



A CONTRIBUTION TO THE KNOWLEDGE OF *SWELTSA EXQUISITA* (FRISON) AND *S. OCCIDENS* (FRISON) AND DESCRIPTION OF A NEW SPECIES OF *SWELTSA* FROM THE NORTHERN ROCKY MOUNTAINS, U.S.A. (PLECOPTERA: CHLOROPERLIDAE)

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ABSTRACT

The fine detail of the male epiproct and aedeagus of two species of similar habitus of Western Nearctic *Sweltsa*, *S. exquisita* (Frison) and *S. occidentis* (Frison) are illustrated using the scanning electron microscope. A new species related to *S. occidentis*, *S. durfee* sp. n., is described from Montana and Idaho. Electron micrographs of the female subgenital plate are provided of *S. exquisita* and *S. durfee* sp. n. for comparison.

Keywords: Plecoptera, Chloroperlidae, *Sweltsa*, stonefly, new species, Rocky Mountains, western North America

INTRODUCTION

The adults of two species of Western Nearctic *Sweltsa* Ricker, *S. exquisita* (Frison) and *S. occidentis* (Frison) are similar in general habitus (Frison 1937). Both species can be readily recognized in the field by the pale yellow (whitish in alcohol) coloration, lacking any dark marking on the head other than dark ocellar rings, and the pronotum margined laterally with black (Fig. 1). These species are often sympatric, usually occurring in higher elevation, high gradient streams of the Coast and Cascade Mountains of Oregon northward to Alaska and west to Idaho (Surdick 1985). Males are readily separable, with *S. occidentis* lacking an elevated transverse process on the anterior margin of tergum 9 (Ricker 1943, Jewett 1959). The specific details of the epiproct

and aedeagus of these two species have not been previously illustrated (Baumann et al. 1977, Frison 1935, Frison 1937, Jewett 1959, Stewart and Oswood 2006). As the authors were examining material of these two species, Richard S. Durfee made a series of specimens available from Mineral County, Montana that are similar to *S. occidentis*, but the specific details of the epiproct and the aedeagus indicated that it was undescribed.

In this paper, we use scanning electron microscope images to describe for the first time the fine details of the epiproct and the aedeagus of the males for the three species studied. In addition, electron micrographs are provided of the female subgenital plates for two species for comparative purposes.

MATERIAL AND METHODS

Specimens were examined from the Brigham Young University Collection (BYUC), Provo, Utah, the C. P. Gillette Museum of Arthropod Diversity, Colorado State University (CSUC), Fort Collins, Colorado and the B. P. Stark Collection (BPSC), Clinton, Mississippi.

Adult genitalia were studied with a WILD M8 stereomicroscope. Scanning electron micrographs (SEM) were taken using a Philips XL2 ESEM FEG at Brigham Young University, Provo, Utah.

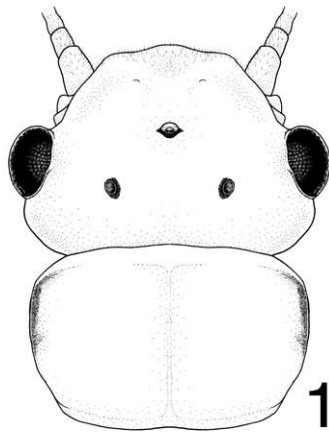


Fig. 1. *Sweltsa durfeeii*, Van Ness Creek, Montana. 1. head and pronotum.

Sweltsa exquisita (Frison) (Figs. 2-9, 26)

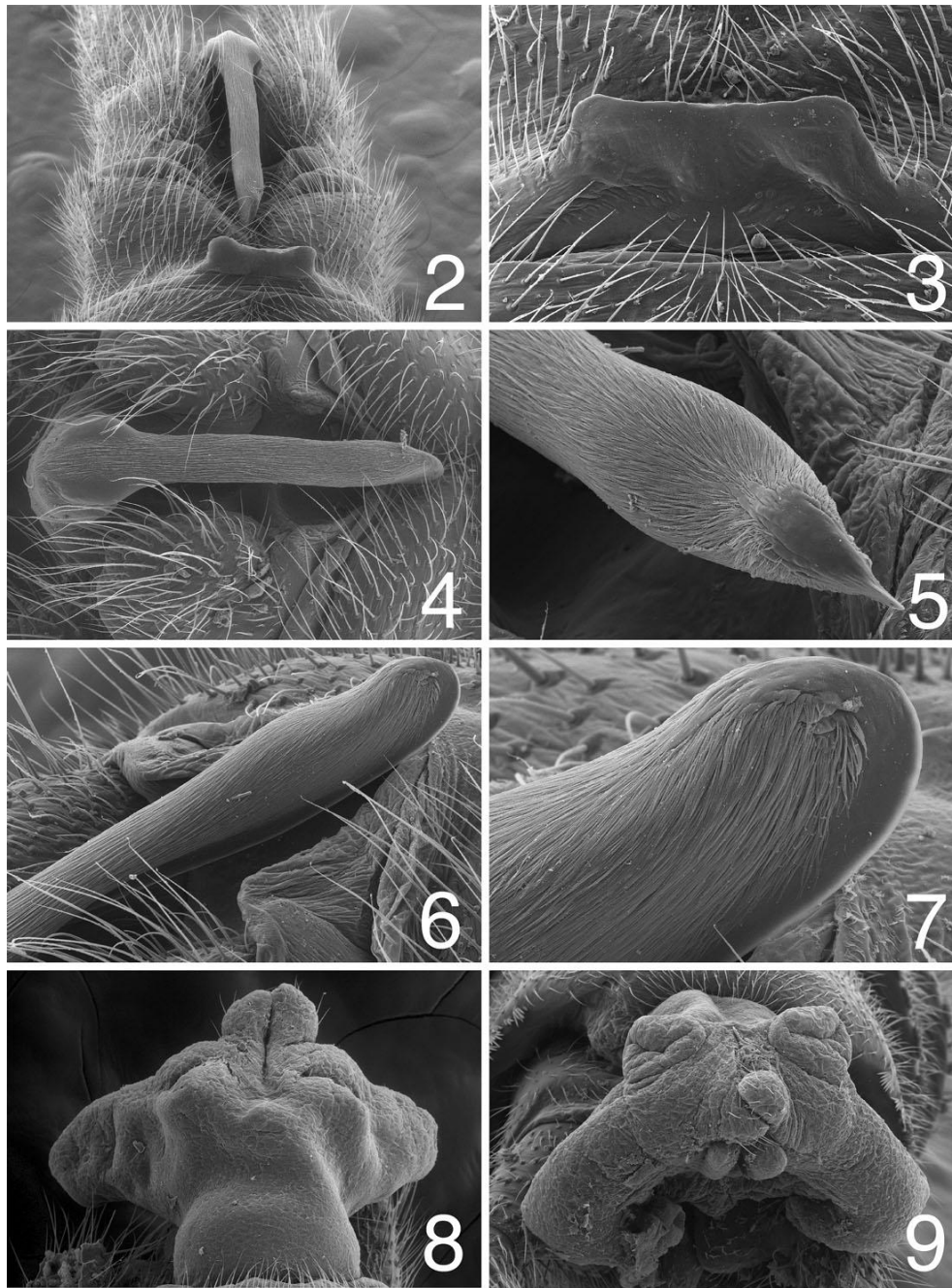
Alloperla exquisita Frison 1935: 337. Holotype ♂, Illinois Natural History Survey: Mt. Hood National Forest, near Welches (Clackamas Co.), Oregon.

Material examined. CANADA: British Columbia: Amadis Creek, above Maple Bay Campground, Cultus Lake Provincial Park, 9 June 1991, R. W. Baumann and B. P. Stark, 1 ♂, 2 ♀ (BYUC); Turbid Creek, junction Squamish River, 15 July 1988, R.W. Baumann, S. A. Wells and M. F. Whiting, 1 ♂, 4 ♀ (BYUC); stream, Hwy 99, S Whistler, 16 July 1988, R. W. Baumann, S.A. Wells and M.F. Whiting, 12 ♂, 10 ♀ (BYUC). USA: Oregon: Clackamas Co., Cedar Creek, 11 June 1986, G.R. Fiala, 1 ♀ (BYUC); Cool Creek, tributary Still Creek, 13 June 1986, G.R. Fiala,

11 ♂, 14 ♀ (BYUC); Still Creek, Still Creek Campground, 28 May 1983, G.R. Fiala, 1 ♂ (BYUC); Clatsop Co., Quartz Creek, Hwy 26, 20 June 1986, G.R. Fiala, 1 ♀ (BYUC); Deschutes Co., Quinn River Spring, Quinn River Campground, 10 June 2004, B.P. Stark and R.W. Baumann, 4 ♂, 1 ♀ (BPSC); Douglas Co., headwaters, Bulldog Creek, Umpqua National Forest, 19 June 1998, R. W. Wisseman, 1 ♂ (BYUC); Hood River Co., McGee Creek, N side of Mount Hood, 20 July 1986, G.R. Fiala, 2 ♂, 1 ♀ (BYUC); Jackson Co., 15 mi. S Talent, Rogue River National Forest, 8 July 1979, B.P. Stark and K.W. Stewart, 10 ♂, 12 ♀ (BPSC); Jefferson Co., headwater spring of Metolius River, 12 June 2004, B.P. Stark and R.W. Baumann, 2 ♂, 1 ♀ (BPSC); Metolius River, Camp Sherman, 11 July 1979, B.P. Stark and K.W. Stewart, 2 ♀ (BPSC); Josephine Co., Lake Creek, Oregon Caves National Monument, 9 July 1979, B.P. Stark and K.W. Stewart, 1 ♀ (BPSC); Klamath Co., Creed National Trail, Crater Lake National Park, 12 August 1973, J. Schuh, 2 ♂, 3 ♀ (BYUC); Sun Creek, Rim Drive, Crater Lake National Park, 7 October 1991, K.W. Stewart, 1 ♂ (BYUC); Lane Co., Alder Springs Campground, 3 June 2000, B.P. Stark, I. Sivec and M. Zúñiga, 3 ♂, 4 ♀ (BPSC); Linn Co., tributary, North Santiam River, Hwy 22, 0.2 mi N Minto Road, 3 June 2000, B.P. Stark, I. Sivec and M. Zúñiga, 2 ♀ (BPSC). Marion Co., North Santiam River, Hwy 22, 3 mi above Idanha, 3 June 2000, B.P. Stark, I. Sivec and M. Zúñiga, 1 ♂ (BPSC); Tillamook Co., tributary, Neskowin Creek, Hwy 12, Neskowin Creek Campground, 4 June 1991, R.W. Baumann and B.P. Stark, 1 ♀ (BYUC); Wasco Co., Barlow Creek, 6 July 1986, G.R. Fiala, 5 ♂, 20 ♀ (BPSC). Washington: Chelan Co., stream, Glacier View Campground, Lake Wenatchee, 15 June 2004, R. W. Baumann and B.P. Stark, 2 ♂, 7 ♀ (BYUC); Bridge Creek, 2 mi. S Hwy 20, Fireweed Campground, 11 July 1994, G. Mackenzie, 15 ♂, 30 ♀ (BYUC); Bridge Creek, below junction Copper Creek, Pacific Coast Trail, 1 mi. off Hwy 20, 11 July 1994, G. Mackenzie, 19 ♂, 29 ♀ (BYUC); Minotaur Creek, 10 mi. W Wenatchee Lake, 4 August 1996, J.R. Wood, 3 ♂, 1 ♀ (BYUC); Rainey Creek, 9 mi. W Wenatchee Lake, 6 July 1975, J.R. Wood, 20 ♂ (BYUC); White Pine Campground, off Hwy 2, 16 June 2004, B.P. Stark and R.W. Baumann, 1 ♂, 3 ♀ (BPSC); Stevens Creek, E Stevens Pass, FR 6980, 16 June 2004, B.P. Stark and R.W. Baumann, 3 ♂, 1 ♀

(BPSC); Clallam Co., Falls Creek, Marymere Falls, Lake Crescent Lodge, Olympic National Park, 15 June 2005, B. Kondratieff and R.W. Baumann, 21 ♂, 14 ♀ (BYUC, CSUC); Dungeness River, Hwy 101, near Sequim, 17 June 1967, R.W. Baumann, 1 ♂ (BYUC); Clark Co., Dry Creek, tributary Kalama River, 26 May 1986, G.R. Fiala, 3 ♂, 3 ♀ (BYUC); Panamake Creek, tributary North Lewis River, 28 May 1986, G. R. Fiala, 3 ♀ (BYUC); tributary, Merrill Lake, near Goat Rock, 26 May 1986, G. R. Fiala, 6 ♂, 1 ♀ (BPSC); Cowlitz Co., spring fed tributary, Kalama River, Weyerhaeuser Limnology Station, 20 June 1967, R.W. Baumann and R.N. Thut, 3 ♂, 1 ♀ (BYUC); Jefferson Co., Spruce Creek, Olympic National Forest, 16 July 1979, B.P. Stark, 2 ♀ (BPSC); Lewis Co., Falls Creek at Stevens Canyon Road, 6 July 1999, B. Kondratieff, 7 ♂, 13 ♀ (CSUC); 8 July 1999, B. Kondratieff, 4 ♂ (CSUC); 25 June 2000, R. Lechleitner, 2 ♂ (CSUC); 7 June 2001, R. Lechleitner, 1 ♂, 1 ♀ (CSUC); 20 June 2003, B. Kondratieff, 6 ♂, 2 ♀ (CSUC); 17 June 2004, B. Kondratieff, 2 ♂, 1 ♀ (CSUC); Glacier Creek, above junction Johnson Creek, Walupt Lake Road, 18 July 1988, R.W. Baumann, S.A. Wells and M.F. Whiting, 2 ♀ (BYUC); Panther Creek, Hwy 123, 9 June 2001, R. Lechleitner, 1 ♂ (CSUC); 13 July 2002, B. Kondratieff, 5 ♂, 4 ♀ (CSUC); 13 July 2003, B. Kondratieff and J. Schmidt, 5 ♂, 5 ♀ (BYUC, CSUC); 14 July 2004, B. Kondratieff, 7 ♂, 3 ♀ (CSUC); Ohanapecosh River, N Hwy 123, 7 July 1999, B. Kondratieff, 10 ♂ (BYUC, CSUC); Ohanapecosh Campground, 16 June 2004, M. Grove, 5 ♂, 4 ♀ (CSUC); Purcell Creek, 5 mi NE Packwood, 15 June 2004, B.P. Stark and R.W. Baumann, 6 ♂, 5 ♀ (BPSC); White Pass, Hwy 12, 28 June 1985, B.P. Stark, 1 ♂, 1 ♀ (BPSC); King Co. Deception Creek, below Deception Falls, Hwy 2, jct. Tye River, 17 July 1988, R.W. Baumann, S.A. Wells and M.F. Whiting, 7 ♂, 25 ♀ (BYUC); creek, Stevens Pass Ski Area, Hwy 2, 17 July 1988, R.W. Baumann, S.A. Wells and M.F. Whiting, 10 ♂, 7 ♀ (BYUC); Mason Co., Jorsted Creek, FR24, NE Lake Cushman, 15 June 2005, B. Kondratieff and R.W. Baumann, 5 ♂, 3 ♀ (BYUC, CSUC); Purdy Creek, George Adams Fish Hatchery, 5 mi. N Shelton, 22 May 1995, G.F. Kraft, 9 ♂, 1 ♀ (BYUC); Rabbit Creek, 4 mi. NW Matlock, 23 April 1995, G.F. Kraft, 1 ♂ (BYUC); Okanogan Co. stream, Loup Loup Campground, Hwy 20, Okanogan National Forest, 10 June 1991, R.W. Baumann and

B.P. Stark, 2 ♂ (BYUC); Boulder Creek 12 mi. NW Conconully, 20 July 1995, Mackenzie, Somera and Schultz, 3 ♂, 5 ♀ (BYUC); Doe Creek, FR 150, 16 mi. N Winthrop, 5 July 1995, Mackenzie, 1 ♀ (BYUC); Foggy Dew Creek, 8 mi. SW Carlton, 11 July 1995, G. Mackenzie, 1 ♂, 2 ♀ (BYUC); Gold Creek, 6.5 mi. SW Carlton, 21 June 1995, G. Mackenzie, 2 ♂, 4 ♀ (BYUC); Goat Creek, FR 300, 15.5 mi. NW Winthrop, 3 July 1995, G. Mackenzie, 9 ♂, 13 ♀ (BYUC); Ortell Creek, FR 5220, Okanogan National Forest, 17 July 1995, G.F. Kraft, 1 ♂ (BYUC); Pierce Co., creek, junction Nisqually River, near Nisqually Glacier, Mount Rainier National Park, 15 June 1969, R.W. Baumann, 1 ♂ (BYUC); Carbon River Entrance, Rainforest Loop Trail, 27 May 1997, B. Kondratieff, 1 ♂ (CSUC); Carbon River Entrance, 27 May 1997, B. Kondratieff, 1 ♂, 1 ♀ (CSUC); 20 June 2003, B. Kondratieff, 2 ♂, 2 ♀ (CSUC); 12 July 2003, B. Kondratieff, 1 ♂, 1 ♀ (CSUC); Carbon River at Chenuis Falls Trailhead, 6 June 1997, R. Lechleitner, 8 ♂ (CSUC); Edith Creek, Fourth Crossing, 13 September 1997, R. Lechleitner, 2 ♂ (CSUC); Fryingpan Creek, Sunrise Road, 13 July 2003, B. Kondratieff and J. Schmidt, 5 ♂, 5 ♀ (BYUC, CSUC); Nisqually River, Glacier View Bridge, 7 July 1999, B. Kondratieff, 2 ♂ (CSUC); Paradise River, Fourth Crossing, Valley Road, 16 August 1999, B. Kondratieff, 1 ♂ (CSUC); 23 July 2000, R. Lechleitner, 3 ♂ (CSUC); St. Andrews Creek, Westside Road, 14 July 2000, R. Lechleitner, 10 ♂, 5 ♀ (CSUC); boggy stream, 17 mi N Paradise Road, Westside Road, 17 June 2001, R. Lechleitner, 1 ♂ (CSUC); St. Andrews Creek, Westside Road, 24 July 1997, B. Kondratieff, 3 ♂, 1 ♀ (CSUC); Tahoma Creek, Westside Road, 22 May 2003, B. Kondratieff, 1 ♂ (CSUC); Skagit Co., unnamed creek, Hwy 11, Lake Tye Community, 17 June 2004, B.P. Stark and R.W. Baumann, 9 ♂, 4 ♀ (BPSC); Skamania Co., Falls Creek, 14 August 1983, G.R. Fiala, 6 ♂, 8 ♀ (BYUC); Mosquito Creek, 14 August 1983, G.R. Fiala, 3 ♀ (BYUC); Smoky Creek, 14 August 1983, G.R. Fiala, 1 ♀ (BYUC); unnamed creek, 2 mi. below Big Creek Falls Viewpoint, FR 90, 14 June 2004, B.P. Stark and R.W. Baumann, 1 ♂, 2 ♀ (BPSC); Snohomish Co., Owl Creek, FR 23, 16 mi. SE Darrington, 9 June 1994, G. Mackenzie, 3 ♀, 2 ♀ (BYUC); unnamed creek, 1.6 mi. up FR 23, 11 mi. SE Darrington, 9 June 1994, G. Mackenzie, 4 ♂, 4 ♀ (BYUC); Whatcom Co., unnamed creek, 100m S ski



Figs. 2-9. *Sweltsa exquisita*, male terminalia and aedeagus. 2. male terminalia, dorsal, Cool Creek, Oregon; 3. tergum 9, with elevated transverse process, Fryingpan Creek, Washington; 4. epiproct, dorsal, Cool Creek, Oregon; 5. epiproct apex, dorsal, Fryingpan Creek, Washington; 6. epiproct, lateral, Fryingpan Creek, Washington; 7. epiproct apex, lateral, Fryingpan Creek, Washington; 8. aedeagus, dorsal, Bridge Creek, Washington; 9. epiproct, terminal, Bridge Creek, Washington.

lift, Mount Baker, 14 July 1994, G. Mackenzie, 10 ♂ (BYUC); stream, North Pass Road, 5 mi. NE Everson, 11 May 1967, K.E. Vander Mey, 2 ♂, 1 ♀ (BYUC); Boulder Creek, Maple Falls, 15 May 1967, K.E. Vander Mey, 2 ♂ (BYUC); Canyon Creek, NE Welcome, 27 July 1966, K.E. Vander Mey, 1 ♂ (BYUC); Cornell Creek, Mt. Baker Road, 29 June 2008, D.E. Ruiter, 3 ♂ (CSUC); Galena Creek, MP 53 Hwy 542, 12 mi. E Glacier, 14 July 1994, G. Mackenzie, 3 ♂, 15 ♀ (BYUC); Happy Creek, Hwy 20, North Cascades National Park, 17 June 2004, B.P. Stark and R.W. Baumann, 3 ♂, 2 ♀ (BPSC); Newhalem Creek, North Cascades National Park, 17 June 2004, B.P. Stark and R.W. Baumann, 11 ♂, 11 ♀ (BPSC); Padden Creek, outlet Lake Bellingham, 18 May 1994, G. Mackenzie, 1 ♀ (BYUC); Razor Hone Creek, Hwy 542, 13 mi. E Glacier, 14 July 1994, G. Mackenzie, 5 ♂, 17 ♀ (BYUC); Ruth Creek, Hannegan Campground, 14 July 1994, G. Mackenzie, 6 ♂, 8 ♀ (BYUC); Sygitowicz Creek, 2 mi SW Van Zandt, 5 May 1994, Kraft and Sammeth, 1 ♀ (BYUC); Swamp Creek, Mount Baker National Forest, 11 August 1966, K.E. Vander May, 4 ♂, 10 ♀ (BYUC); Yakima Co., Ahtanum Creek, Ahtanum Meadows Campground, 25 June 2000, R.L. Newell, 4 ♂, 5 ♀ (BYUC); seep, 5 mi E White Pass, Hwy 12, 15 June 2004, B.P. Stark and R.W. Baumann, 3 ♂ (BPSC).

Male. General color yellow in life, head with black ocellar rings, pronotum yellow except for wide black lateral margins, abdomen with wide black stripe covering terga 1 to 8, black mark on tergum 8 much broader than long as shown in Frison (1935) and sometimes even slightly divided medially. Tergum 9 with a definite, bare elevated transverse process on the anterior margin (Figs. 2 & 3). The anterior margin of the process varies from entire to slightly emarginate (Figs. 2 & 3). In dorsal aspect, the epiproct is erectile, elongate, and subparallel (Fig. 4); in lateral view, slightly enlarged subapically (Figs. 6 & 7), in dorsal aspect, apex sharp and bare (Fig. 5), laterally, rounded and bare at edge (Figs. 6 & 7); in dorsal aspect, epiproct surface covered with dense pile of appressed long setae, extending to base (Figs. 4-7), in lateral aspect, $\frac{2}{3}$ or more of epiproct, covered by pile-like hairs, ventrally bare (Fig. 6). Aedeagus tubular basally, dorsal aspect subtriangular, with two small dorsal lobes, bearing long thin setae (Fig. 8), lateral, terminal aspect exhibiting paired curled horn-

like lobes (Fig. 9); surface with pores (Fig. 9).

Female. Color and dark markings similar to male. Subgenital plate large, nearly covering sternum 9, sides subparallel, with a broadly rounded apex, that can sometimes appear truncate (Fig. 26).

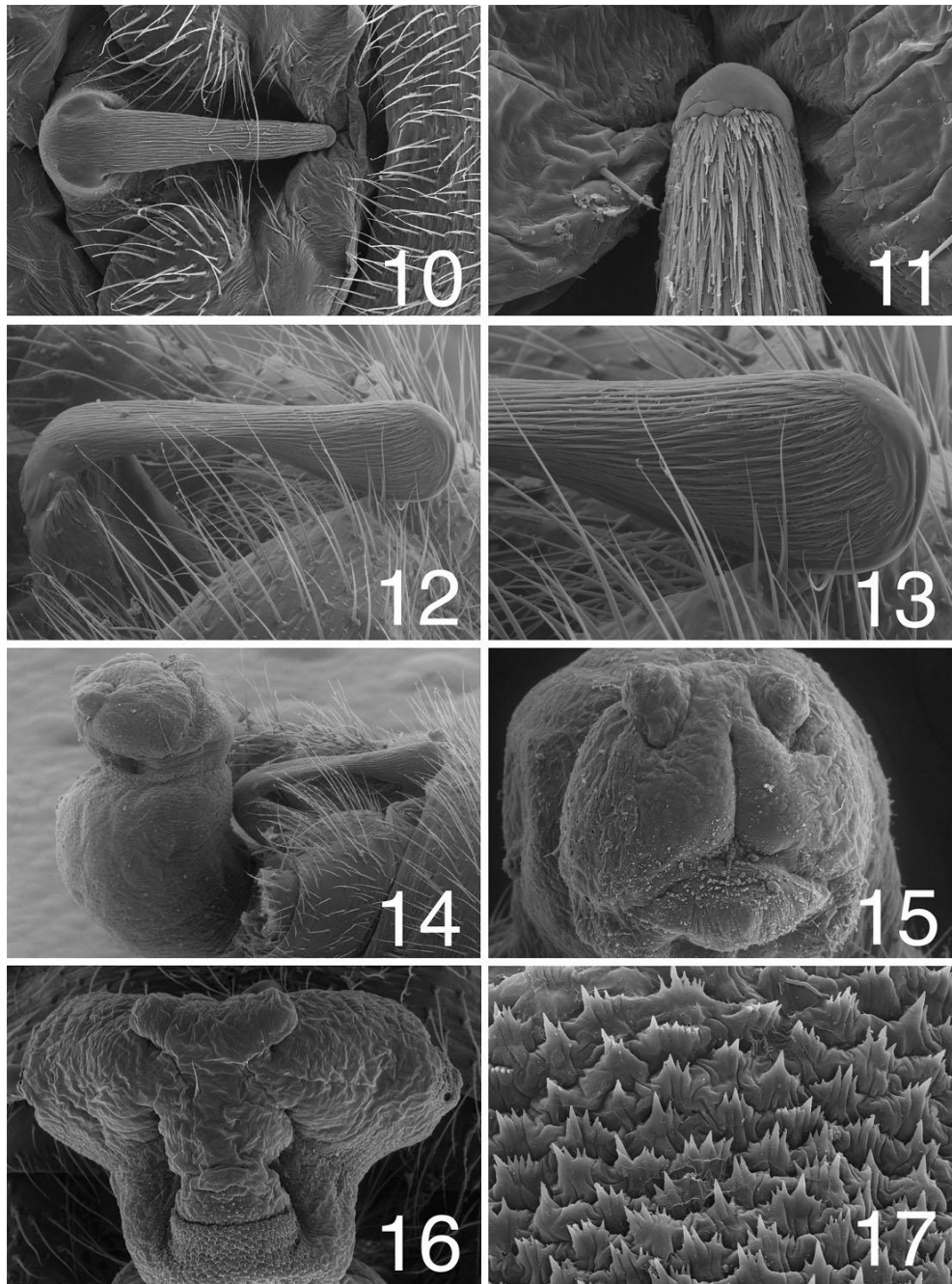
Sweltsa occidentis (Frison)

(Figs. 10-17)

Alloperla occidentis Frison 1937: 96. Holotype ♂, Illinois Natural History Survey: Razorhone Creek, Shucksan (sic) [Shuksan](Whatcom Co.), Washington.

Material examined. USA: Alaska: Pullen Creek, Skagway, 14 July 2002, K.T. Huntzinger, 1 ♂ (BYUC). Oregon: Clackamas Co., Mt. Hood, 3 mi below Timberline Lodge, 12 July 1979, B.P. Stark and K.W. Stewart, 1 ♀ (BPSC). Washington: Chelan Co. Minotaur Creek, 10 mi. W Wenatchee Lake, 14 July 1976, J.R. Wood, 7 ♂, 8 ♀ (BYUC); 21 July 1976, 2 ♂, 3 ♀ (BYUC); 4 August 1976, 3 ♂, 5 ♀ (BYUC); Lewis Co., Laughingwater Creek, 27 June 1995, E. Lisowski, 5 ♂ (CSUC); Falls Creek, Stevens Canyon Road, 25 June 2000, R. Lechleitner, 1 ♂ (CSUC); Panther Creek, 9 June 2001, R. Lechleitner, 1 ♂ (CSUC); Pierce Co., Paradise River, Fourth Crossing, Valley Road., 16 August 1999, B. Kondratieff, 1 ♂ (CSUC); 23 July 2000, R. Lechleitner, 2 ♂, 1 ♀ (CSUC); Meadow Creek, Mt. Rainier National Park, 14 July 1979, B.P. Stark and K.W. Stewart, 1 ♂ (BPSC); St. Andrews Creek, Westside Road, 24 July 1997, R. Lechleitner, 7 ♂, 25 ♀ (BYUC, CSUC); Skamania Co, small creek, N Twin Fall Creek, 30 July 1983, G.R. Fiala, 1 ♀ (BYUC); Snohomish Co., Crystal Creek, 1.6 mi. up FR 27 off FR 23, 11 mi. SE Darrington, 9 June 1994, G. Mackenzie, 1 ♂, 1 ♀ (BYUC); Whatcom Co., Big Face Creek, E Ross Lake, 1 mi. SE of Joker Mountain, 8 August 1966, K.E. Vander Mey, 3 ♂, 12 ♀ (BYUC); Swamp Creek, 7 August 1966, K.E. Vander Mey, 1 ♂, 1 ♀ (BYUC).

Male. General color yellow in life, head with dark ocellar rings, pronotum yellow, but with dark lateral margins, black stripe running down terga 1-8, terminal mark on tergum 8 longer than wide and never divided. Tergum 9 lacking bare elevated process (Fig. 10). Epiproct erectile, elongate, in dorsal view, tapered to apex (Fig. 10); extreme apex bare, (Figs. 10-13), in lateral aspect, apex expanded ventrally, but generally flattened laterally (Figs. 12 & 13); dorsal and lateral



Figs. 10-17. *Sweltsa occidentis*, male terminalia and aedeagus. 10. male terminalia, dorsal, St. Andrews Creek, Washington; 11. epiproct apex, dorsal, St. Andrews Creek, Washington; 12. epiproct, lateral, St. Andrews Creek, Washington; 13. epiproct apex, lateral, St. Andrews Creek, Washington; 14. aedeagus and epiproct, lateral, St. Andrews Creek, Washington; 15. aedeagus, terminal, St. Andrews Creek, Washington; 16. aedeagus, apex expanded, dorsal, Big Face Creek, Washington; 17. spine patch, aedeagus, dorsal, below apex, Big Face Creek, Washington.

surface of epiproct covered with dense pile of long appressed setae, extending to the epiproct base (Figs. 10-13), laterally, base bare (Fig. 12). Aedeagus tubular, constricted near upper $\frac{1}{3}$, with two bulbous lobes, bearing two smaller apical projections (Figs. 14 & 15), more expanded apex with broad lobes and dorsal finger-like projection medially (Fig. 16), surface with comb-like setae arranged in interrupted rows, with patch of stronger setae located at base of constricted area (Figs. 16 & 17).

Female. Color and markings similar to male. Subgenital plate subtriangular and not covering all of sternum 9, apex more narrowly rounded, often exhibiting a shallow emarginate area at the tip, but the posterior margin is usually entire (Fig. 27) for *S. durfee*.

Sweltsa durfee, sp.n.
(Figs. 1, 18-25, 27)

Material examined. Holotype ♂, USA: Montana: Mineral Co., Van Ness Creek, Lolo NF, FR 7812, 2 miles off FR 250 (Trout Creek Road), south of Superior, 2 July 2008, R. Durfee. Paratypes: Idaho: Lemhi Co., Moose Creek, off Hwy 93, below Lost Trail Pass, 23 July 1979, B.P. Stark, K.W. Stewart and R.W. Baumann, 4 ♂, 8 ♀ (BPSC, BYUC). Montana: same locality as holotype: 18 June 2004, R.W. Baumann and B.P. Stark, 2 ♂, 4 ♀ (BYUC); 2 July 2008, R. Durfee, 8 ♂, 15 ♀ (BYUC, CSUC); Ravalli Co., tributary, Bear Creek, 6 July 1995, A.L. Sheldon, 4 ♂ (BYUC); tributary, Gash Creek, Rd. 737, 24 July 1995, A.L. Sheldon, 5 ♂, 6 ♀ (BYUC); Judd Creek, 14 June 1999, A.L. Sheldon, 2 ♂, 2 ♀ (BYUC); Lick Creek, 31 July 1997, A.L. Sheldon, 1 ♂ (BYUC). The holotype will be deposited at the United States National Museum (USNM).

Male. Macropterous. Body length 8-9 mm; Forewing length 9-10 mm. General color light yellow in life, white in alcohol. Head yellow with black ocellar rings, pronotum with black lateral markings (Fig. 1). Terga 1-8 with a wide interrupted black stripe middorsally that terminates in a narrow spot. Tergum 9 lacking elevated process (Fig. 22). Epiproct erectile, elongate, in dorsal aspect, slightly constricted subapically, apex expanded (Figs. 18 & 22); apex bare, caplike (Figs. 18, 19 & 22), in lateral aspect, apex expanded, and club-like but not laterally flattened (Figs. 20 & 21); in dorsal and lateral aspect, surface of epiproct covered with dense pile of long appressed setae, extending to near epiproct base (Figs. 18-22), laterally, base bare (Fig. 18). Aedeagus tubular (Fig. 23) lacking terminal lobes (Fig. 24), surface with comb-like setae, distributed scale-like over

surface (Fig. 25).

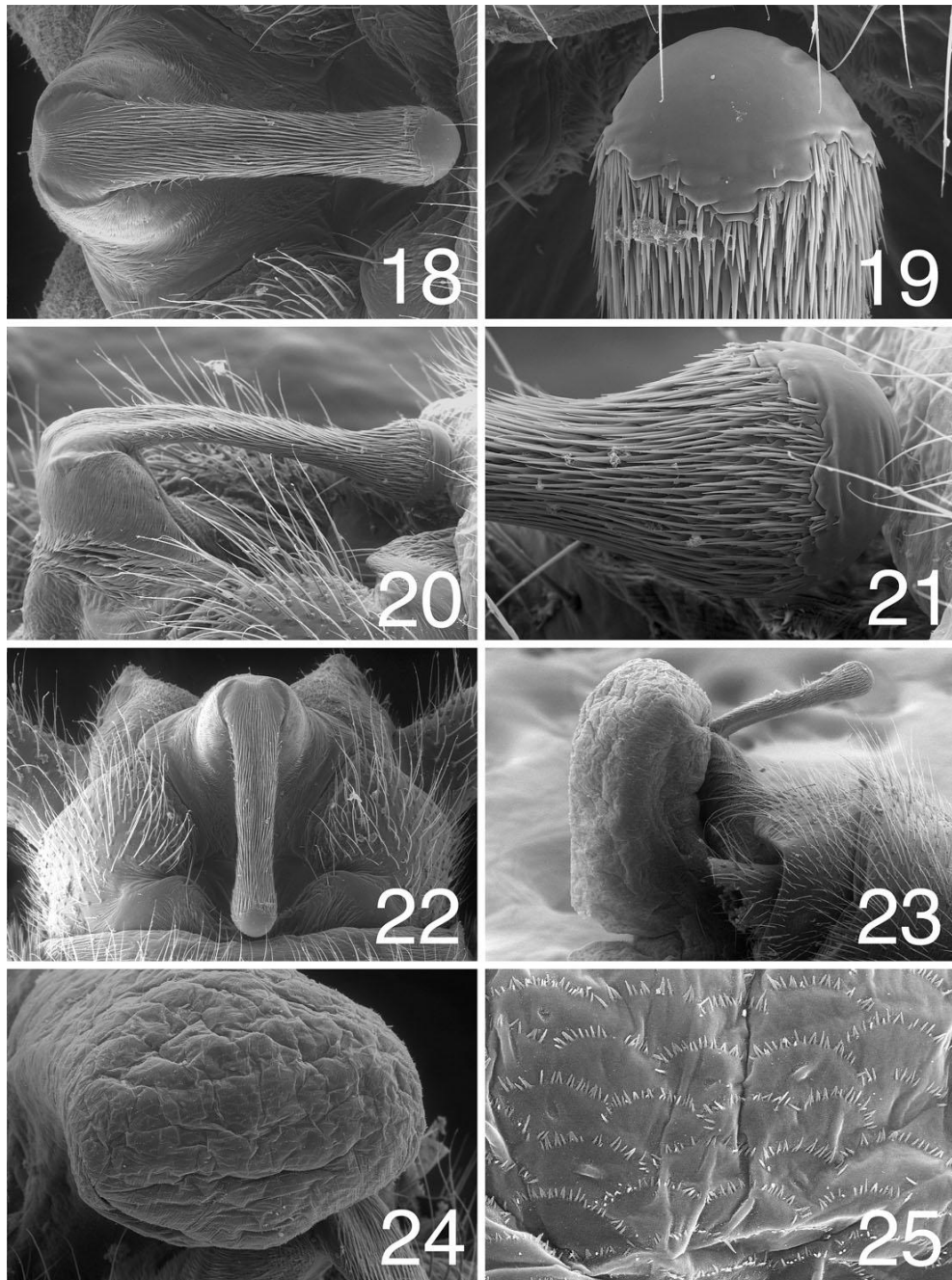
Female. Macropterous. Body length 8-10.5 mm; forewing length 9-10.5 mm. General color and morphology similar to male. Subgenital plate extending only partially over sternum 9, outline subtriangular, apex narrowly rounded, sometimes with indented areas laterally (Fig. 27).

Etymology. The patronym honors Richard S. Durfee, Pueblo West, Colorado. He collected the type material and many other valuable stonefly specimens that have been useful in our review of the stonefly fauna of western North America.

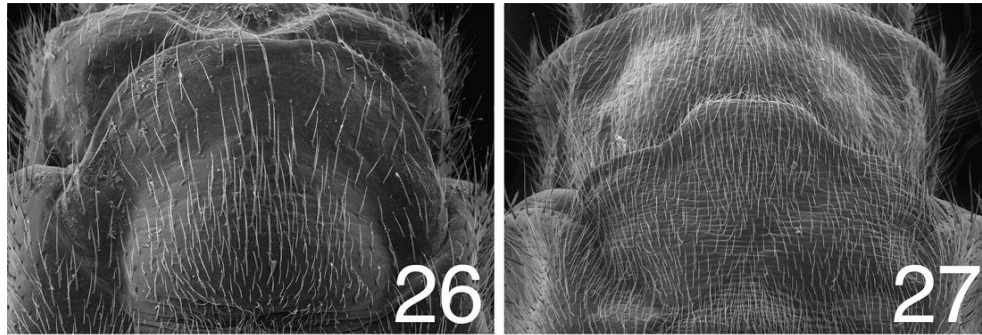
DIAGNOSIS

Males of *S. exquisita* are readily separable from both *S. occidentis* and *S. durfee* since they possess a definite elevated transverse process on the anterior margin of tergum 9 (Figs. 2 & 3). Sometimes this process is reduced, but the epiproct of *S. exquisita* is subparallel, terminating in a pointed bare tip (Figs. 4-7). Additionally, the aedeagus of *S. exquisita* has two elongate tubular lateral lobes (Figs. 8 & 9). The male terminalia of *S. durfee* and *S. occidentis* are similar, and the species are probably closely related. The epiproct of *S. durfee* in dorsal view is slightly constricted subapically, the apex expanded, with a rounded cap-like tip (Figs. 18-19). The lateral aspect is club-like apically (Figs. 20 & 21). The epiproct of *S. occidentis* is tapered toward the apex in dorsal view (Figs. 10 & 11). It is flattened laterally and expanded ventrally (Figs. 12 & 13). The aedeagus of *S. durfee* lacks developed terminal lobes in the specimens examined (Fig. 24), and has comb-like setae arranged scale-like over the surface (Fig. 25), whereas, in *S. occidentis*, definite terminal lobes are present on the aedeagus (Fig. 16), which bears scale-like setae in interrupted rows. It also has a large patch of short stout setae located at the base of the expanded apex (Fig. 17).

Females of *S. exquisita* can usually be separated by the large, broadly rounded subgenital plate (Fig. 26) as compared to the narrower, shallowly emarginate, subtriangular plate of *S. occidentis* (see Stewart and Oswood 2006). The subgenital plate of *S. durfee* is most similar to *S. occidentis*, but it usually has the posterior margin entire (Fig. 27). The most consistent character for sorting *S. exquisita* females is the wide black patch on tergum 8. This patch is narrow and triangular in both *S. occidentis* and *S. durfee*. However care must be taken because the females of *Sweltsa fidelis* (Banks) look similar when only viewed dorsally, but they have black c-shaped markings on the thoracic segments.



Figs. 18-25. *Sweltsa durfee*, Van Ness Creek, Montana, male terminalia and aedeagus. 18. epiproct, dorsal; 19. epiproct, apex, dorsal; 20. epiproct, lateral; 21. epiproct apex, lateral; 22. terminalia, dorsal; 23. aedeagus and epiproct, lateral; 24. aedeagus, terminal; 25. spines, aedeagus surface.



Figs. 26-27. Female subgenital plate, ventral. 26. *Sweltsa exquisita*, Fryingpan Creek, Washington; 27. *Sweltsa durfeeii*, Van Ness Creek, Montana.

REMARKS

Sweltsa exquisita has been reported from Alaska south to Oregon, usually occurring in small to medium sized streams, whereas *S. occidentis* has been reported from smaller, high elevation streams from Alaska south to Oregon east to Idaho and Montana. *Sweltsa occidentis* appears to be less common than *S. exquisita*. Gaufin et al. (1972) mentioned in their treatment of Montana stoneflies that they did not have the opportunity to examine specimens of *S. occidentis* from Montana, indicating the state listing of this species was based on Jewett's (1959) statement. Later, Gaufin and Ricker (1974) listed a specimen from Missoula, collected on 7 July 1950. This specimen was not available for examination. Consequently, *S. durfeeii* was described from a series of specimens from Mineral County, Montana. In addition, a small series of specimens from Idaho was discovered, that represents another population of *S. durfeeii*. The occurrence of this species in nearby areas in Montana and Idaho fits the specialized distribution pattern noted in Stark and Gustafson (2004), which includes disjunct and endemic species of plants and insects representing a Pacific Coast refugium.

ACKNOWLEDGEMENTS

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figure plates were constructed by Randy Baker, graphic artist at the Monte L. Bean Life Science Museum, Provo, Utah. Richard A. Lechleitner is thanked for providing material and allowing access to the beautiful streams of Mount Rainier National Park, Washington. Andrew L. Sheldon provided the specimens from Ravalli County, Montana. We thank Lori Discoe for producing Figure 1 and Bill P. Stark for providing additional records.

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