



WHAT IS *BOLSHECAPNIA SASQUATCHI* RICKER?
PLUS A NEW SPECIES OF *BOLSHECAPNIA* FROM MONTANA
(PLECOPTERA: CAPNIIDAE)

Richard W. Baumann¹ and David S. Potter²

¹ Department of Integrative Biology, Monte L. Bean Life Science Museum,
Brigham Young University, Provo, UT 84602, USA
E-mail: richard_baumann@byu.edu

² Unity College in Maine, HC 78, Box 1, Unity, ME 04988, USA
E-mail: dpotter@unity.edu

ABSTRACT

The name *Bolshecapnia sasquatchi* was found to include 2 different species. The name bearing, original species, occurs in British Columbia and Washington and a previously undescribed species, *B. missiona*, occurs in Montana. *Bolshecapnia sasquatchi* was only known in the male adult stage, but the female is herein described. *Bolshecapnia missiona* is described in the male, female and larval stages. SEM photos of the male and female terminalia are given for both species and a diagnosis is provided that separates these 2 species in the male and female adult stages. Distribution records are given for both species.

Keywords: Plecoptera, Capniidae, *Bolshecapnia*, stoneflies, western North America

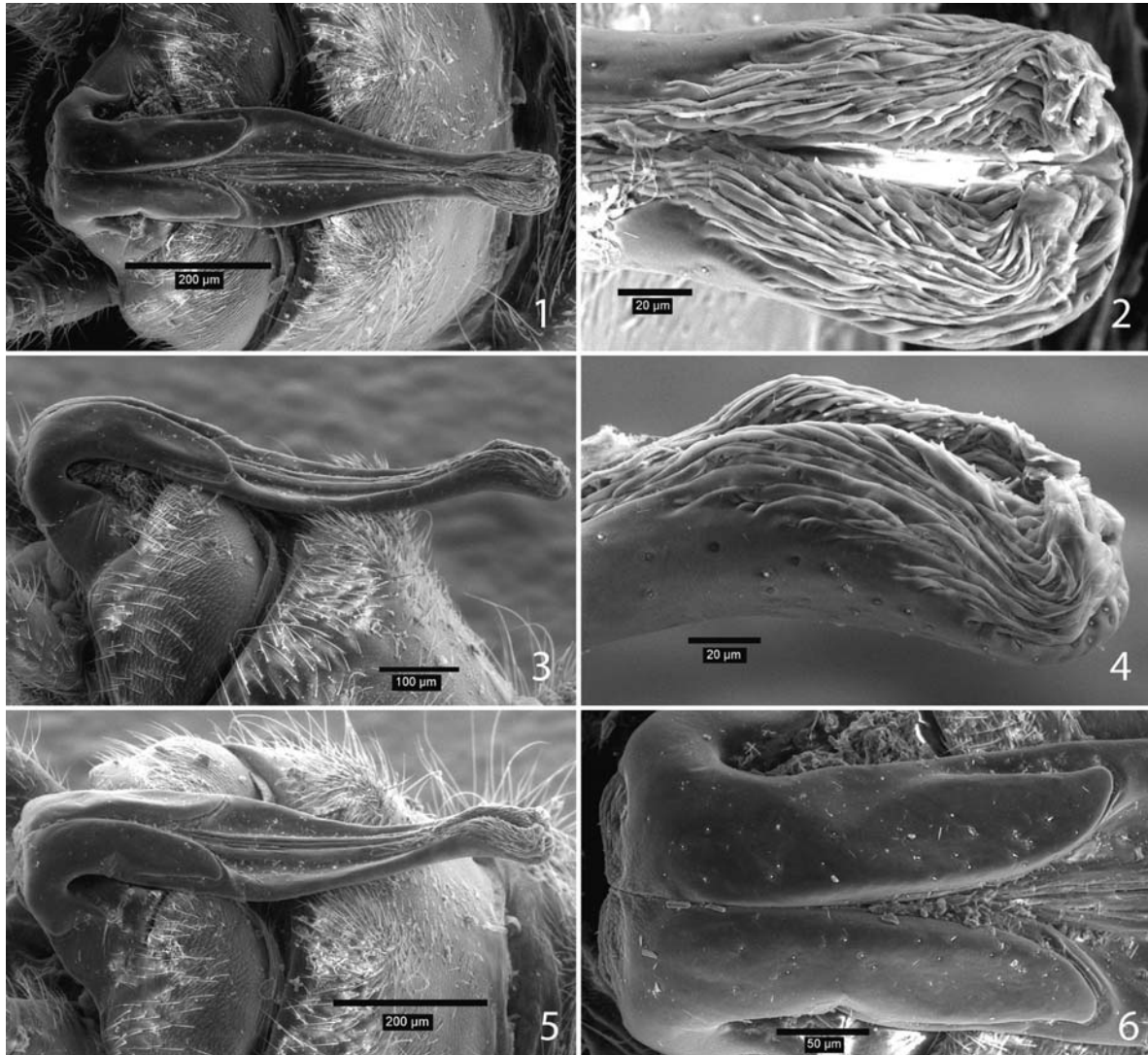
INTRODUCTION

Ricker (1965) erected the subgenus *Capnia* (*Bolshecapnia*) based on several species from western North America. He included *C. maculata* Jewett from California and four new species occurring in Alberta and British Columbia: *gregsoni*, *rogozera*, *sasquatchi* and *spenceri*. *Capnia* (*Bolshecapnia*) *sasquatchi* (Ricker) was described from a single male collected at the Fraser River, Agassiz, British Columbia. Nebeker and Gaufin (1967) reported the species incorrectly from Montana and described what they thought was the previously unknown female. This definition of the species has been used in the following publications: (Nebeker and Gaufin 1968, Gaufin et al. 1972, Ricker and Scudder 1975, Baumann et al. 1977, Cannings 1989, Nelson and Baumann 1989 and Scudder 1994. In addition, *Bolshecapnia* was elevated to generic status by Ricker and Scudder (1975).

Cannings (1989) listed two males of *B. sasquatchi* from Manning Provincial Park, British Columbia. Recently, during a study of the stoneflies of Mount Rainier National Park (Kondratieff and Lechleitner 2002), three additional males were listed extending

the distribution to Washington. In addition, the Gerald Kraft Collection contained a series of males and females from Mount Baker, Washington. These specimens and a good series collected in Montana in the 1970's by the junior author and colleagues, raised questions about the true identity of *B. sasquatchi*. An in-depth study of the specimens was done and the results form the foundation of this paper.

Bolshecapnia sasquatchi, as contained in the literature, was found to actually represent two closely related species. Actual *B. sasquatchi* is confirmed from British Columbia and Washington, while specimens from Montana represent an undescribed species. The figures in Ricker (1965) of the male *B. sasquatchi* holotype are generally descriptive, but without a specimen to compare it is easy to see how Nebeker and Gaufin (1967) included the Montana specimens under this name. Also, the female of *B. sasquatchi* needs to be re-described because the specimen that is described and illustrated in Nebeker and Gaufin (1967) is actually the female of our new species, *B. missiona*.



Figs. 1-6 *Bolshecapnia sasquatchi* male: Ohanapecosh River, Washington. 1. epiproct, dorsal, 2. epiproct tip, dorsal, 3. epiproct, lateral, 4. epiproct tip, lateral, 5. epiproct, dorsolateral, 6. epiproct, dorsal plate, dorsal.

RESULTS AND DISCUSSION

Bolshecapnia sasquatchi (Ricker) (Figs. 1-6, 13, 14)

Capnia (*Bolshecapnia*) *sasquatchi* Ricker, 1965:482. Holotype ♂ (Canadian National Collection). Fraser River, Agassiz, British Columbia.
Bolshecapnia sasquatchi: Ricker & Scudder, 1975:338.

Material examined. All available specimens of *B. sasquatchi* were examined as part of this study. The

following locality records represent *B. sasquatchi*. CANADA, British Columbia: Fraser River, Agassiz, 21 February 1958, W.E. Ricker, 1 ♂, Holotype (CNCI); Similkameen River, Cambie Creek Ski Area, Manning Provincial Park, 19 March 1983, S.G. Cannings, 1 ♂ (SMDV); Skagit River, Manning Provincial Park, 18 March 1983, S.G. Cannings, 1 ♂ (SMDV). UNITED STATES, Washington: Lewis Co., Ohanapecosh River, Hwy 143, Mount Rainier National Park, 17 March 1970, D.S. Potter and R.A. Haick, 2 ♂ (BYUC); 16 March 1973, D.S. Potter and

L.M. Preble, 1 ♂ (BYUC). Whatcom Co., Razor Hone Creek, Hwy 542, Mount Baker, 4 March 1967, K.E. Vander Mey, 2 ♂, 6 ♀ (BYUC).

Female. Body and wings dark brown to black, wings fumose, macropterous; length of forewings 8.5-9.5 mm; length of body 7.5-9.0 mm. Subgenital plate broader than long, with only a few hairs on lateral margins, posterior margin straight and not notched (Figs. 13-14).

Remarks. *Bolshecapnia sasquatchi* has a relatively short epiproct and the tip does not reach the margin of tergum eight in relaxed specimens. The dorsal plate is large and broad and extends to nearly ½ the length of the epiproct. The basal lobe is directed upward very slightly in a sinuate shape and ends in a broad apex. The tip is rounded dorsally and shaped like an upside down foot laterally (Figs. 1-6). The female subgenital plate of *B. sasquatchi* has a straight posterior margin, while in *B. missiona* it has a notch. Nebeker and Gaufin (1967) do not mention the median posterior notch in the subgenital plate in their description, nor is it shown in their illustration. However, we examined a large number of specimens from Montana and all had the notch.

Bolshecapnia missiona sp. n.
(Figs. 7-12, 15, 16)

Capnia (*Bolshecapnia*) *sasquatchi* Ricker, Nebeker and Gaufin 1967:243. ♀ description, Montana.

Material examined. Holotype male, allotype female and 16 male and 7 female paratypes, Montana, Missoula Co., Grant Creek, Snow Bowl Road, north of Missoula, 15 March 1971, D.S. Potter. Holotype deposited at the California Academy of Sciences, San Francisco, California. Additional paratypes were examined from the following localities: UNITED STATES, Montana: Flathead Co., Alpha Creek, junction South Fork Flathead River, Hungry Horse Dam, 26 March 1966, P. Milam, 1 ♂ (BYUC); Canyon Creek, South Fork Road, 25 March 1973, D.S. Potter and J.A. Stanford, 7 ♂, 4 ♀ (BYUC, UMBS); Kootenai Creek, junction Middle Fork Flathead River, 26 March 1966, P. Milam, 8 ♂, 14 ♀ (BYUC, UMBS); creek at MacDonald Hotel, Glacier National Park, 2 April 1966, P. Milam, 1 ♂ (BYUC). Lake Co., Six Mile Creek, between Swan Lake and Big Fork, 6 March 1966, P. Milam, 1 ♂ (BYUC). Missoula Co., Grant

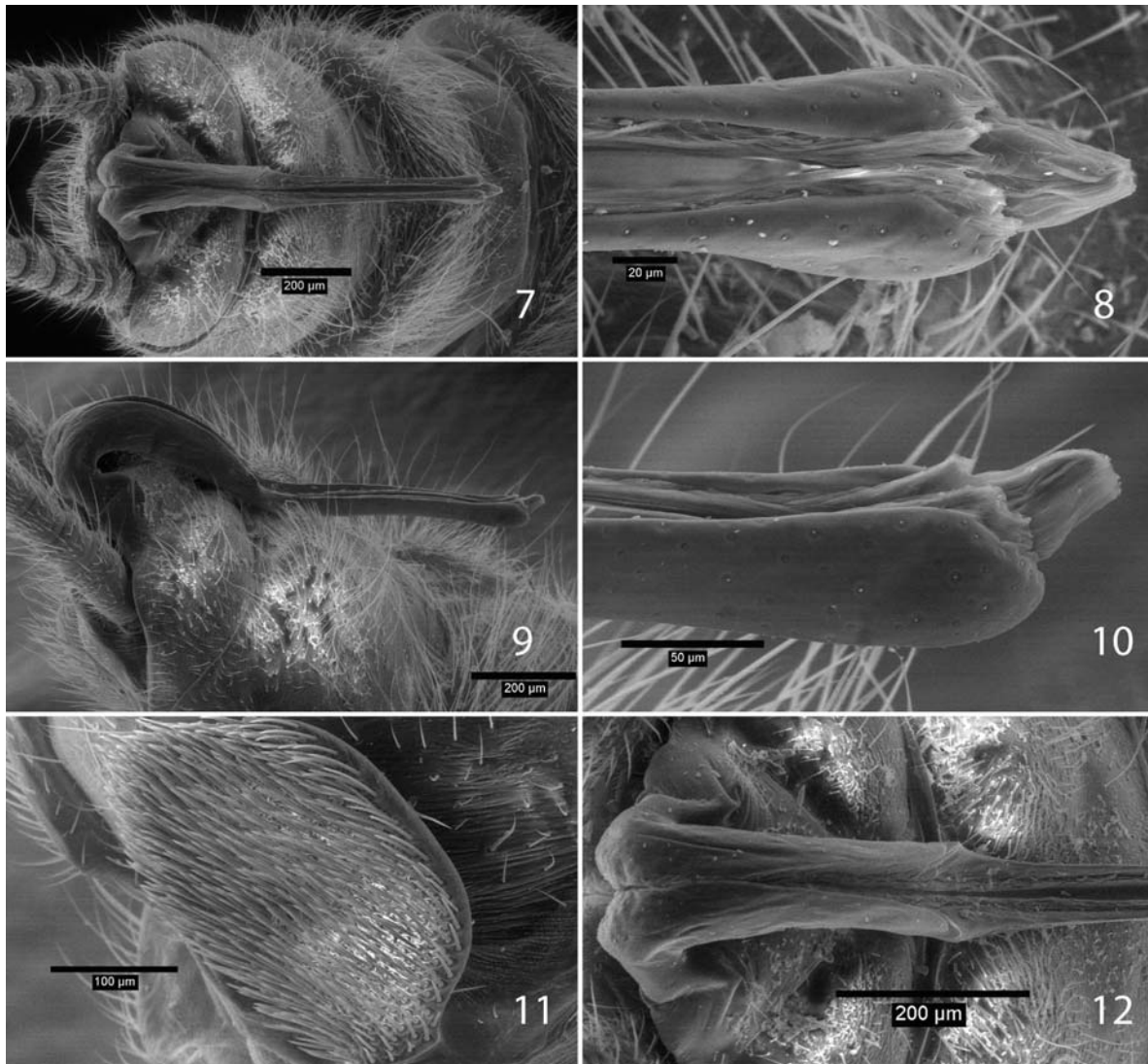
Creek, Snow Bowl Road, 31 December 1970, D.S. Potter and R.A. Haick, 3 larvae (CSUC); 8 March 1970, D.S. Potter and R.A. Haick, 13 ♂, 3 ♀ (BYUC); 23 March 1971, D.S. Potter, 15 ♂, 3 ♀ (CSUC); 21 January 1972, R.A. Haick, 12 larvae (BYUC); 5 March 1972, R.A. Haick, 24 ♂, 2 ♀ (BYUC); 4 March 1973, R.A. Haick and D. McAuliffe, 5 ♂, 6 ♀ (BYUC); 19 March 1973, R.A. Haick, 1 ♂, 9 ♀ (CSUC); 20 March 1983, J. Bramlett, 1 ♂, 2 ♀ (CSUC).

Male. Body color dark brown to black, wings fumose, macropterous; length of forewings 6.5-7.0 mm; length of body 7.5-8.5 mm. Ninth sternum with large, round lobe or vesicle, covered by dense mat of short hairs, directed toward and overlapping apex. Tenth tergum bisected medially. Ninth tergum with large V-shaped notch along posterior margin. Epiproct long and thin, apex extending over posterior margin of tergum 8; dorsal plate extending to 1/3 length of epiproct, apical aspect deeply notched, forming sharply pointed, paired processes; basal lobe long and thin and directed upward in sinuate shape laterally, with median groove dorsally that terminates in pointed apex, tip bearing small membranous section that might be expandable; ventral surface well sclerotized, smooth and covered by few pit-like sensory structures (Figs. 7-12).

Female. Body and wing color similar to male, macropterous; length of forewings 9.0-10.0 mm; length of body 9.5- 10.5 mm. Subgenital plate broader than long, with narrow hairless area medially, posterior margin broadly rounded, bearing V-shaped median notch (Figs. 15-16).

Larva. Length 9.0-11.0 mm. Head, thorax and abdomen clothed in short, fine hairs. Femur with few long hairs on dorsal surface, ventral margin with two rows of short stout spines; tibia with sparse row of long, thin hairs along ventral margin. Mesosternal Y-ridge with wide reaching arms that extend nearly to bases of mesocoxal legs. Right mandible, as in Stewart and Stark (2002), with both terminal and basal teeth large and forked, fringe of short spines covering basal half of mandible; lacinia pointed, spines below terminal teeth short, longer hair-like spines on outer margin, extending along ½ of outer margin. Epiproct directed posteriorly on male larva.

Etymology. The species name is based on the fact that the type and most of the paratypes were collected in the Mission Mountains of Montana.



Figs. 7-12 *Bolshecapnia missiona* male: Grant Creek, Montana. 7. epiproct, dorsal, 8. epiproct tip, dorsal, 9. epiproct, lateral, 10. epiproct tip, lateral, 11. vesicle, ventrolateral, 12. epiproct, dorsal plate, dorsal.

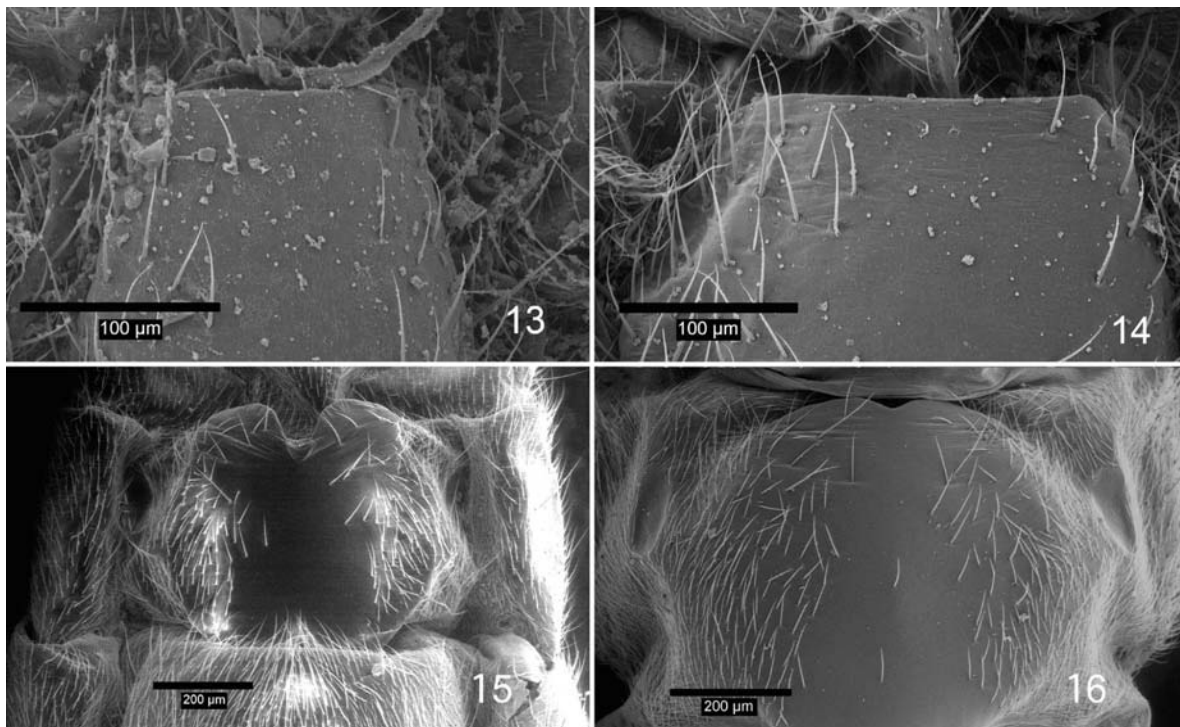
Diagnosis. *Bolshecapnia missiona* is most similar to *B. sasquatchi*, but it can be separated in the details of the epiproct and the posterior margin of the female subgenital plate. The epiproct is long and very thin apically in *B. missiona* with a pointed tip (Fig. 7), while in *B. sasquatchi* it is much shorter and ends in a bluntly rounded tip (Fig. 1), appearing foot shaped in lateral aspect (Fig. 4). Also, the dorsal plate covers nearly half of the epiproct in *B. sasquatchi* (Fig. 6) while in *B. missiona* it only reaches the basal third (Fig. 12). The female of *B. sasquatchi* has a subgenital plate with a straight, flat posterior margin (Fig. 13-

14), but the female of *B. missiona* exhibits a rounded subgenital plate that terminates in a median V-shaped notch (Figs. 15-16). The notch is always present but varies somewhat in size and shape. However, the female illustrated by Nebeker and Gaufin (1967) shows little or no notch. The larva is similar to the *B. spenceri* description in Stewart and Stark (2002) but shows slight differences in the shape of the mandible and lacinia.

Remarks. *Bolshecapnia missiona* is known mostly from first order and small second order streams at elevations from 750 to 1500 meters above sea level.

Grant Creek is a freestone stream fed directly by snowmelt and cold seeps. High elevation reaches flow in small cascading pools and riffles over small angular cobble and gravel with an open southerly exposure. Twenty-meter-high steep slopes at streamside release cold seepage into thick moss over deep sand and gravel mixed with woody debris. Stream channels at lower elevation sites are mixed

sand, gravel, and larger rounded cobble in long riffles forming a channel bordered by *Alnus* stands at streamside and open meadows on the floodplain. These lower reaches include an extensive hyporheic zone confirmed by nearby domestic water wells that penetrate 20-40 meters of saturated gravels as much as 200 meters laterally from the surface stream.



Figs. 13-14 *Bolshecapnia sasquatchi* female: Razor Hone Creek, Washinton. 13. subgenital plate, ventral, specimen A, 14. subgenital plate, ventral, specimen B.
Figs. 15-16 *Bolshecapnia missiona* female: Grant Creek, Montana. 15. subgenital plate, ventral, deep notch, 16. subgenital plate, ventral, shallow notch.

ACKNOWLEDGEMENTS

Thanks are given to the following individuals and institutions that aided in the completion of this study. Roger Haick, Loon Lake, Washington collected many valuable specimens from Montana in the 1970's. Cheryl Kraft, Yachats, Oregon and Bob Wisseman, Corvallis, Oregon donated the Gerald Kraft Collection, which contained the specimens from Mount Baker. Boris Kondratieff, Colorado State University Fort Collins, Colorado (CSUC) provided paratypes and encouraged us to look more closely at

the *B. sasquatchi* question. Jack Stanford and Robert Newell, University of Montana Biological Station (UMBS) made specimens available and provided the opportunity to give the results of this study at the XV International Symposium on Plecoptera at Flathead Lake, Montana in 2004. Karen Needham and Rex Kenner, Spencer Entomological Museum, University of British Columbia (SMDV) allowed us to examine their specimens from Manning Provincial Park. Donald Bright, Canadian National Collection (CNCI) Ottawa, Ontario helped us borrow the *B. sasquatchi*

holotype. The remaining specimens are deposited in the Brigham Young University Collection (BYUC) in Provo Utah. Mike Standing, Brigham Young University Electron Optics Laboratory aided in the SEM studies and Riley Nelson, Department of Biology, Brigham Young University prepared the figure plates.

REFERENCES

- Baumann, R.W., A.R. Gaufin & R.F. Surdick. 1977. The stoneflies (Plecoptera) of the Rocky Mountains. *Memoirs of the Entomological Society of America*, 31:1-208.
- Cannings, S.G. 1989. New records of slender winter stoneflies (Plecoptera: Capniidae) in British Columbia. *Journal of the Entomological Society of British Columbia*, 86:77-80.
- Gaufin, A.R., W.E. Ricker, M. Miner, P. Milam & R.A. Hays. 1972. The stoneflies (Plecoptera) of Montana. *Transactions of the American Entomological Society*, 98:1-161.
- Kondratieff, B.C. & R.A. Lechleitner. 2002. Stoneflies (Plecoptera) of Mount Rainier National Park, Washington. *Western North American Naturalist*, 62:385-404.
- Nebeker, A.V. & A.R. Gaufin. 1967. New *Capnia* from the Rocky Mountains (Plecoptera, Capniidae). *Transactions of the American Entomological Society*, 93:235-247.
- Nebeker, A.V. & A.R. Gaufin. 1968. The winter stoneflies of the Rocky Mountains (Plecoptera, Capniidae). *Transactions of the American Entomological Society*, 94:1-24.
- Nelson, C.R., & R.W. Baumann. 1989. Systematics and distribution of the winter stonefly genus *Capnia* (Plecoptera: Capniidae) in North America. *Great Basin Naturalist*, 49: 289-363.
- Ricker, W.E. 1965. New records and descriptions of Plecoptera (Class Insecta). *Journal of the Fisheries Research Board of Canada*, 22:475-501.
- Ricker, W.E. & G.G.E. Scudder. 1975. An annotated checklist of the Plecoptera (Insecta) of British Columbia. *Syesis*, 8:333-348.
- Scudder, G.G.E. 1994. An annotated systematic list of the potentially rare and endangered freshwater and terrestrial invertebrates in British Columbia. *Occasional Papers of the Entomological Society of British Columbia*, 2:1-92.
- Stewart, K.W. & B.P. Stark. 2002. *Nymphs of North American stonefly genera (Plecoptera)*. Caddis Press, Columbus, Ohio, USA. 510 pp.

Received 5 November 2007, Accepted 5 November 2007, Published 12 November 2007