

TWO NEW SPECIES OF CHLOROPERLIDAE (PLECOPTERA) FROM CALIFORNIA

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ABSTRACT.-*Suwallia sierra* and *Sweltsa pisteri* are described as new species in the family Chloroperlidae from California, USA. Illustrations of the male terminalia of both species and the female and egg of *S. sierra* are presented. In addition, detailed figures of the epiproct of 2 similar species, *Sweltsa townesi* and *Sweltsa resima*, are included. Diagnoses are provided comparing the new taxa with related species. Observations indicate that *S. sierra* may belong to the same clade as the genus *Neaviperla*.

Key words: stoneflies, Plecoptera, Suwallia, Sweltsa, Chloroperlidae, California.

The stonefly fauna of California was first treated as an entity by Jewett (1960), who included 14 species in the family Chloroperlidae and gave limited distributional data and a key. Stark et al. (1986) listed 23 species for the state. Then Surdick (1995) named 2 additional species from California to bring the total to 25 chloroperlids.

We discovered 2 additional undescribed species of Chloroperlidae from California and decided to name them so they could be added to the growing knowledge of California stoneflies.

Suwallia sierra, new species

Figs 1-5, 13

MALE.-Macropterous. Body length 5-7 mm; forewing length 6-7 mm. General body color medium brown. Dorsum of head with dark brown interocellar area and Vine. Mouthparts lightly sclerotized. Pronotum with margins and rugosities dark brown, disks light, angles rounded. Meso- and metanota with dark U-marks. Wings light with dark veins. Abdomen with dark brown median stripe on dorsum of segments 1-8, dark brown lateral marks on segments 1-2; tergum 9 with dense setal patches, posterior margin slightly excavated medially, not projecting posteriorly or heavily sclerotized. Hemitergal lobes very short, pointed; not attenuated into medially directed digitate processes (Fig. 3). Epiproct tip a small membranous knob densely covered with fine curved setae; basal anchor, bar, and paragenital plates fused to form

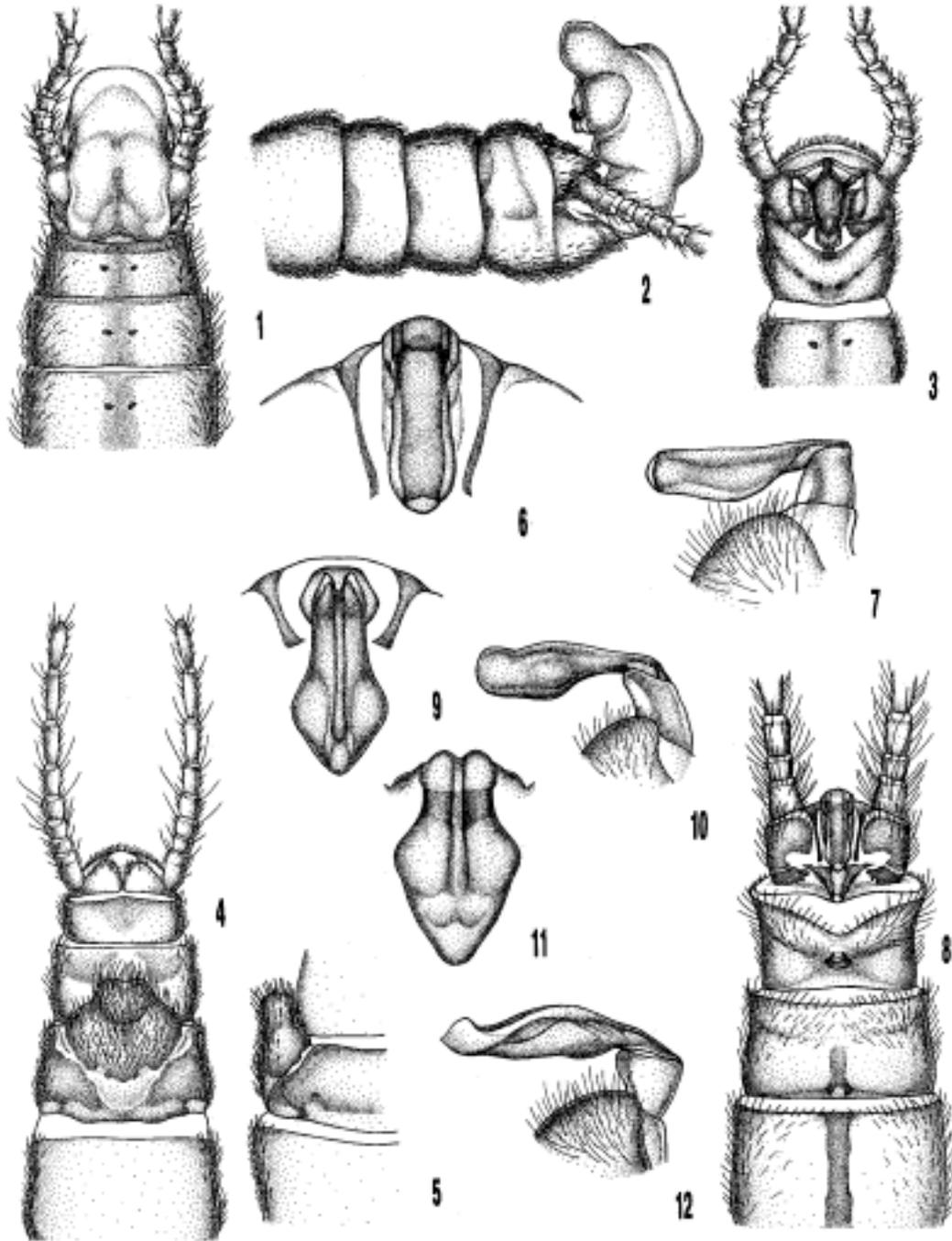
star-shaped plate; basal plate with small median dome and 15-25 stout setae on anterior 1/3, anterior margin of basal plate uneven and turned dorsally (Fig. 3). Aedeagus tubular, terminating in 2 apical lobes and 2 lateral lobes; subapical frontal surface with 2 curved sclerotized patches laterally, separated by 3 scaled lobes; proximal surface inflated and covered with fine spinules and scales (Figs. 1, 2). Cerci curved in basal segments 1-4; segment 1 elongated (length 2.5-4 times width), the posterior 1/4-1/3 slightly demarked from the anterior portion but lacking the free articulation of a separate segment; segments 2-4 (length = width) and posterior portion of segment 1 with stout spines on interior surface; remaining segments slender, straight, and lacking stout spines (Fig. 3).

FEMALE.-Macropterous. Body length 6-8 mm; forewing length 6-8 mm. General body color and external morphology similar to male. Subgenital plate wide at base, narrowing to median truncate, swollen lobe that protrudes at least 1/2 over sternum 9, plate originates near middle of sternum 8. Cercal segment 1 less elongated (length 2 times width) than on male, segments 1-4 not curved and lacking stout spines on interior surface (Figs. 4, 5).

NYMPH.-Body length 6-8 mm. General body color golden brown. Lacinia with main terminal tooth and small subapical tooth; double row of marginal setae: 20-24 equal-spaced setae on dorsal margin (12 stout, 4 medium, 8 fine), 16-18 setae on ventral margin (10 stout

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Figs. 1-5. *Suwallia sierra*: 1, male terminalia and aedeagus, dorsal; 2, male terminalia and aedeagus, lateral; 3, male terminalia, dorsal; 4, female terminalia, ventral; 5, female subgenital plate, lateral. Figs. 6-8. *Sweltsa pisteri*: 6, male epiproct, dorsal; 7, male epiproct, lateral; 8, male terminalia, dorsal. Figs. 9-10. *Sweltsa townesi*: 9, male epiproct, dorsal; 10, male epiproct, lateral. Figs. 11-12. *Sweltsa resima*: 11, male epiproct, dorsal; 12, male epiproct, lateral.

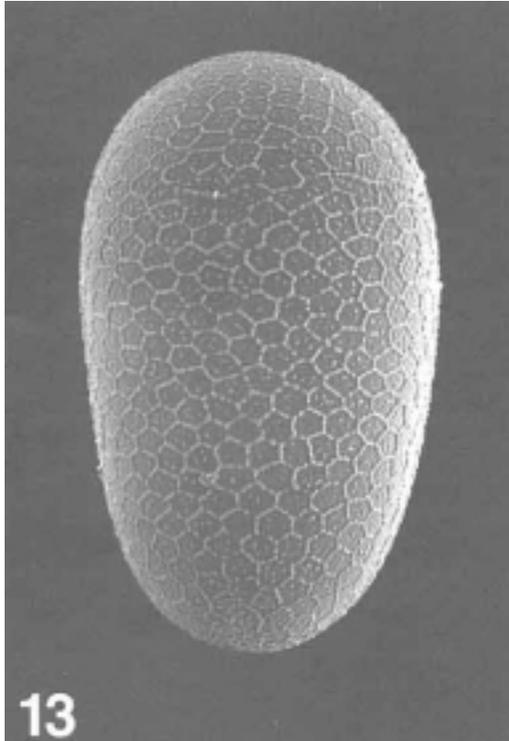


Fig. 13. *Suwallia sierra*: egg, lateral view (200X). California, Sacramento Co., small south bank tributary to Cosumnes River, upstream of Michigan Bar bridge, 29-IV-1996, R.L. Bottorff.

near subapical tooth, 6 fine near base). Pronotum with variable-length setae around entire margin, angles rounded. Mesonotum margined laterally and anteriorly with stiff setae. Abdomen concolorous; dorsum covered with fine setae; setation less dense ventrally; membranes with chloride cells. Cerebral segments with 1 long dorsal and 1 ventral seta posteriorly; setal length subequal to segment length.

EGG.-Length 500 μm ; width 250 μm . General shape oval; cross section circular. Color light golden brown. Collar and eclosion line absent; chorion covered with irregularly hexagonal follicle cell impressions, with walls of varying thickness and occasionally broken; follicle cell impression floors with 2-6 central raised areas (Fig. 13).

DISTRIBUTION.-This species is known only from lower elevations in the Sierra Nevada of California.

TYPES.-Holotype male, allotype female, and 5 male and 10 female paratypes collected from

California, Nevada County, Sweetland Creek, Hwy 49, 3.2 km south of North San Juan, 18 May 1983, R.W. Baumann, R.C. Mower; and M.F. Whiting. Holotype and allotype deposited in the U.S. National Museum, Washington, D.C. Paratypes were examined from the following localities: Amador Co.: Big Indian Creek, 6 km north of Plymouth, 11-IV-1986, R.L. Bottorff, 1 female; 25-IV-1986, 1 male, 1 female; 29-IV-1986, 1 female; 9-V-1986, 1 male; Little Indian Creek, 3 km west of Plymouth, 18-IV-1986, R.L. Bottorff, 3 males, 5 females, 1 nymph; 9-V-1986, 2 females; 1-V-1987, 1 female; 12-V-1987, 2 males, 3 females. El Dorado Co.: Indian Creek, 3.3 km northeast of Michigan Bar bridge, 8-IV-1987, R.L. Bottorff, 15 males, 10 females, 1 nymph; 13-IV-1987, 5 males, 2 females; unnamed north bank tributary to Cosumnes River, 2.9 km upstream of Michigan Bar bridge, 9-IV-1986, R.L. Bottorff, 16 males, 13 females, 14 nymphs; unnamed creek tributary to north bank of North Cosumnes River, 6 km north of Nashville, 1-V-1987, R.L. Bottorff, 1 male, 3 females, 1 nymph; 12-V-1987, 15 males, 19 females, 25 nymphs. Mariposa Co.: Maxwell River near Coulterville, 25-V-1974, D.G. Denning, 2 females (USNM). Sacramento Co.: Cosumnes River at Michigan Bar, 6-IV-1983, R.L. Bottorff, 1 female; unnamed south bank tributary to Cosumnes River, 0.3 km upstream of the Michigan Bar bridge, 21-III-1986, R.L. Bottorff, 25 males, 16 females, 2 nymphs; 29-III-1986, 17 males, 21 females, 3 nymphs; 11-IV-1986, 25 males, 20 females, 5 nymphs; 29-IV-1986, 24 males, 23 females; 25-III-1987, 14 nymphs. Paratypes are in the collections of the M.L. Bean Life Science Museum, Brigham Young University, Provo, Utah, and R.L. Bottorff, South Lake Tahoe, California.

ETYMOLOGY.-This species is named for the Sierra Nevada of California.

BIOLOGICAL NOTES.-*Suwallia sierra* emerged from late March to mid-May and occurred in low-elevation, small, often intermittent streams with *Bolshecapnia maculata* (Jewett), *Cosumnoparla hypocrena* Szczytko and Bottorff, *Isoperla acula* Jewett, *Isoperla adunca* Jewett, *Isoperla miwok* Bottorff and Szczytko, *Oemopteryx vanduzeeae* (Claassen), and *Sweltsa californica* (Jewett). Nymphal gut contents included chironomid larvae, diatoms, and fine organic detritus. Well-developed eggs were found in mature nymphs.

DIAGNOSIS.-Because the epiproct tip is a hairy membraneous knob, the fused basal plate star-shaped, the aedeagus spinulated, and the adult mandibles reduced, *S. sierra* is clearly within the tribe Suwalliini (Surdick 1985), which includes the genera *Suwallia* and *Neaviperla*. Although *S. sierra* shares important characters with *Neaviperla*, such as cerci with modified basal segments and an aedeagus with sclerotized lateral patches, we have assigned this species to *Suwallia* based on the adult meso- and metanota U-marks and the shape of the male basal plate. The most important feature absent in *S. sierra* males that characterizes *Suwallia* is the lack of distinct, medially directed, digitate processes on the hemiterga. In *S. sierra* the hemiterga have medially directed points, but these are not attenuated into the typical digitate processes of *Suwallia* and are smaller than the digitate processes of *Neaviperla*. *Suwallia sierra* is not placed in *Neaviperla* because of important character differences, including the lack of an anteriorly projecting process on the 9th tergum of the male, lack of a bifurcated anterior edge on the male basal plate, less modified basal segments of the male cerci, dark U-shaped pattern on the adult meso- and metanota, and lack of an egg collar. Apparently *S. sierra* is intermediate in appearance between *Suwallia* and *Neaviperla forcipata* (Neave).

Suwallia sierra males differ from all other *Suwallia* by (1) the greatly reduced hemitergal processes; (2) elongated and curved basal cercal segments, which possess stout spines on the interior surface; (3) excavated, instead of posteriorly produced, 9th tergum; and (4) lateral sclerotized patches on the aedeagus. Female *Suwallia* often cannot be clearly identified to species, although *S. sierra* females do differ slightly by having a more swollen posterior lobe on the subgenital plate, and this lobe projects posteriorly rather than ventrally. *Suwallia* nymphs cannot be separated at this time. The eggs of *S. sierra* are distinctive by lacking a collar and having hexagonal reticulations (Fig. 13).

Suwallia sierra was found in the same major drainage basin of the central Sierra Nevada with 2 other *Suwallia* species; however, it is separated spatially and temporally from both species: *S. pallidula* occurs in middle-elevation perennial streams and emerges in June-August, and

S. autumnna occurs in high-elevation perennial streams and emerges in August-September.

Sweltsa pisteri, new species

Figs. 6-8

MALE.-Macopterous. Body length 7-8 mm; forewing length 8-9 mm. General body color yellow-brown. Dorsum of head, from hind ocelli to front margin, brown. Pronotum with dark margin and dark lateral rugosities, with lateral disks light and corners rounded. Meso- and metanota with dark U-marks. Wings light brown and veins slightly darker. Abdomen with dark brown, median stripe that extends to anterior margin of 8th tergum. Ninth tergum bearing small, rounded, sclerotized knob medially. Tenth tergum with large, V-shaped, darkly sclerotized area located under apex of epiproct; hemiterga sclerotized and bearing long hairs (Fig. 8). Epiproct large and well developed, lightly sclerotized dorsally, tip with round, sclerotized cap that extends ventrally; dorsal aspect nearly parallel sided but sometimes slightly narrower at base or near apex; lateral aspect flat dorsally, thin near base, with massive, rectangular-shaped apex, encompassing apical 2/3, dorsal outline straight (Figs. 6, 7).

FEMALE.-Macopterous. Body length 8.5 mm; forewing length 9 mm. General body color similar to male. Subgenital plate with broad base, narrowly constricted posteriorly, forming pointed tip. The apex is gently rounded but is much narrower than in most *Sweltsa* species.

DISTRIBUTION.-*Sweltsa pisteri* is presently known from the Coast Range in northern California.

TYPES.-Holotype male and allotype female collected from California, Mendocino County South Caspar Creek, Jackson State Forest, east of Caspar, 9 May 1991, R.L. Bottorff. The holotype male and allotype female are deposited at the U.S. National Museum, Washington, D.C. Paratypes were studied from the following places: Marin Co., Woodacre, 1-V-1955, S.W. Hitchcock, 1 male (USNM); Lily Pond, Alpine Lake (malaise trap), 10-V-9-VI-1970, 6 males, 6 females (CNC). Mendocino Co., same data as holotype, 18-IV-1985, 1 male.

ETYMOLOGY.-This species is named for Edwin P. Pister of Bishop, California. Phil has long been a supporter of rare species and endangered habitats. *Sweltsa pisteri* is presently in this category and needs to be better understood.

DIAGNOSIS.—The male genitalia of *S. pisteri* are most similar to *Sweltsa tamalpa* Ricker, *Sweltsa townesi* Ricker (Figs. 9, 10), and *Sweltsa resima* Surdick (Figs. 11, 12). Both *S. pisteri* and *S. tamalpa* bear a sclerotized prong on their 9th tergum, but it is small and delicate in *S. pisteri* (Fig. 8), while it is large and bears broadly sclerotized lateral bands in *S. tamalpa* (Ricker 1952, fig. 140). The lateral outline of the epiproct has a downward-pointed projection in *S. tamalpa*, but in *S. pisteri*, *S. resima*, and *S. townesi* it is broad and flat. In dorsal view the epiproct is pointed in *S. tamalpa*, enlarged apically in *S. resima* and *S. townesi*, and nearly parallel in *S. pisteri*. The female subgenital plate of *S. pisteri* is narrow at the tip as in *S. tamalpa* (Ricker 1952, Fig. 143) but not bifurcate or as sharply pointed.

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