterior tip of apical apophysis of male genital bulb; PP, primary pores; DP, dictynoid pore; SS, stalk of spermatheca.

Results and discussion

Ontogeny and intraspecific variation of the epigynum and vulva in *Cybaeus* spiders

The mature adult female *Cybaeus* copulatory apparatus is composed of a simple epigynum

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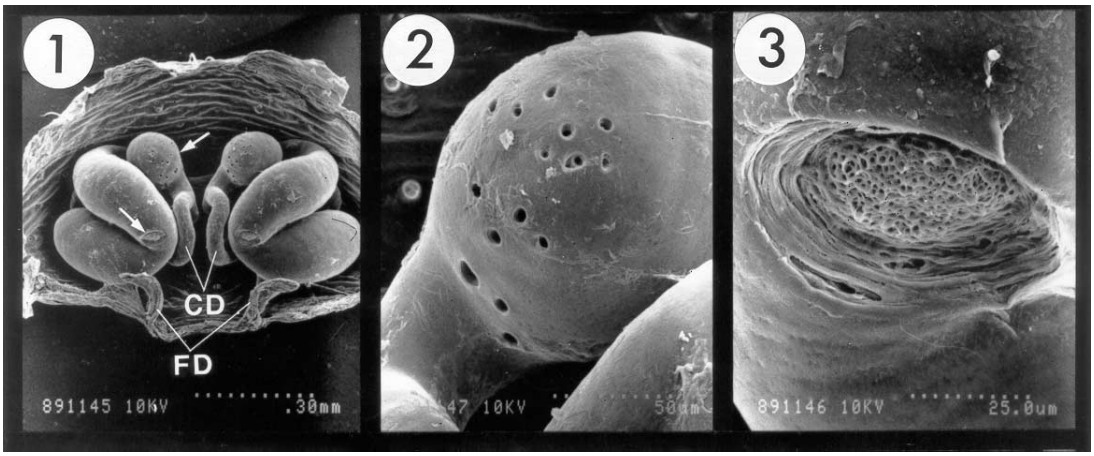
Figs. 1–3. *Cybaeus signifer*, cleared vulva and vulval pores: 1, dorsal; 2, detail of Figure 1, primary pores on spermathecal head; 3, detail of Figure 1, dictynoid pore on spermathecal stalk. Arrows in Figure 1 indicate primary and dictynoid pores. Slightly modified from Bennett (1992).



and a relatively more complex entelegyne vulva. The epigynum is an unadorned integumentary plate bearing simple single or paired atria that lead into the vulva (Figs. 13, 15, 17, 19, 23, 25–27, 31, 44, 45). The vulva is a paired, bilaterally symmetrical organ with each half composed of copulatory and fertilization ducts connected by a tripartite (head, stalk, and base), more or less sinuous spermatheca (Figs. 1, 7, 10–12, 14, 16, 21, 22, 28–30, 32, 33, 40, 41, 46–49, 51, 53). The spermathecal head contains a number of simple primary pores (Figs. 1, 2); the stalk contains a single complex "dictynoid" pore (Figs. 1, 3; see Bennett (1992) for descriptions and discussion of spermathecal pores).

Three distinct ontogenetic stages (two of them primordial) of the female copulatory organs were noted: pre-epigynum/pre-vulva, subadult / teneral adult, and mature adult. Most of the development of the vulva and the epigynum occurs during the penultimate instar, when the copulatory apparatus takes on much of its mature form. Primordia of the epigynum and vulva likely develop for some time prior to maturity. Perhaps if the exuviae of living individuals of *Cybaeus* are studied, as was done with pisaurids by Sierwald (1989), more and earlier primordial stages will be noted. However, penultimate female lycosoid spiders (including pisaurids) generally have recognizable but reduced versions of adult epigyna (Sierwald 1989; personal observation) that are morphologically intermediate between the pre-epigynal and later stages. This situation apparently does not occur in *Cybaeus* species or other cybaeid spiders and it seems likely that only the three main ontogenetic stages discussed here exist in these spiders.

Pre-epigynum/pre-vulva

In *Cybaeus* species (Figs. 4–6), pisaurids (Sierwald 1989), and many other entelegyne spiders (personal observation), the pre-epigyna are typically characterized by a pair of longitudinal, lightly sclerotized, curved folds (the preatria) anterior to the epigastric furrow. The preatria open internally into the pre-vulva (Figs. 4, 6), a pair of variously lobed anterolateral invaginations. In all pre-vulvae examined, primary pores were present anteriorly in the deepest invagination (Figs. 4, 5). The pore-bearing invaginations likely are the primordia of the spermathecal heads. One (Fig. 4) or two (Figs. 5, 6) other invaginations and a variable amount of hazy sclerotization are also found in each half of the pre-vulva, but it has been impossible to associate these components of the pre-vulva with components of the mature vulva.

Subadult / teneral adult

A subadult is a penultimate spider immediately prior to its moult to maturity. Preserved subadult females can be recognized by the presence of two distinct layers of integument, the outer one with a typical pre-epigynum and pre-vulva as described above and the inner one possessing a well-developed vulva (very similar to the adult vulva but with important differences) and a pale, unsclerotized but otherwise mature epigynum. Teneral adult females have recently

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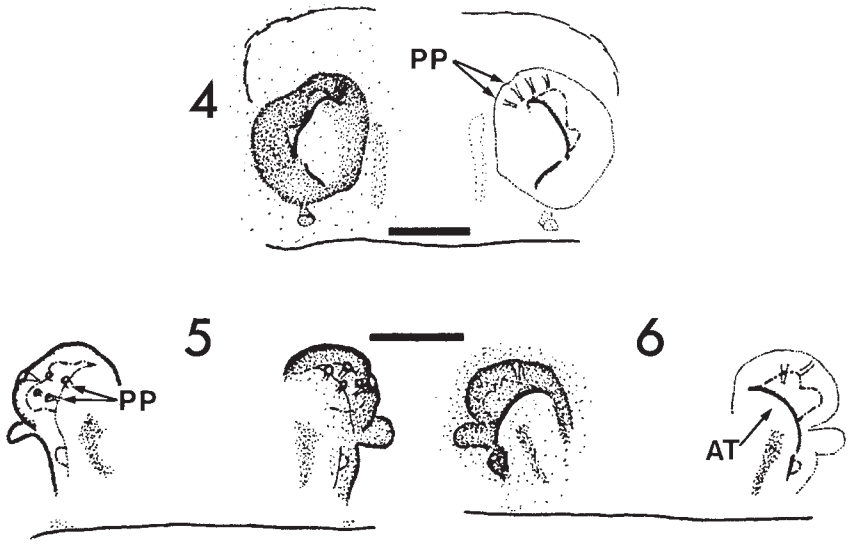
Figs. 4–6. *Cybaeus* spp., cleared pre-vulvae: 4, *C. multnoma*, Sams Valley, California, ventral; 5, *C. bulbosus*, Wallowa Lake, Oregon, dorsal; 6, same, ventral. Scale bars = 0.05 mm.



moulted to maturity and are recognized by a single layer of integument, pale coloration, and weakly sclerotized integument, epigynum, and vulva.

There is a great developmental leap in *Cybaeus* species from the pre-epigynum/pre-vulva stage to the subadult stage. Even in those species, such as *C. reticulatus*, in which adults have complex vulvae (Figs. 46–49) and (or) single atria (Figs. 44, 45), no intermediate specimens have been observed. Paired, longitudinal pre-atria transform directly into a single (or paired) transverse atrium, while the simple paired anterolateral invaginations become complex ducting with distinct copulatory ducts, spermathecal components (heads, stalk, and base), and fertilization ducts (Figs. 7, 11, 28, 40, 48). All the parts of the subadult vulva are of mature form but are very thin-walled and weakly sclerotized in comparison with a mature vulva (*cf.* Figs. 7 and 9, 28 and 29, 40 and 41, 47 and 48). Furthermore, the spermathecal stalk lacks (Fig. 7) or has only a very weakly developed dictynoid pore (Fig. 28). The teneral vulva is little different from that of the subadult except that the dictynoid pore is starting to develop if it was absent earlier (Figs. 8, 11, 40). Because of the weak and variable sclerotization of the subadult and teneral epigynum and vulva, the vulval components are more or less readily visible ventrally through the epigynal integument than they are in older adults.

Mature adult

The mature adult spider displays "normal" coloration and is well sclerotized. The mature adult vulva apparently goes through an age-related process involving gradually increasing sclerotization and coalescence of adjacent components within each lateral half of the vulva. Early in the mature adult stage, the dictynoid pores become fully developed (Fig. 9). In older adults the vulva becomes thicker walled and more opaque (*cf.* Figs. 9 and 10, 40 and 41). Distinctly saccate spermathecal heads may become enveloped within the general vulval sclerotization and lose their distinctness (*cf.* Figs. 40 and 41). Copulatory ducts in some species become imbedded in thick, opaque matrices (Figs. 12, 29). Spermathecal bases may become fused to spermathecal stalks and the stalks to the spermathecal heads. The general trend in the maturation process of *Cybaeus* vulvae is from an open sinuous form (Figs. 11, 28, 40) in young adults to a closed one (Figs. 12, 30, 41) in "grandmothers". Perhaps copulation and insemination trigger this process as they do changes in the vulva in *N. clavipes* (Higgins 1989).

Variation of size and female copulatory organ characters

As in *Wadotes* species (Bennett 1987), in *Cybaeus* and other cybaeid species (Bennett 1991) there are species pairs and (or) small clusters in which the females are very difficult

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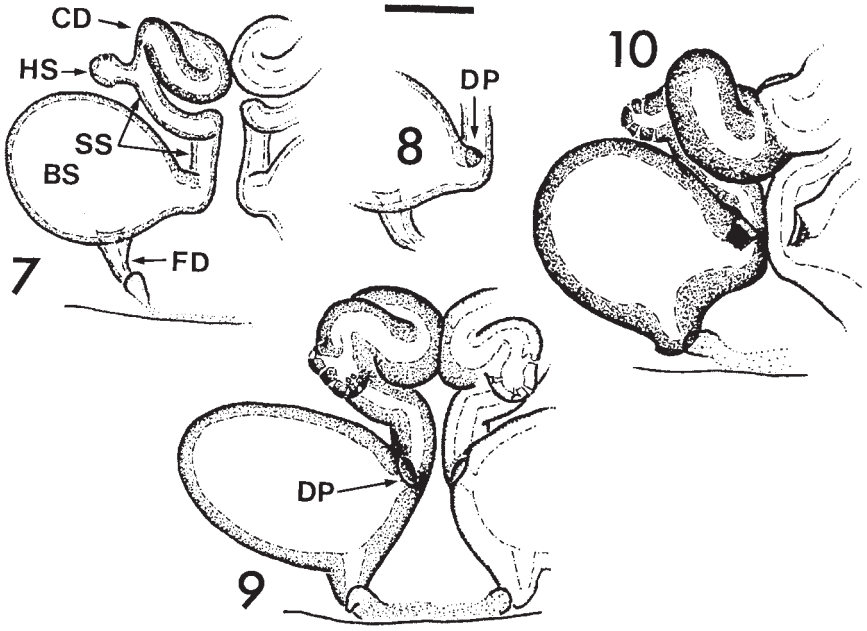
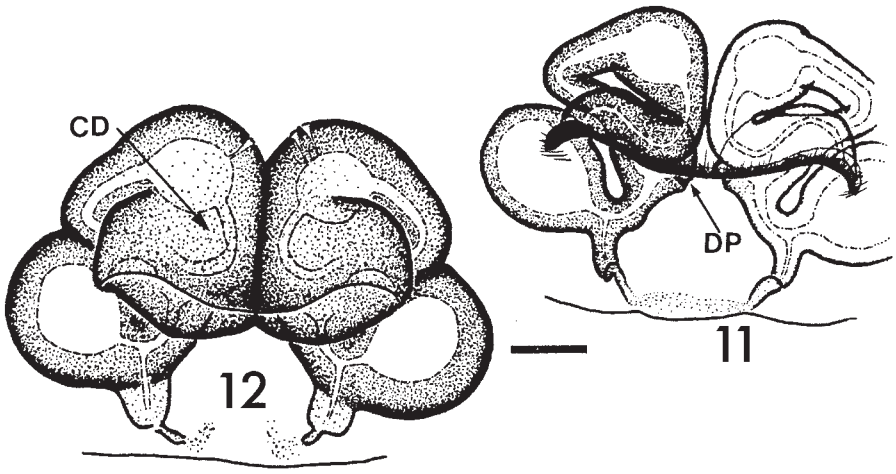
Figs. 7–10. *Cybaeus septatus*, cleared vulvae, dorsal views: 7, McCloud, California, subadult; 8, same, teneral adult; 9, Potter Creek Cave (holotype), mature adult; 10, McCloud, California, "grandmother". Scale bar = 0.10 mm.



Figs. 11–12. *Cybaeus multnoma*, cleared vulvae, ventral views: 11, Pistol River, Oregon, teneral adult; 12, Canyon Creek, Oregon (holotype), "grandmother". Scale bar = 0.10 mm.



or apparently impossible to separate morphologically. Typically the males of these species are distinct and do not exhibit much character variability. In females, in addition to the temporal, ontogenetic variation in individuals noted above, there is often considerable intraspecific variation among individuals especially in the form of the atrium (*cf.* Figs. 13 and 15, 17–19, 23–25, 42) but also in the vulva (*cf.* Figs. 14 and 16, 47 and 49, 51 and 53).

There is also considerable size variation in certain species of *Cybaeus*. Most species of *Cybaeus* do not show the degree of size variation recorded in *Phidippus* (Edwards 2004), *Araneus* (Levi 1971), and *Gnaphosa* and *Teminius* (Platnick and Shadab 1975, 1989), but

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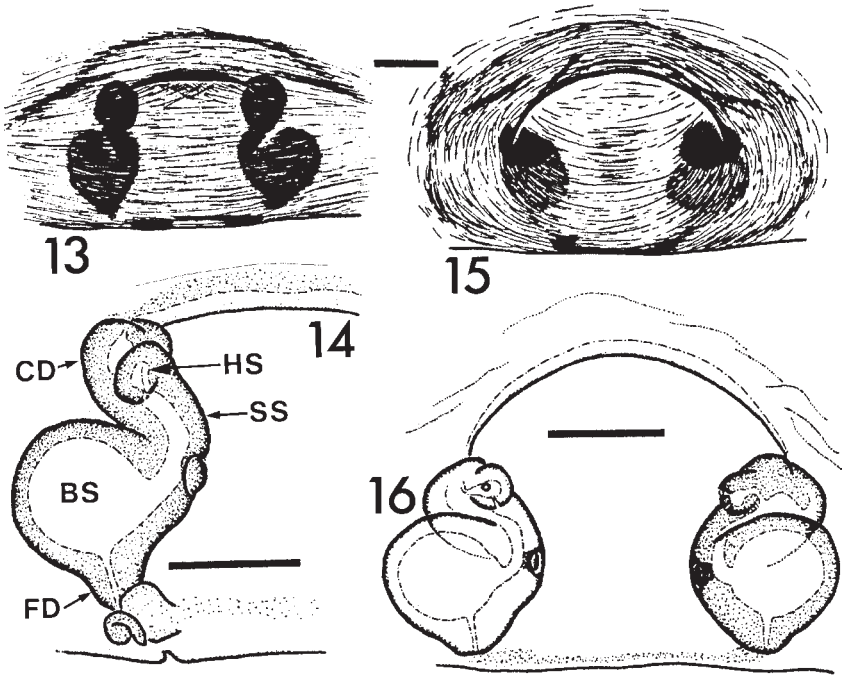
Figs. 13–16. *Cybaeus reducens*, epigyna and cleared vulvae: 13, Carmel, California, epigynum, ventral; 14, same, vulva, ventral; 15, Big Sur, California, epigynum, ventral; 16, same, vulva, dorsal. Scale bars = 0.10 mm.



variation in many species of *Cybaeus*, while not exceptional, is still significant. For example, carapace lengths vary approximately twofold in *C. eutypus* (2.7–4.8 (4.0 ± 0.5), *n* = 43), *C. morosus* Simon, 1886 (2.6–5.1 (4.0 ± 0.5), *n* = 43), *C. multnoma* Chamberlin and Ivie, 1942 (2.6–5.1 (3.6 ± 0.5), *n* = 37), and *C. reticulatus* (2.38–4.9 (4.0 ± 0.6), *n* = 56).

Taxonomic changes in North American *Cybaeus*

The variability and ontogenetic changes discussed above have been the cause of all the synonymy proposed below except for that of *C. adenoides* under *C. grizzlyi* (there is no apparent reason for Schenkel's (1950) description of these conspecific taxa). This section presents the new taxonomic changes and relevant discussion alphabetically by species name.

Cybaeus adenes Chamberlin and Ivie

(Figs. 17–20)

Cybaeus adenes Chamberlin and Ivie, 1932: 24, Fig. 59 (in part, ♀ holotype only); Roewer 1954: 89; Bonnet 1956: 1300; Roth 1956: 178; Roth and Brown 1986: 3.

Cybaeus grizzlyi: Roth 1956: 178; Roth and Brown 1986: 3. **Synonymy rejected.**

Cybaeus adenoides: Roth 1956: 178; Roth and Brown 1986: 3. **Synonymy rejected.**

Types

Female holotype from Marin County, California (R.V. Chamberlin), in AMNH, examined but subsequently lost in return mail. Male neotype here designated from San Geronimo, Marin County, California (37°59′N, 122°42′W), 19 September 1963 (J. and W. Ivie), in AMNH, examined. Chamberlin and Ivie's paratypes of *C. adenes* are females of *C. grizzlyi*. In the absence of valid paratypes of *C. adenes*, a male neotype has been designated from the same general vicinity (Marin County) as the holotype. Type information for other species is listed under *C. grizzlyi*.

Specimens examined

UNITED STATES OF AMERICA. California: Green Valley [probably Sonoma Co.], 16.i.58 (Raney, Schuster), 2 ♀ (CAS); Marin,

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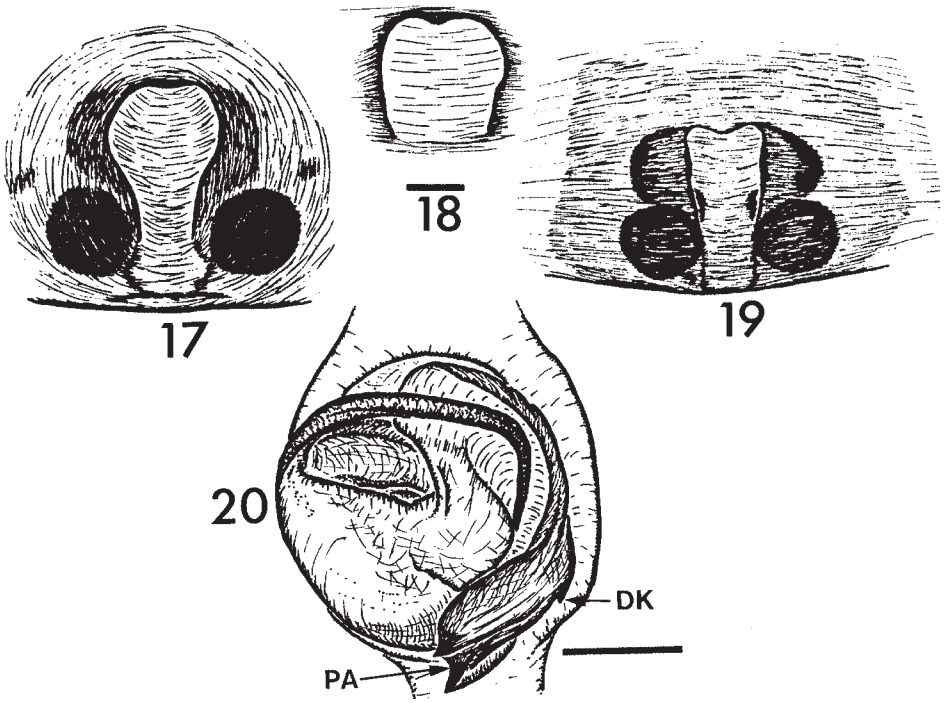
Figs. 17–20. *Cybaeus adenes*, epigyna and genital bulb: 17, Marin County, California (holotype), epigynum, ventral; 18, San Geronimo, California, atrial variant, ventral; 19, St. Helena, California, epigynum, ventral; 20, San Geronimo, California, left genital bulb, ventral. Scale bars = 0.10 mm (Figs. 17–19), 0.20 mm (Fig. 20). Figure 20 reproduced from scanning electron micrograph.



San Geronimo, 37°59′N, 122°42′W, 18.ix.63 (J. and W. Ivie), 6 ♂ 3 ♀ (AMNH); Napa, St. Helena, 31.xii.53 (VDR, Marsh, Schuster), 1 ♀ (AMNH); San Francisco, San Francisco, 19.ix.65 (WI), 1 ♂ (AMNH), vii.53 (WJG), 1 ♀ (AMNH); Sonoma, Annadel State Park, 11.xi.79 (DU), 1 ♂ (DU), El Verano, 11.ii.83 (Briggs, DU, Lee), 3 ♀ (DU), 6.ii.88 (DU), 2 ♀ (DU), Glenn Ellen, 15.ii.54 (VDR, Schuster), 4 ♀ (AMNH) 7 ♀ (CAS), Healdsburg, 27.xii.80 (DU), 2 ♀ (DU), 29.iii.81 (DU), 5 ♀ (DU), Mark West Springs, 31.xii.53 (VDR, Marsh, Schuster), 3 ♀ (AMNH), Penngrove, 2/3.xii.72 (DU), 1 ♀ (DU), Sugarloaf Ridge State Park, 11.xi.79 (DU), 1 ♀ (DU), Mt. St. Helena, 31.xii.53 (VDR, Marsh, Schuster), 2 ♀ (AMNH), Sonoma, 5.ii.55 (BM), 1 ♀ (AMNH).

Remarks

Roth (1956) placed *C. grizzlyi* (along with *C. adenoides*) in *C. adenes* because the females are basically indistinguishable and the male of *C. adenes* was still unknown then. However, the males of *C. adenes* and *C. grizzlyi* are distinct: in ventral view, the apical apophysis (functional conductor) of the male genital bulb in *C. adenes* has a bifid posterior tip and a very small dorsal keel (Fig. 20); in *C. grizzlyi* the posterior tip is single and the keel is large (Fig. 43). Also, based on the male records (Bennett 1991), the ranges of the two species appear to be separated by San Francisco Bay (*C. adenes* occurs to the north and west of the Bay, *C. grizzlyi* immediately to the east). See comments regarding *C. adenoides* under *C. grizzlyi*.

Range

Marin, Napa, San Francisco, and Sonoma counties in the San Francisco Bay area.

Cybaeus bulbosus Exline

(Figs. 5, 6, 21, 22)

Cybaeus bulbosus Exline, 1935*b*: 285, Fig. 1 (♀); Exline 1938: 13, Fig. 10 (♀); Roewer 1954: 89; Bonnet 1956: 1301; Roth and Brown 1986: 3.

Cybaeus exlineae Chamberlin and Ivie, 1937: 224, Figs. 62–64 (♂, ♀); Roewer 1954: 90; Bonnet 1956: 1301. **New synonymy.**

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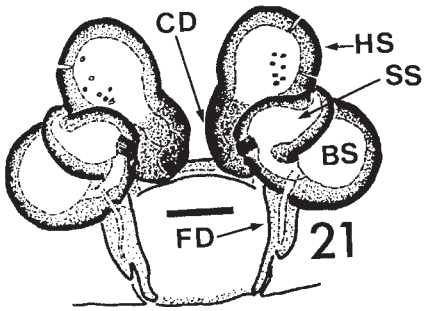
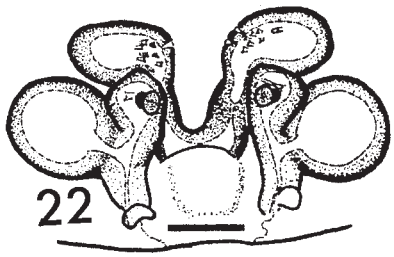
Figs. 21–22. *Cybaeus bulbosus*, cleared vulvae, dorsal views: 21, Honeysuckle Ranger Station, Idaho (holotype); 22, Lost Creek Reservoir, Idaho (*C. exlineae* allotype). Scale bars = 0.10 mm.





Cybaeus exlinae: Roth 1952: 216, Figs. 25–27, 30 (♂, ♀); Roth and Brown 1986: 3. Incorrect subsequent spelling of *C. exlineae*.

Types

Female holotype from Honeysuckle Ranger Station [probably Kootenai County], Idaho, 16 August 1934 (M.H. Hatch), in poor condition in MCZ, examined. Male holotype, female allotype of *C. exlineae* from Lost Creek Reservoir, near Tamarack, Adams County, Idaho, August 1936, in AMNH, examined.

Specimens examined

UNITED STATES OF AMERICA. Idaho: Adams, 44°50′N, 116°28′W, upper Weiser River, 6.viii.43 (WI), 12 ♂ 12 ♀ (AMNH), Tamarack, viii.36 (WI), 1 ♂ 1 ♀ (AMNH), Lost Lake [vicinity of 44°52′N, 116°32′W], 20.viii.36 (WI), 2 ♂ 8 ♀ (AMNH), 7.viii.43 (WI), 10 ♂ 4 ♀ (AMNH), McCall, 18.x.44 (WI), 1 ♀ (AMNH), Payette Lake, 5.vii.43 (WI), 1 ♀ (AMNH). **Oregon:** Langdon Lake, Blue Mountains, 13.ix.49 (VDR), 1 ♂ 4 ♀ (CAS), Tollgate, Blue Mountains, 19.ix.37 (Hatch), 1 ♀ (AMNH), 25.vii.50 (BM), 1 ♀ (AMNH); Wallowa, Wallowa Lake, 26.vii.50 (BM), 1 ♂ 3 ♀ (AMNH), Wallowa Lake State Park, 31.vii.68 (REL), 2 ♂ 4 ♀ (REL). **Washington:** Douglas, Waterville, 28.viii.59 (VDR, WJG), 3 ♀ (AMNH); King, Seattle, v.52 (BM), 1 ♀ (AMNH); Okanogan, Bonaparte Lake, 2.viii.85 (Crawford), 1 ♂ 2 ♀ (UWBM); Spokane, Newman's Lake, 15.viii.34 (Hatch), 1 ♀ (MCZ); Stevens, Cedar Lake, 10.vi.61 (WI), 2 ♀ (AMNH).

Remarks

The male of *C. bulbosus* was unknown to Exline (1935*b*). Chamberlin and Ivie described the male and female of *C. exlineae* as being "somewhat smaller" than those of *C. bulbosus*. The allotype is at the bottom of the size range recorded for *C. bulbosus* (CL = 3.2), but the size range for the species is quite small (CL = 3.2–4.1 (3.5 ± 0.2), *n* = 36). The form of the spermathecal heads is variable (*cf.* Figs. 21 and 22), but not greatly so. The male and female of *C. exlineae* are viewed, respectively, as the previously unknown male and a small specimen of *C. bulbosus*.

Range

Northeastern Oregon, adjacent Idaho, and scattered localities in Washington.

Cybaeus consocius Chamberlin and Ivie

(Figs. 23–25)

Cybaeus consocius Chamberlin and Ivie, 1932: 25, Fig. 61 (♀); Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3.

Cybaeus marinensis Chamberlin and Ivie, 1932: 25, Fig. 60 (♀); Roewer 1954: 91; Bonnet 1956: 1302. **New synonymy.**

Cybaeus angelus Chamberlin and Ivie, 1942: 16, Fig. 50 (♀); Roewer 1954: 89; Roth and Brown 1986: 3. **New synonymy.**

Cybaeus mariensis: Roth and Brown 1986: 4. Incorrect subsequent spelling of *C. marinensis*.

Types

All from California, in AMNH, and examined. Female holotype of *C. consocius* from Marin County (R.V. Chamberlin), lost in return mail after examination. Male neotype (with one female) here designated from south end of Samuel P. Taylor State Park, Marin County, 1 November 1953 (V.D. Roth, G. Marsh), in

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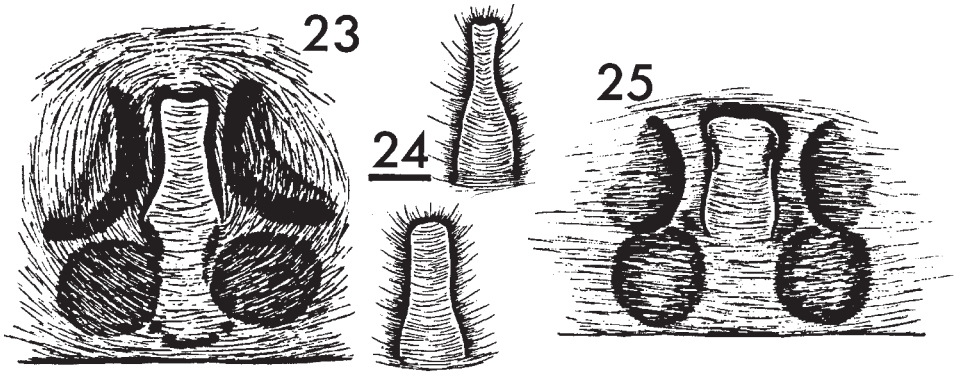
Figs. 23–25. *Cybaeus consocius*, epigyna, ventral views: 23, Marin County, California (holotype); 24, Oakville, California, atrial variants; 25, Marin County, California (*C. marinensis* holotype). Scale bar = 0.10 mm.



AMNH. Female holotype of *C. angelus* from Los Angeles, Los Angeles County. A male (labelled allotype) in the same vial as the holotype but unmentioned in the description or subsequently is a specimen of *C. cribelloides*. Female holotype of *C. marinensis* from Marin County (R.V. Chamberlin).

Specimens examined

UNITED STATES OF AMERICA. California: Marin, Mt. Tamalpais, 14.v.52 (Dybas), 1 ♀ (FMNH), Muir Woods, 5.ix.27, 2 ♂ 3 ♀ (AMNH), 24.x.53 (VDR), 1 ♀ (CAS); Napa, Oakville, 31.xii.53, 3 ♀ (AMNH), 15.ii.54 (VDR, Schuster), 1 ♀ (AMNH), 15.ii.54, 1 ♀ (AMNH), 13.xii.57 (Smith, Schuster), 2 ♀ (CAS); San Francisco, San Francisco, (Marx), 1 ♀ (MCZ).

Remarks

Variability in epigynal sclerotization (affecting the degree of visibility of the vulva through the epigynum) and form of the atrium and vulval ducts resulted in Chamberlin and Ivie's (1942) description of a specimen of *C. consocius* as *C. angelus*. The holotype of *C. angelus* is viewed as a lightly sclerotized atrial/vulval variant of *C. consocius* (*cf.* Chamberlin and Ivie 1932, Fig. 61 and Chamberlin and Ivie 1942, Fig. 50). The distinctive inverted U-shaped form of the atrium of *C. consocius* is quite variable (Figs. 23–25). *Cybaeus consocius* has page precedence over *C. marinensis*; the holotype of *C. marinensis* (Fig. 25) is viewed as an atrial variant of *C. consocius*.

Range

Coastal California from northern San Francisco Bay area south to Los Angeles. The Los Angeles record for the holotype of *C. angelus* (and the misidentified male *C. cribelloides*) may be mislabelled. No other record of *C. consocius* (and only one of *C. cribelloides*, also from Los Angeles) is known south of San Francisco.

Cybaeus cribelloides Chamberlin and Ivie

(Figs. 26, 27)

Cybaeus cribelloides Chamberlin and Ivie, 1932: 26, Fig. 62 (♀); Chamberlin and Ivie 1942: 18, Figs. 45, 46 (♂); Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3.

Cybaeus consocius: Gertsch and Ivie 1936: 22, Fig. 48 (♂). Misidentification.

Cybaeus hystrix Chamberlin and Ivie, 1942: 18, Fig. 47 (♀); Roewer 1954: 91; Roth and Brown 1986: 4. **New synonymy.**

Holotypes

Female holotypes of *C. cribelloides* and *C. hystrix* from, respectively, Marin County, California, (R.V. Chamberlin) and Redwood Highway, 38°N, 123°W [Marin County], April (Cockerell), both in AMNH, examined.

Specimens examined

Approximately 50 ♂, 100 ♀. **UNITED STATES OF AMERICA. California:** El Dorado, Riverton; Humboldt, F.K. Lane State Park, Jordan Creek, Miranda, Pepperwood; Lake, Cow Mountain; Los Angeles, Los Angeles;

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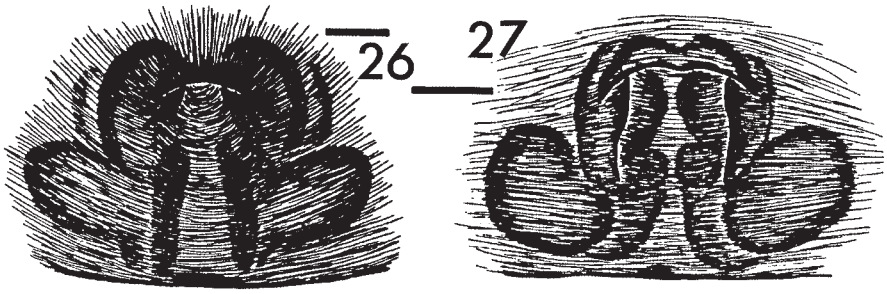
Figs. 26–27. *Cybaeus cribelloides*, epigyna, ventral views: 26, S.P. Taylor State Park, California; 27, Marin County, California (*C. hystrix* holotype). Scale bars = 0.10 mm.



Marin, Bolinas, Inverness, Muir Woods, San Geronimo, San Rafael, S.P. Taylor State Park, Woodacre; Mendocino, Caspar, Comptche, Cummings, Elk, Ft. Bragg, Little River, Mendocino, Noyo, Piercy; San Francisco, San Francisco; Sonoma, Cape Meeker, Cazadero, Healdsburg, Mark West Springs, Mt. St. Helena, Salt Point State Park, Sugarloaf Ridge State Park, Trenton.

Remarks

The holotype of *C. hystrix* is a small (bottom of recorded size range for *C. cribelloides*), lightly sclerotized (*i.e.*, young) adult (Fig. 27). The holotype of *C. cribelloides* is of average size for the species and is comparatively heavily sclerotized (as in Fig. 26). The size range observed among female specimens of *C. cribelloides* is not great (CL = 1.96–2.8 (2.5 ± 0.2), n = 22). No closely related species of *C. cribelloides* are known and no unmatched males are likely candidates for pairing with the female of *C. hystrix*. Therefore the holotype of *C. hystrix* is viewed as a small, teneral specimen of *C. cribelloides*.

Range

North coastal California from Humboldt County south to San Francisco. Within this area, this is one of the most commonly collected species of *Cybaeus*. Specimens from Los Angeles may be mislabelled (see discussion under *C. consocius*).

Cybaeus eutypus Chamberlin and Ivie

(Figs. 28–30)

Cybaeus eutypus Chamberlin and Ivie, 1932: 19, Figs. 43–45 (♂, ♀); Exline 1938: 13; Roth 1952: 212, Figs. 15, 17, 33 (♂, ♀); Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3.

Cybaeus morosus: Emerton 1923: 240 (in part), Fig. 5(c) (♂).

Cybaeus janus Chamberlin and Ivie, 1942: 15, Fig. 44 (♀); Roth 1952: 212, Fig. 23 (♀); Roewer 1954: 91; Roth and Brown 1986: 4. **New synonymy.**

Types

Male holotype, female allotype from Bay City, Tillamook County, Oregon, 6 August 1929 (R.V. Chamberlin), in AMNH, examined. Female holotype of *C. janus* from Comstock (43°45′N, 123°10′W), Oregon, 9 September 1935 (R.V. Chamberlin, W. Ivie), in AMNH, examined.

Specimens examined

Approximately 100 ♂, 200 ♀. **CANADA. British Columbia:** Cortes Island, Cultus Lake, Forward Harbour, King Island, Manning Provincial Park, Rivers Inlet, Sonora Island, Squamish, Surrey, Vancouver, Vancouver Island (Brooks Peninsula, East Sooke, Forbidden Plateau, Hornby Island, Jordan River, Ladysmith, Mesachie Lake, Mt. Arrowsmith, Mt. Benson, Nanaimo, Parksville, Port Renfrew, Qualicum, Sidney, S. Pender Island, Tofino, Victoria, Wellington). **UNITED STATES OF AMERICA. Oregon:** Clackamas, Mt. Hood, Douglas, Idleyld Park, Hood River, Parkdale, Lane, Blue River, Cottage Grove, Eugene, McCredie Springs, Siltcoos, Linn, Cascadia, Sweet Home, Tillamook, Bay City, Washington, Forest Grove, Yamhill, McMinnville. **Washington:** Clallam, Crescent Lake, Elwah Valley, Olympic Hot Springs, Grays Harbor, Quinault, Jefferson, Hoh River, King, Snoqualmie Pass, Kittitas, Easton, San Juan, Friday Harbor, Mt. Constitution, Snohomish, Everett, Whatcom, Shuksan.

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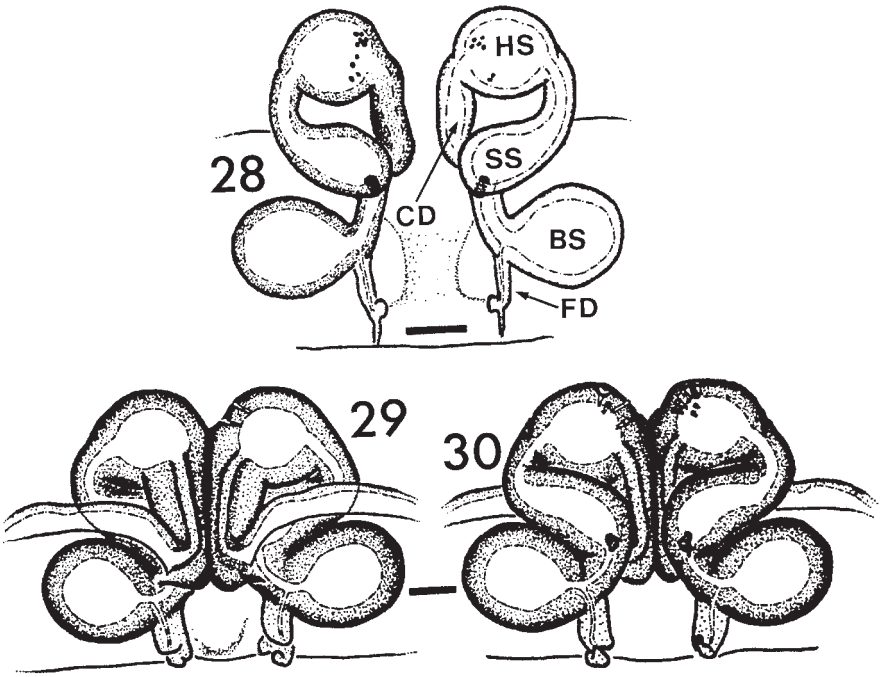
Figs. 28–30. *Cybaeus eutypus*, cleared vulvae: 28, Sooke, British Columbia, subadult, dorsal; 29, Bay City, Oregon, "grandmother", ventral; 30, same, dorsal. Scale bars = 0.10 mm.



Remarks

The holotype of *C. janus* is the smallest recorded specimen of *C. eutypus*. However, the size difference is not great: the largest recorded specimen of *C. eutypus* is less than 2 times larger than the holotype (CL = 2.7–4.8 (4.0 ± 0.5), *n* = 43) (Bennett 1991). Also, males of all species closely related to *C. eutypus* are matched with females and there are no other *Cybaeus* species described that share the same *eutypus*-type epigynal and vulval morphology (Bennett 1991). Therefore, the holotype of *C. janus* is viewed as a small specimen of *C. eutypus*.

Range

Mid-coastal British Columbia south to west-central Oregon and inland to the Hood River, Oregon region, and Manning Park, British Columbia. Within its range, *C. eutypus* is one of the most commonly encountered species of *Cybaeus*.

Cybaeus giganteus Banks

(Figs. 31–34, 37)

Cybaeus giganteus Banks, 1892: 23, Figs. 71, 71*a* (♀); Chamberlin and Ivie 1932: 14, Fig. 33 (♀); Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3.

Cybaeus patritus: Roth and Brown 1986: 3. **Synonymy rejected.**

Cybaeus silicis: Roth and Brown 1986: 4. **Synonymy rejected.**

Holotype

Female holotype from Ithaca, New York, in MCZ, examined. See information regarding other types under their respective species.

Specimens examined

UNITED STATES OF AMERICA. Alabama: Madison, Monte Sano, xii.40 (Archer), 1 ♀ (AMNH). **Georgia:** Rabun, Rabun Bald, 6.vii/11.viii.85 (Davidson, Hildebrandt), 1 ♂ 1 ♀ (MPM). **Kentucky:** Carter, Carter Caves State Park,18.ix.50 (Jones, Valentine), 1 ♂ (AMNH); Edmonson, Mammoth Cave, 30.iii.57, 1 ♀ (AMNH), 19.vi.57 (Barr), 1 ♀ (AMNH); Powell, Natural Bridge State Park, 19.vii.66, 2 ♂ (AMNH). **New York:** Frecks, 10.viii.26 (Bishop), 3 ♀ (AMNH); Allegany, nr. Ceres, 30.viii.26, 1 ♀ (AMNH); Cattaraugus, Allegany State Park, 15.vii.27 (Martin), 1 ♂ 1 ♀ (AMNH); Tioga, Oswego, 20.ix.43, 1 ♀ (AMNH). **North Carolina:** Avery, Grandfather

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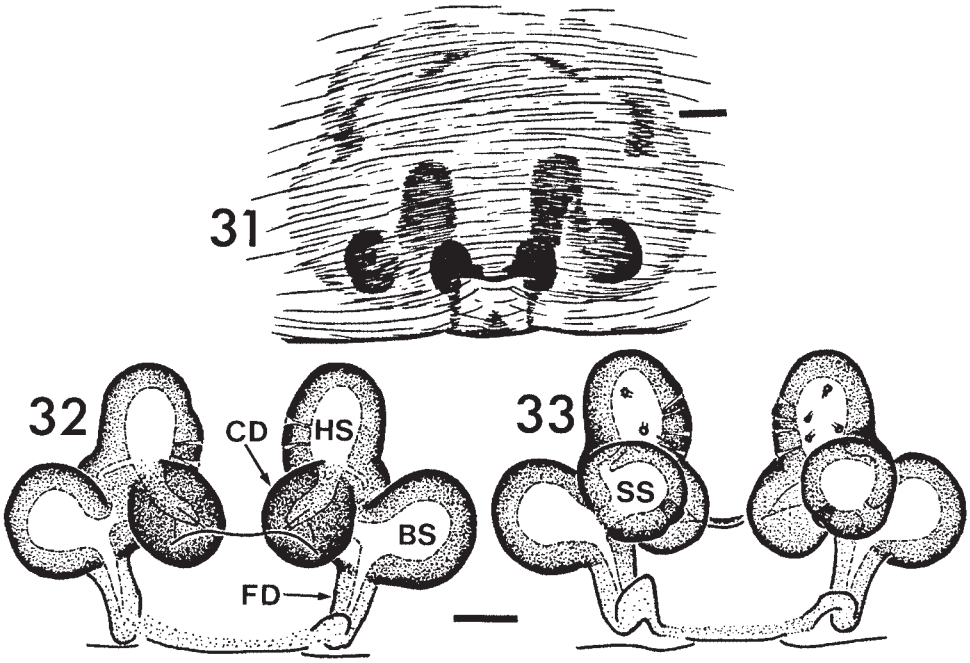
Figs. 31–33. *Cybaeus giganteus*, Ithaca, New York (holotype), epigynum and cleared vulva: 31, epigynum, ventral; 32, vulva, ventral; 33, same, dorsal. Scale bars = 0.10 mm.



Mountain, 5.viii.51 (Cohn), 1 ♂ (AMNH); McDowell, Little Switzerland, 1 ♀ (AMNH). **Ohio:** Wayne, Funk's Hollow, 27.ix.62 (Shear), 1 ♂ 1 ♀ (AMNH). **Pennsylvania:** Bedford, "summer"-42 (Briscoe), 1 ♂ (AMNH); Potter, Sweden Valley, 7.viii.67 (Shear), 1 ♀ (AMNH). **Tennessee:** Overton, Falling Water Cave, 23.ix.49 (Jones, Valentine, Royer), 1 ♀ (AMNH). **Virginia:** Lee, nr. Dryden, 2/3.ix.72 (Hoffman), 1 ♂ 1 ♀ (AMNH). **West Virginia:** Mercer, Athens, 22.x.66 (Shear), 1 ♀ (AMNH); Pocahontas, Durbin, 2.viii.43, 1 ♂ (AMNH), Kennison Mountain, 26/31.vii.81 (Davidson, Censky), 1 ♂ (MPM), Minnehaha Springs, vii.47 (Haller), 1 ♂ (AMNH).

Remarks

Roth and Brown (1986) incorrectly synonymized *C. patritus* and *C. silicis* with *C. giganteus* probably because the females are essentially indistinguishable. Although some females can be separated on the basis of size (*giganteus* ≥ *patritus* ≥ *silicis*), there is considerable overlap and no other unique morphological features are known. However, the males are distinct. Pedipalps of male *C. giganteus* have a short, stout palpal tibia (Fig. 34) and a strongly anteriorly directed patellar apophysis (Fig. 37). In male *C. patritus* the palpal tibia is longer (Fig. 35) and the patellar apophysis is laterally directed (Fig. 38). In male *C. silicis* the palpal tibia is very long (Fig. 36) and the patellar apophysis is laterally directed and considerably reduced (Fig. 39). There appear to be no valid reasons for the synonymy of *C. patritus* and *C. silicis* under *C. giganteus*.

Range

New York south to northern Georgia and Alabama.

Cybaeus grizzlyi Schenkel

(Figs. 40–43)

Cybaeus adenes Chamberlin and Ivie, 1932: 24 (in part, ♀ paratypes only).

Cybaeus grizzlyi Schenkel, 1950: 86, Fig. 32 (♂); Roewer 1954: 90; Bennett 1992: 4, Figs. 1–2 (♀).

Cybaeus adenoides Schenkel, 1950: 88, Fig. 33 (♀); Roewer 1954: 89. **New synonymy.**

Holotypes

Male holotype of *C. grizzlyi* (from Grizzly Peak, near Berkeley, Alameda County, California, 5.xi.38) and lectotype female of *C. adenoides* (from Berkeley Hills, Alameda County,

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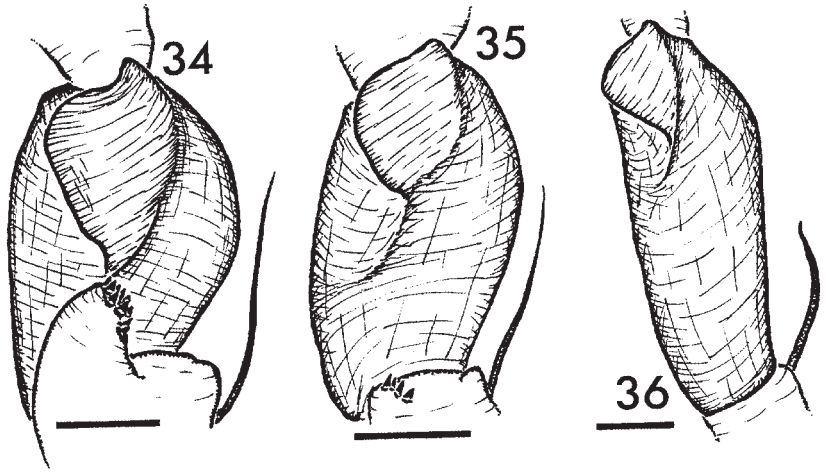
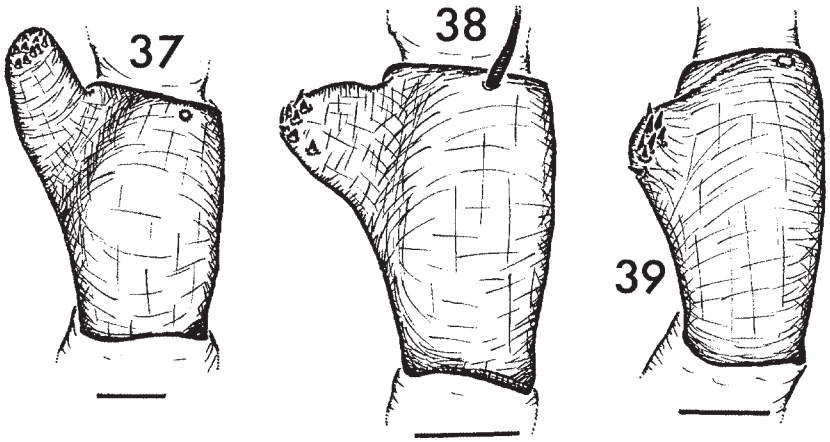
Figs. 34–36. *Cybaeus* spp., male palpal tibiae, retrolateral views: 34, *C. giganteus*, Bedford County, Pennsylvania; 35, *C. patritus*, Gatlinburg, Tennessee; 36, *C. silicis*, Bainbridge, Ohio. Scale bars = 0.20 mm. Figures reproduced from scanning electron micrographs.



Figs. 37–39. *Cybaeus* spp., male palpal patellae, dorsal views: 37, *C. giganteus*, Bedford County, Pennsylvania; 38, *C. patritus*, Gatlinburg, Tennessee; 39, *C. silicis*, Bainbridge, Ohio. Scale bars = 0.20 mm. Figures reproduced from scanning electron micrographs.



California, 23.iv.39) in Naturhistoriches Museum, Basel, examined.

Specimens examined

UNITED STATES OF AMERICA. California: Alameda, Castro Valley, 21.i.84 (DU), 43 ♀ (DU), Redwood Regional Park, 6.iv.82 (DU), 2 ♀ (DU), vicinity of Berkeley and Oakland, various dates and collectors, 21 ♂ 53 ♀ (AMNH, DU, CAS, MCZ); Contra Costa, Marsh Creek Springs, 5.v.40 (Pearce), 2 ♀ (AMNH), Mount Diablo, 8.v.47 (Chandler), 2 ♀ (CAS), 23.iv.53 (Schuster), 1 ♂ (AMNH), Orinda, 27.xii.53 (VDR, Marsh, Schuster), 1 ♂ 6 ♀ (AMNH), Redwood Park, 9.i.54 (Marsh, Schuster, Helfer), 2 ♀ (CAS).

Remarks

Schenkel (1950) described the male and female of this species as separate species even though both type specimens came from the same general locality. There is no apparent reason to separate these species. Roth (1956) recognized the synonymy of *C. grizzlyi* and *C. adenoides* but mistakenly synonymized both of these species with the closely related species *C. adenes* (see comments under that species). *Cybaeus grizzlyi* has page precedence over *C. adenoides*.

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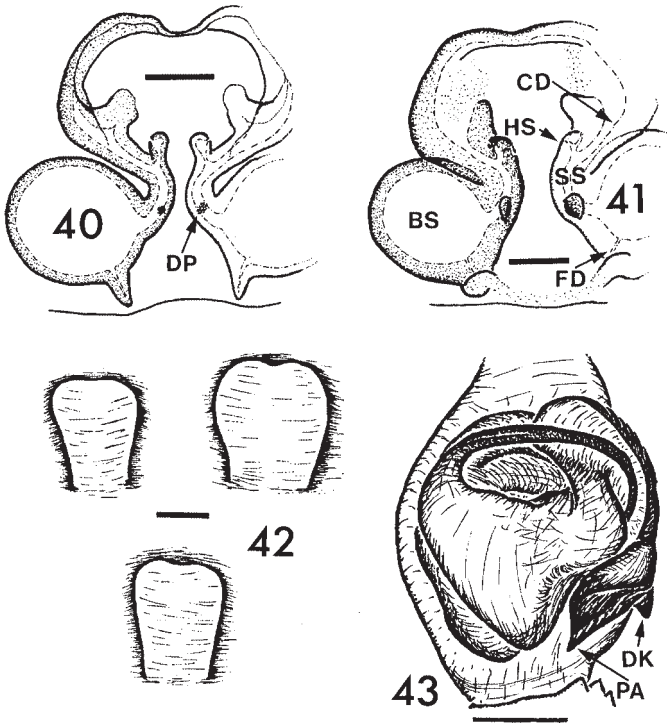
Figs. 40–43. *Cybaeus grizzlyi*, vulvae (cleared), atria, and genital bulb: 40, Berkeley, California, teneral vulva, dorsal; 41, Berkeley Hills, California (*C. adenoides* lectotype), mature vulva, dorsal; 42, Orinda, California, atrial variants, ventral; 43, Oakland, California, genital bulb, ventral. Scale bars = 0.10 mm (Figs. 40–42), 0.20 mm (Fig. 43). Figure 43 reproduced from scanning electron micrograph.



Range

Contra Costa and Alameda counties, California.

Cybaeus patritus Bishop and Crosby

(Figs. 35, 38)

Cybaeus patritus Bishop and Crosby, 1926: 202, Figs. 54–55 (♂, ♀); Chamberlin and Ivie 1932: 15, Figs. 34, 35 (♂, ♀); Roewer 1954: 91; Bonnet 1956: 1303.

Types

Male holotype, female allotype from Grandfather Mountain [Avery County], North Carolina, 12 October 1923, in AMNH, examined but subsequently lost in return mail. Male neotype here designated from Clingman's Dome, Great Smoky Mountains National Park, Sevier County, Tennessee, 25 June 1936 (W.M. Barrows), in AMNH, examined.

Specimens examined

UNITED STATES OF AMERICA. North Carolina: Jackson, Balsam, vii.24, 1 ♂ (MCZ), Cullowhee, vii/ix.70 (Coyle), 9 ♂ (MCZ), 27.viii.83 (Bennett), 1 ♂ 1 ♀ (Bennett), Owen's Gap, 28.viii.30 (N. Banks), 1 ♂ (MCZ); Macon, Highlands, 6/20.vii.85 (Davidson, Hildebrandt), 1 ♂ (MPM), 11/12.viii.85 (Hildebrandt), 4 ♂ (MPM). **Tennessee:** Sevier, Gatlinburg, ix.36 (WMB), 1 ♂ palpus (AMNH), 1 ♂ 2 ♀ (AMNH), Clingman's Dome, 25.vi.36 (WMB), 2 ♂ 4 ♀ (AMNH), 6/26.viii.65 (Peck), 1 ♂ 1 ♀ (AMNH), Little Pigeon Creek, 9.vii.33 (WI), 4 ♂ 4 ♀ (AMNH).

Remarks

See comments under *C. giganteus* for justification of removal of *C. patritus* from synonymy with that species.

Range

Eastern Tennessee and western North Carolina. Most collections are from the Smoky Mountains region.

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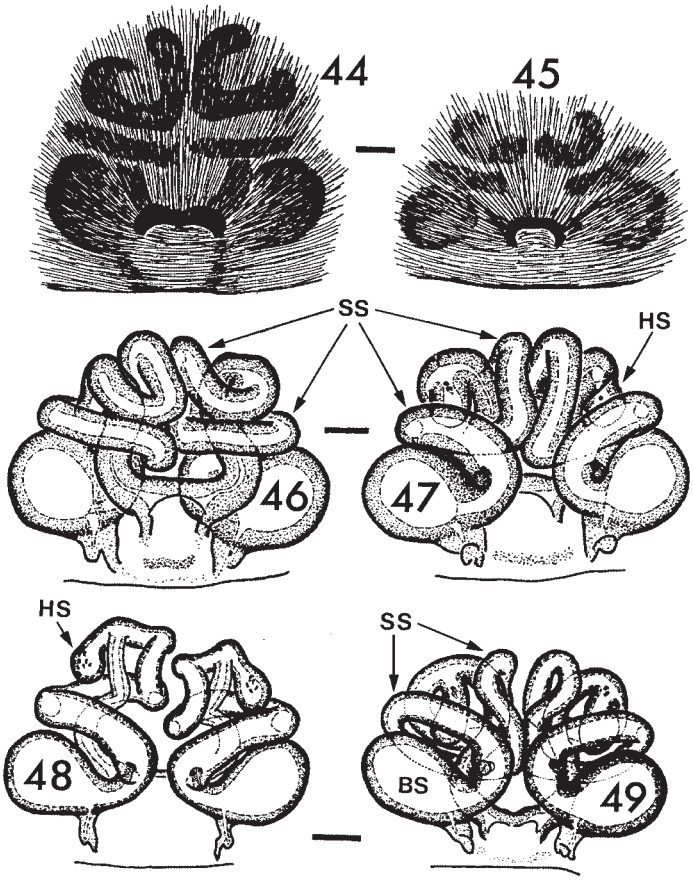
Figs. 44–49. *Cybaeus reticulatus*, epigyna and cleared vulvae: 44, Mount Raymond, British Columbia, epigynum, ventral; 45, same; 46, "Wash. Terr." (lectotype), vulva, ventral; 47, same, dorsal; 48, Olympia, Washington (*C. olympiae* holotype), teneral vulva, dorsal; 49, Longmire, Washington (*C. r. tius* allotype), vulva, dorsal. Scale bars = 0.10 mm.



Cybaeus reticulatus Simon

(Figs. 44–49)

Cybaeus reticulatus Simon, 1886: lvi; Emerton 1923: 240, Fig. 4(*a–f*) (♂, ♀); Chamberlin and Ivie 1932: 17, Figs. 40–42 (♂, ♀); Exline 1938: 12, Fig. 1 (♂, ♀); Roth 1952: 207, Figs. 18, 22 (♂, ♀); Roewer 1954: 91; Bonnet 1956: 1303; Roth and Brown 1986: 4; Roth 1988: 32.

Cybaeus tius Chamberlin and Ivie, 1932: 19; Crawford 1988: 28. **New synonymy.**

Cybaeus olympiae Exline, 1935*a*: 129, Fig. 1 (♀); Exline 1938: 11, Fig. 8 (♀). **New synonymy.**

Types

Lectotype female and paralectotype male (unpublished designation by V.D. Roth 1986), from "Wash. Terr.", in Muséum National d'Histoire Naturelle, Paris (Jar 1935, Vial 5231, with another 3 males, 25 females), examined. Holotype male, allotype female of *C. r. tius* from Longmire, Pierce County, Washington (R.V. Chamberlin), in AMNH, examined. Holotype female of *C. olympiae* from Olympia, Thurston County, Washington, September 1931 (H. Exline), in poor condition in MCZ, examined.

Specimens examined

Approximately 300 ♂, 450 ♀. **CANADA. British Columbia:** Agassiz, Babine Lake, Bella Coola Valley, Calvert Island, Langley, Metlakatla, Pitt Island, Prince Rupert, Haida Gwaii – Queen Charlotte Islands (Deana River, Frederick Island, Lyell Island, Masset, Mt. Moresby, Mt. Raymond, Queen Charlotte City, Rose Harbour, Slatechuck Mountain, Tanu, Tasu, Tlell, Tow Hill, Yakoun River), Terrace,

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Vancouver, Vancouver Island (Courtenay, Hornby Island, Kyuquot, Parksville, Port Renfrew, Sidney, Victoria). **UNITED STATES OF AMERICA. Alaska:** Adak Island, Anchorage, Andreanof Island, Attu Island, Camp Island, Cordova, Evans Island, Haines, Homer, Ikatan, Juneau, Ketchikan, Kodiak Island, Kuiu Island, Kukak Bay, Kupreanof Island, Latouche, Nulato, Prince of Wales Island, Umnak Island, Unalaska, Unga Island, Yakutat Bay. **Oregon:** Benton, Corvallis, Philomath; Clackamas, Portland; Clatsop, Melville; Coos, Charleston; Curry, Port Orford; Harney, Malheur Cave [nr. New Princeton]; Hood River, Hood River; Jackson, Ashland; Lane, Cape Perpetua; Lincoln, Tidewater City, Waldport; Linn, Cascadia, Sweet Home; Multnomah, Troutdale; Washington, Timber; Yamhill, McMinnville. **Washington:** Clallam, Port Angeles, Sol Duc Hot Springs; Clark, Vancouver; Columbia, Scappoose; Jefferson, Hoh River; King, Seattle; Kittitas, Easton; Pierce, Longmire; Polk, Grande Ronde; Snohomish, Arlington, Everett; Thurston, Olympia; Whatcom, Mt. Baker. **California:** Del Norte, Earl Lake; Humboldt, Carlotta, Klamath.

Remarks

The holotype of *C. olympiae* is a teneral adult (Fig. 48) and is viewed as a simple ontogenetic variant of *C. reticulatus*. The subspecies *C. r. tius* (Fig. 49) was elevated to species status on the basis of unrecorded apparent discrete size differences (Crawford 1988). However, in this study the examination of approximately 750 specimens of *C. reticulatus* (including analysis of measurement data from a portion of these) revealed no discrete size classes within an unexceptional size range. Additionally, at any one site a wide range of sizes of adults may be encountered (*cf.* Figs. 44 and 45). The holotype and allotype of *C. tius* are relatively small specimens (CL: ♂, 3.2; ♀, 2.9) but still fit well within the size range recorded for *C. reticulatus* (CL: ♂, 2.38–4.9 (4.0 ± 0.6), $n = 56$; ♀, 2.6–5.1 (4.0 ± 0.6), $n = 68$). Specimens of *C. tius* are viewed as somewhat small specimens of *C. reticulatus*.

Range

West coastal North America from outermost American Aleutian Island (Attu) to northwest California (one isolated record from eastern Oregon). Not known from East Asia including the Asian Aleutian Islands. This is the most commonly collected *Cybaeus* species throughout most of its range.

Cybaeus shoshoneus Chamberlin and Ivie

(Figs. 50–53)

Cybaeus shoshoneus Chamberlin and Ivie, 1932: 16, Figs. 37–39 (♂, ♀); Roewer 1954: 92; Bonnet 1956: 1303; Roth and Brown 1986: 4.

Cybaeus chaudius Exline, 1935*a*: 131, Fig. 3 (♀); Exline 1938: 12, Fig. 9 (♀); Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3. **New synonymy.**

Cybaeus hatchi Exline, 1935*a*: 130, Fig. 2 (♀); Exline 1938: 12; Roewer 1954: 90; Bonnet 1956: 1301; Roth and Brown 1986: 3. **New synonymy.**

Types

Male holotype and female allotype from Coeur d'Alene (Blue Creek), Kootenai County, Idaho, 11 August 1929 (R.V. Chamberlin) in AMNH, examined but subsequently lost in return mail. Neotype here designated from paratype series: male left palpus (patella, tibia, and tarsus), same collection data as holotype, in AMNH, examined. The holotype lacked its left palpus when examined. The neotype palpus was in a vial (labelled paratype ♂) with a female of *C. shoshoneus*. The neotype palpus is likely the missing left palpus (and now, the only known surviving part) of the holotype. Female holotypes of *C. chaudius* and *C. hatchi* from, respectively, Palouse, Whitman County, Washington, 28 August 1932 (M.H. Hatch) and Pierce, Clearwater County, Idaho, 30 August 1933 (M.H. Hatch); in poor condition in MCZ, examined.

Specimens examined

UNITED STATES OF AMERICA. Idaho: Benewah, Chatcolet Lake, 11.viii.57 (Smith), 1 ♀ (MCZ), Tensed, 24.ix.50 (VDR), 1 ♂ 2 ♀ (CAS), St. Maries, 15.viii.34 (Bryant), 3 ♀ (CAS); Clearwater, Greer, 30.viii.59 (WJG, VDR), 1 ♂ 3 ♀ (AMNH), Pierce, 29.viii.59 (WJG, VDR), 4 ♂ 2 ♀ (AMNH); Idaho, Kooskia, 23.viii.40 (WI), 1 ♂ 1 ♀ (AMNH), Whitebird Hill Summit, 31.vii.68 (REL), 1 ♂ (REL); Kootenai, Coeur d'Alene, 11.viii.29 (Chamberlin), 3 ♀ (AMNH), viii.49 (Mulaik), 2 ♀ (AMNH), 24.ix.50 (VDR), 1 ♂ 16 ♀ (CAS),

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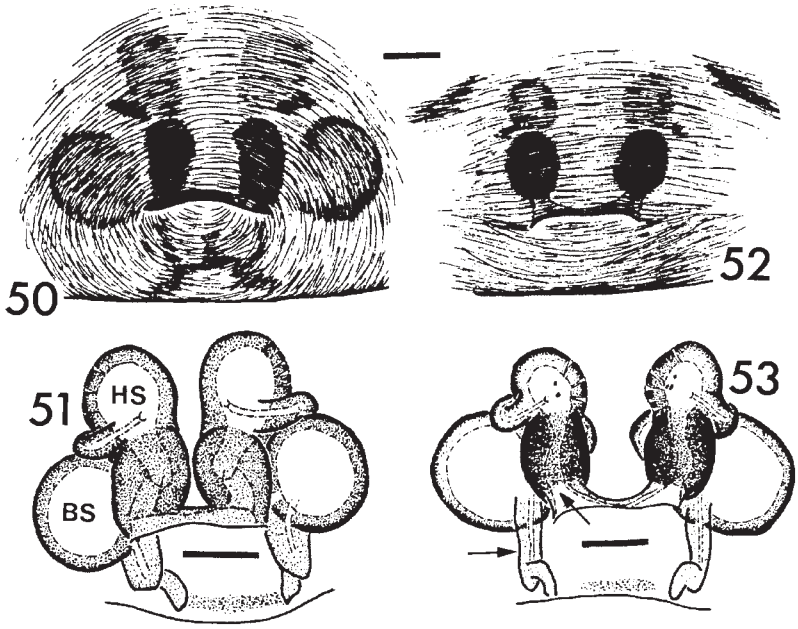
Figs. 50–53. *Cybaeus shoshoneus*, epigyna and cleared vulvae, ventral views: 50, Coeur d'Alene, Idaho, epigynum; 51, same, vulva; 52, Pierce, Idaho (*C. hatchi* holotype), epigynum; 53, same, vulva. Scale bars = 0.10 mm.



Rose Lake, 12.viii.29 (Chamberlin), 1 ♀ (AMNH); Shoshone, Wallace, 3.ix.49 (Mulaik), 1 ♂ 7 ♀ (AMNH). **Montana:** Rock Creek Recreation Area, 23.ix.50 (VDR), 2 ♂ 4 ♀ (CAS); Flathead, Flathead Lake, 27.vii.66, 1 ♂ (MCZ); Missoula, Lolo Hot Springs, 5.viii.56 (Rindge), 1 ♀ (AMNH). **Oregon:** Wallowa, Wallowa Lake, 12.ix.49 (VDR), 2 ♀ (CAS). **Washington:** Spokane, Newman's Lake, 29.v.37 (Hatch), 1 ♀ (CAS), Spokane Mountain, 28.viii.59 (VDR, WJG), 19 ♂ 18 ♀ (CAS); Stevens, Cedar Lake, 48°56′N, 117°36′W, 30.ix.64 (WI), 1 ♀ (AMNH), 27.vii.68 (WI), 1 ♂ (AMNH).

Remarks

Variability in sclerotization, affecting the degree of visibility of the vulva through the epigynum, coupled with the mediocre original description of *C. shoshoneus* resulted in Exline (1935*a*) describing single specimens of *C. shoshoneus* as *C. chaudius* and *C. hatchi*. The vulval components of the holotype of *C. chaudius* are all but invisible in uncleared ventral view of the epigynum (see Exline 1935*a*, Fig. 3); in the holotype of *C. hatchi* (Fig. 52), the copulatory ducts are clearly visible (as is usual for females of *C. shoshoneus* (Fig. 50)). Exline, like Chamberlin and Ivie, did not usually examine the vulval components of spiders. Perhaps if she had done so, the similarity between her specimens and *C. shoshoneus* would have been noted (*cf.* Figs. 51 and 53).

Range

Northern Idaho and adjacent areas of Washington, Oregon, and Montana.

Cybaeus silicis Barrows

(Figs. 36, 39)

Cybaeus silicis Barrows, 1919: 356, Fig. 7 (♂, ♀); Chamberlin and Ivie 1932: 15, Figs. 26, 27, 36 (♂, ♀); Roewer 1954: 92; Bonnet 1956: 1303.

Types

Barrows (1919) did not designate a type specimen for this species and Bennett (1991) was unable to locate one. A holotype is listed in the catalogue of the MCZ but is not in that collection. Chamberlin and Ivie (1932) redescribed the male and female "from the type specimens" and stated the type locality as Rockbridge, Ohio. In the Ohio State University (Marion) collection, Richard Bradley recently found a vial

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containing a male and female of this species and labelled in Barrows's handwriting "*Cybaeus silicis* ♂♀ Type W.M. Barrows" but with no locality data. These specimens have now been examined. The male is here designated as lectotype. Barrows's original description highlights Bainbridge, Ohio, specimens; presumably these "types" are from that locality and not Rockbridge (*contra* Chamberlin and Ivie). Male and female paratypes from Bainbridge, Ross County, Ohio, and Rockbridge, Hocking County, Ohio, in AMNH, MCZ, and CAS, examined.

Specimens examined

UNITED STATES OF AMERICA. Maryland: Washington, Smithsburg Pike, Jugtown Cave, 2.xii.47, 1 ♀ (AMNH). **North Carolina:** McDowell, Little Switzerland, 19.viii.30 (Creighton), 1 ♂ 1 ♀ (MCZ), 23.viii.30 (Creighton), 2 ♂ 2 ♀ (MCZ); Yancey, Mt. Mitchell, 11.vii.69 (Shear), 1 ♂ (MCZ). **Ohio:** Hocking, Cantwell Cliffs, Rockbridge, 1914 (WMB), 1 ♂ (AMNH), 4/11.ix.22, 2 ♂ (CAS); Ross, Bainbridge, 17.viii.17 (WMB), 1 ♂ (AMNH), 1 ♂ 1 ♀ (MCZ). **Virginia:** Blue Ridge Mountain, 7.viii.38 (Barber), 1 ♂ (NMNH), White Top Mountain, 11.vii.56 (Zweifel), 1 ♀ (AMNH); Page, Shenandoah National Park, Mary's Rock, 5.x.43 (BM), 1 ♀ (AMNH); Patrick, Pinnacles of Dan, 27.iv.75 (Hoffman), 1 ♀ (AMNH). **West Virginia:** Mercer, Athens, 5.viii.74 (Platnick), 3 ♀ (AMNH), 23.ix.66 (Shear), 1 ♀ (AMNH), Bush Creek at Bluestone River, 20.x.71 (Shear), 1 ♂ (MCZ); Pocahontas, Durbin, 1.viii.43, 1 ♂ 2 ♀ (AMNH), Kennison Mountain, 26/31.vii.81 (Davidson, Censky), 4 ♂ 1 ♀ (MPM).

Remarks

See discussion under *C. giganteus* for justification of removal of *C. silicis* from synonymy with that species.

Range

Ohio and Maryland south to North Carolina.

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