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SWELTSA YUROK (PLECOPTERA: CHLOROPERLIDAE), A NEW STONEFLY FROM CALIFORNIA, U.S.A.

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ABSTRACT

Sweltsa yurok, sp. n. is described from specimens collected in the Coast Range of northern California. The new species is compared to *S. pisteri* Baumann & Bottorff, and *S. tamalpa* (Ricker), closely related species found in the same region, and a provisional key to males of the *Sweltsa tamalpa* species group is presented.

Keywords: Plecoptera, Chloroperlidae, *Sweltsa*, new species, California

INTRODUCTION

Following the studies of Surdick (1995) and Baumann & Bottorff (1997) the systematics of western Nearctic *Sweltsa* has remained unchanged with 21 species recognized. In 1998, 2001 and again in 2005 we, and various colleagues, collected specimens of a small distinctive *Sweltsa* in tributaries of Willow Creek in the greater Trinity-Klamath River drainage of northern California, an area where several other interesting stoneflies have been discovered (Baumann & Lauck 1987; Stark & Baumann 2001; Baumann & Lee 2007). Because the new species appears to form a natural group within *Sweltsa*, with *S. pisteri* Baumann & Bottorff and *S. tamalpa* (Ricker), we take this occasion to document the species and the group. Specimens are deposited in the Monte L. Bean Museum, Brigham Young University, Provo (BYU), the C.P. Gillette Museum of Arthropod Diversity, Colorado State University, Fort Collins (CSU), the Canadian National Collection, Ottawa (CNC), the Stark Collection, Clinton (BPS), the Szczytko Collection, Stevens Point (SWS), and the United States National Museum, Washington (USNM).

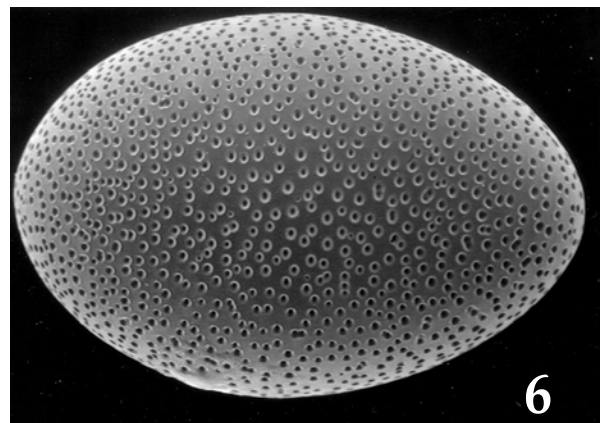
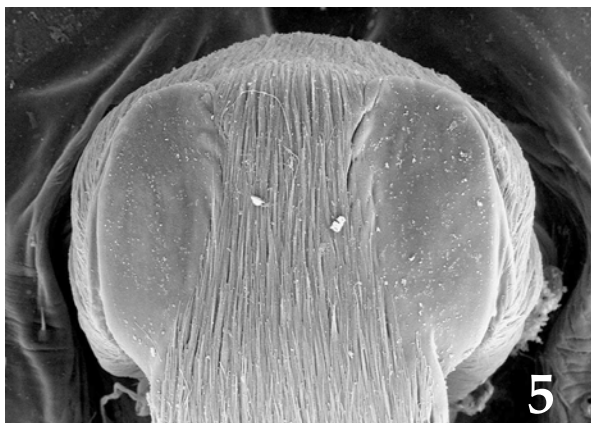
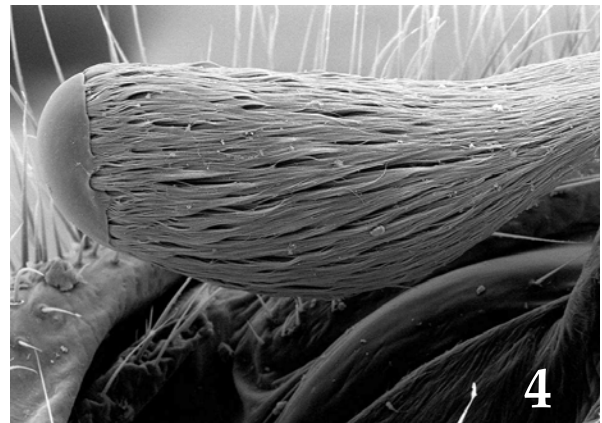
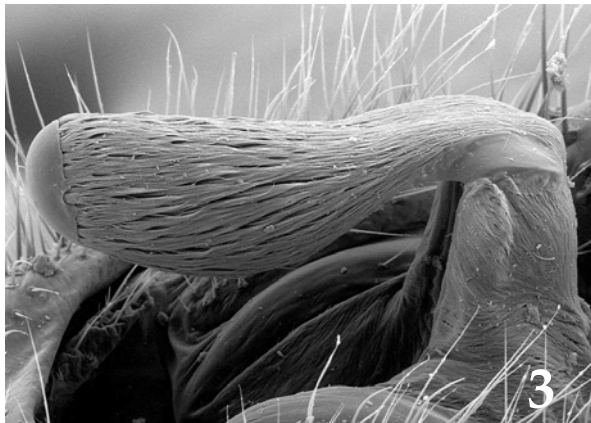
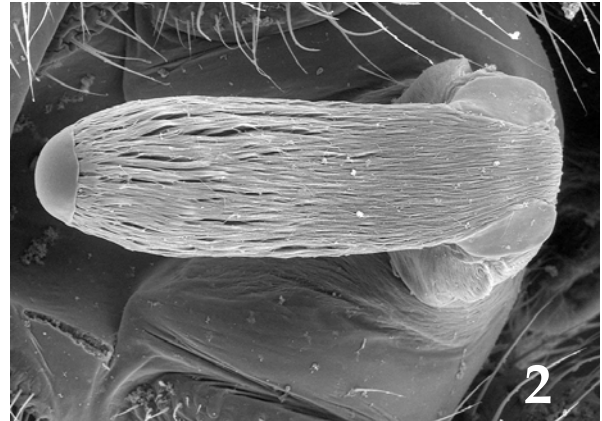
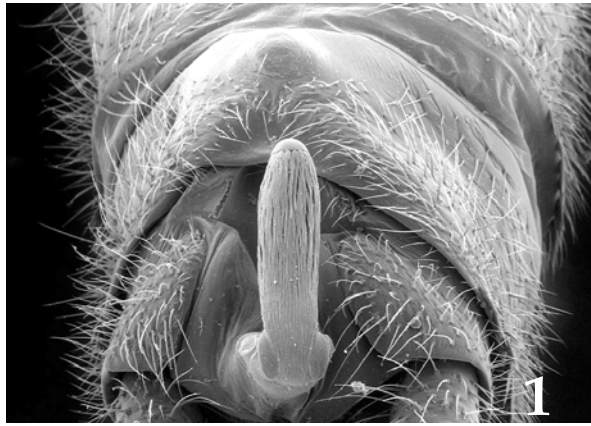
The *Sweltsa tamalpa* group

Members of this group have a relatively short, slender, hairy epiproct with bare tip and a median, bare knob on male tergum 9; the epiproct apex is expanded near midlength, usually giving the structure a foot shaped appearance in lateral aspect. Female subgenital plates are more or less triangular, have a basal transverse groove, and are relatively strongly sclerotized. Eggs are oval with coarsely pitted chorions and no collar. Adults are smaller than most *Sweltsa* and have pale yellow-brown coloration patterned with dusky brown. The known distribution for the group is centered on the northern California Coast Range with one record of *S. tamalpa* from as far south as the Pinnacles National Monument in San Benito Co.

Sweltsa pisteri Baumann & Bottorff (Figs. 1-6)

Sweltsa pisteri Baumann & Bottorff, 1997: 346. Holotype

♂ (U. S. National Museum). South Caspar Creek, Jackson State Forest, Mendocino Co., California



Figs. 1-6. *Sweltsa pisteri* (1-5: Irish Gulch Creek, Mendocino Co., CA; 6: Caspar Creek, Mendocino Co., CA). 1. Male terminalia, dorsal aspect, 2. Epiproct, dorsal aspect, 3. Epiproct, lateral aspect, 4. Epiproct apex, lateral aspect, 5. Epiproct base, dorsal aspect, 6. Egg.

Material examined. California: Humboldt Co., tributary Mattole River, 4.1 miles E Petrolia, Mattole

Road, 20 May 2007, J.J. Lee, 1 ♂, 1 ♀ (BYU). Humboldt Co., Woods Creek, 1.4 miles W

Honeydew, Mattole Road, 20 May 2007, J.J. Lee, 1 ♂, 1 ♀ (BYU). Lake Co., tributary South Fork Scotts Creek, Hwy 175, mile 2.8, 5 May 2006, J.J. Lee, 1 ♂ (BYU). Marin Co., Lily Pond, Alpine Lake (Malaise trap), 10 May-9 June 1970, 6 ♂, 6 ♀ (CNC). Mendocino Co., South Caspar Creek, Jackson State Forest, 18 April 1985, R.L. Bottorff, 1 ♂ (BYU). Mendocino Co., Jackson State Forest, Caspar Creek, 18 May 1998, B. Stark, C.R. Nelson, S.W. Szczytko, I. Sivec, 16 ♂, 32 ♀ (BYU, SWS, BPS). Mendocino Co., Irish Gulch Creek, below Hwy 1, 15 April 2005, L.D. Bottorff, 3 ♂, 2 ♀ (BYU). Mendocino Co., upper Irish Gulch Creek, 1.5 miles E Pacific Ocean, 21 April 2006, L.D. & R.L. Bottorff, 3 ♂, 3 ♀ (BYU).

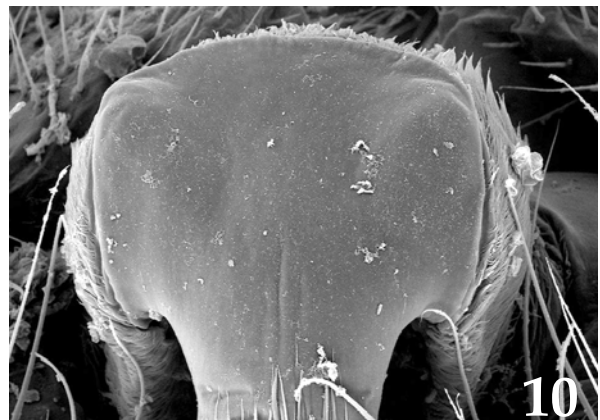
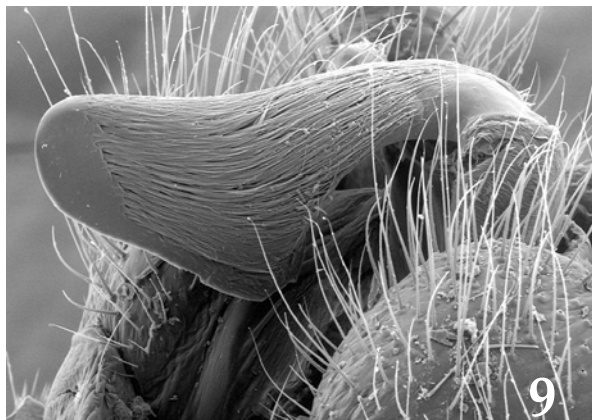
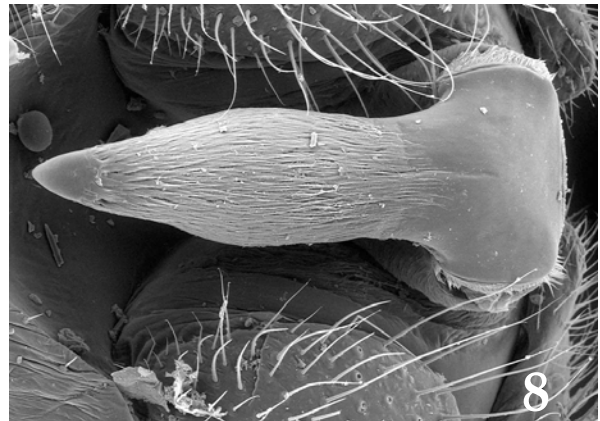
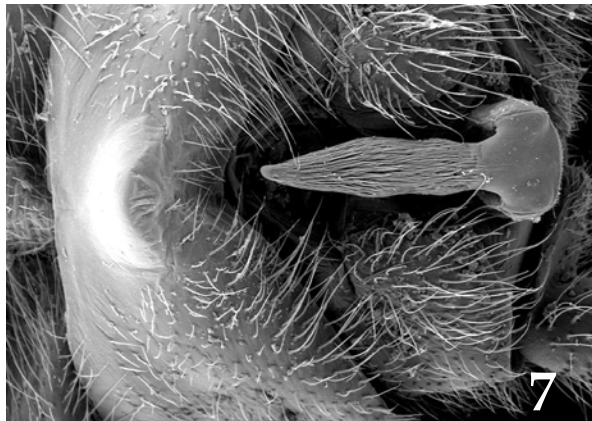
Remarks. The epiproct shape for this species is beautifully illustrated in Baumann & Bottorff (1997), however details of epiproct setation were not given. In dorsal aspect, the epiproct has almost parallel sides except for the apex, and in lateral aspect the apical half is expanded but does not exhibit a foot shape as in the other members of the complex. The

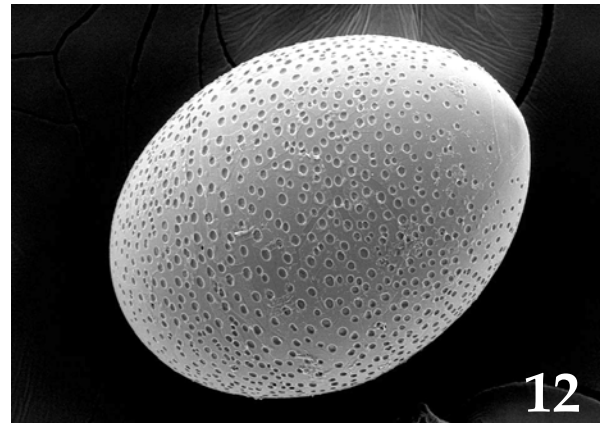
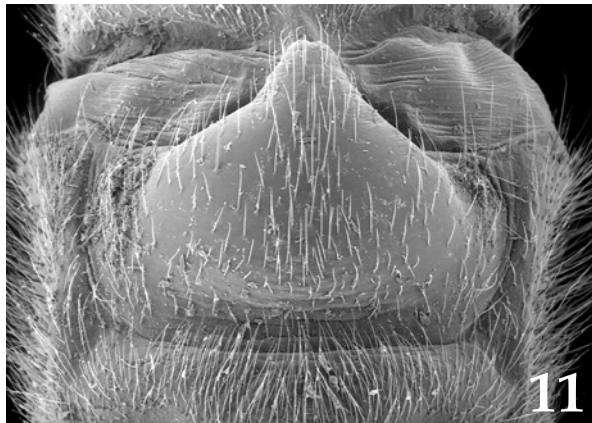
epiproct tip is rounded and bare but most of the dorsal and lateral surface is covered with a dense pile of setae which extends to the epiproct base, leaving, on either side of the base, an oval bare spot. We provide Figs. 1-5 to permit direct comparisons of these characters with other members of the complex. No eggs were available at the time of the original description, consequently we also add the following brief description of chorionic features.

Egg. Outline oval, collar absent. Length ca. 0.35 mm, width ca. 0.23 mm. Chorion completely punctate with coarse, somewhat irregularly spaced, shallow pits (Fig. 6).

Sweltsa tamalpa (Ricker)
(Figs. 7-12)

Alloperla (*Sweltsa*) *tamalpa* Ricker, 1952:182. Holotype ♂ (Illinois Natural History Survey). Bootjack Camp, Mt. Tamalpais State Park, California.





Figs. 7-12. *Sweltsa tamalpa* (Woodacre, Marin Co., CA). 7. Male terminalia, dorsal aspect, 8. Epiproct, dorsal aspect, 9. Epiproct, lateral aspect, 10. Epiproct base, dorsal aspect, 11. Female abdominal sterna 8-9, 12. Egg.

Material examined. California: Marin Co., Woodacre, San Geronimo Valley Road, near junction Francis Drake Boulevard, 13 May 1983, R.W. Baumann, R.C. Mower, 23 ♂, 60 ♀ (BYU). Marin Co., Muir Woods National Monument, 13 June 1980, S.M. Clark, 1 ♀ (BYU). Mendocino Co., Dooley Creek, Hwy 175, E Hopland, 23 April 1987, R.W. Baumann, B.P. Stark, C.R. Nelson, S.A. Wells, 1 ♂, 3 ♀ (BYU). Mendocino Co., seep 9 miles E Hopland, Hwy 75, 23 April 1987, R.W. Baumann, B.P. Stark, C.R. Nelson, S.A. Wells, 1 ♂ (BYU). San Benito Co., West Fork Chalone Creek, Pinnacles National Monument, 10 May 1987, D. Giuliani, 5 ♂, 2 ♀ (BYU). Sonoma Co., Copeland Creek, Fairfield Osborne Preserve, 13 April 1981, L.E. Serpa, 1 ♂ (BYU).

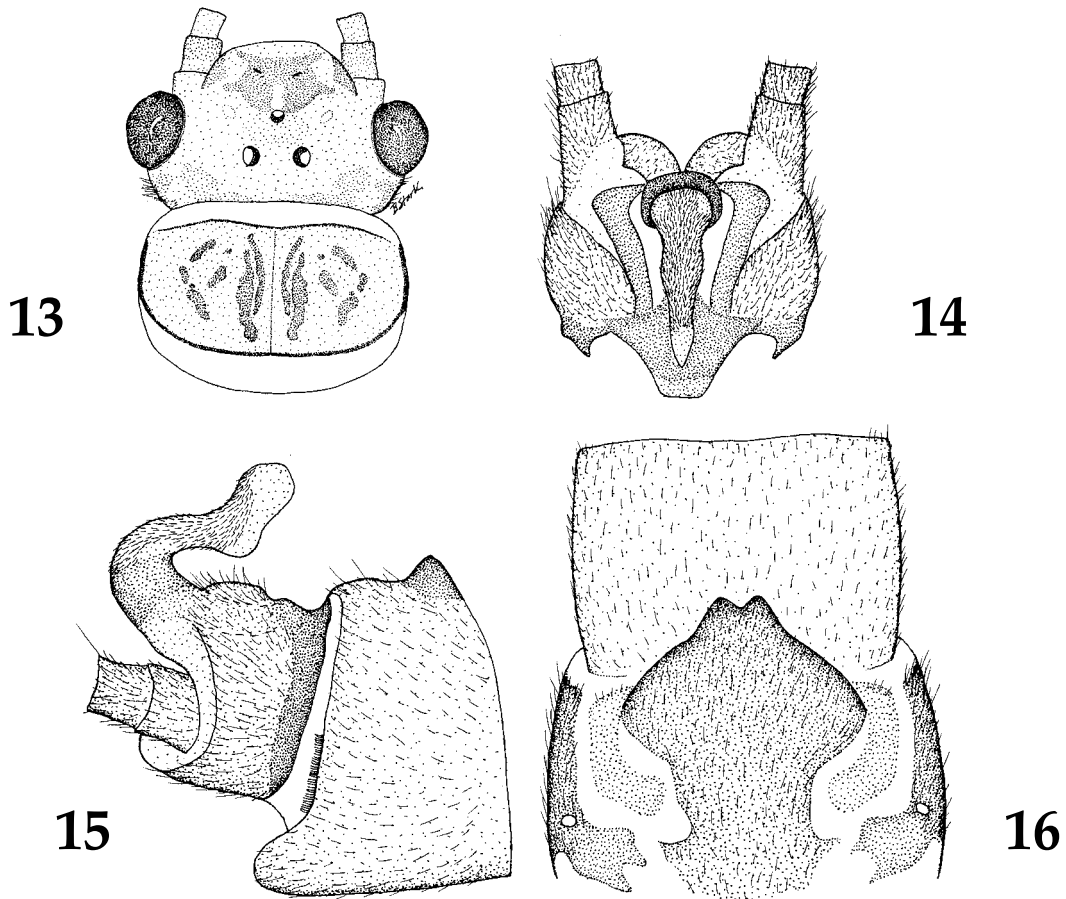
Remarks. Ricker's (1952) figures give the general impression of shape and relative length of the epiproct of this species but do not provide information on epiproct setation, and the egg has not previously been described. Consequently, we offer Figs. 7- 12 and the following comments to document these characters for *S. tamalpa*. The typical epiproct has a pointed, bare apex and a completely bare base (Fig. 8). The apex is foot shaped in lateral aspect (Fig. 9), but is not upturned at the "ankle" as in *S. yurok*. The egg lacks a collar and is coarsely pitted over most of the chorionic surface, but a small apical area is smooth (Fig. 12).

Sweltsa yurok, sp. n.
(Figs. 13-22)

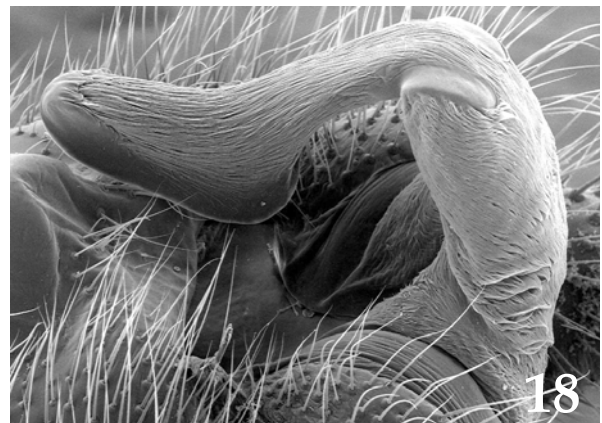
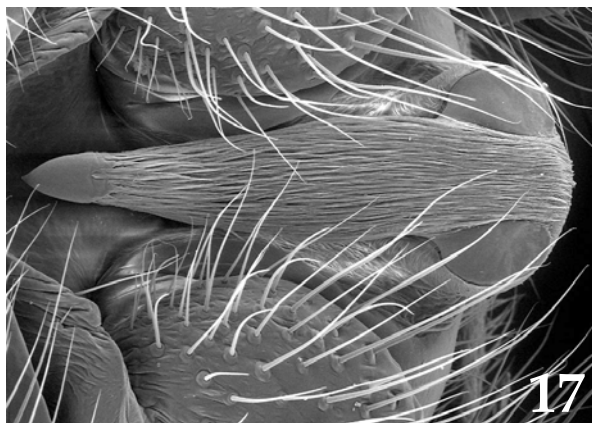
Material examined. Holotype ♂ and ♀ paratype from California, Humboldt Co., 2.3 miles E Berry Summit, Hwy 299, 20 May 2001, B. Stark, K.W. Stewart, deposited in the United States National Museum (USNM). Additional paratypes: California: Humboldt Co., Captain Creek, Chezam Rd, 13 May 2006, J.J. Lee, 8 ♂, 1 ♀ (BYU). Humboldt Co., unnamed stream, Redwood Creek Trailhead, near Orick, Redwood National Park, 1 June 1991, R.W. Baumann, B.P. Stark, 2 ♂, 4 ♀ (BYU). Same site, 20 May 2006, J.J. Lee, 2 ♂ (BYU). Humboldt Co., Willow Creek, Hwy 299, 2.7 miles E Berry Summit, 19 May 1998, B.P. Stark, C.R. Nelson, S.W. Szczytko, I. Sivec, 2 ♂, 2 ♀ (BPS, BYU). Humboldt Co., tributary seeps Willow Creek, Hwy 299, 2.4 miles E Berry Summit, 19 May 1998, B.P. Stark, C.R. Nelson, S.W. Szczytko, I. Sivec, 50 ♂, 29 ♀ (BPS, BYU, SWS). Humboldt Co., tributary seeps Willow Creek, Hwy 299, 2.5 miles E Berry Summit, 19 May 1998, B.P. Stark, C.R. Nelson, S.W. Szczytko, I. Sivec, 2 ♂, 5 ♀ (BYU, SWS). Humboldt Co., Spring stream, Hwy 299, mile 31.33, upper Willow Creek drainage, 13 May 2006, J.J. Lee, 14 ♂, 7 ♀ (BYU). Same site, 19 May 2006, J.J. Lee, 13 ♂, 5 ♀ (BYU). Same site, 3 July 2007, J.J. Lee, 6 ♂, 4 ♀ (BYU). Humboldt Co., Slide Creek, near Fish Lake, Rd 13N01, 23 June 2005, J.J. Lee, 3 ♂, 5 ♀ (BYU). Humboldt Co., unnamed creek, mile 4.1 near Fish Lake, Rd 13N01, 20 April 2006, J.J. Lee, 8 ♂, 4 ♀ (BYU). Humboldt Co., seep near Fish Lake, Rd 13N01, 0.25 miles from Hwy 96, 20 April 2006, J.J. Lee, 1 ♂ (BYU). Humboldt Co., Mason Gulch Creek, Hwy 299, mile 29.68, near junction Willow Creek, 3

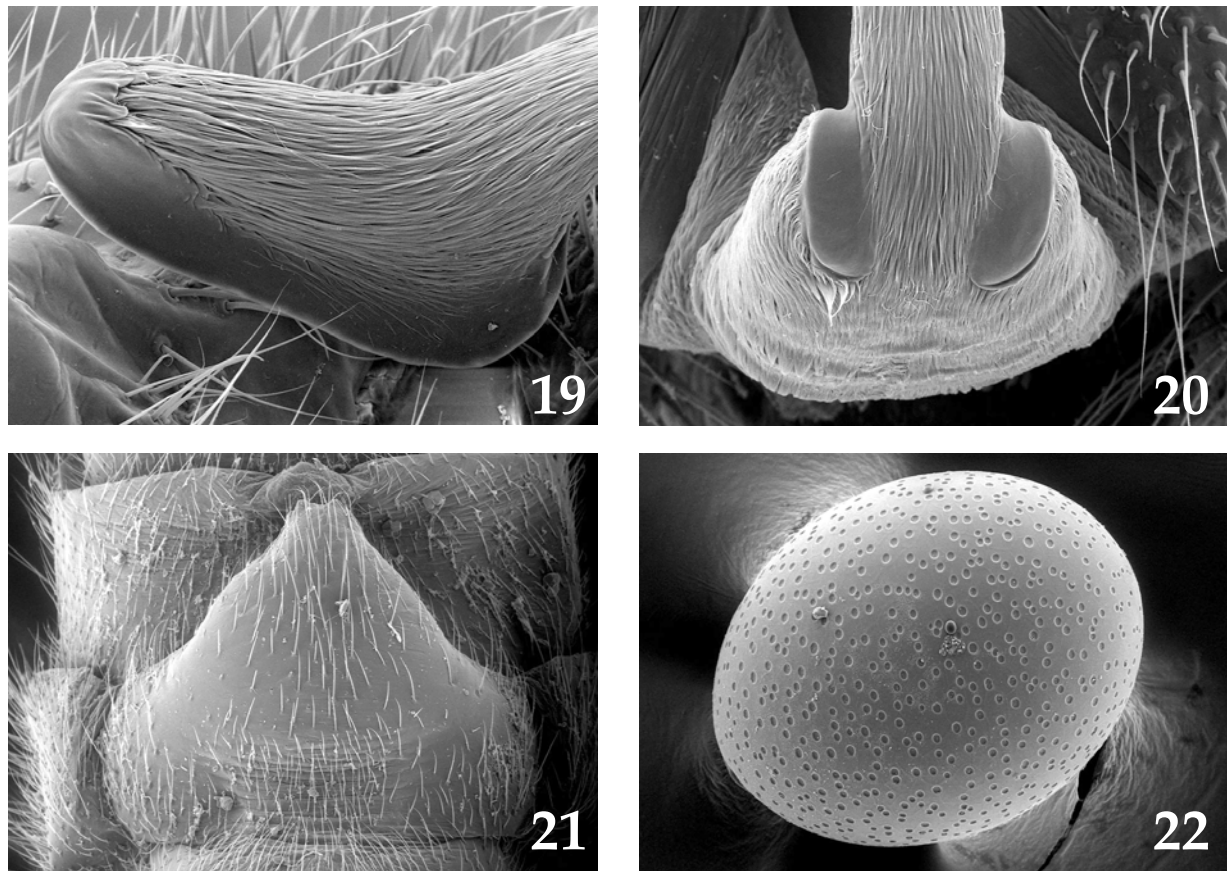
July 2007, J.J. Lee, 21 ♀ (BYU). Lake Co., East Fork Middle Creek, 0.5 mile above Middle Creek Campground, 23 April 1987, R.W. Baumann, B.P. Stark, C.R. Nelson, S.A. Wells, 3 ♂, 1 ♀ (BYU).

Adult habitus. General color pale yellow brown with dusky brown markings on head and pronotum (Fig. 13). Head and pronotal disk setae with brown freckle spots around base. Legs pale, wings transparent with



Figs. 13-16. *Sweltsa yurok*. 13. Head and pronotum, 14. Male terminalia, dorsal, 15. Male terminalia, lateral, 16. Female terminalia, ventral.





Figs. 17-22. *Sweltsa yurok* (17, 22: tributary Willow Creek, 2.4 miles E Berry Summit, Humboldt Co., CA; 18-20: Mile 4.1, Rd 13N01, Humboldt Co., CA; 21: Slide Creek, Humboldt Co., CA). 17. Dorsal aspect male epiproct, 18. Lateral aspect epiproct, 19. Epiproct apex, lateral aspect, 20. Epiproct base, dorsal aspect, 21. Female terminalia, ventral, 22. Egg.

pale brown veins; M and CuA veins darker. Dark brown median abdominal stripe extends through tergum 7 on female and to anterior margin of tergum 8 in male.

Male. Forewing length 8.0-9.0 mm. Bare epiproct tip rounded or triangular in dorsal aspect, wide basally and narrowed apically (Figs. 14, 17-18); lateral margins slightly curved beyond midlength in some specimens; dorsal and much of lateral surfaces clothed with dense pile of golden brown setae except for tip (Figs. 17-19); apex of epiproct foot shaped in lateral aspect and upturned near tip, but without setae on "heel" and on ventrolateral surface (Fig. 19); ventral margin strongly narrowed and blade like; epiproct base wider with bare shoulders (Figs. 17, 20); stalk of epiproct densely hairy. Tergum 9 with a median, bare knob near anterior margin (Fig. 15).

Aedeagus membranous but with a pair of small, ventroapical lobes bearing a few setae.

Female. Forewing length 9.0-10.0 mm. Subgenital plate outline triangular, apex entire or with a shallow apical notch (Figs. 16, 21). Plate extends over basal third of sternum 9.

Egg. Length about 0.31 mm, width about 0.25 mm. Outline oval, collar absent, but a bare low knob is present in the collar region. Chorion coarsely punctate throughout; pit size variable but largest pits about 4-5 μ m in diameter (Fig. 22). Micropylar orifices small and strongly slanted.

Larva. Unknown.

Etymology. The species name, used as a noun in apposition, honors the Yurok people of California.

Diagnosis. The new species is most similar to *S. tamalpa* but males of these species are distinguished

on the basis of epiproct shape and setation. In *S. tamalpa* the epiproct base is usually completely bare, and the epiproct tip is not bent dorsad at the “ankle” region, whereas in *S. yurok* the epiproct base has a setose band extending between the bare lateral shoulders to the base, and in lateral aspect the epiproct apex is distinctly foot shaped with tip upturned at the “ankle”. The third member of the group, *S. pisteri*, differs from both species in lacking the foot shaped apical region of the epiproct, and in having more-or-less parallel margins for most of the dorsal length of the epiproct. Females of these species may be inseparable based on subgenital plate morphology, however the eggs of *S. pisteri* (Fig. 6) have much more prominent and numerous chorionic punctations than do those of *S. yurok* (Fig. 22) and *S. tamalpa* (Fig. 12), and the latter species has a more conspicuous non-punctate apical area than *S. yurok*. The following key is offered to assist in identification of males of this group.

Key to Males of the *Sweltsa tamalpa* Species Group

- 1 Epiproct lateral margins almost parallel in dorsal aspect for most of length (Fig. 2); apical half to third of epiproct not forming a conspicuous foot shaped process in lateral aspect (Fig. 3) *pisteri*
- 1' Epiproct lateral margins conspicuously constricted in dorsal aspect near midlength (Fig. 8); apical half to third of epiproct forming a more-or-less foot shaped process in lateral aspect (Fig. 9) 2
- 2 Base of epiproct bare in dorsal aspect (Fig. 10), setose band terminates forward of lateral shoulders; dorsal margin of epiproct tip almost straight in lateral aspect (Fig. 9), foot shaped process poorly define *tamalpa*
- 2' Dorsal aspect of epiproct with setose band extending between basolateral shoulders to posterior margin (Fig.20); tip of epiproct angled dorsad from “ankle” (Fig. 19), apex distinctly foot shaped *yurok*

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Gillette Museum and J.J. Lee and R.L. Bottorff for their generosity in sharing specimens of this interesting new species and others in the complex. We also thank D.E. Bright of the Canadian National Collection for the loan of *Sweltsa pisteri* material. Most micrographs were taken at the Brigham Young University Electron Microscopy Laboratory using a Philips XL 30, ESEM FEG. We thank M. Standing for technical support and R. Baker, graphic artist at the Monte L. Bean Life Science Museum, for assisting in preparation of the SEM images.

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