THE *ALLOPERLA SEVERA* COMPLEX (PLECOPTERA: CHLOROPERLIDAE) OF WESTERN NORTH AMERICA.

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ABSTRACT

The Chloroperlinae taxon *Alloperla severa* of western North America is reviewed. *Alloperla elevata* and *A. thalia* previously treated as a synonyms of *A. severa* are considered valid species. The male genitalia of all three species are illustrated using the scanning electron microscope.

Keywords: Plecoptera, stonefly, *Alloperla, A. elevata, A. severa, A. thalia*, western North America

INTRODUCTION

Currently, the chloroperlid *Alloperla severa* (Hagen 1861) is considered a wide-ranging western Nearctic species, recorded from Alaska, the Yukon to the Northwest Territories, south to California and Nevada, and east to Colorado (Claassen 1940, Surdick 1985, Lyon & Stark 1997, Stewart & Ricker 1997, Stewart & Osoow 2006). In 1954, Ricker considered both *A. elevata* Frison 1935 and *A. thalia* Ricker 1952 as junior subjective synonyms of *A. severa*. *Alloperla severa* was originally described from Unga Island of the Shumagin Island group, off the southeast coast of the Alaska Peninsula. The holotype of *A. elevata* was taken in Curry County, Oregon, and the holotype of *A. thalia* was collected in Gallatin County, Montana. Ricker (1954) concluded “the Montana specimens are evidently an Interior form of *severa* (*elevata*), rather smaller than the Coast form and possibly differing in other average characters.” Studying many specimens of the putative *A. severa* from throughout its reported range indicated that *A. elevata* and *A. thalia* are valid taxa.

MATERIAL AND METHODS

Specimens were examined from the following colleagues and institutions: Brigham Young University Collection (BYUC), Provo, Utah; Canadian National Insect Collection (CNIC), Ottawa, Ontario; C. P. Gillette Museum of Arthropod Diversity, Colorado State University (CSUC), Fort Collins, Colorado; Illinois Natural History Survey (INHS), Champaign, Illinois; Royal Ontario Museum (ROMC), Toronto, Ontario; Spencer Entomological Museum (SMDV), Vancouver, British Columbia; Bill P. Stark Collection (Bpsc), Clinton, Mississippi; and the Kenneth W. Stewart Collection (KWSC), Denton, Texas.

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. The description of the epiproct follows the style of Lyon and Stark (1997).
**Alloperla severa** (Hagen)  
(Figs. 1-8)


**Male.** Macropterous. Length of forewing 7-9 mm. General color, lime green in life, dirty white in alcohol. Head and pronotum without black markings. Dorsal aspect of epiproct elongate and narrow, subparallel, slightly broader at base, apex evenly rounded, with shallow crenulations (Figs. 1, 2, 5, 7); surface bare in apical half, clothed with dense
appropped setae in basal half (Figs. 1-8); beak-like in lateral view (Figs. 3, 4, 6, 8). Stem clothed with fine setae (Figs. 1, 5, 7).

**Female.** Length of wings 8-11 mm. Subgenital plate triangular, apex more acute, margin usually reaching to center or beyond sternum 9 (Lyon & Stark 1997, Fig. 43).

**Diagnosis.** The male of *A. severa* can be distinguished from the closely related *A. thalia* by the more elongate and dorsally narrow, bare portion of the epiproct (Figs. 1, 2, 5, 7). In lateral view, the epiproct of *A. severa* is more beak-like, with the apex dipping down beyond the ventral aspect, and the basal portion about 1/5 of the length of the epiproct (Figs. 3, 4, 6, 8). The epiproct of the closely related *A. thalia* in lateral view, slopes to the apex or is almost hood-like, the bare portion being about 1/3 of the total epiproct length (Figs. 19, 20, 22, 23). The females of *A. severa* and *A. thalia* cannot be reliably distinguished, other than by geographical proximity, or with the presence of associated males.

**Remarks.** *Alloperla severa* appears to be distributed throughout the northern Rocky Mountains in Canada and the United States, being especially abundant in western Montana.

**Alloperla elevata** Frison (Figs. 9-16)

*Alloperla elevata* Frison 1935: 335. Holotype male, INHS, Floras Creek, Curry Co., Oregon, examined.


Nisqually, 13 June 1967, R.W. Baumann, 3 ♀ (BYUC). **Male.** Macropterous. Length of forewing 9-11 mm. General color, lime green in life, white in alcohol. Head and pronotum without black markings. Dorsal aspect of epiproct elongate, constricted near middle, apex broadly rounded, with numerous shallow marginal crenulations fringing apex (Figs.11-14); surface bare in apical half, clothed with dense appressed setae in basal half (Figs. 9-16); in lateral view, disc shaped (Figs. 9, 10, 15, 16). Stem clothed with fine setae (Figs. 9, 11, 13). **Female.** Length of wings 10-11 mm. Coloration and markings similar to male. Subgenital plate produced with posterior margin acute to slightly rounded, general outline triangular, margin usually reaching beyond sternum 9 (Frison 1935, Plate XIV, Fig. 41). **Diagnosis.** The male of **A. elevata** can be easily distinguished from both **A. severa** and **A. thalia**, by the hour glass shape of the epiproct in dorsal view, enlarged at base, and broadly rounded at apex, bearing fringe of shallow crenulations (Figs. 11-14) and disc shaped in lateral view (Figs. 9, 10, 15, 16). The subgenital plate of the female of **A. elevata** is more rounded at the apex (Frison 1935, Plate XIV, Fig. 41) than either **A. severa** (Lyon and Stark 1997, Fig. 43), or **A. thalia** (Fig. 24). **Remarks.** **Alloperla elevata** is a species that appears restricted to larger Coastal streams and rivers of the Pacific Northwest, from northern California to British Columbia. Ricker (1943) in his work on the stoneflies of southwestern British Columbia considered **A. elevata** “…enormously abundant on Sweltzer creek, and moderately so in other medium to large streams near sea level. It has been taken in every month but December and January…“. Ricker (1943) described the epiproct of **A. elevata** as “dumbbell-shaped,” however, in 1954 he considered that “straight and dumbbell shapes intergrade, and even coastal specimens vary somewhat in this respect.” Our examination of material indicates that **A. elevata**, Ricker’s “coastal form”, is consistent in epiproct shape and form (Figs. 9-16) throughout its known range. Jewett’s (1959) description of the epiproct of **A. severa** as “dumbbell shaped” and his use of Frison’s (1935) illustration of that species indicates that he might have only examined specimens of **A. elevata**. Jewett (1960) did not report this species from California. Gaufin et al. (1972) listed Montana records for **A. elevata**, but did not include it in the key to the species. These specimens could be either **A. severa** or **A. thalia**, since both occur in Montana.

**Alloperla thalia Ricker**

(Figs. 17-24)

**Alloperla thalia** Ricker 1952: 178. Holotype male, INHS, Central Park Bridge to Cameron Bridge (Gallatin River), Gallatin Co., Montana, examined.


**Male.** Macropterous. Forewing length 7-8 mm. General color, lime green in life, white in alcohol. Head and pronotum without black markings. Dorsal aspect of epiproct elongate but short, subparallel, slightly inflated at base, apex evenly rounded, with fringe of shallow crenulations (Figs. 17, 18, 21); dorsal surface bare in apical 1/3 (Figs. 17, 18, 21); clothed with dense appressed setae in basal 2/3 (Figs. 17-23); hood-like in lateral view, apex not extending below plane of the ventral surface (Figs. 19, 20, 22, 23). Stem clothed with fine setae (Figs. 17, 19, 21, 23).

**Female.** Length of wings 10-11 mm. Coloration and markings similar to male. Subgenital plate general outline triangular, margin usually reaching to center or beyond sternum 9 (Fig. 24).

**Diagnosis.** Males of *Alloperla thalia* can be distinguished from *Alloperla severa* by the shorter epiproct, with the bare portion 1/3 of the length of the epiproct (Figs. 17, 18, 21), and in lateral view, hood-like to helmet-like apically, the apex not extending below the plane of the ventral surface (Figs. 19, 20, 22, 23).

**Remarks.** Ricker (1952) in his original description of *Alloperla thalia* compared it with *A. neglecta* Frison, a southern Appalachian species, but not with either *A. elevata* or *A. severa*, apparently because the two Montana males had an epiproct with lateral margins “straight-sided” (Ricker 1954). Previously, *A. thalia* was identified as *A. severa* (Baumann et al. 1977, Kondratieff & Baumann 2002). However, the details of the *A. severa* epiproct were unavailable until Lyon & Stark (1997) provided excellent figures. These SEM photographs indicated to the authors that more than one taxon was present in western North America.

**Distribution.** The northern North American representative of this complex is *A. severa*. It occurs in Alaska from Mount McKinley west to the Aleutian Islands and south to the Canadian border (Stewart & Oswood 2006). Sporadic records exist from throughout northwestern Canada, with most collections from the Canadian Rocky Mountains. In the continental United States, *A. severa* occurs abundantly in the streams of Glacier National Park and northwestern Montana. It occurs in northern Idaho, but no confirmed records are available from Washington. *Alloperla elevata* is found in the Pacific Northwest from southern British Columbia to northern California. It occurs in rivers and large creeks that drain to the Pacific Ocean.

The more southern representative of the complex is *A. thalia*. Records exist from southern Idaho, southcentral Montana, and Wyoming. Additionally, disjunct populations occur in Colorado, Utah, and Nevada.

*Alloperla pilosa* Needham & Claassen 1925, which Lyon and Stark (1997) included in a similar appearing species pair with *A. severa*, is indeed similar, but lacks the fringe of shallow crenulations that rings the sclerotized apex of the epiproct in *A*.

thalia, A. elevata, and A. severa. However, A. pilosa only occurs in the southern Rocky Mountains, so its distribution just overlaps with A. thalia. It is most common in Colorado (Kondratieff & Baumann 2002), but a record exists from New Mexico (Jacobi et al. 2005). Single Alloperla females have been collected from two widely separated localities in Arizona, that could represent A. pilosa or A. thalia.

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REFERENCES


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