Six New Records of Hydroptilidae (Trichoptera) from Korea

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ABSTRACT

In the microcaddisfly family Hydroptilidae, only 12 species belonging to four genera are known currently from the Korean Peninsula. Yet, worldwide this family is one of the biggest of the Trichoptera families. Collection from 2015 to 2017 by aerial sweeping and light-trapping in the southeastern part of the Korean Peninsula (Gyeongsangbuk-do and Gyeongsangnam-do) included species not recorded previously from the Korean Peninsula. We provide re-descriptions of the six species (Hydroptila dampfi Ulmer, 1929, H. introspinata Zhou and Sun, 2009, Orthotrichia costalis (Curtis, 1834), O. tragetti Mosely, 1930, Oxyethira miea Oláh and Ito, 2013, and Stactobia nishimotoi Botosaneanu and Nozaki, 1996) to improve comprehension of Korean hydroptilids.

Keywords: Hydroptila, Orthotrichia, Oxyethira, Stactobia, redescription, illustration

INTRODUCTION

The family Hydroptilidae Stephens, 1836 is a large family including over 2,000 species in the world (Holzenthal et al., 2015), 62 species in China (Yang et al., 2005; Zhou et al., 2009a, 2009b, 2010, 2016), and 54 species in Japan (Ito, 2018). However, knowledge of this family in Korea is quite poor; undoubtedly they have been ignored because of their small body size. Until this present time, only 12 hydroptilid species belonging to four genera were known from the Korean Peninsula: eight species of Hydroptila Dalman, 1819, two species of Oxyethira Eaton, 1873, and one species of Stactobia McLachlan, 1880 were recorded from North Korea (Botosaneanu, 1970; Kumanski, 1990). Only one species, Orthotrichia coreana Ito and Park, 2016, was recorded from South Korea (Ito and Park, 2016). Here, we examine specimens collected from the southeastern part of the Korean Peninsula, collected from a variety of habitats including streams, marshes, and big reservoirs (Fig. 1). Collections from these sites included six hydroptilid species not previously recorded from Korea. In this paper, we provide re-descriptions and illustrations of these species, thus making them readily available to local researchers and giving basic information for further study on local variations.

MATERIALS AND METHODS

Collections were made on three occasions in Gyeongsangnam-do and Gyeongsangbuk-do from 2015 to 2017, at sites shown in Fig. 1 and detailed in Table 1. The Unmuncheon Stream (Cheongdo-gun, Gyeongsangbuk-do), arising in the conserved and protected area between the northern slopes of Mt. Gajisan and Mt. Unmunsan, plays a role as a source of tap water. The Hobakso Valley (Miryang-si, Gyeongsangnam-do), running down the southern slope of Mt. Gajisan, is on the side opposite to the Unmuncheon Stream. Daepyeong Marsh (Haman-gun, Gyeongsangnam-do) is located near the Namgang River and, being designated as a natural monument, it is managed by local government. Junam Reservoir (Changwon-si, Gyeongsangnam-do) is located near the Namgang River and, being designated as a natural monument, it is managed by local government. Junam Reservoir (Changwon-si, Gyeongsangnam-do) comprises three big reservoirs, Sannam, Junam, and Dongpan, and is famous as a sanctuary for migratory birds and for fishing. Aerial sweeping, light trapping, and UV pan light traps were used for collecting. All specimens are preserved in 80% ethanol, and genitalia were figured after treatment in dilute KOH. The voucher specimens for newly recorded Korean species will be deposited in the National Institute of Biological Resources (NIBR), Incheon, Korea. Other specimens used in this study are deposited in Kyonggi University, Suwon, Korea.
rea and the personal collections of S.J. Park, Suwon, Korea, T. Ito, Eniwa, Japan, and T. Nozaki, Kanagawa, Japan. The number of males and/or females, locality numbers (Table 1), collectors, and collecting methods are provided. The morphological terminology applied is indicated in the figure legends.

**SYSTEMATIC ACCOUNTS**

Order Trichoptera Kirby, 1813  
Family Hydroptilidae Stephens, 1836  
Genus *Hydroptila* Dalman, 1819

Table 1. Geographical details for collection localities

<table>
<thead>
<tr>
<th>Loc. No.</th>
<th>Locality</th>
<th>Latitude/Longitude (elevation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Small tributary of Unmuncheon Stream, behind Ojin-ri Village Center, Ojin-ri, Unmun-myeon, Cheongdo-gun, Gyeongsangbuk-do, Korea</td>
<td>35°42'42.4&quot;N, 128°58'31.4&quot;E (163 m)</td>
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<tr>
<td>2</td>
<td>Ojin-1 Bridge, Unmuncheon Stream, Ojin-ri, Unmun-myeon, Cheongdo-gun, Gyeongsangbuk-do, Korea</td>
<td>35°42'13.9&quot;N, 128°58'19.3&quot;E (170 m)</td>
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<tr>
<td>3</td>
<td>Unmun Camping Area, Unmuncheon Stream, Sinwon-ri, Unmun-myeon, Cheongdo-gun, Gyeongsangbuk-do, Korea</td>
<td>35°40'42.6&quot;N, 128°57'29.0&quot;E (199 m)</td>
</tr>
<tr>
<td>4</td>
<td>Upper stream of Hobakso Valley, Mt Gajisan, Nammyeong-ri, Sannae-myeon, Miryang-si, Gyeongsangnam-do, Korea</td>
<td>35°35'44.6&quot;N, 128°59'37.5&quot;E (498 m)</td>
</tr>
<tr>
<td>5</td>
<td>Junam Reservoir, Dongeup-ro 747, Uchangan-gu, Changwon-si, Gyeongsangnam-do, Korea</td>
<td>35°19'40.0&quot;N, 128°40'12.6&quot;E (7 m)</td>
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<td>6</td>
<td>Seoksan Landing Place, Junam Reservoir, Uchangan-gu, Changwon-si, Gyeongsangnam-do, Korea</td>
<td>35°18'48.1&quot;N, 128°39'56.2&quot;E (6 m)</td>
</tr>
<tr>
<td>7</td>
<td>Small ferry, 330 m upstream of Baekgok Bridge, Namgang River, Daesong-ri, Beopsu-myeon, Haman-gun, Gyeongsangnam-do, Korea</td>
<td>35°20'11.8&quot;N, 128°21'44.3&quot;E (17 m)</td>
</tr>
<tr>
<td>8</td>
<td>Daepyeong Marsh, Daesong-ri, Beopsu-myeon, Haman-gun, Gyeongsangnam-do, Korea</td>
<td>35°20'23.7&quot;N, 128°20'09.4&quot;E (11 m)</td>
</tr>
</tbody>
</table>

**Material examined.**  
**Description.** Male genitalia (Fig. 2A–D). Ventral process of
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Hydroptila Distribution.

orth and caudad in lateral aspect. Inferior appendages slender, gently curved dorso-caudad, in lateral aspect blunt protuberance at base. Phallic apparatus long, almost straight, with short titillator at middle.

Female genitalia (Fig. 2E, F). Segment VIII with large round sclerites laterally and transparent semicircular sternite ventrally. Segment IX with pair of round sclerites dorso-laterally, large sclerite ventro-laterally; ventral sclerite sub-quadrate with deep, wide concavity at posterior margin.

**Distribution.** Europe, the Russian Far East (Lake Khanka), China (Heilongjiang, Jiangsu, Henan), Japan (Hokkaido, Honshu), Korea.

**Diagnosis and remarks.** This species is widely distributed in Europe and Far East Asia and is now recorded from the Korean Peninsula for the first time. Adult males are clearly discriminated from those of other congeneric species by the slender inferior appendages and almost straight phallic apparatus and females by the 5 large sclerites of segments VIII–IX. The genitalic morphology of a female recorded as *Hydroptila sp.* from North Korea by Kumanski (1990) conforms with that of this species. 

**19** *Hydroptila introspinata* Zhou and Sun, 2009 (Fig. 2G–L)

*Hydroptila introspinata* Zhou and Sun in Zhou et al., 2009b: 906–908, 910–911, figs. 12–16, male, China (Heilongjiang).

**Material examined.** 5♂♂, Loc. 2, 23 May 2017, Park SJ, Nozaki T, light trap.

**Description.** Male genitalia (Fig. 2G–L). Sternite VII ventral process elongate, apex expanded and jagged. Segment IX with round anterolateral margin, short round processes posterolaterally. Dorsal plate membranous, subtriangular in lateral aspect, subquadrate in dorsal aspect, 4 pairs of thick spines ventrally; each basolateral process slender, directed ventro-caudad, apex acute. Subgenital plate trapezoidal, pair of papillae at posterolateral corners in ventral view; papillae with long apical setae. Inferior appendages rod-shaped in lateral aspect, short setae dorso-apically and ventrally. Phallic apparatus long; slender titillator arises at mid-way, directed posteriad, apically subacute.

Female unknown.

**Distribution.** China (Heilongjiang), Korea.

**Diagnosis and remarks.** This species was described based on male specimens collected from Heilongjiang, China, and here is recorded from the Korean Peninsula for the first time. In the shapes of the inferior appendages, dorsal plate, and phallic apparatus, males are similar to three Asian species: *Hydroptila pectinifera* Schmid, described from Mongolia (Schmid, 1970), *H. spinosa* Arefina and Armitage, found in the Russian Far East (Sakhalin) and Japan (Hokkaido, Honshu, Shikoku, Kyushu) (Arefina and Armitage, 2011), and *H. geniel* Malicky, described from Taiwan (Malicky, 2014). However, *H. introspinata* differs in having slender lateral processes which arise basolaterally from the dorsal plate and are directed ventro-caudad.

**Genus Orthotrichia** Eaton, 1873

20* Orthotrichia costalis* (Curtis, 1834) (Fig. 3A–C)

*Hydroptila costalis* Curtis, 1834: 218, male, Europe.


**Description.** Male genitalia (Fig. 3A, B). Segment VIII somewhat asymmetrical with posterolateral corners protruded in ventral aspect. Segment IX asymmetrical, right posterolateral process slender bar-like, apically acute, in ventral aspect left posterolateral process slightly shorter than right one. Dorsal plate large, asymmetrical, leaf-like, cleft medially. Right inferior appendage bar-like, gently curved mesally, apically acute; left inferior appendage thick and robust, in ventral aspect short basoventral process and subapical protuberance. Phallic apparatus slender with ring-like titillator at middle.

Female genitalia (Fig. 3C). Segment VIII with pair of almond-shaped sclerotized plates ventrally. Segment X subquadrate apically, with pair of cerci.

**Distribution.** Europe, Russian Far East (Amur, Ussuri, Lake Khanka, Sakhalin), China (Shandong, Jiangsu, Henan, Hebei, Jiangxi, Guangxi, Hainan), Japan (Hokkaido, Honshu), Korea.

**Diagnosis and remarks.** This species was described originally from Europe and is also found in many localities of East Asia (Ito, 2013); this is the first record from the Korean Peninsula.

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Korean name: 19팔가시애날도래(신청), 20 لهذه الدراية (신청)
Peninsula. Males differ from other congeneric species by a combination of the asymmetrically protruded segment IX, the large membranous dorsal plate with a median cleft, and the shape of inferior appendages.

Orthotrichia tragetti Mosely, 1930 (Fig. 3D–F)
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Description. Male genitalia (Fig. 3D, E). Segment IX somewhat asymmetrical, with strongly sclerotized postero-lateral processes; each process directed ventrad, truncate apically. Dorsal plate large, semi membranous, asymmetrical in dorsal and ventral aspects, with sharp left projection subapically. Inferior appendage strongly sclerotized, very short. Phallic apparatus long, long titillator arising at middle.

Female genitalia (Fig. 3F). Segment VIII collar-like in ventral aspect, marginal setae strongly sinuous. Segment IX with pair of small lobes postero-ventrally. Segment X round to subquadrat in ventral aspect, pair of short cerci apically.

Distribution. Europe, Russian Far East (Amur, Ussuri, Lake Khanka, Vladivostok, Khasanski), China (Jiangsu, Henan,
Fig. 4. Male and female of *Oxyethira miea*. A–E, Male: A, Genitalia, lateral; B, Same, dorsal; C, Same, ventral; D, E, Phallic apparatus, lateral. F–H, Female: F, Genitalia, lateral; G, Same, dorsal; H, Same, ventral. VII–X, abdominal segments VII–X; ia, inferior appendage; pl, postero-lateral lobe of segment IX; sg, subgenital plate. Scale bar = 0.1 mm.
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Hubei), Vietnam, Japan (Hokkaido, Honshu, Kyushu, Amami-o-shima, Minami-daito-jima), Korea.

**Diagnosis and remarks.** This species was described originally from Europe and is also found in many localities of East Asia and Southeast Asia (Ito, 2013); this is the first record for the Korean Peninsula. The males are distinguished from other congeneric species by the combination of the strongly sclerotized postero-lateral processes of segment IX, the very short inferior appendages, and the large dorsal plate with a sharp left subapical protrusion.

1*Genus *Oxyethira* Eaton, 1873

2* *Oxyethira miea* Oláh and Ito, 2013 (Fig. 4)

*Oxyethira miea* Oláh and Ito, 2013: 42–43, figs. 53–56, male, Japan (Honshu); Ito and Oláh, 2017: 14–16, fig. 7, male, female, Japan (Hokkaido).


**Description.** Male genitalia (Fig. 4A–E). Segment VIII annulate, with finger-like and obtuse processes at middle of posterior margin in lateral aspect. Segment IX produced anteroventrally, in lateral aspect forming triangular lobe; with short lobes anterodorsally and posterodorsally in lateral aspect; posterodorsal lobe plate-like in dorsal aspect. Segment X short, membranous. Subgenital plate well sclerotized, subtriangular in lateral aspect, short, apically truncate, pair of small triangular projections at middle in ventral aspect. Inferior appendages heavily sclerotized, fused to Sternite IX at base, short, truncate, pair of short quadrate projections at middle and long stout setae in ventral aspect. Phallic appa-

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Korean name: 1*긴다리애날도래속(신칭), 2*엄지애날도래(신칭)
ratus long, thick, beak-shaped apically; small lateral process at apical 1/4, shapes variable individually; titillator arise from basal 1/3, broadened apically.

Female genitalia (Fig. 4F–H). Sternum VIII with pentagonal sclerites in ventral aspect, two ellipsoidal sclerites connected to sternite VIII posterolaterally. Segment IX membranous; tergite X weakly sclerotized.

Diagnosis and remarks. This species was described originally from Japan (Honshu) (Oláh and Ito, 2013), and is recorded here from the Korean Peninsula for the first time. The male of this species is clearly discriminated from other congeners by the plate-like lobe on the postero-dorsal corner of segment IX, the short inferior appendage, the short truncate subgenital plate, and the shape of the phallic apparatus.

Genus *Stactobia* McLachlan, 1880

*Stactobia nishimotoi* Botosaneanu and Nozaki, 1996 (Fig. 5)

Stactobia nishimotoi Botosaneanu and Nozaki, 1996: 58–59, 61, figs. 15–18, male, Japan (Honshu); Ito, 2017: 218–219, fig. 10, male, Japan (Honshu, Shikoku, Kyushu, Yakushima).

Material examined. 4♂♀, Loc. 4, 21 May 2017, Nozaki T, swept.

Description. Male genitalia (Fig. 5A–D). Ventral process of sternite VII longer than sternite VII, spiny apex expanded. Tergite IX with long anterior apodeme, sternite IX lost. Segment X semi-membranous. Subgenital appendages thin, each mesal edge round in ventral aspect. Inferior appendages ventrally reduced to small, ellipsoidal lobes. Phallic apparatus long, rounded apically with slender sclerotized band and two short internal spines; spines strongly sclerotized, proximal spine long, gently curved, directed posteriad; apical spine shorter, slightly curved, directed anteriad.

Distribution. Japan (Honshu, Shikoku, Kyushu, Yakushima), Korea.

Diagnosis and remarks. This species was described originally from Japan (Honshu); its known distribution is now extended to the Korean Peninsula. Males of this species are clearly distinguished from those of other congenic species by the two short spines of the phallic apparatus.

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