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NOTE ON THE REDESCRIPTION OF THE NYMPH OF THE MAYFLY *RHITHROGENA VIRILIS* MCDUNNOUGH 1934 (EPHEMEROPTERA: HEPTAGENIIDAE)

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ABSTRACT.—The mayfly *Rhithrogena virilis* was first described in 1934 by McDunnough in western Canada. Since its description, it has been recorded only once. We reared nymphs and provide descriptions and digital photos that may make identification of this species easier.

Key words: mayfly, Rhithrogena*, Montana, morphology, descriptions, photos.*

Rhithrogena virilis McDunnough is a species of the *brunnea* group (Traver 1935) based upon the presence of a strong lateral spine near the base of each penis division of male adults. The species was first described by McDunnough (1934) in British Columbia, Canada, from reared nymphs. McDunnough had collected additional adult specimens from Jasper Park in Alberta, Canada, in 1928, which he had erroneously determined to be *Rhithrogena brunnea* (McDunnough 1928). Since 1934, the only account of this species being collected was from a stream in Missoula County, Montana, in 1938 (Linduska 1942). No additional collection records exist for the succeeding 71 years.

We collected nearly mature *Rhithrogena* nymphs from 2 streams in western Montana during each spring from 2005 to 2008. Nymphs were collected from the fourth-order Big Thompson River in Sanders County (47.6°N, 115.22°W) and the fifth-order north fork of the Flathead River (48.65°N, 114.18°W) in Flathead County, which fork is also the western boundary of Glacier National Park. These nymphs could not be determined to species using existing identification keys (Traver 1935, Jensen 1966). The live nymphs were returned to the University of Montana, Flathead Lake Biological Station, and placed into flow-through, aerated chambers of spring water at about 11 °C. and day length of 14 h light, 10 h dark. Nymphs were checked daily, and emerged subimagoes were placed into a humid environment until imagoes appeared. Nymphal exuviae, subimago exuviae, and imagoes were preserved in 80% ethyl alcohol.

Upon examination, we found the males to be *R. virilis.* Examination and comparison of the adults and nymphs indicated characteristics that will allow for identification of the nymphs of this species from sympatric species (*Rhithrogena futilis, Rhithrogena hageni,* and *Rhithrogena morrisoni*). We believe that McDunnough's (1934) previous, rather general description of the nymph may have resulted in this species being rarely reported.

Our goal was to examine the nymph more closely, clarify certain morphological features, and report features missed by McDunnough. We also provide photographs that will simplify species identification.

The nymphs of *R. virilis* are, as reported, large, ranging from 12 to 14 mm in length or slightly longer—perhaps the largest *Rhithrogena* nymphs known. Nymphs are dark brown, with 3 long caudal filaments. In life, the large gills are tinged with purple in the dorsal half. However, this character is only useful for identification in live or freshly collected nymphs. The femora of all legs are unicolorous except for a pale-colored oval area (= streak) that begins proximally and runs distally to a point just past half (Fig. 1). This pale oval area blends quickly into the surrounding brown femora, unlike the coloring of some *Rhithrogena* species that have a distinct margin of the pale oval of the femora. Very mature nymphs also have a dark brown to black streak in the center

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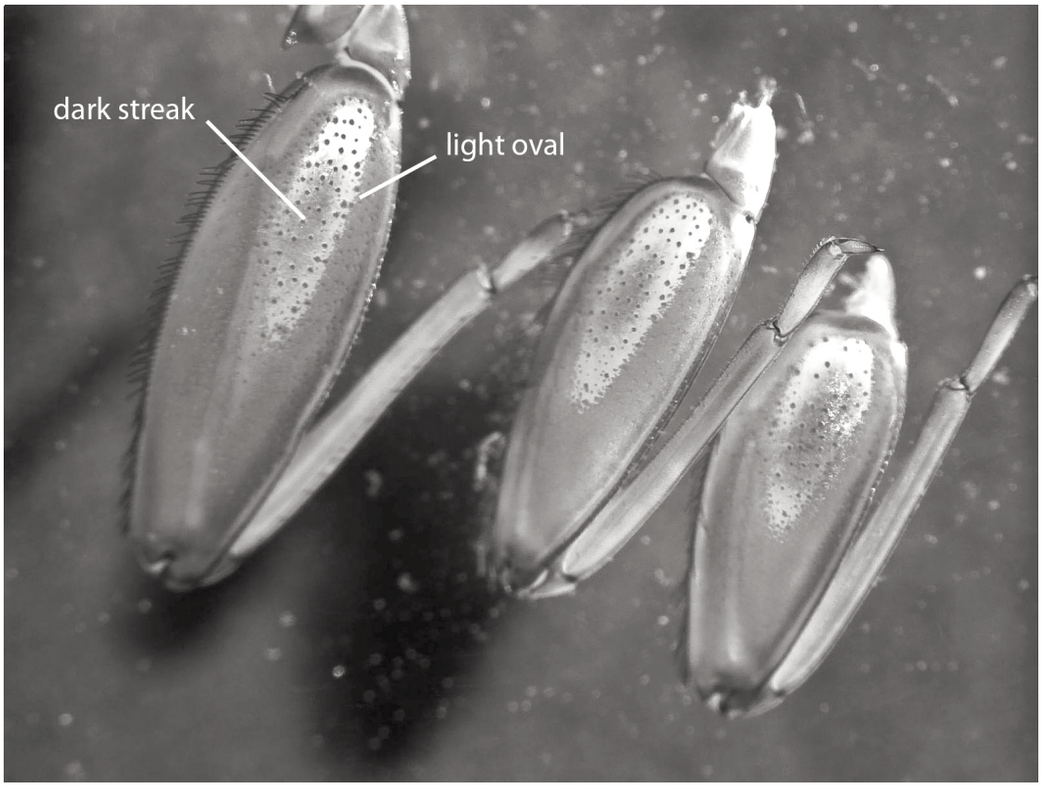

Fig. 1. Legs of a mature nymph showing the major shading and patterns on the femora.

of the pale oval (Fig. 1). This dark streak, centered on the leg, is an adult characteristic and is missing in nymphal exuviae and immature nymphs.

McDunnough (1934) provided a general description of the coloration of the male and female imagoes. We found the male imago to be about 15 mm long, with a reddish-brown abdomen. The male cerci are relatively long, up to 34 mm in length. The leading edge of the forewing is infused with yellow. Wings are 16 mm long and hind wings are 6 mm long. McDunnough's brief description of the nymph is from exuviae and consists of 2 sentences: "Large gills tinged with purple in the dorsal half and the brown femora have a broad pale streak extending from base to beyond half. There is no abdominal pattern visible in the nymphal exuviae other than a pair of very minute sub-dorsal pale dots on the last four or five segments." Traver (1935) repeated McDunnough's original description and distribution and added slightly more detail by noting that the nymphal body is greater than 12 mm long and that the gills lack an erect dorsal lobe and a sclerotized line.

McDunnough (1934) noted the presence on the nymph of "very minute sub-dorsal pale dots on the last four or five segments." Under higher magnification, these pale dots are raised points lateral to the longitudinal axis and are present on all abdominal terga 1–9 of both nymphs and adults (Fig. 2). These dots are surrounded by a darkened circle in adult abdominal terga 1–7 (Fig. 3). The dots are more difficult to observe on terga 1–4 of the nymph. Tergum 10 does not have a pair of pale dots; instead, it has 2 longitudinal lines, lateral to the longitudinal axis, situated in the middle third of tergum 10 (Fig. 2). An unreported characteristic is the presence of a white line that extends from the lateral edge of each posterior ocellus, under (but not touching) the eye, to the lateral edge of the head (Fig. 4).

Emergence of adults in Alberta (June 24–29) and British Columbia (July 14) is oddly much

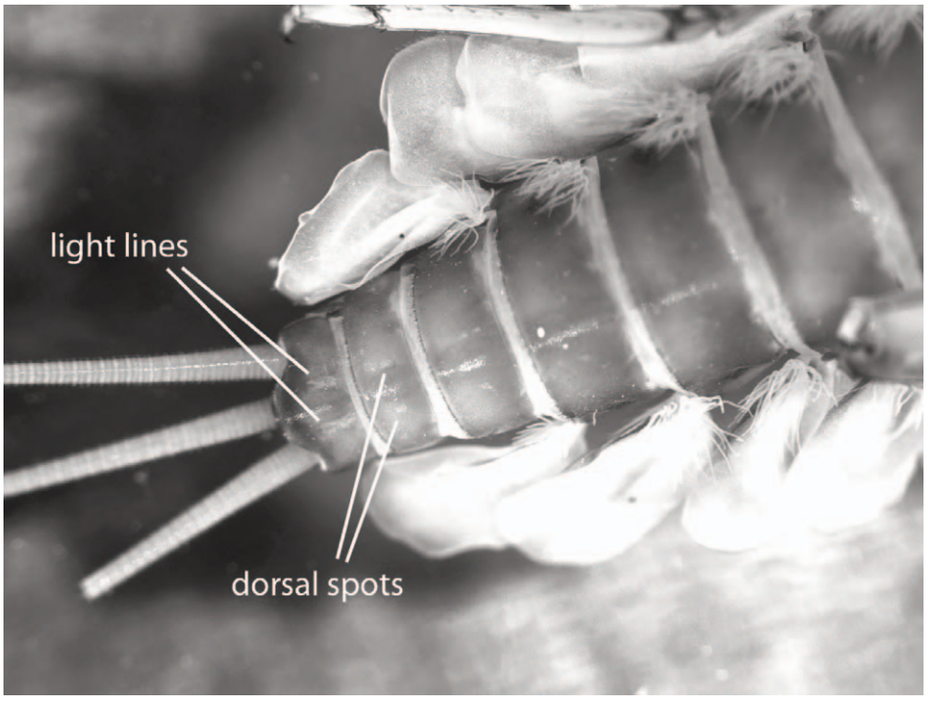

Fig. 2. Dorsal view of the nymphal abdomen showing the faint dorsal dots and the lines on the tenth terga.

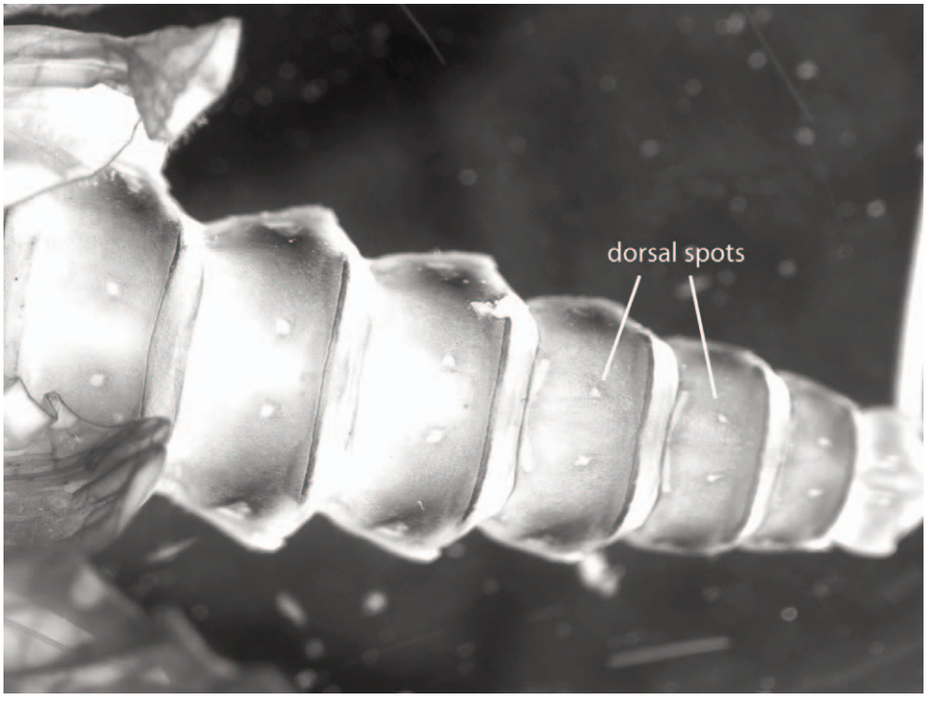

Fig. 3. Dorsal view of the adult abdomen showing the pale dorsal spots.

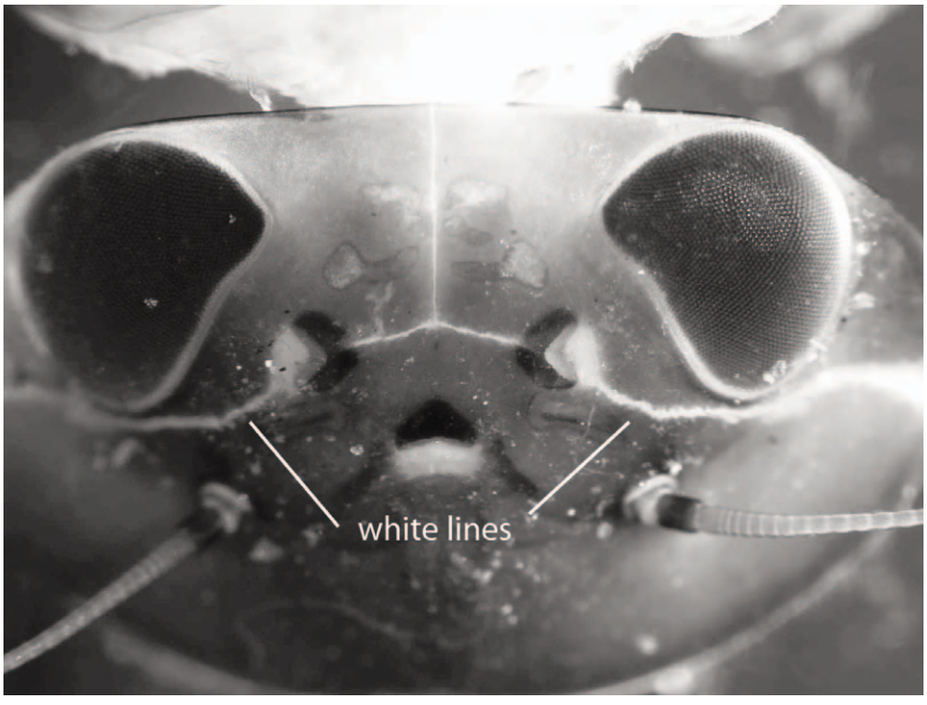

Fig. 4. Dorsal view of the nymph head showing the white line originating at each ocellus and extending to the margin of the head.

later than the specimens we reared from western Montana. Mature nymphs were captured in early April prior to normal high runoff waters, and adults emerged in rearing chambers from 21 April to 10 May in 2005 and 2007–2008. Adult males are easily identified by their large size, the lateral spines on the penes, and the paired abdominal tergal dots. A characteristic not mentioned by previous authors is the relatively long cerci of males, up to 34 mm in length. Female characteristics are listed by McDunnough (1934) and repeated in Traver (1935). The females' large size and the presence of the small dots on all abdominal tergites may assist with female identifications; however, females of sympatric species are not fully characterized.

In summary, we noted nymphal characteristics and provide photographs that should help researchers identify nymphs of *R. virilis*. These characteristics include purple-tinged gills (live or fresh specimens only); pale maculations on femora; subdorsal pale dots on abdominal terga 1–9; two short, pale longitudinal lines on terga 10; a pale line extending from each posterior ocellus to the margin of the head; large size; and spring emergence in medium to large western Rocky Mountain rivers.

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