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Gaufinia, a new stonefly genus (Plecoptera: Chloroperlidae), with the description of six new species from western North America

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Sweltsa was proposed by Ricker (1943) as a subgenus of Alloperla and given generic status by Illies (1966). The subgenus originally included 9 species, with Alloperla oregonensis Frison 1935 selected as subgenotype (Ricker 1943). Ricker (1952) listed 5 additional species in the group, including 3 from the eastern Nearctic region, and other western Nearctic species were proposed by Baumann (1973), Baumann and Jacobi (1984), Gaufin (1964b), Jewett (1955, 1959, 1960, 1965), Baumann and Bottorff (1997), and Surdick (1995). More recently, a few species have been described by Kondratieff and Baumann (2009), Lee and Baumann (2010), and Stark and Baumann (2007, 2018), and scanning electron microscopy has previously been used to document epiproct structure for 16 currently recognized western Nearctic Sweltsa (Table 1). For much of its history, the genus was thought to be a moderately sized Nearctic endemic but several species from eastern Asia were recognized by Zwick (1971, 1973), and the genus currently includes 26 western Nearctic, 10 eastern Nearctic, and 18 eastern Palearctic/Oriental species (Stark and Sivec 2009, Chen and Du 2017, DeWalt et al. 2018, Dong et al. 2018).

Currently only 3 Sweltsa species groups—the S. borealis (Banks 1895) group, the S. lamba (Needham and Claassen 1925) group, and the S. tamalpa (Ricker 1952) group—have gained formal recognition (Surdick 1995, Stark and Baumann 2007). Surdick (1995) proposed keys for the 5 Nearctic species whose males have a "sclerotized leaflet on the aedeagus" and referred to these species as the "Sweltsa lamba group." She also referred to 7 Nearctic species whose females have the "subgenital plate … emarginate" as the "Sweltsa borealis group," although she noted that 2 of these (S. californica [Jewett 1965] and S. continua [Banks 1911]) “…are more distantly related.” Tentative species groups among western Nearctic Sweltsa are listed in Table 1.

Needham and Claassen (1925) provided the first details of the unique aedeagal lamella (= "chitinized lobe") in their descriptions of male Alloperla lamba and A. albertensis Needham.
Table 1. Tentative species groups, current species composition, and sources of SEM epiproct data among western Nearctic *Sweelsa*.

| Taxa                                                                 | SEM Study                  |
|---------------------------------------------------------------------|----------------------------|
| Borealis group                                                     |                            |
| *S. adamantae* Surdick 1995                                        | None                       |
| *S. borealis* (Banks 1895)                                         | None                       |
| *S. fidelis* (Banks 1920)                                          | Delk et al. 1998           |
| *S. revelsoka* (Jewett 1955)                                       | Delk et al. 1998           |
| *S. anubonata* Surdick 1995                                        | None                       |
| Californica group                                                  |                            |
| *S. californica* (Jewett 1965)                                     | None                       |
| *S. continua* (Banks 1911)                                         | None                       |
| Coloradensis group                                                 |                            |
| *S. coloradensis* (Banks 1898)                                     | Stark and Baumann 2018     |
| *S. lyrata* Stark & Baumann 2018                                   | Stark and Baumann 2018     |
| *S. mogollonica* Stark & Baumann 2018                              | Stark and Baumann 2018     |
| Exquisita group                                                    |                            |
| *S. exquisita* (Frison 1935)                                       | Kondratieff and Baumann 2009|
| Lamba group                                                        |                            |
| *S. albertensis* (Needham & Claassen 1925)                         | Current study              |
| *S. cristata* Surdick 1995                                         | Current study              |
| *S. gaufini* Baumann 1973                                          | Current study              |
| *S. hondo* Baumann & Jacobi 1984                                   | Current study              |
| *S. lamba* (Needham & Claassen 1925)                               | Current study              |
| Occidens group                                                     |                            |
| *S. durfeei* Kondratieff & Baumann 2009                            | Kondratieff and Baumann 2009|
| *S. occidens* (Frison 1937)                                        | Kondratieff and Baumann 2009|
| Oregoneensis group                                                 |                            |
| *S. oregoneensis* (Frison 1935)                                    | Nye and Stark 2010         |
| Pacifica group                                                     |                            |
| *S. pacifica* (Banks 1895)                                         | Nye and Stark 2010         |
| Tamalpa group                                                      |                            |
| *S. pisteri* Baumann & Bottorff 1977                               | Stark and Baumann 2007     |
| *S. tanalpa* (Ricker 1952)                                         | Stark and Baumann 2007     |
| *S. yurok* Stark & Baumann 2007                                    | Stark and Baumann 2007     |
| Townesi group                                                      |                            |
| *S. restina* Surdick 1995                                          | Nye and Stark 2010         |
| *S. saltai* Lee & Baumann 2010                                     | Lee and Baumann 2010       |
| *S. townesi* (Ricker 1952)                                         | Lee and Baumann 2010, Nye and Stark 2010 |

and Claassen 1925. Baumann (1973) provided additional details of the structure (= “leaflike structure”) for 3 species of *Sweelsa* (*S. albertensis*, *S. gaufini* Baumann 1973, and *S. lamba*). Baumann and Jacobi (1984) later observed the same structure (= “leaf-like appendage”) on the aedeagus of *S. hondo* Baumann and Jacobi 1984, and Surdick (1995) confirmed its presence (= “leaflet” = “sclerotized lamella”) in *S. cristata* Surdick 1995 and indicated that this structure is unique to the related species of the *S. lamba* group. In the present study, we used scanning electron microscopy to examine males from throughout the known range of the *S. lamba* group. These data support recognition of 6 previously undescribed species and suggest that the *S. lamba* species group should be recognized as a genus distinct from *Sweelsa*.

Methods

Specimens from the following collections were examined during the study: Bill P. Stark Collection, Mississippi College, Clinton, Mississippi (BPSC); Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah, Shawn M. Clark (BYU); Canadian National Collection of Insects, Ottawa, Ontario, Owen Lonsdale (CNC); C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins, Colorado, Boris C. Kondratieff (CSUIC); Illinois Natural History Survey, Champaign, Illinois, R. Edward DeWalt (INHS); Spencer Entomological Collection, University of British Columbia, Vancouver, BC, Karen Needham (UBCV); and United States National Museum of Natural History, Washington, DC, Oliver S. Flint Jr.
Holotypes of new species are deposited at the Monte L. Bean Life Science Museum, Brigham Young University, Provo, Utah (BYU). Registered codens used for institutional collections were obtained from the GBIF Registry of Scientific Collections (https://www.gbif.org/grscicoll).

Wings were removed from male specimens, and the bodies of specimens were placed in an ultrasonic cleaner for 10–15 s. Specimens were inspected using an Olympus SZH10 or Wild M8 stereomicroscope and dehydrated through a series of 90%, 95%, and 100% ethanol for 10 min each before transfer to hexamethyldisilizane for 30 min to an hour. Dehydrated specimens were studied with a Philips XL30 ESCM FEG scanning electron microscope or a Thermo Fisher Scientific Apreo C scanning electron microscope at Brigham Young University, or with an Amray 1810 scanning electron microscope at Mississippi College. Terms used for epiproct structures are illustrated in Fig. 1.

**SPECIES ACCOUNTS**

**Gaufinia, new genus**

*Type species.*—*Alloperla lamba* Needham and Claassen, 1925 = *Gaufinia lamba* (Needham and Claassen), original designation. The virtual tautonomy formed by *Sweltsa gaufini* Baumann, 1973 = *Gaufinia gaufini* (Baumann) is contraindicated as type species because *Gaufinia lamba* is more common, better known, and more widely distributed, and it is part of the more diverse clade of the new genus.

*Adult body color.*—Body yellow to brown patterned with darker markings on head and pronotum; meso and metathoracic U-shaped sutures dark, abdomen with a median, dark, longitudinal band.

*Male aedeagus.*—A membranous, bilobed sac that bears a sclerotized, bilobed or trilobed anterior lamella. The membranous sac bears sparse clusters of fine setae.

*Male epiproct.*—A moderately wide structure which extends forward over much of
tergum 9, constricting subapically to a narrow neck and terminating in a relatively long, upturned hook. Densely hirsute over most of surface with non-appressed, long, thin setae. A single, or sometimes double, dorsal carina extends along much of the epiproct length (Fig. 1).

**Tergal process.**—A single transverse, dorsally notched process occurs near the anterior margin of tergum 9.

**Female subgenital plate.**—Posterior margin entire, truncate or rounded, and usually reaching the anterior margin of sternum 9.

**Egg.**—Outline oval, collar short and moderately wide with flanged and irregularly incised rim. Chorionic surface finely puncate (Baumann 1973).

**Larva.**—None described (Stewart and Stark 2002).

**Etymology.**—The genus name honors the late Dr. Arden R. Gaufin, our major professor for doctoral work at the University of Utah. Dr. Gaufin was an enthusiastic collector of chloroperlid adults, and he published an early synopsis of the Nearctic species (Gaufin 1964a).

**Distribution.**—**Canada:** AB, BC. **USA:** AZ, CO, ID, MT, NM, NV, OR, UT, WA, WY. The genus is presently considered endemic to western North America. Northernmost records are from the Waterton Lakes area of southern Alberta (Needham and Claassen 1925), and southernmost records are from northern New Mexico (Baumann and Jacobi 1984) and central Arizona (this paper). No records are listed for British Columbia by Baumann and Stark (2010), Ricker (1939, 1943), Ricker and Scudder (1975), or Stewart and Oswood (2006), but Surdick (1985) includes a record of *G. albertensis* from “Vancouver Isl.” No records are known from California (Jewett 1960, Surdick 1985) or Alaska.

**Diagnosis.**—Adults of the new genus share a distinctive reticulate head and pronotal color pattern with some members of *Sweltsa* (e.g., *S. borealis, S. coloradensis*, and *S. revelstoka*). Males are distinguished from all known chloroperlid genera by the presence of an aedeagal lamella and by details of the epiproct. The epiproct always terminates in a slender, upturned hook connected to a sclerite that often bears marginal spines. Apical hooks on the epiproct are also known in most species of eastern Nearctic *Sweltsa* (e.g., *S. lateralis* [Banks 1911]) and in *S. californica* (Jewett 1965), *S. coloradensis* (Banks 1898), and *S. continua* (Banks 1911) in western North America. All these species have appressed hair covering the epiproct surface, and the epiproct hook lacks the spine-bearing basal sclerite. They also lack extensive development of a dorsal carina; only in *S. coloradensis* does this feature occur as a small structure near the hook. Females and larvae are more difficult to distinguish from other chloroperlid genera, but some groups (e.g., the *Sweltsa borealis* group females) are distinct on the basis of their lobed subgenital plates. *Gaufinia* females share hair brushes on the posterolateral margins of segment 8 with *Sweltsa* and *Alloperla* species and can usually be distinguished from these by combinations of color pattern and subgenital plate shape (Surdick 1985). Presently, none of the *Gaufinia* larvae have been described, although a few have been associated (Stewart and Stark 2002).

**Gaufinia albertensis** (Needham and Claassen), new combination

http://lsid.speciesfile.org/urn:lsid:Plecoptera .speciesfile.org:TaxonName:3562 (Figs. 2–7)

**Alloperla albertensis** Needham and Claassen, 1925:116. Holotype ♂ (Canadian National Collection), Waterton Lakes, Alberta, Canada.

**Alloperla (Sweltsa) albertensis:** Jewett, 1959:84.

**Sweltsa albertensis:** Illies, 1966:450.

**Material examined.**—**Canada:** Alberta: Livingston Creek, 25 July 1968, A.R. Gaufin, 1 ♂ 2 ♀ (BYU). Waterton Lakes, 6 July 1923, J. McDunnough, 1 ♂, 3 ♀ (CNC). **British Columbia:** Cowichan Lake, 1.7 km NW Lake Cowichan, 29 June 1979, I.M. Smith, 1 ♀ (CNC). Golden Dreams River, Hwy. 99, S Whistler, 16 July 1988, R.W. Baumann, S. Wells & M. Whiting, 1 ♀ (BYU). North Fork Flathead River, 35 mi NE Fernie, 3 July 1985, D.W. Webb, 5 ♂ 5 ♀ (INHS). **USA:** **Idaho:** Boise Co., Cape Horn Creek, Hwy. 21, 20 miles SW Stanley, 2 July 1972, R.L. Newell, 4 ♂ 1 ♀ (BYU). North Fork Cottonwood Creek, trib. Boise River, 26 June 1983, C.R. Fiala, 1 ♂ (BYU). **Custer Co.,** Big Wood River, jct. Owl Creek, 17 June 1964, A.R. Gaufin, 2 ♂ 1 ♀ (BYU). Horse Creek, Hwy. 93, junction Big Wood River, 40 miles N Ketchum,
14 June 1966, A.R. Gaufin, 24 ♂ (BYU). Tributary upper Salmon River, 31 July 2014, B. Wiseman, 1 ♂ (BYU); Stanley Basin, 17 July 1930, T.H. Frison, 1 ♂ (INHS), Valley Creek, Stanley, 17 June 1964, J.W. Richardson & S.L. Jensen, 46 ♂ 23 ♀ (BYU). Wild Horse Creek, Copper Mountain, 2 July 1972, R.L. Newell, 1 ♂ 1 ♀ (BYU). Idaho Co., Maggie Creek, Hwy. 12, N Kooska, 29 May 1992, R. Baumann & J. Zenger, 10 ♂ 8 ♀ (BYU). Lemhi Co., North Fork Salmon River, Hwy. 93, N North Fork, 18 June 1964, A.R. Gaufin, 23 ♂ 17 ♀ (BYU). Lewis Co., Six Mile Creek, Hwy. 12, 6 mi SW Kamiah, 29 May 1992, R.W. Baumann & J.T. Zenger, 1 ♂ (BYU). Teton Co., Victor, 7100 ft, 20 June 1966, J.H. Baker, 2 ♂ (USNM). Montana: Beaverhead Co.: Birch Creek, Birch Creek Campground, 15 July 1979, J. Fraley, 1 ♂ 1 ♀ (BYU). Broadwater Co., Deep Creek, 15 mi E Townsend, 8 July 1966, J.R. Grierson, 3 ♂ 5 ♀ (BYU). Carbon Co., Rock Creek, 11 July 1953, R. Hays, 6 ♂ 5 ♀ (CNC). Rock Creek, Ratine Campground, 15 July 1989, B. Stark, 13 ♂ 3 ♀ (BPSC). Cascade Co., Belt Creek, jct. O’Brien Creek, 7 June 1966, J.R. Grierson, 4 ♂ 1 ♀ (BYU). Deer Lodge Co., Big Hole River, Sportsman Camp, 8 June 2000, R.L. Newell, 1 ♂ (BYU). Flathead Co., Dutch Creek, North Fork Road, Glacier National Park, 11 July 1967, M.L. Miner, 47 ♂ 38 ♀ (BYU). Gallatin Co., Gallatin River, 42 mi SSE Big Sky, 23 June 1985, D.W. Webb, 11 ♂ 10 ♀ (INHS). Grayling Creek, 9 miles N West Yellowstone, 9 June 1987, B. Kondratieff, 2 ♂ (CSUIC). Hyalite Creek, below dam, 20 June 2006, G. Roehmold, 3 ♂ 2 ♀ (BYU); same locality, 4 July 1952, R. Hays, 7 ♂ 5 ♀ (CNC). Hyalite Creek, Champagne Falls, 29 July 1979, J. Fraley, 1 ♂ (BYU). Smith Creek, Squaw Creek Road, 10 July 1999, B. Stark & L. Stark, 4 ♂ 3 ♀ (BPSC). Glacier Co., Cutbank Creek, Glacier National Park, 13 July 1940, H.H. & J.A. Ross, 3 ♂ 5 ♀ (INHS), Cutbank Creek, Hwy. 89, 18 July 1965, A.R. Gaufin, 30 ♂ 25 ♀ (BYU). Swift Current Creek, Red Rock Falls, 8 July 1967, M.L. Miner, 38 ♂ 13 ♀ (BYU). Trick Falls, Glacier National Park, 3 July 1940, H.H. & J.A. Ross, 4 ♂ 15 ♀ (INHS). Granite Co., West Fork Rock Creek, Sapphire Mine Campground, 3 July 1966, M.L. Miner, 1 ♂ 11 ♀ (BYU). Judith Basin Co., Martin Creek, 9.5 miles N Geysers, 7 July 1966, J.R. Grierson, 19 ♂ 6 ♀ (BYU). Lewis and Clark Co., Keep Cool Creek, 1 July 1969, R.L. Newell, 6 ♂ (BYU). Meagher Co., Duck Creek, 15 miles W jct. Smith River, 8 July 1966, J.R. Grierson, 14 ♂ 8 ♀ (BYU). Missoula Co., Grant Creek, near Missoula, 23 June 1966, A.R. Gaufin, 32 ♂ 25 ♀ (BYU). Rattlesnake Creek, Missoula, 29 June 1969, A.R. Gaufin, 10 ♂ 12 ♀ (BYU). Park Co., Broadwater River, 3 mi E Cooke City, 28 July 1966, J.R. Grierson, 6 ♂ (BYU). Powell Co., Monture Creek, Hwy. 200, 11 July 1970, A.R. Gaufin, 7 ♂ 20 ♀ (BYU). Ravalli Co., South Bear Creek, Hwy. 93, near Victor, 28 June 1964, A.R. Gaufin, 76 ♂ 24 ♀ (BYU). South Fork Bitterroot River, Sula Ranger Station, 27 June 1964, J.R. Grierson, 3 ♂ 3 ♀ (BYU). Blodgett Creek, N Hamilton, 29 June 1963, A.R. Gaufin, 24 ♂ 34 ♀ (BYU). Kootenai Co., 1.3 mi above Hwy. 93, 14 July 1965, J.R. Grierson, 4 ♂ 6 ♀ (BYU). Sweet Grass Co., Big Timber Creek, 15 mi N Big Timber, 30 June 1966, J.R. Grierson, 9 ♂ 12 ♀ (BYU). Boulder River, 30 miles SW Big Timber, 24 June 1966, J.R. Grierson, 16 ♂ 4 ♀. Stillwater Co., Stillwater River, 40 mi above Hwy. 10, 20 June 1966, J.R. Grierson, 4 ♂ 4 ♀ (BYU). Teton Co., North Fork Depuyer Creek, 4800 ft, 9 July 1996, A.L. Sheldon, 4 ♀ (BYU). Washington: Stevens Co., Flodell Creek, Little Pend Oreille River. Flodell Creek Campground, Selkirk Mtns., 48°33’N 117°35’W, 3 June 2010, B. Stark & R.W. Baumann, 2 ♂ (BPSC). Wyoming: Fremont Co., Wind River, E Togwotee Pass, 19 July 1967, R.W. Baumann, 6 ♂ 26 ♀ (BYU). Togwotee Pass, 19 July 1961, B.A. Foote, 3 ♂ 6 ♀ (CNC). Park Co., Beartooth Creek, Beartooth Lake, Hwy. 212, 20 July 1989, B. Stark, 1 ♂ (BPSC). Blacktail Deer Creek, 7 mi E Mammoth Hot Springs, Yellowstone National Park, 26 June 1964, J.W. Richardson & S.L. Jensen, 17 ♂ 1 ♀ (BYU). Island Lake, 0.5 mi above Hwy. 212, 28 July 1966, J.R. Grierson, 5 ♂ 5 ♀ (BYU). Lava Creek, 4 mi E Mammoth Hot Springs, Yellowstone National Park, 26 June 1964, J.W. Richardson & S.L. Jensen, 3 ♂ 1 ♀ (BYU). Yellowstone River, 1 mi S Canyon Junction, Yellowstone National Park, 26 June 1964, J.W. Richardson & S.L. Jensen, 1 ♂ (BYU). Sweetwater Co., Trout Creek, Little Mountain, near Clay Basin, 20 June 1978, D.S. Landeen, 2 ♂ 1 ♀ (BYU). Teton Co., Crayfish Creek, 10 mi S West Thumb, Yellowstone National Park, 27 July 1964, J.W. Richardson & S.L. Jensen, 5 ♂ (BYU). Virginia
Meadows, Gibbon River, Gibbon River Bridge, Yellowstone National Park, 31 August 1940, T.H. Frison & T.H. Frison Jr., 4 ♀ (INHS). Lewis River, below Lewis Falls, Yellowstone National Park, 18 July 1980, G. Roemhild, 1 ♂ (BYU). Snake River, S Heart Lake, Yellowstone National Park, 19 July 1967, R.W. Baumann, 3 ♂ 2 ♀ (BYU).

**Distribution.**—**Canada:** AB, BC. **USA:** ID, MT, WA, WY. Stark et al. (1973) and Baumann et al. (1977) list a few Colorado sites for

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**Figs. 2–7. Gaufinia albertensis** epiproct and aedeagal structure. 2. Epiproct, lateral, Hyalite Creek, Montana. 3–4. Rattlesnake Creek, Montana. 3. Epiproct dorsal. 4. Epiproct, oblique dorsolateral aspect. 5. Epiproct apex, dorsal, Hyalite Creek, Montana. 6. Aedeagal body and lamella, caudal aspect in situ recurved over abdomen, Boulder Creek, Montana. 7. Aedeagal lamella, anterior aspect, erect over abdomen, Cutbank Creek, Montana.
Gauffinia albertensis. These specimens were misidentified by W.E. Ricker, who stated the following in a February 1972 letter to B.R. Oblad: “The collections that contained males were certainly albertensis or some closely-allied undescribed species.” We found 8 vials of specimens from Colorado in the CNC collection that were labeled S. albertensis by W.E. Ricker. These proved to be S. lamba and are probably the material that resulted in the incorrect Colorado records in the past literature.

Adult habitus.—Head and pronotum with typical pattern of dark reticulations on a pale background. Abdomen with a prominent dark median longitudinal stripe on segments 1–8.

Male.—Forewing length ca. 6.5–7.0 mm. Epiproct length from base to apex of neck ca. 3.18× greatest width of epiproct body. Shoulders converge gradually to neck; neck not constricted and not clearly defined, but lateral margins convergent to apex (Figs. 2–4). Neck apex projects slightly over base of hook; hilt obscure, without marginal spines and terminating in a short and almost straight or spatulate hook (Figs. 3–5). Notch of 9th tergal process shallow and narrow. Aedeagal lamella narrowed from base to tip, bilobed with rounded apices (Figs. 6–7).

Female.—Forewing length ca. 7.5–8.0 mm. Posterior margin of subgenital plate entire and generally reaching posterior margin of sternum 9.

Larva.—Undescribed.

Comments.—The epiproct of G. albertensis is markedly more slender, and bears a shorter and less upturned hook, than other members of the genus, except for G. gaufini, which shares both features. Males of these 2 species are most readily distinguished on the basis of the epiproct carina. Among specimens of G. albertensis, the dorsal carina is a single, relatively low ridge, whereas among specimens of G. gaufini, the carina is a double ridge whose margins are flared away from a median suture. In addition, the aedeagal lamella of G. albertensis has 2 lobes; however, this structure in males of G. gaufini bears an additional small median lobe. Although the epiprocts for both species are slender, the widest point on the epiproct is located near the apex in G. albertensis and nearer the base in G. gaufini. Gauffinia albertensis females are not considered reliably distinct from other members of the genus.

Gauffinia cristata (Surdick), new combination

http://lsid.speciesfile.org/urn:lsid:Plecoptera.speciesfile.org:TaxonName:3569
(Figs. 8–13)

Sweltsa cristata Surdick, 1995:163. Holotype ♂ (United States National Museum), Johnson Creek, 19 miles N Blanding, San Juan Co., Utah.

Material examined.—Utah: Garfield Co., Dark Canyon, Henry Mountains, 7 July 1981, S.A. Wells, 1 ♂ 3 ♀ (BYU). Slate Creek, Henry Mountains, 7 July 1981, S.A. Wells, 4 ♀ (BYU). San Juan Co., Indian Creek, Abajo Mountains, 37.8425°N 109.5011°W, 25 July 2019, R.L. Johnson, 9 ♂ 12 ♀ (BYU). Indian Creek, Abajo Mountains mountain road, 37.8414°N 109.505°W, 21 August 2019, D.J. Cavan, J.W. Quist & C.W. Ramsey, 1 ♂ 4 ♀ (BYU). Johnson Creek, tunnel 19 miles N Blanding, [no date], S. Muliak, 1 ♂ 1 ♀ (USNM). Johnson Creek, Abajo Mountains, 37.7946°N 109.5125°W, 25 July 2019, R.L. Johnson, 1 ♀ (BYU). Spring Creek, Abajo Mountains, 37.8886°N 109.4662°W, 25 July 2019, R.L. Johnson, 2 ♂ 4 ♀ (BYU).

Adult habitus.—Typical of genus, with pale yellow body marked with scattered, dark hieroglyphic-like spots on the head and pronotum, and with a prominent dark median abdominal stripe extending over segment 8.

Male.—Forewing length ca. 7.5 mm. Lateral margins of epiproct body almost parallel for most of length but constricted near base and with margins strongly convergent apically (Fig. 8); neck short, with parallel sides (no basal constriction), and with head not expanded (Fig. 10). Carina conspicuous and extending almost to apex of neck (Fig. 9). Hook very slender and without basal hilt (Fig. 12) (see Surdick 1995).

Female.—Forewing length ca. 8 mm. Posterior subgenital plate margin entire, extending over most of sternum 9; lateral margins slightly concave.

Larva.—Unknown.

Comments.—This species was previously known only from the holotype and allotype specimens collected in San Juan County, Utah.
Figs. 8–13. *Gaufinia cristata* epiproct and aedeagal structure. 8. Epiproct, dorsal, Indian Creek, Utah. 9. Epiproct, lateral, Henry Mountains, Utah. 10–13. Indian Creek, Utah. 10. Epiproct, dorsal apex. 11. Epiproct, lateral apex. 12. Male, aedeagus ventral. 13. Female, subgenital plate ventral.
Gaufinia gaufini (Baumann), new combination

http://lsid.speciesfile.org/urn:lsid:Plecoptera:speciesfile.org:TaxonName:3498
(Figs. 14–19)

Sweltsa gaufini Baumann, 1973:102. Holotype ♂ (United States National Museum), Ricks Spring, Logan Canyon, Cache Co., Utah.

Material examined.—Idaho: Franklin Co., Cub River, Mapleton, 25 June 1955, G.F. Knowlton, 10 ♂ 9 ♀ (BYU). Cub River, Willow Flat Campground, Cub River Canyon, 29 June 1979, G.F. Knowlton, 16 ♂ 10 ♀ (BYU); same locality, 11 July 1999, B. Stark & L. Stark, 11 ♂ 28 ♀ (BPSC). Franklin Basin, 28 July 1974, G.F. Knowlton, 10 ♂ 9 ♀ (USNM); same locality, 21 June 1976, G.F. Knowlton, 2 ♂ 2 ♀ (INHS). Preston Spring, Cub River Canyon, 6 July 1985, G.F. Knowlton, 2 ♂ 2 ♀ (BYU). Thomas Spring, Cub River Canyon, 22 June 1979, G.F. Knowlton, 7 ♂ 10 ♀ (BYU); same locality, 2 July 1985, G.F. Knowlton, 1 ♂ 4 ♀ (BYU). Utah: Cache Co., Beaver Creek, Beaver Mountain, Wasatch Range, 6 July 1952, B. Malkin, 8 ♂ 8 ♀ (USNM). Beaver Creek, Logan Canyon, near Beaver Mountain, 1 July 1983, G.F. Knowlton, 1 ♂ 3 ♀ (BYU). Beaver Creek, 1 mile below Beaver Creek Lodge, 11 July 1999, B. Stark & L. Stark, 1 ♂ 9 ♀ (BPSC). China Row Picnic Area, Logan Canyon, 11 July 1999, B. Stark & L. Stark, 3 ♂ 1 ♀ (BPSC). Logan Canyon, 7 August 1938, D.E. & A.T. Hardy, 2 ♀ (INHS). Logan Cave Spring, 22 September 1989, R.W. Baumann, 1 ♂ 1 ♀ (BYU); same locality, 18 August 2004, R.W. Baumann & S.M. Clark, 8 ♂ 15 ♀ (BYU); same locality, 11 August 2011, R.W. Baumann & B.C. Kondratieff, 25 ♂ 14 ♀ (BYU); same locality, 7 September 2011, R.W. Baumann & D. Muranyi, 20 ♂ 19 ♀ (BYU). Ricks Spring, Logan Canyon, 29 August 1964, A.V. Nebeker, 11 ♂ 15 ♀ (BYU & USNM); same locality, 22 September 1978, R.W. Baumann, 3 ♂ 3 ♀ (BYU); same locality, 21 October 1982, G.F. Knowlton, 2 ♂ 3 ♀ (BYU); same locality, 7 September 2011, R.W. Baumann & D. Muranyi, 62 ♂ 36 ♀ (BYU). Spring Hollow, 24 July 1960, R.E. Nye, 1 ♀ (BYU). Spring Hollow, Logan Canyon, 30 August 1964, A.V. Nebeker, 3 ♂ 1 ♀ (BYU); same locality, 16 October 1974, G.F. Knowlton, 12 ♂ 9 ♀ (USNM).

Distribution.—USA: ID, UT.

Adult habitus.—Typical of genus, with scattered, dark hieroglyphic-like markings on head and pronotum, and with a median dorsal abdominal stripe composed of a series of dusky spots, each enclosing a pair of pale spots on abdominal terga 1–8.

Male.—Forewing length ca. 8–9 mm. Epiproct length from base to apex of neck ca. 2.75–3.15 × width of epiproct at midlength of epiproct body. Epiproct body somewhat oval with greatest width at ca. 45% of distance from base (Fig. 14). Neck short and wide, length ca. 0.87–0.96 × width at midlength. Hilt indistinct, entire hook short, somewhat spatulate, wide basally, upturned, acute at apex and without marginal spines (Figs. 15–16). Carina double with panels constricted at ca. 25% of epiproct body length, flared outward for most of length and divided by a prominent groove on the basal half; carina ending short of neck (Figs. 14, 17). Aedeagal lamella bearing 3 apical lobes; lateral lobes somewhat scoop shaped, wide at midlength and narrowed to a rounded apex; mid lobe much narrower, slightly shorter than outer lobes and apically acute (Fig. 19); length of aedeagal lamella ca. 1.28 × basal width; lateral margins concave; posterior membranous section of aedeagus bulging at midlength and bearing a pair of small rabbit ear–like apical lobes (Fig. 18).

Female.—Forewing length ca. 9–10 mm. Posterior margin of subgenital plate entire, forming a triangular outline with rounded apex extending beyond posterior margin of sternum 9.

Larva.—Unknown.

Comments.—Males of this species are distinct from other members of the genus by virtue of the double carina on the epiproct, and the trilobed aedeagal lamella.

Gaufinia hondo (Baumann and Jacobi), new combination

http://lsid.speciesfile.org/urn:lsid:Plecoptera:speciesfile.org:TaxonName:3547
(Figs. 20–25)

Sweltsa hondo Baumann and Jacobi, 1984:151. Holotype ♂ (United States National Museum), Lake Fork Rio Hondo, Taos Ski Valley, Taos Co., New Mexico.

Material examined.—New Mexico: Calfax Co., Agua Fria Creek, Fish Campground, Philmont Scout Ranch, 28 June 1987, R.C.
Mower, 2 ♂ 2 ♀ (BYU), Sandoval Co., Las Huertas Creek, Las Huertas Campground, 7 August 1980, G.Z. Jacobi, 4 ♀ (BYU); same locality, 26 May 1991, C.R. Nelson & J.K. Gehaus, 46 ♂ 12 ♀ (BYU); same locality, 18 June 1992, R.W. Baumann & L. Liu, 5 ♂ 21 ♀ (BYU). Alder Creek, Rito de los Indios Creek, Valles Caldera National Preserve, 27 July 2004, N. Vieira, 3 ♂ 1 ♀ (BYU); same locality, 27–28 June 2008, K.W. Stewart & D.F. Stewart, 24 ♂ 8 ♀ (BPSC); same locality, 15 July 2008, Parmenter et al., 13 ♂ (USNM); same locality, 23 July 2008, Parmenter et al., 12 ♂ 4 ♀ (USNM); same locality, 5 August 2008,
N Vieira, 2 ♂ 1 ♀ (USNM); same locality, 22 August 2008, N. Vieira, 8 ♂ (BYU). Jaromillo Creek, Valles Caldera National Preserve, spring seep at ghost town, 23 May 2004, N. Vieira, 8 ♂ 1 ♀ (CSUIC). Redondo Creek, Valle Caldera National Preserve, 10 June 2008, Parmenter et al., 1 ♂ (USNM). Santa Fe Co., creek NE Santa Fe, 11,000 ft. Santa Fe National Forest, 12 June 1950, W.E. Ricker, 1 ♂ (BYU). Little Tesuque Creek, Aspen Basin Campground, Hyde Memorial State Park, 1 August 1952, A.C. Cole, 1 ♂ (BYU). Rio En Medio, Sante Fe Basin Ski Area, end of Hwy. 475, 26 June 2008, K.W. Stewart & D.F.
Stewart, 3 ♂ 2 ♀ (BPSC). Tesuque Creek, Charnisa Trailhead, Hwy. 475, 27 May 1991, J.K. Gelhaus, 5 ♂ 8 ♀ (BYU). San Miguel Co., Gallinas Creek, above Gallinas, 7500 ft, Santa Fe National Forest, 16 June 1947, C.P. Alexander, 1 ♂ (USNM). Creek 3 miles NNW Terrero, 20 June 1978, D.J. Hansen, 1 ♂ (BYU). Taos Co., Honda Canyon, 7 mi E Valdez, 10,000 ft, 18 June 1981, D.R. Smith, 1 ♀ (BYU). Lake Fork Rio Hondo, Taos Ski Valley, 14 July 1999, B. Stark, L. Stark, 10 ♂ 3 ♀ (BPSC). Lake Fork Rio Hondo, above Taos Ski Valley, 23 July 1980, G.Z. Jacobi, 1 ♂ (BYU); same locality, 31 July 1980, G.Z. Jacobi, 2 ♂ 5 ♀ (BYU). West Fork Red River, Wheeler Peak Wilderness, 9 June 1974, B. Stark & T. Wolfe, 1 ♂ (BPSC). West Fork Red River, Hwy. 578, S Red River, 30 July 2011, K.W. Stewart, 1 ♂ 3 ♀ (BYU). Utah: Grand Co., Beaver Creek, Dons Lake, 10 June 1988, Baumann, Nelson & Tibbetts, 1 ♀ (BYU). Springs entering Lake Oowah, La Sal Mountains, 20 June 1987, C.R. Nelson & family, 104 ♂ 58 ♀ (BYU); same locality, 25 September 1988, R.W. Baumann & R.G. Call, 5 ♀ (BYU).

**DISTRIBUTION.**—USA: NM, UT.

**ADULT HABITUS.**—Typical of genus, with scattered, dark hieroglyphic-like markings on head and pronotum; abdomen bearing a median stripe composed of dusky brown spots on segments 1–8; spots become progressively smaller on posterior segments.

**MALE.**—Forewing length ca. 7–8 mm. Epiproct length from base to apex of neck ca. 1.6–1.9 × width of epiproct body at midlength (Figs. 20–22); base much narrower than width at shoulders. Shoulders of epiproct body conspicuously bulging (Figs. 20–21); width of body across shoulders ca. 0.55 × epiproct length; epiproct margins forward of shoulders converge abruptly to base of neck. Neck ca. 1.4 × long as width at midlength; lateral margins of neck converge basally with greatest width near apex. Hilt well defined, forming a circular scoop-shaped disc and bearing a short keel (Fig. 23); lateral margins with obscure scalloping. Hook slender, forming a curved cylinder arising from hilt. Carina extends beyond constricted portion of neck. Aedeagal lamella about as wide as long, bilobed with apex narrow and rounded (Figs. 24–25).

**FEMALE.**—Forewing length ca. 9–10 mm. Posterior margin of subgenital plate entire; lateral margins convergent from midlength to slightly pointed apex; apex extends over about two thirds of sternum 9.

**LABRA.**—Undescribed.

**COMMENTS.**—Male epiprocts of this species are very similar in most respects to *G. lamba* but differ in having much more prominent shoulders on the epiproct body. The 2 species exhibit scarcely any differences in details of the epiproct neck, hilt, and hook. The aedeagal lamellae for both species are also similar in length and width, but the posterior aspect of the *G. lamba* lobes are more nearly truncate at the apical margin.

**Gaufinia jarbidge n. sp.**

(Figs. 26–31)

**MATERIAL EXAMINED.**—Holotype ♂, Nevada, Elko Co., Coon Creek, Jarbidge Mountains, 22 August 1999, A.L. Sheldon (BYU). Paratypes: Nevada: Elko Co., Bear Creek, Bear Creek Meadows, Jarbidge Mountains, 2 August 1990, R.W. Baumann, 1 ♂ 2 ♀ (BYU); same locality, 30 July 1996, R.W. Baumann, 4 ♂ 4 ♀ (BYU); same locality, 2 August 1990, R.W. Baumann & R. Glassford, 1 ♂ (BYU); same locality, 8000 ft, 9 July 1999, A.L. Sheldon, 3 ♂ (BYU). Coon Creek, Jarbidge Mountains, 8300 ft, 22 August 1999, A.L. Sheldon, 4 ♂ 13 ♀, (BYU). Dead Horse Creek, 3 miles SE Coon Creek Summit, 26 June 2014, R.L. Bottorff, 4 ♂ 3 ♀ (BYU). Tributary Jarbidge River, Jarbidge Mountains, 7800 ft, A.L. Sheldon, 5 ♂ 1 ♀ (BYU); same locality, 8400 ft, A.L. Sheldon, 5 ♂ (BYU). Maggie Gulch Creek, 12 mi SW Mountain City, 28 June 2014, R.L. Bottorff, 3 ♀ 3 ♂ (BYU). Major Gulch, 4 miles NE Charleston, 27 June 2014, R.L. Bottorff, 2 ♂ 1 ♀ (BYU). Seventy Six Creek, Jarbidge Mountains, 7600 ft, 9 June 1999, A.L. Sheldon, 4 ♂ 2 ♀ (BYU). Seventy Six Creek, 4 miles SE Coon Creek Summit, 27 June 2014, R.L. Bottorff, 4 ♂ 3 ♀ (BYU).

**ADULT HABITUS.**—Ocellar triangle encloses a butterfly-shaped pale brown area; anterior to lateral ocelli, a small brown, knob-like extension directed toward anterior margin of eye occurs, and forward of the ocellar triangle, a pair of bar-shaped pigmented areas occur. Most of occiput and lateral area of frons are pale. Pronotum bears a pair of longitudinal brown bars on either side of median suture, and a few (ca. 3–4) obscure sublateral dusky spots are present on the disk. Median stripe consists of ca. 5–7 dorsal pigment spots on
abdominal terga. Legs, cerci and antennae pale. Wings hyaline, veins pale.

M A L E . — Forewing length ca. 4.5–5.0 mm. Epiproct length from base to apex of neck ca. 2.07× width of epiproct body at midlength. Anterolateral margins of epiproct body form a straight line which angles from shoulders to base of neck (Fig. 28). Neck margins parallel (Figs. 26, 28), apex truncate or slightly rounded; neck ca. 1.12–1.19× long as width at midlength. Hilt becomes gradually wider from hook base to near neck apex (Figs. 27–29), then is abruptly constricted; lateral margins bear an irregular row of spiny projections (Fig. 29), dorsum bears a low median keel. Carina extends to near neck apex (Fig. 28).

Figs. 26–31. Gauninia jarbidge, epiproct and aedeagal structure, Jarbidge Mountains, Nevada. 26. Epiproct, dorsal. 27. Epiproct, lateral. 28. Epiproct apex, dorsal. 29. Epiproct hook and hilt, dorsal. 30. Aedeagal apex, caudodorsal aspect. 31. Aedeagus, dorsolateral aspect.
Aedeagal lamella bilobed; apical margin almost truncate from anterior aspect (Fig. 31) and narrowed to a rounded margin in caudal aspect (Fig. 30). Lobes of membranous sac bear numerous minute pores along basolateral surfaces (Fig. 30).

**FEMALE.**—Forewing length ca. 5.0–6.0 mm. Posterior margin of subgenital plate entire, rounded to slightly pointed; apex extends over about half of sternum 9.

**LARVA.**—Unknown.

**ETYMOLOGY.**—The species name is based on the Jarbidge Mountain Range of eastern Nevada and is used as a noun in apposition.

**DIAGNOSIS.**—The neck of this species is similar to those of *G. kaibabensis* and *G.*
wasatchensis in being relatively slender and short, but the hook and hilt are slightly more prominent and the neck is slightly larger than in those species. The lateral margins of the epiproct body from shoulders to neck form straight lines rather than the curved profile of the G. kaibabensis epiproct. Gaufinia jarbridge is also a smaller species with male forewing lengths of about 5 mm or less and female forewing lengths of about 6 mm or less.

**DISTRIBUTION.**—Known only from the Jarbridge Mountains, Nevada.

**Gaufinia kaibabensis n. sp.**  
(Figs. 32–37)

**MATERIAL EXAMINED.**—Holotype ♂, Arizona: Coconino Co., North Canyon Spring, Kaibab National Forest, 14 August 2009, R.W. Baumann, B.C. Kondratieff & D.R. Smith (BYU). Paratypes: Arizona: Coconino Co., Middle North Canyon Spring, 2500 m, 7 September 2001, L.E. Stevens, 1 ♂ (BYU). North Canyon Spring, Kaibab National Forest, 36°23′51″N 112°05′02″W, 17 August 2007, D. Smith, 7 ♂ 3 ♀ (BYU). North Canyon Spring, Kaibab National Forest, 16 August 2008, D. Smith, 36°24′00″N 112°04′48″W, 29 ♂ 9 ♀ (BYU). North Canyon Spring, 1 September 2008, L.E. Stevens, 8 ♂ 2 ♀ (BYU). North Canyon Spring, Kaibab National Forest, 14 August 2009, R.W. Baumann, B.C. Kondratieff & D.R. Smith, 22 ♂ 12 ♀ (BYU). North Canyon Spring, Kaibab National Forest, 36°24′06″N 112°04′42″, 1 August 2010, D. Smith, 7 ♂ 1 ♀ (BYU).

**ADULT HABITUS.**—Body pale with brown markings on dorsum of head, thoracic nota, and abdomen. Wings, cerci, and legs pale, antennae pale basally but brown on apical two thirds. Abdominal terga 2–7 with dark blotch forming median stripe. Head mostly pale but with small brown markings forward of median ocellus; occipital area pale except for obscure brown posterolateral spots and a dark linear spot on either side of epicranial suture. Pronotum with 2 irregular linear patches of brown on either side of median suture, and additional pigmented areas scattered on disc; pronotum dark brown along most of lateral and posterior margins.

**MALE.**—Forewing length ca. 7.5–8.0 mm. Epiproct length from base to apex of neck ca. 2.13× width of epiproct body at midlength. Shoulders converge gradually to neck; neck ca. 1.20× long as width at midlength, with lateral margins slightly convergent apically (Figs. 32–34). Hilt sclerite only slightly wider in dorsal aspect near base than near hook, but distinctly thicker in lateral aspect at base and bearing an obscure dorsal keel; lateral margins of hilt irregularly scalloped forming a few broad, triangular spines, and hook surface bearing scattered irregular tubercles (Figs. 33, 35–36). Carina extends to neck apex, or nearly so; carina bare along dorsal margin (Figs. 32–33, 37). Lateral aspect of epiproct neck apex strongly slanted from carina for more than half the distance to hilt base. Aedeagal lamella similar to that of G. lamba; apical margins truncate in caudal aspect, rounded in anterior aspect; anterior surface with fine, reticulate, chain-like pattern.

**FEMALE.**—Forewing length ca. 8.5–9.2 mm. Subgenital plate extends over ca. three fourths of sternum 9. Lateral margins slightly convex forming a rounded apex.

**LARVA.**—Unknown.

**ETYMOLOGY.**—The species name refers to the type locality on the Kaibab Plateau.

**DIAGNOSIS.**—Gaufinia kaibabensis is one of several species in which the neck region is relatively slender and not constricted at the base. The hilt is obscure and the slender hook bears irregular spiny projections scattered over the surface. The neck and hook for G. cristata are similar (Surdick 1995), but the lateral margins of the epiproct body for that species are not smoothly rounded and gradually convergent as in this species (Fig. 32). Gaufinia wasatchensis is also similar (see below), but in that species, the neck is longer and the hilt is distinct and clearly defined from the hook.

**DISTRIBUTION.**—Known only from North Canyon Spring on the Kaibab Plateau, Arizona.

**Gaufinia lamba** (Needham and Claassen), new combination

http://lsid.speciesfile.org/urn:lsid:Plecoptera.speciesfile.org:TaxonName:3545  
(Figs. 38–43)

**Alloperla lamba** Needham and Claassen, 1925:115. Holotype ♂ (Cornell University), Fern Lake, Estes Park [Larimer Co.], Colorado. Alloperla (Sweltsa) lamba: Jewett, 1959:85. Sweltsa lamba: Illies, 1966:452.

**MATERIAL EXAMINED.**—**COLORADO: Boulder Co., Long Lake, outlet, 31 July 2008, Ruiter &
Brooks, 6♂3♀(BYU). Nederland, Science Lodge Mountain Research Station, 9500 ft, 26 June 1961, R.M. Mason, 2♂(CNC). Nederland, Roosevelt National Forest, 16 July 1981, C. O’Neil, 7♂4♀(BYU), Redrock Lake, 2 mi W Ward, 31 July 1998, O.S. Flint Jr., 7♀(USNM). 7 mi E Rolls Pass, 2 September 1973, C.W. O’Brien, 25♂26♀(USNM). Chaffee Co., Cottonwood Pass, 29 July 1961, J.G. Chilcott, 1♀(CNC). Clear Creek Co., Berthoud Pass, 3.5 miles below summit, 16 August 2004, B. Stark, L. Sivec, 2♂6♀(BPSC). Chicago Creek, 8800 ft, 11 August 1961, B.H. Poole, 7♂5♀(CNC). South Chicago Creek, Chicago Peaks Picnic Area, 8 August 1984, K.W. Stewart, 12♂5♀(BPSC). Summit Lake, Mount Evans, 2800 ft, 24 July 1961, W.R. Mason, 1♂(CNC). Conejos Co., Massey Gulch Creek, 22 km W Antonito, 1.3 km above confluence Rio Conejos, Rio Grande National Forest, 27 June 1989, R.E. DeWalt, 1♂2♀(INHS); same locality and collector, 1 July 1989, 2♂2♀(INHS); same locality and collector, 20 August 1990, 1♂(INHS). Seep above Conejos River, River Springs Ranger Station, Rio Grande National Forest, 2 June 1988, R.E. DeWalt, 2♀(INHS). Custer Co., Verde Creek, W of Westcliff, 24 July 1989, B.A. Foote, 13♂13♀(BYU). Delta Co., stream at Grand Mesa, 7000 ft, 27 June 1961, S.G. Jewett Jr., 26♂3♀(USNM). Douglas Co., Castlewood Canyon State Park, seep Cherry Creek, 7 July 1988, B.C. Kondratieff, J. Welch, 5♂(CSUIC). Gilpin Co., creek at Cold Spring Campground, 13 July 1982, D.E. Ruiuter, 9♀(BYU). South St. Vrain Creek, Hwy. 72, N Ward, 7 July 1944, C.L. Remington, 2♂3♀(INHS). Grand Co., Echo Creek, West Portal, Rocky Mountain National Park, 24 July 1938, H.H. & J.A. Ross, 6♂4♀(INHS). Creek, W Milner Pass, Rocky Mountain National Park, 24 August 1967, R.W. Baumann, 10♂6♀(BYU). Saint Louis Creek, 7 mi SW Fraser, 4 August 1973, R.W. Baumann & B. Stark, 3♂1♀(BYU). Tonahutu Creek, above Big Meadows, Rocky Mountain National Park (CSUIC), Gunnison Co., Gothic, July 1934, G.C. Crampton, 1♂(USNM). Tributary Halls Gulch Creek, N Pitkin, 5 August 1984, K.W. Stewart, 2♂4♀(BPSC). Huerfano Co., North Santa Clara Creek, Mount Shadow Falls Ranch, 6 June 2007, B.C. Kondratieff, 4♂3♀(BYU). Larimer Co., Agnes Lake, Cameron Pass, Rocky Mountain National Park, 1100 ft, 28 July 1938, H.H. & J.A. Ross, 7♀(CNC). Cache La Poudre River, Poudre Lake outlet, Rocky Mountain National Park, 17 August 1972, R.A. Haick, 5♀(USNM). Chasm Falls, Rocky Mountain National Park, 27 July 1938, H.H. & J.A. Ross, 6♂15♀(CNC & USNM). Fern Lake, Estes Park, 3 August 1921, P.W. Claassen, 1♂3♀(CNC, INHS, & USNM). Glacier Creek, Rocky Mountain National Park, 27 July 1960, A.R. Gauffin, 2♂5♀(BYU). Glacier Creek, Bear Lake Trailhead, Rocky Mountain National Park, 7 July 1999, B. Stark, L. Stark, 1♂(BPSC). Icy Brook, above The Loch, Rocky Mountain National Park, 2 August 1988, B.C. Kondratieff, 2♂(CSUIC). Loveland Pass, 12,000 ft, 7 August 1961, J.G. Chilcott, 4♀(CNC). Mill Creek, W Bear Lake, 28 July 2011, B. Gill, 5♂1♀(BYU). Poudre Lake, Rocky Mountain National Park, 11 August 1948, collector ?, 2♂5♀(CNC). Las Animas Co., stream Cordova Pass, Rt. 46, 17 July 2012, B.C. Kondratieff, 4♂2♀(BYU). Park Co. Geneva Creek, Geneva Creek Campground, NW Grant, 1 August 1995, O.S. Flint Jr., 2♂2♀(USNM). High Creek Fen, near Fairplay, 29 July 2009, B.C. Kondratieff & D. Ruiter, 3♂4♀(BYU). Tarryall Creek, 3 miles N Como, 8 August 1973, B. Stark, R.W. Baumann, 1♂1♀(BPSC). Routt Co., Burgess Creek, Steamboat Springs, 28 June 1968, B.R. Oblad, 6♂5♀(BYU). San Juan Co., creek near Red Mountain Pass, 26 June 1961, S.G. Jewett Jr., 1♀(USNM). Teton Co., Togwotee Pass, 17 July 1961, B.H. Poole, 4♂6♀(CNC). Wyoming: Albany Co., Fence Creek, Rt. 47, 1.5 mi N Rt. 230, 7680 ft, 14 July 2011, C.M. & O.S. Flint, 1♂(USNM). Glacier Lakes, Medicine Bow National Forest, Route 130, 24 July 1989, B.C. Kondratieff, J. Welch, 11♂3♀(CSUIC). Nash Fork Little Laramie River, near Centennial, 17 August 1938, W.P. Hayes, 1♂1♀(INHS). North Fork Campground, Snowy Mountains, 24 July 1983, R. Lavigne, 6♂4♀(BYU & CSUIC). Snowy Mountains, 13 August 1957, D.G. Denning, 1♂4♀(BYU). Carbon Co., North French Creek, Hwy. 130, Medicine Bow National Forest, 11 July 2002, R.C. Mower, 4♂1♀(BYU). Lincoln Co., Cottonwood Lake, 2 July 1952, B. Malkin, 3♂1♀(USNM). Park Co., Bear Tooth Creek, Bear Tooth Mountains, 9500 ft, 21 August 1946, W.E. Ricker, 6♀(CNC). Sheridan Co., Burgess Junction Lodge, 21 July 1995, C.M.
& O.S. Flint Jr., 1 ♂ 2 ♀ (USNM). Headwaters, E Fork Tongue River, Sawmill Pass, Big Horn Mountains, 26 July 1998, C.M. & O.S. Flint Jr., 3 ♂ 1 ♀ (USNM). Sublette Co. Faller Creek, Faller Lake, Bridger Wilderness Area, N Cora, 16 July 1969, S.W. Hitchcock, 1 ♂ 1 ♀ (USNM). Sweetwater Co., Trout Creek, Little Mountain, near Clay Basin, 20 June 1978, D.S. Landeen, 12 ♂ 9 ♀ (BYU).

**DISTRIBUTION.**—USA: CO, WY.

**ADULT HABITUS.**—Head with dark, somewhat butterfly-shaped marking over ocellar triangle and extending with swallowtail-like markings over anterolateral frons; 2 additional...
small dark spots occur near anterior margin of head. Occiput with a transverse row of irregular brown spots near posterior margin of head. Antennal scape brown, segments 2–6 pale and additional segments brown. Pronotum with ca. 6 brown hieroglyphic-like markings on each side of median suture. Median abdominal stripe consists of dark spot on ca. terga 1–8. Legs brown, cerci and wings pale; veins amber.

**Male.**—Forewing length ca. 7.5–8.0 mm. Epiproct length from base to apex of neck ca. 2.2–2.5 × length of epiproct body at midlength. Shoulders not conspicuously bulging and anterolateral margins of epiproct body gradually convergent in slanted lines to base of neck (Figs. 38–40). Length of neck ca. 1.0–1.2 × neck width at midlength; lateral margins of neck constricted basally and widest near or beyond anterior margin of carina (Figs. 38–39). Hilt forming a circular disc at base of hook; lateral margins of hilt and surface of hook with minute, irregular spiny projections (Fig. 41). Carina extends to apical third of neck. Aedeagal lamella bilobed; apical margins of lobes truncate in anterior aspect (Fig. 43), but narrowly rounded in caudal aspect (Fig. 42).

**Female.**—Forewing length ca. 8.5–9.0 mm. Subgenital plate entire; posterior margin essentially truncate with convergent lateral margins. Apex of plate covers sternum 9.

**Larva.**—Undescribed.

*Gaufinia shivwitsa* n. sp. 18

(Figs. 44–49)

**Material Examined.**—Holotype ♀, Utah: Washington Co., headwaters Santa Clara River, South Juniper Campground, 14 July 2005, R.W. Baumann, C.W. Baumann (BYU). Paratypes: Nevada: *Lincoln Co.*, Craw Creek, Wilson Creek Range, 38.2614°N 114.4322°W, 11 June 2009, A.L. Sheldon, 3 ♀ 7 ♂ (BYU). Utah: *Beaver Co.*, upper Beaver Creek, 15 July 1959, A.R. Gaufin, 1 ♀ (BYU). Birch Creek, above Beaver, 26 June 1975, M.L. Reichert, 9 ♀ 8 ♂ (BYU). *Washington Co.*, Leed Creek, junction Twin Pines Creek, 9 June 1984, C.R. Nelson, 7 ♀ 5 ♂ (BYU); same locality, 31 May 1985, C.R. Nelson, 2 ♀ (BYU); same locality, 30 May 1986, C.R. Nelson, 11 ♀ (BYU). *Leeds Creek*, Oak Grove Campground, 28 May 1989, R.C. Mower, 1 ♀ (BYU); same locality, 25 June 1986, B.O. Huntsman, 1 ♀ (BYU). Santa Clara River, North Juniper Campground, 26 May 1976, R.W. Baumann, 6 ♂ 4 ♀ (BYU); same locality, 6 June 1981, R.W. Baumann, 10 ♂ 4 ♀ (BYU); same locality, 10 June 1982, R.W. Baumann & S.M. Clark, 25 ♂ 17 ♀ (BYU). Santa Clara River, South Juniper Campground, 9 June 1990, R.C. Glassford, 15 ♂ 11 ♀ (BYU); same locality, 14 July 2005, R.W. Baumann & C.W. Baumann, 15 ♂ 25 ♀ (BYU). Whipple Trail, Pine Valley Mountains, 16 June 1961, B.A. Haws, 6 ♂ 5 ♀ (BYU).

**Adult Habitus.**—Head with dusky brown X-shaped pattern that extends from lateral ocelli through anterior ocellus and terminates on the frontoclypeus; small lateral extensions to the X-pattern occur midway between lateral and anterior ocelli and on the anterobasal part of the X-pattern; 2 additional small pale brown spots occur near the anterior margin of the head and more obscure ones occur on the occiput. Pronotum with ca. 7 elongate dusky brown hieroglyphic-like markings on either side of median suture. Median abdominal stripe consists of dark brown rings on ca. 5 basal terga and obscure markings on distal segments through tergum 8.

**Male.**—Forewing length ca. 7.5–8.1 mm. Epiproct length from base of apex of neck ca. 2.59 × width of epiproct body at midlength. Shoulders converge strongly to neck from epiproct midlength (Figs. 44–45); neck ca. 2.8 × long as width at midlength, and conspicuously constricted near midlength (Figs. 44–45, 48). Carina extends to near neck apex (Figs. 46–47). Hilt sclerite ellipsoid with marginal spines and a median longitudinal dorsal keel (Figs. 48–49); hook short and slightly widened at apex. Aedeagal lamella not examined.

**Female.**—Forewing length ca. 8.5–9.0 mm. Subgenital plate entire, broadly rounded to almost truncate across posterior margin, and extending over ca. two thirds of sternum 9.

**Larva.**—Unknown.

**Etymology.**—The species name, used as a noun in apposition, honors the Native American Shivwits Band of Southern Paiutes of southwestern Utah.

**Diagnosis.**—The neck of the epiproct of *G. shivwitsa* is distinctive in being slender, strongly constricted at roughly midlength, and in becoming much wider across the head region of the epiproct tip.

**Distribution.**—Presently known from southwestern Utah and from one site in southeastern Nevada.
Gaufinia shoshone n. sp.

(Figs. 50–55)

MATERIAL EXAMINED.—Holotype ♂, Utah: Box Elder Co., One Mile Creek, Raft River Mountains, 16 July 1980, R.W. Baumann & S.M. Clark (BYU). Paratypes: Utah: Box Elder Co., Big Hollow Creek, Raft River Mountains, 27 July 1995, R.W. Baumann & R.M. Houseman, 2 ♀ (BYU). Clear Creek, Rocky Road Ranch, Raft River Mountains, 27 July 1995, R.W. Baumann & R.M. Houseman, 1 ♂ (BYU), One Mile Creek, headwaters, Raft River Mountains, 19 June 1979, R.W. Baumann, S.M. Clark, 1 ♂ (BYU). One Mile Creek, Raft River Mountains, 16 July 1980,

Gaufinia shoshone n. sp.

(Figs. 44–49) Gaufinia shivwitsa, epiproct structure. 44. Epiproct, dorsal, Birch Creek, Utah. 45. Epiproct, dorsal, Santa Clara River, Utah. 46–48. Wilson Creek, Nevada. 46. Epiproct, lateral. 47. Epiproct apex, lateral. 48. Epiproct hook and hilt, dorsal. 49. Epiproct hilt and hook, dorsal, Birch Creek, Utah.
Figs. 50–55. Gaufinia shoshone, epiproct and aedeagal structure, Raft River Mountains, Utah. 50. Epiproct, dorsal. 51. Epiproct, lateral. 52. Epiproct hilt and hook, dorsal. 53. Epiproct apex, oblique frontal aspect. 54. Aedeagal posterior lobes, dorsocaudal aspect. 55. Aedeagus, dorsal aspect.

R.W. Baumann & S.M. Clark, 12 ♂ 83 ♀ (BYU). Fisher Creek, above reservoir, Raft River Mountains, 21 June 1979, R.W. & J.W. Baumann, 1 ♂ 1 ♀ (BYU). George Creek, Raft River Mountains, 27 July 1995, R.W. Baumann & R.M. Houseman, 1 ♂ (BYU). Long Birch Creek, headwater spring, Raft River Mountains, 20 June 1979, R.W. Baumann & G.M. Webb, 2 ♂ 1 ♀ (BYU). Long Birch Creek, Raft River Mountains, 16 July 1980, R.W. Baumann & S.M. Clark, 9 ♂ 11 ♀ (BYU). Rock Creek, Raft River Mountains, 21 June 1979, R.W. Baumann & S.M. Clark, 2 ♂ (BYU).
ADULT HABITUS.—Head with pale brown X-pattern extending from lateral ocelli, through anterior ocellus, to frontoclypeus; small pigmented spots located adjacent to anterior ocellus and connected to anterior base of X-pattern. More prominent dusky markings occur along the posterior occiput and adjacent to the compound eye. The pronotum bears ca. 6 hieroglyphic-like markings on either side of median suture. The median abdominal stripe is composed of brown rings located on the posterior margins of terga 1–8. Legs, wings and veins and cerci pale; antennae pale in posterior margins of terga 1–8. Legs, wings and veins and cerci pale; antennae pale in basal third, but brown beyond.

MALE.—Forewing length ca. 6.0–6.5 mm. Epiproct length from base to apex of neck ca. 2.3–2.6 times width of epiproct body at midlength. Shoulders usually converge gradually to base of neck (Fig. 50), but some specimens exhibit a slight constriction of the lateral margins in the apical half of the epiproct body; neck about as long as wide or slightly wider at midlength than long (Fig. 50); base narrow and neck apex wider and slightly notched in most specimens. Hilt slender, with dorsal ridge and irregular projections along lateral margins (Figs. 52–53). Carina reaches almost to midlength of neck (Figs. 50–51). Aedeagal lamella bilobed; lobes narrowly rounded in caudal aspect (Fig. 55); membranous aedeagal body typical of genus (Fig. 54).

FEMALE.—Forewing length ca. 7.5–8.2 mm. Subgenital plate extends beyond posterior margin of sternum 9; lateral margins slightly concave.

LARVA.—Unknown.

ETYMOLOGY.—The species name, used as a noun in apposition, honors the Native American Shoshone people of northwestern Utah.

DIAGNOSIS.—The epiproct of G. shoshone is similar to that of G. lamba in dorsal aspect, but the hilt and hook (Figs. 50–53) are more slender than in the latter species, and the apical notch on the neck of the new species appears distinctive.

DISTRIBUTION.—Known only from the Raft River Mountains of northwestern Utah.

Gaunia wallowa n. sp.
(Figs. 56–61)

MATERIAL EXAMINED.—Holotype ♂, Oregon: Walla Walla Co., Lowsite River, Lake Creek Campground, 15 July 2000, R.L. Newell (BYU). Paratypes: Oregon: Baker Co., Spring Creek, 3900 ft, 26 June 1948, C.P. Alexander & J.H. Baker, 3 ♀ 5 ♂ (USNM). Grant Co., Blue Mountain Hot Springs, 29 May 1978, J. Schuh, 2 ♀ 1 ♂ (BYU). Bridge Creek, Lunch Creek Road, 4 June 2000, B. Stark, I. Sivec & M. Zuniga, 1 ♂ 5 ♀ (BYU). Small creek, Dixie Pass, Hwy. 26, E Prairie City, 25 June 1983, G.R. Fiala, 6 ♂ 22 ♀ (BYU). Trout Meadows, 5500 ft, 9 July 1967, J.H. Baker, 1 ♂ 1 ♀ (USNM). Union Co., Beaver Creek, 5150 ft, Wallowa–Whitman National Forest, near intake La Grande water system, 25 June 1990, B. Betts, 1 ♂ (BYU). Jordan Creek, 20 mi SW La Grande, 24 June 1976, R.W. Baumann & S.D. Smith, 1 ♂ (BYU). Ladd Creek, 20 mi SW La Grande, 23 June 1976, D. Dunster & S.D. Smith, 1 ♂ 1 ♀ (BYU). Wallowa Co., Lake Creek, Lake Creek Campground, Lostine Valley, Wallowa Mountains, 30 June 1948, C.P. Alexander, 2 ♂ 7 ♀ (USNM); same locality, 15 July 2000, R.L. Newell, 1 ♂ 4 ♀ (BYU). Washington: Columbia Co., Tucannon River, jct. Punjab Creek, 5 July 1997, R.L. Newell, 7 ♂ 6 ♀ (BYU).

MALE.—Forewing length ca. 6.0–6.5 mm. Epiproct length from base to apex of neck ca. 1.85–1.95 times width of epiproct at midlength. Epiproct body with swollen shoulders and short length, appearing almost circular in outline; shoulders converge strongly on sides of neck, attaching at an almost 90° angle (Figs. 56, 60–61). Neck length ca. 1.8–2.0 times neck width at midlength; base narrow, apex wider and projecting along median line (Fig. 60). Hilt short, narrow at base and expanded apically into a prominent disc-like structure; lateral margins of disc irregularly scalloped with small spine-like projections (Figs. 57–59). Anterolateral shelf sclerites project ventrally from epiproct body at about midwidth of shoulders (Figs. 56, 60–61). Carina reaches about midlength on neck (Fig. 57). Aedeagal lamella not examined.

FEMALE.—Forewing length ca. 8.5–9.0 mm.

LARVA.—Unknown.

ETYMOLOGY.—The species name, used as a noun in apposition, is based on the Wallowa Mountains of northeastern Oregon.

DIAGNOSIS.—The neck region of this species is suggestive of G. lamba; however, the neck is longer than in typical G. lamba (Figs. 56, 60).

DISTRIBUTION.—Presently known from eastern Oregon and southeastern Washington.
Gaufinia wasatchensis n. sp.

(Figs. 62–67)

Material examined.—Holotype ♂, Utah: Wasatch Co., Cascade Springs, west of Midway, 9 August 2011, R.W. Baumann & B.C. Kondratieff (BYU). Paratypes: Idaho: Bannock Co., Birch Creek, North Canyon Fork, Hwy. I-15, Malad Summit, 15 June 2004, S.M. Clark & M.H. Goodman, 1 ♂ 6 ♀ (BYU). Mill Creek, Summit Campground, Hwy. I-15, 5 June 2010, R.W. Baumann & B.P. Stark, 6 ♂ (BYU). Bear Lake Co., Bloomington Creek, Bloomington Canyon, 5.2 mi W Bloomington, 22 June 1985, D.W. Webb, 1 ♂ (INHS). Emigration Creek, Emigration Canyon Campground, 1-15, Malad Summit, 15 June 2004, S.M. Clark & M.H. Goodman, 1 ♂ 6 ♀ (BYU). Mill Creek, Summit Campground, Hwy. I-15, 5 June 2010, R.W. Baumann & B.P. Stark, 6 ♂ (BYU). Bear Lake Co., Bloomington Creek, Bloomington Canyon, 5.2 mi W Bloomington, 22 June 1985, D.W. Webb, 1 ♂ (INHS). Emigration Creek, Emigration Canyon Campground, 1-15, Malad Summit, 15 June 2004, S.M. Clark & M.H. Goodman, 1 ♂ 6 ♀ (BYU). Mill Creek, Summit Campground, Hwy. I-15, 5 June 2010, R.W. Baumann & B.P. Stark, 6 ♂ (BYU). Bear Lake Co., Bloomington Creek, Bloomington Canyon, 5.2 mi W Bloomington, 22 June 1985, D.W. Webb, 1 ♂ (INHS). Emigration Creek, Emigration Canyon Campground, 1-15, Malad Summit, 15 June 2004, S.M. Clark & M.H. Goodman, 1 ♂ 6 ♀ (BYU). Mill Creek, Summit Campground, Hwy. I-15, 5 June 2010, R.W. Baumann & B.P. Stark, 6 ♂ (BYU). Bear Lake Co., Bloomington Creek, Bloomington Canyon, 5.2 mi W Bloomington, 22 June 1985, D.W. Webb, 1 ♂ (INHS). Emigration Creek, Emigration Canyon Campground.
14 July 1990, C.R. Nelson, 12 ♂ 13 ♀ (BYU). Georgetown Creek, 4 miles NE Georgetown, 13 June 1969, S.D. Smith, 2 ♂ (BYU). Blaine Co., tributary, North Fork Big Wood River, 9 mi N Ketchum, 24 July 1964, S.L. Jensen, 1 ♂ 6 ♀ (BYU). Salmon River, Hwy. 93, 26 mi N Ketchum, 24 July 1964, S.L. Jensen, 3 ♀ (BYU). Bonneville Co., Yeaman Creek, Yeaman Canyon, Little Lemhi BSA Camp, below Pali-sades Reservoir, 14 June 2007, R.G. Call, 7 ♀ 6 ♀ (BYU). Caribou Co., Gravel Creek, Gravel Creek Campground, 23 June 1996, R.M. & M.L. Houseman, 1 ♀ (BYU). Kendall Creek, 25 June–3 July 1961, malaise trap, W.J. Hanson, 26 ♂ 34 ♀ (BYU). Clark Co., Camas Creek, Kilgore, 1–30 July 2004, malaise trap, A.C. Williams, 1 ♀ (♀) (BYU). Fremont Co., spring, 11 mi S Drumm, 19 June 1955, S.G. Jewett Jr., 3 ♀ 3 ♀ (BYU). Warm River, 19 June 1955, S.G. Jewett Jr., 48 ♀ 80 ♀ (BYU & USNM). Warm River, Warm River Springs, 2 August 1982, R.W. Baumann & R.N. Winget, 2 ♂ 1 ♀ (BYU). Warm River Spring near Mesa Falls, 13 August 2020, R.G. & B.L. Call, 3 ♂ 1 ♀ (BYU). Teton Co., Victor, 20 June 1966, J.H. Baker, 2 ♂ (USNM). Utah: Cache Co., Tony Grove Creek, Tony Grove Canyon, 9 July 1974, G.F. Knowlton, 9 ♂ 2 ♀ (USNM). Tony Grove Creek, Turner Campground, Logan Canyon, 22 June 1983, G.F. Knowlton, 1 ♂ 1 ♀ (BYU). Davis Co., seep, Farmington Flat, Bountiful Peak Campground, 27 June 2012, Baumann, Myrup & Clark, 7 ♂ 8 ♀ (BYU). Headwaters, Farmington Creek, 27 June 2012, Baumann, Myrup & Clark, 2 ♂ (BYU). Rich Co., Allen Canyon, 5 mi below Monte Cristo, 23 June 1973, G.F. Knowlton, 8 ♂ 6 ♀ (BYU & USNM). Salt Lake Co., Big Cottonwood Creek, Brighton, 29 June 1966, R.W. Baumann, 3 ♂ 2 ♀ (BYU). Cottonwood Creek, The Spruces, 21 July 1966, 2 ♂ 5 ♀ (BYU). Emigra-tion Creek, Pinecrest, 1 July 1966, R.W. Baumann, 1 ♂ 2 ♀ (BYU). Burr Fork, Emigra-tion Creek, 20 July 2005, 1 ♂ 1 ♀ (BYU). Headwaters, Lambs Canyon Creek, 20 July 2005, R.W. Baumann & M. Goodman, 11 ♂ 22 ♀ (BYU). Mill Creek, above Salt Lake City, 7000 ft, 15 July 1952, Malkin & Mulaik, 3 ♂ 2 ♀ (BYU). Headwaters Mill Creek, Big Water Trailhead, 10 August 2011, R.W. Baumann & B.C. Kondratieff, 1 ♂ 3 ♀ (BYU). Mill Creek, Log Haven, Mill Creek Canyon, 13 July 1966, R.W. Baumann, 3 ♂ (BYU). Thousand Springs, Mill Creek Canyon, above Salt Lake City, 20 July 1965, R.W. Baumann, 9 ♂ 16 ♀ (BYU). Red Butte Creek, Knowlton Fork, 1 July 1965, R.W. Baumann, 3 ♂ 4 ♀ (BYU). Summit Co., upper South Fork Provo River, 7 July 1959, A.R. Gaufin, 1 ♂ (BYU). Uintah Co., West Fork Eagle Creek, 12 mi SW Dutch John, 19 June 1985, D.W. Webb, 1 ♂ (INHS). Utah Co., Big Springs, Little South Fork, Provo Canyon, above Vivian Park, 16 July 2007, R. Baumann & A. Myrup, 11 ♂ 28 ♀ (BYU). Cold Spring, Rt. 27, Uinta National Forest, S.M. Clark, 3 ♂ 5 ♀ (BYU). Dry Creek, near Rock Canyon Campground, 30 June 1981, S.M. Clark, 5 ♂ 2 ♀ (BYU). Headwaters, Rock Canyon Creek, E Provo, 5 July 1977, R.W. Baumann, 2 ♂ 5 ♀ (BYU). Stewart Creek, above Sundance, 21 June 1983, R.W. Baumann & M.F. Whiting, 1 ♂ 2 ♀ (BYU). Wasatch Co., Cascade Springs, W Midway, 18 July 1964, E.C. Devenport, 3 ♂ 2 ♀ (BYU); same locality, 23 May 1979, R. Baumann & D. Landeen, 4 ♂ 5 ♀ (BYU); same locality, 5 July 1980, S.M. Clark, 3 ♂ 4 ♀ (BYU); same locality, 8 Sept. 1980, K. Dobry, 1 ♂ 3 ♀ (BYU); same locality, 13 June 1984, C.R. Nelson, 2 ♂ 1 ♀ (BYU); same locality, 27 May 2000, B. Stark, 2 ♂ (BPSC); same locality, 9 August 2011, R.W. Baumann & B.C. Kondratieff, 9 ♂ 7 ♀ (BYU). Headwaters, Strawberry River, 9 July 1980, M. Webb, 1 ♂ 2 ♀ (BYU). Tut Creek, Rt. 083, 40.356°N 111.139°W, 26 June 2020, S.M. Clark & R.L. Johnson, 1 ♂ 4 ♀ (BYU). Wallsburg Creek, 22 June 1977, G.M. Webb, 2 ♂ 5 ♀ (BYU). Weber Co., Causey Creek, above Causey Reservoir, 19 Oct, 1936, M.C. Tanner, 1 ♀ (INHS). Wyoming: Lincoln Co., Cottonwood Lake, 2 July 1952, B. Malkin, 3 ♂ 1 ♀ (USNM). Creek, 3 mi S Alpine Junction, 22 June 1985, D.W. Webb, 1 ♂ (INHS). Sheridan Co., Fishhook Creek, Wheldon Spring, 8 July 1999, B. Stark & L. Stark, 1 ♀ (♀) (BYU). Pole Creek, Hwy. 14A, Big Horn National Forest, 18 August 2004, B. Stark & I. Sivec, 8 ♂ 2 ♀ (BPSC). Sweetwater Co., Trout Creek, Little Mountain near Clay Basin, 20 June 1978, D.S. Landeen, 12 ♂ 9 ♀ (♀) (BYU). ADULT HABITUS.—Head almost completely pale, but with small brown spots over lateral ocelli and anterior ocellus, small bars near anten-nal bases, and obscure brownish spots near front margin of head. Occiput pale. Prono-tum with 2 major brown markings adjacent to median suture, each separated into a cluster of 2–4 smaller brown spots by intervening pale
areas; generally with ca. 4 additional brown spots near anterolateral margins. Median abdominal stripe consists of dark pigment spots on terga 2–8; brown spots less conspicuous on terga 2–4. Legs, wings, wing veins, and cerci pale; antennae pale in basal third but brown beyond.

**Male.**—Forewing length ca. 7.5–8.0 mm. Epiproct length from base to apex of neck ca. 2× width of epiproct body at midlength. Shoulders converge gradually to neck; neck ca. 2.25× long as width at midlength, head rounded and narrow, with lateral margins almost parallel (Figs. 62–63). Hilt sclerite
expanded in basal half to about midlength, then narrowed to near base of hook (Figs. 64–65); lateral margins of hilt bear an irregular row of narrow spines. Carina extends almost to apex of neck (Figs. 62–64). Aedeagal lamella bilobed; caudal aspect of lobes narrowed apically and rounded along apical margins (Fig. 67); membranous caudal lobes of aedeagus typical of genus.

**Female.**—Forewing length ca. 8.5–9.0 mm. Subgenital plate extends to posterior margin of sternum 9. Lateral margins slightly concave.

**Larva.**—Unknown.

**Etymology.**—The species name, used as a noun in apposition, is based on the Wasatch Mountains where most of the known specimens were collected.

**Diagnosis.**—Males of this species are similar to those of *G. lamba*, but in that species the epiproct head is broad, with an angular apex (Figs. 39, 40).

**Distribution.**—Presently known from the Wasatch Mountain Range in northern Utah, in southern Idaho, and at scattered sites in Wyoming.

**Ecology**

*Gaufinia* species live mostly in spring-fed habitats (Fig. 68). Some of these springs can be very large like the following springs from Utah: Big Springs, Utah Co.; Cascade Springs, Wasatch Co.; Thousand Springs, Salt Lake Co.; Ricks Spring, Cache Co.; and Spring Hollow Spring, Cache Co. However, *Gaufinia* also occurs in small headwater tributaries of larger creeks and rivers, and for this reason the collection information data are sometimes too general, such as “Snake River, Yellowstone National Park.”

**Distribution**

This genus occurs primarily in the Rocky Mountains in the United States and the Canadian Rockies in Canada. Needham and Claassen (1925) described the first 2 species that now occur in the genus: *Gaufinia lamba* from Colorado and *Gaufinia albertensis* from Alberta. In addition, *Gaufinia* is sometimes found in lower-elevation regions where ideal spring-fed habitats occur. For example, *Gaufinia kaibabensis* is found in North Canyon Spring on the Kaibab Plateau in Arizona.

Since 1925, several publications have included citations of distribution records of species that presently occur in the genus *Gaufinia*. The most-often-cited works are “Systematic List of Plecoptera of Intermountain Region” (Gaufin 1964b) and *The Stoneflies (Plecoptera) of the Rocky Mountains* (Baumann et al. 1977). These publications were not always supported by careful research but often relied on the published literature. Consequently, we will explain the history involved and attempt to resolve any problems that might exist. Each province and state will be covered separately.

**Canada**

**Alberta.**—The holotype ♂ and 3 ♀ paratypes of *Gaufinia albertensis* from Waterton Lakes National Park (CNC) and a collection from Livingston Creek (BYU) are the only confirmed specimens of *Gaufinia* from this province.

**British Columbia.**—Three records from British Columbia were confirmed: North of Cowichan Lake (CNC), Golden Dreams River, near Whistler (BYU), and North Fork Flathead River, SE of Fernie (INHS).

**United States**

**Arizona.**—The distribution and past dispersal of southwestern United States Plecoptera (Stewart et al. 1974) lists *Sweltsa lamba* from Arizona. This record gives a reference to Gaufin (1964b). All *Sweltsa* specimens in the BYU collection, which was once at the University of Utah, were studied, and no confirmation was made. However, several specimens labeled as *Sweltsa coloradensis* were present that could have contributed to the misidentification. The specimens noted were found to represent 2 *Sweltsa* species: *S. coloradensis* and *S. mogollonica* (Stark and Baumann 2018). These specimens were from small streams but not large springs like North Canyon Spring, the type locality of *Gaufinia kaibabensis* on the Kaibab Plateau. Consequently, the only *Gaufinia* species known from Arizona is *G. kaibabensis*.

**Colorado.**—The type locality of *Gaufinia lamba* is Fern Lake, Estes Park, Colorado. The holotype is in the Cornell University Collection. The original description lists 33 ♂ 34 ♀ paratypes that are to be shared with several colleagues. We studied specimens from this
Fig. 68. Big Springs, Utah Co., Utah. Photo credit: Alan R. Myrup.
series that were from the Illinois Natural History Collection. This species has been widely collected in Colorado and was included in the thesis studies of 2 students of Arden Gaufin from the University of Utah: Alan W. Knight, Gunnison River, and Bryant R. Oblad, Yampa River. Their results are included in Stark et al. (1973) as *Sweltsa lamba*. This species was also listed more recently in Kondratieff and Baumann (2002).

In addition, both papers also list *Sweltsa albertensis* incorrectly as occurring in Colorado. The reason for the incorrect *Gaufinia albertensis* records stems from the fact that William E. Ricker identified 8 vials of Colorado specimens that were in the CNC collection as *Sweltsa albertensis*. Workers went with his identifications, but they were not correct.

Our conclusion, based on specimens studied in this revision, is that *Gaufinia lamba* is the only *Gaufinia* species in Colorado.

**Idaho.**—Nebeker and Gaufin (1966) list 2 species that are now included in the genus *Gaufinia: albertensis* and *lamba*. The first species, *G. albertensis*, does indeed occur in Idaho, but the second one, *G. lamba*, does not. In total, we found that 3 species of *Gaufinia* presently occur in Idaho: *albertensis, gaufini, and wasatchensis*. *Gaufinia albertensis* is widespread in south central Idaho and as far east as Teton County. *Gaufinia gaufini* occurs only in the Cub River drainage in Franklin County, in the extreme southeastern corner of the state. Finally, *Gaufinia wasatchensis* extends north from Utah into several southeastern Idaho counties.

**Montana.**—This state likely has the most ideal habitats for *Gaufinia* species. Large numbers of stoneflies were collected over the years in studies by Arden Gaufin, students, and colleagues at the University of Montana Flathead Lake Biological Station. Add their efforts to the work by Andy Sheldon, Jack Stanford, Bob Newell, Kenneth Stewart, and others and the volume of specimens is enormous. Still only one species of *Gaufinia* was found in Montana, and that is *Gaufinia albertensis*.

Two publications on Montana stoneflies are especially important to remember: “The Stoneflies (Plecoptera) of Montana” by A.R. Gaufin, William E. Ricker, Michael L. Miner, Paul Milam, and Richard A. Hays (Gaufin et al. 1972) and “Stoneflies of Glacier National Park and Flathead River Basin, Montana” by Robert L. Newell, Richard W. Baumann, and Jack A. Stanford (Newell et al. 2008).

**Nevada.**—Only one species was listed from Nevada when Baumann et al. (2017) recorded *Sweltsa lamba*. This species turned out to be *Gaufinia jarbidge*, which occurs in the Jarbidge Mountains in the northern part of Elko County. However, a single female with an odd subgenital plate was collected at Bottle Creek in the Jackson Range, Humboldt County, that could belong to *Gaufinia*. In addition, a small series of specimens was collected in Lincoln County near Panaca by Andy Sheldon. These resemble *Gaufinia shivwitsa* and have been lumped under *G. shivwitsa* in this paper. Future collecting in this area could yield another new *Gaufinia* species.

**New Mexico.**—The first *Gaufinia* species to be listed from New Mexico was *Sweltsa lamba*. In the mid-1970s, Stark et al. (1975) listed *S. lamba* in a paper on new records of stoneflies from the state. And then in 2005, it was included again in an updated list by (Jacobi et al. 2005).

During this time, a second species that belonged to the genus, *Sweltsa hondo*, was described (Baumann and Jacobi 1984). As part of our study, many specimens from throughout the state were studied. The present study included 5 counties in north-central New Mexico. The results showed that only *Gaufinia hondo* was present.

**Oregon.**—*Gaufinia* is not well represented in Oregon. This result is surprising because ideal spring-fed habitats are common. However, since the genus does not occur near the Pacific Coast, the only species present in Oregon is in the Blue or Wallowa Mountains in the northeast corner of the state. This new species, *Gaufinia wallowa*, also occurs southwest into the headwaters of the John Day River in Wallowa–Whitman National Forest.

**Utah.**—*Gaufinia* is broadly distributed in Utah, where 6 species are represented. Originally, the only species recorded from the state was *Gaufinia lamba*. However, now we know that this species, which was named from Colorado, is not found in Utah. What was called *G. lamba* is really our new species, *Gaufinia wasatchensis*. This species is distributed in the Wasatch Mountains from north central Utah to southern Idaho (Gaufin et al. 1966, Baumann and Gaufin 1969).
Historically, the second species named in what is now *Gaufinia* was *Sweltsa gaufini* from Ricks Spring in upper Logan Canyon (Baumann 1973). Then Baumann and Jacobi (1984) described a new species from New Mexico, *Sweltsa hondo*. Another species, *Sweltsa crisata*, was later named from the Abajo Mountains near Blanding, Utah. (Surdick 1995).

In this paper, we now describe 2 additional species of *Gaufinia* from Utah: *G. shoshone* and *G. shivwitsa*.

The Raft River Mountains of northwestern Utah is the home of *Gaufinia shoshone*. The Raft River originally flowed into the Snake River in Idaho. Now, it usually dries up, except in abundant water years (Houseman and Baumann 1997).

*Gaufinia shivwitsa* is found in southwestern Utah, from Beaver south to the Pine Valley Mountains near St. George (Call and Baumann 1997).

Finally, during this study, we discovered that specimens collected in the extreme southeastern corner of Utah belong to the species *Gaufinia hondo*. If a straight line is drawn, New Mexico in the Four Corners area is very close to southeastern Utah.

Thus, there are 6 species of *Gaufinia* presently recorded from Utah: *cristata, gaufini, hondo, shoshone, shivwitsa*, and *wasatchensis*.

**WASHINGTON.**—Two species of *Gaufinia* have been recorded from Washington: *G. albertensis* and *G. wallowa*.

*Gaufinia albertensis* was found at Flodell Creek in the Little Pend Oreille River drainage. This locality is in Stevens County in the Selkirk Mountains.

*Gaufinia wallowa* specimens were collected from the Tucannon River, junction Punjab Creek, in Columbia County in Umatilla National Forest.

**PRELIMINARY KEY TO MALE GAUFINIA**

1. Dorsal aspect of epiproct with 2 median longitudinal carinae (Figs. 14–17); aedeagal lamella trilobed (Fig. 19) .......................... *G. gaufini*
   Dorsal aspect of epiproct with a single median longitudinal carina (Fig. 38); aedeagal lamella bilobed (Fig. 7) ........................................ 2

2. Median longitudinal carina of epiproct usually incomplete in a short section between shoul-
   ders (Figs. 2–4); hook trowel shaped, without hilt or lateral spines .......................... *G. albertensis*
   Median longitudinal carina of epiproct a continuous, well-developed ridge from at least neck base to near basal third of epiproct (Figs. 26, 38); hook with a basal hilt, usually with small spines along lateral margins (Fig. 29) .................. 3

3. Lateral margins of epiproct neck typically parallel, or apically convergent ........................ 4
   Lateral margins of epiproct neck typically constricted basally or near midlength, apex slightly to conspicuously wider than base .................. 7

4. Epiproct hook very narrow, hilt scarcely expanded (Fig. 35) .................................. *G. cristata*
   Epiproct hook expanded into a distinct basal hilt (Figs. 44, 65) ................... 6

5. Lateral margins of epiproct body almost parallel for most of its length; shoulders join neck at a near 90° angle; neck about as long as wide .......................... *G. cristata*
   Lateral margins of epiproct body gradually converge on neck from midlength (Fig. 32); shoulders join neck at an obtuse angle (Fig. 34); neck longer than wide (Fig. 34) .......................... *G. kaibabensis*

6. Epiproct neck apex wider than hilt (Fig. 28) ................................ *G. garbidge*
   Epiproct hilt wider than neck apex (Fig. 65) ...................................... *G. wasatchensis*

7. Epiproct hook scarcely expanded at hilt (Fig. 32); apex of neck slightly notched (Fig. 50) .......................... *G. shoshone*
   Epiproct hook with distinctly expanded hilt (Figs. 41, 48); apex of neck without notch ........ 8

8. Shoulders of epiproct distinctly bulging, joining neck at a near 90° angle (Figs. 20–21) .................. *G. hondo*
   Shoulders of epiproct less prominent and not forming approximate 90° angles with neck (Figs. 38, 44) .................. 9

9. Neck long and slender, particularly slender near midlength (Fig. 44) .......................... *G. shivwitsa*
   Neck more robust, not markedly slender at midlength (Fig. 56) ................... 10

10. Epiproct shoulders conspicuously rounded in dorsal aspect (Figs. 56, 61); neck apex conspicuously hairy .......................... *G. wallowa*
    Epiproct shoulders widen gradually from midlength to anterolateral margins (Fig. 32); neck apex with short, less conspicuous hair (Fig. 40) .......................... *G. lamba*
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Samuel A. Wells
Michael F. Whiting
C. Williams
Robert N. Winget
T. Wolfe
M. Zuniga

SPECIAL THANKS

Richard L. Bottorff made collections at many hard-to-locate places in Nevada.
Shawn M. Clark contributed numerous collecting records from sites in Montana and Utah.
George Edmunds was our mentor and encouraged us and Becky Surdick to study Chloroperlidae.
Gerald Z. Jacobi was the focal point of our sites and collections from northern New Mexico.
Robert L. Johnson provided new collection records from the Abajo Mountains in southeastern Utah.
Boris C. Kondratieff provided many valuable specimens and was a great collecting friend.
Alan R. Myrup contributed photos of Big Springs in Provo Canyon, Utah.
Alan V. Nebeker provided the specimens from Ricks Spring that resulted in the naming of Sweltsa gaufini.
C. Riley Nelson added valuable specimen records from the La Sal Mountains, Utah.
Robert L. Newell helped us access the stonefly collection at the Flathead Lake Biological Station, Montana.
William E. Rickert moved the range of Gaufinia albertensis south in the Rocky Mountains, USA.
Andrew L. Sheldon helped obtain many valuable records in Montana and the Great Basin.
David R. Smith of the U.S. Fish and Wildlife Service collected in North Canyon Spring and led a hike for Baumann and Kondratieff.
Jean A. Stanger made the excellent illustrations of Sweltsa hondo in Baumann and Jacobi (1984).
Rebecca F. Surdick examined many specimens, from diverse collections, of this genus during her thesis study on the Chloroperlidae at the University of Utah, in Salt Lake City.
George Venable made the illustrations of Sweltsa gaufini and the leaf-like structures on the aedeagus for 3 species now located in the genus Gaufinia in Baumann (1973).
RICKER, W.E. 1939. A preliminary list of stoneflies (Plecoptera) from the vicinity of Cultus Lake, British Columbia. Proceedings of the Entomological Society of British Columbia 35:19–23.

RICKER, W.E. 1943. Stoneflies of southwestern British Columbia. Indiana University Publications, Science Series, Number 12. Indiana University, Bloomington, IN. 145 pp.

RICKER, W.E. 1952. Systematic studies in Plecoptera. Indiana University Publications, Science Series, Number 18. Indiana University Press, Bloomington, IN. 200 pp. http://www.nativefishlab.net/library/textpdf/16861.pdf

RICKER, W.E., AND G.G.E. SCUDDER. 1975. An annotated checklist of the Plecoptera (Insecta) of British Columbia. Syesis 8:333–348.

STARK, B.P., AND R.W. BAUMANN. 2007. *Sweltsa yurok* (Plecoptera: Chloroperlidae), a new stonefly from California, U.S.A. Illinois 3:95–101.

STARK, B.P., AND R.W. BAUMANN. 2018. Two new stonefly species in the *Sweltsa coloradensis* (Banks) complex (Plecoptera: Chloroperlidae). Illinois 14:30–43.

STARK, B.P., B.R. OBLAD, AND A.R. GAUFIN. 1973. An annotated list of the stoneflies (Plecoptera) of Colorado. Part II. Entomological News 84:301–305.

STARK, B.P., AND I. SIYEC. 2009. *Sweltsa wui* and *Haploperla valentinae* (Plecoptera: Chloroperlidae), two new stoneflies from Sichuan Province, China. Illinois 5: 156–163.

STARK, B.P., T.A. WOLFE, AND A.R. GAUFIN. 1975. New records of stoneflies (Plecoptera) from New Mexico. Great Basin Naturalist 35:97–99.

STEWART, K.W., AND M.W. OSWOOD. 2006. The stoneflies (Plecoptera) of Alaska and western Canada. The Caddis Press, Columbus, OH. 325 pp.

STEWART, K.W., AND B.P. STARK. 2002. Nymphs of North American stonefly genera (Plecoptera). The Caddis Press, Columbus, OH. 510 pp.

STEWART, K.W., R.W. BAUMANN, AND B.P. STARK. 1974. The distribution and past dispersal of southwestern United States Plecoptera. Transactions of the American Entomological Society 49:507–546.

SURDICK, R.F. 1985. Nearctic genera of Chloroperlinae (Plecoptera: Chloroperlidae). Illinois Biological Monographs 54. University of Illinois Press, Urbana, IL. 146 pp.

SURDICK, R.F. 1995. New western Nearctic *Sweltsa* (Plecoptera: Chloroperlidae). Proceedings of the Entomological Society of Washington 97:161–177.

ZWICK, P. 1971. Bemerkungen über die Gattung *Sweltsa*, mit der Beschreibung einer neuen Art (Plecoptera, Chloroperlidae). Mitteilungen der Deutschen Entomologischen Gesellschaft 29:40–43.

ZWICK, P. 1973. Insecta: Plecoptera, Phylogenetisches System und Katalog. Das Tierreich 94, I–XXXII + 465 pp.

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