STUDIES ON SWELTSA TOWNESI AND A NEW SPECIES, SWELTSA SALIX, FROM NORTHERN CALIFORNIA (PLECOPTERA: CHLOROPERLIDAE)

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ABSTRACT
Sweltsa townesi is redescribed and refigured using scanning electron micrographs and available records are provided from its known range in the Sierra Nevada Mountains of California and Nevada. Sweltsa salix sp. n. from the Klamath River drainage in the Coast Range and the upper Sacramento River drainage of California is described for the male and female, and compared with its closest congener, S. townesi.

Keywords: Plecoptera, stonefly, Chloroperlidae, Sweltsa, new species, Sierra Nevada and Coast Range, California and Nevada

INTRODUCTION
Stark et al. (2009) listed 23 Sweltsa species from western North America. Of these, two species were recently added. Stark and Baumann (2007) described S. yurok from northwestern California and Kondratieff and Baumann (2009) added S. durfeei from the northern Rocky Mountains. Several stonefly species have been described from tributaries of Willow Creek in Humboldt Co., California – part of the greater Klamath-Trinity River system - since 1987 (Baumann and Lauck 1987; Nelson and Baumann 1990; Stark and Baumann 2001; Baumann and Lee 2007; Baumann and Lee 2009; Baumann and Kondratieff 2009). Therefore, it was not surprising to discover an undescribed Sweltsa from the mainstem of Willow Creek. Further study of material from northern California showed this new stonefly occurs in additional tributaries of the Klamath and Trinity Rivers and the McCloud River, historically a tributary of the Pit River in the upper Sacramento River drainage (Pacific Gas and Electric Company 1962). Sweltsa salix sp. n. is similar in appearance to S. townesi (Ricker). In this paper, we describe S. salix, redescribe S. townesi, and compare the two species using SEM images.

MATERIAL AND METHODS
Specimens were studied from the following collections: Brigham Young University Collection (BYUC), Provo, Utah; C.P. Gillette Museum of Arthropod Diversity (CSUC), Fort Collins, Colorado; United States National Museum (USNM) Washington, D.C.; Richard Bottorff Collection (RLBC), Placerville, California; and Jonathan Lee Collection (JLJC), Eureka, California.

Adult characters were studied using a WILD M8 stereomicroscope and a PHILIPS XL.30 ESCM FEG scanning electron microscope at Brigham Young University, Provo, Utah. Adult and larval characters were studied using a ZEISS Stemi SV11 stereomicroscope in Eureka, California.
Sweltsa townesi (Ricker)
(Figs. 1-8)

Alloperla (Sweltsa) townesi Ricker 1952:184. Holotype ♂, Dardanelle (Tuolomne Co.) California.


Figs. 1-8. *Sweltsa townesi*, male and female genitalia and aedeagus. 1. epiproct, dorsal, S F Stanislaus River, CA; 2. epiproct, apex, dorsal, S F Stanislaus River, CA; 3. epiproct, lateral, Galena Creek, NV; 4. epiproct, dorsolateral, S F Stanislaus River, CA; 5. epiproct, base, dorsal, S F Stanislaus River, CA; 6. female, subgenital plate, ventral, S F Stanislaus River, CA; 7. aedeagus, dorsal, Galena Creek, NV; 8. aedeagus, terminal, Galena Creek, NV.

**Male.** General body color yellow with brown markings. Head yellow, ocellar rings dark brown; brown mark forward of anterior ocellus to frontal margin masking center of M line; brown behind eyes. Pronotum wider than long, yellow with dark brown margins and rugosities. Abdomen with dark brown median stripe from tergum 1 to the anterior half of tergum 8. Lateral brown marks anteriorly on at least segments 1-4; anteromedial transverse, anteriorly sclerotized, scalloped ridge on tergum 9, often with unevenly crenulate margin. Epiproct tip chocolate brown; in dorsal aspect (Fig. 1) spatulate, ca. twice as long as greatest width; narrowing slightly from base then gradually widening to its greatest width at 2/3 length before narrowing to a bluntly pointed apex (Fig. 2); narrow median groove running from base to near apex (Figs. 1, 2). In lateral aspect (Figs. 3, 4) narrow at base with club shaped apex; dorsal margin nearly straight with slight dip where median groove terminates, before rising to a club-shaped apex; ventral margin nearly straight in basal 1/3, becoming declivent at ca. 45°, then recurved to apex. Aedeagus membranous (Figs. 7, 8), tubular basally, expanded abruptly into thick, semicircular, plate-like process, with horn-like lateral extensions; dorsal margin bearing paired finger-like lobes medially, with an elongate covered orifice below the lobes (Figs. 7, 8) much like *Sweltsa exquisita* (Frison) in Kondratieff and Baumann (2009) Figs. 8, 9.

**Female.** General body color and markings similar to male but median brown mark on tergum 8 mostly restricted to anterior margin. Subgenital plate roughly hexagonal (Fig. 6), usually darker than surrounding sterna, hirsute, elevated anteriorly and centrally, posterior margin straight to slightly emarginate, extending at least ½ over sternum 9.

**Distribution.** *Sweltsa townesi* is well distributed in the heart of the Sierra Nevada near Lake Tahoe. It extends northward to Tehama County and southward to the Yosemite region but does not cross to the east slope of the Sierra except near Lake Tahoe in Nevada. *Sweltsa resina* Surdick replaces *S. townesi* on the east slope of the Sierra Nevada near Mount Whitney and ranges east to the White Mountains and southwest to Sequoia National Park.
Sweltsa salix sp. n.
(Figs. 9-16)

Material examined. Holotype ♂ from California, Humboldt Co., Willow Creek, East Fork Willow Creek Campground, 19-V-08, J.J. Lee. Paratypes: -

CALIFORNIA: Humboldt Co., Willow Creek, Hwy 299, East Fork Willow Creek Campground, 22-VI-1985, R.W. Baumann, C.R. Nelson & M. L. Whiting, 2♂, 1♀ (BYUC); 2-VI-2007, J.J. Lee, 3♂, 13♀ (BYUC); 5-VI-07, J.J. Lee, 4♂, 2♀ (JLJC); 19-V-08, J.J. Lee, 21♂, 10♀ (BYUC, JLJC); 25-V-09, J.J. Lee, 1♂, 3 nymphs, 1♂, 6♀ reared, 26-28-V-09 (JLJC); spring, East Fork Willow Creek Campground, 19-08, J.J. Lee, 1♂ (JLJC); 28-V-2008, J.J. Lee, 2♂, 3♀ (JLJC).


Male. Macropterous; body length 7.5-9 mm; forewing length 8.5-9 mm. General body color and markings similar to male but median brown mark on tergum 8 mostly restricted to anterior margin. Subgenital plate crudely hexagonal (Fig. 14), wider than long, elevated anteriorly and centrally, hirsute, extending at least one-half over sternum 9.

Larva. Characters for mature larva similar to description for S. townesi (Stewart and Stark 2005) although M-line centered on anterior ocellus is pale in specimens not exhibiting adult coloration beneath cuticle.

Etymology. The species epithet salix is based on the Latin word for willow. This not only has reference to the fact that the types were collected from Willow Creek but also that the adults are often found on streamside willows (Salix spp.).

Diagnosis. Sweltsa salix is closely related to S. townesi but they can be separated by the male epiproct. The epiproct of S. townesi possesses a distinct dorsomedial narrow groove extending from the base to near the apex (Figs. 1-5). The epiproct of S. salix possesses a broad, shallow dorsomedial channel extending from the base and bisected apically by a carinate knob (Figs. 9-13). The aedeagus of the two species is very similar in shape. Females can not be separated without associated males.

Distribution. Present collection records of S. salix indicate an interesting distribution pattern in the California Coast Range. It was collected from Willow Creek and East Weaver Creek, both medium sized tributaries of the Trinity River, and from the Scott River, a small river flowing into the middle Klamath River. Sweltsa salix was also collected on the east side of the Sacramento Valley from the McCloud River. We suspect it occurs in medium sized creeks and small rivers throughout the Klamath-Trinity watershed, however, a thorough search of material at BYUC did not produce S. salix specimens from streams adjacent to the McCloud River.

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REFERENCES


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