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## DNA-based association and description of the larval stage of *Apatania helvetica* Schmid 1954 (Trichoptera, Apataniidae) with notes on ecology and zoogeography

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### Abstract

This paper describes the hitherto unknown larva of *Apatania helvetica* Schmid 1954. Sequence data from the mitochondrial cytochrome *c* oxidase region were used to associate adult females and larvae. Genetic data confirmed the autochthonous status of this taxon within the parthenogenetic *Apatania muliebris* Complex ('sous groupe') *sensu* Schmid 1954. Information on the morphology of the larva is given, and the most important diagnostic features are illustrated. *Apatania helvetica* is morphologically close to *Apatania muliebris* McLachlan 1866 and *A. fimbriata* (Pictet 1834). In the context of Apataniidae, this trio of species can be separated by the presence of long tapering setae with flexible tips at the anterior border of the pronotum, by a central gap within the transverse setal band on the 1st abdominal dorsum, by biometry of the frontoclypeal setation and by their distribution in Europe. With respect to European ecoregions (Graf *et al.* 2008), *Apatania muliebris* has been recorded from the Alps, the central plains and highlands, the Baltic countries, Great Britain, Ireland and Scandinavia; *A. fimbriata* is known from the Alps, the western and central highlands, the western plains, the Hungarian lowlands and the Carpathians; and *A. helvetica* is restricted to the Alps and has been recorded only in Switzerland.

**Key words:** 5th instar larva, description, identification, distribution, life stage association

### Introduction

Thirty-two species of genus *Apatania* Kolenati 1848 were included in the "Atlas of European Trichoptera" of Malicky (2004, 2005). Subsequently, another two taxa were described: One taxon of the *Apatania muliebris* Complex from France (Botosaneanu & Giudicelli 2004) and *A. szczesnyorum*, a taxon belonging to the *A. crassa* Subgroup of the *A. complexa* Complex *sensu* Schmid (1955) (Oláh 2006). Graf *et al.* (2008) also included *Apatania crymophila* McLachlan 1880, yielding a total of 35 European taxa. However, we are aware of only 12 species which are known in the larval stage and have been included in keys so far (Gislason 1979; Lepneva 1966; Solem 1985; Pitsch 1993; Wallace *et al.* 2003). Recently, however, V.L. collected fifth instar larvae and many adult females of the parthenogenetic *A. helvetica* at two Swiss locations. The identified females could be fully associated with the collected larvae using standard molecular sequence data. This material enabled us to observe reliable diagnostic characters permitting integration of the species into existing keys.

### Material and methods

Four larvae (fifth instars) of *A. helvetica* Schmid 1954 were collected by V. Lubini on 31 July 2014 using a hand net at spring Punt Periv, Zerne, Switzerland (46.643°N, 10.187°E, 1660 m a.s.l.) and another three larvae (fifth instars) by the same collector on 5 June 2007 at a spring location at Netstal, Switzerland (47.077°N, 09.052°E, 450