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Two Co-inhabiting Species of *Ephemera* (Ephemeroptera: Ephemeridae), *E. orientalis* and *E. sachalinensis*, in Korean Streams

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The burrowing mayfly family Ephemeridae is widespread in the Holarcitc, Oriental, and Afrotropical regions. The larvae of *Ephemera* inhabit in sand-gravel substrates in streams and rivers. Due to their large body size, common occurrence, and ecological importance in stream ecosystems, members of the family are relatively well known.

The larva of *Ephemera* can be characterized by a pronounced and bifurcate frontal process, antennae with long whorled setae over most of their lengths, and prothoracic legs whose tibiae are distally rounded and with no process the long up-curved tusks that are setaceousonly at the base are also unique to the larva.

Among the species of the genus, *Ephemera strigata* Eaton, *E. japonica* McLachlan, *E. orientalis* McLachlan, *E. sachalinensis* Matsumura, and *E. separigata* Bae are common in temperate streams in Northeast Asia. When the species of *Ephemera* inhabit in a stream watercourse, they show a stratified pattern of altitudinal distribution occupied by *E. separiagta*or *E. japonica* in the uppermost section, *E. strigata* in the mid-stream section, and *E. orientalis* and/or *E. sachalinensis* in the downstream section of the stream. *E. orientalis* and *E. sachalinensis* are therefore the representatives of lowland streams and rivers showing a high degree of individual abundance particularly in the emergence time.

Although adults of *E. sachalinensis* were recorded from North Korea, only three ephemerid mayflies, i.e. *E. separigata*, *E. strigata*, and *E. orientalis*, are well known in South Korea. Not only from a comprehensive material examination of Korean *Ephemera*species but only from a close field survey and rearing experiment in a Korean stream, however, we have recognized that two species of *Ephemera*, *E. orientalis* and *E. sachalinensis*, are co-inhabiting in the downstream reaches in Korean streams. Up to date, these two species have been lumped as *E. orientalis*in numerous faunistic and ecological studies in Korea due to their morphological similarity in the larval stage. We, therefore, herewith provide their taxonomic accounts and other biological and ecological data. This is the first formal record of *E. sachalinensis* in South Korea.

E. sachalinensis and *E. orientalis* are similar each other, but the body length of *E. sachalinensis* (mean male adult 18.4 40.70 mm, female adult 21.460.46 mm) is larger than that of *E. orientalis* (mean male adult 13.920.04 mm, female adult 15.270.48 mm). In adults, the abdominal terga 6-9 of *E. sachalinensis* possess more thickeded paired stripes than those of *E. orientalis* (Figs. 2 & 4). The male adult of *E. sachalinensis* can be distinguished from that of *E. orientalis* by the shape of genitalia (Figs. 1 & 3) the female adult of *E. sachalinensis* can be distinguished by the forewings which lack distinct median and basal markings (Figs. 6 & 8). The mature larva of *E. sachalinensis* differs from *E. orientalis* in having a deeper and more divergent head frontal process (Figs. 9-12).

Although the male adults of *E. orientalis* and *E. sachalinensis* can be obviously distinguishable by the genital and other characters, those of immature larvae are hard to separate. Based on a close field examination of the populations of the two species in Korean streams, the body size groups of the larvae of the two species are not well distinguishable (Fig. 14) although those of male and female adults are well separated (Fig. 13). *E. sachalinensis* tends to be found in more clean water streams in northern

parts in Northeast Asia, but there is still no quantitative data to support this tendency.

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