*Lauterbornia* 68: 3-8, D-86424 Dinkelscherben, 2009-12-17

# First records of *Simulium (E.) petricolum* (Rivosecchi), *Simulium (N.) bavaricum* Seitz & Adler and *Simulium (N.) oligotuberculatum* (Knoz) (Diptera: Simuliidae) in Austria

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With 2 figures

**Keywords**: Simulium, Simuliidae, Diptera, Insecta, Austria, first record
Schlagwörter: Simulium, Simuliidae, Diptera, Insecta, Österreich, Erstfund

**The first findings of *Simulium* (*E.*) *petricolum*, *Simulium* (*N.*) *bavaricum*, and *Simulium (N.) oligotuberculatum* in Austria are now reported.**

## 1 Introduction

Due to its central geographical location, Austria takes part in the four ecoregions Alps, Dinaric western Balkan, Central highlands, Hungarian lowlands (Illies 1978, fig. 1) and thus shows the most different running water bioregions (Ofenböck & al. 2007). The resulting characteristic of diversified running water biotopes causes a species-rich inventory of lotic fauna elements (cf. Moog 2002), the typical representatives of which include the preimaginal stadiums of the black flies.

The material discussed afterwards comes from collections the author has made during a stay in Zillertal (Tyrol) as well within the scope of the international Fountain Weeks organized by the National Park Administration of "National Park Gesäuse" (Styria) (Nationalpark Gesäuse 2009; cf. fig. 2).

## 2 *Simulium* (*Eusimulium*) *petricolum* (Rivosecchi 1963)

On the basis of cytologic examinations, this means the sibling species "J" from the *aureum* group (Leonhardt 1985, Adler & Crosskey 2009). Certain morphologic identification is possible by determining the males or fully-developed male pupae the gonosterna and gonostyli of which have a characteristic form - the latter having prominent corners of the outer edge (Beaucournu-Saguez 1977, Rivosecchi 1978). With the pupa, the uppermost filament of the gill is moreover said to be longer than the other filaments (fig. 60 in Rivosecchi 1978, Crosskey 1987).

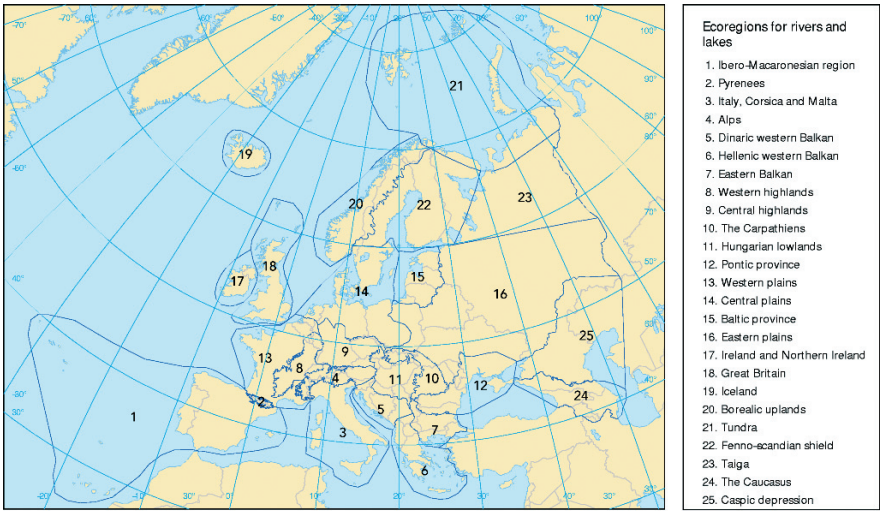


**Fig. 1: Ecoregions according to Illies (Copyright: European Environment Agency, Copenhagen, 2004)**


**Fig. 2: Location of the areas of examination "Gesäuse" and "Zillertal". As amendment, the map also shows the Chiemgauer Alpen ("Chiemgau"), Berchtesgaden National Park ("BGL"), Gardone Riviera ("Gardone") and Jeseniky Mountains ("Jeseniky") mentioned in the text**

During the fountain week 2008, it was possible to capture a total of 14 larvae and 4 pupae, including 1 fully developed male, in the lateral spring brooks of Bruckgraben (Höll, 925 m a.s.l.) in Gesäuse National Park on 02-07-2008. The individuals were associated with young larvae from the *Nevermannia vernum* group that could not be determined in more detail. Besides the morphological verification via the male, affiliation with the species could also be confirmed by means of chromosomal examinations with 4 larvae fixed in Carnoy's solution that "*conformed nicely to the chromosomal characterization of Simulium petricolum. Three of these larvae had an inversion polymorphism that I had not seen before, but it is not unusual for various populations of S. petricolum to have unique inversion polymorphisms*" (Adler, pers. comm.).

The hygropetric characteristic of the location corresponds to the personal observations in similar biotopes on Elba and Madeira where the preimaginal stadiums often occupy the thin water film at hygropetric rocks, as well. With regard to the altitude, the species doesn't seem to be limited as in the Western Alpes, they can be found up to 2100 m a.s.l. (Vincon & Clergue-Gazeau 1993). Apart from the record by Knoz (1965) sub. nom. *E. latizonum* that is "not unambiguous" (cf. Stloukalova & Jedlicka 2005), this finding is the second proof in Central Europe and located almost 400 km North East of a location in Gardone Riviera (Italy, cf. fig. 2), where the author made collections in 1994. Together with the latest proof from the south of England (Post & Mustapha 2004), the current occurrence in Northern Styria is further proof that the distribution area certainly exceeds the Mediterranean which has up to now been regarded as natural range.

### 3 *Simulium* (*Nevermannia*) *bavaricum* Seitz & Adler 2009

After it has only been possible to record the existence of this species earlier this year (Seitz & Adler 2009), its occurrence can now also be confirmed 120 km further east of the locus typicus in Berchtesgaden National Park (fig. 2). In Gesäuse National Park, 7 larvae and 2 pupae have been found up to now, in spring brooks at an altitude of between 835 and 1572 m a.s.l.: 1 larva in the spring at Haindlwald, 17-07-2007; 2 larvae in Hüttenquelle at Haindlkar, 18-07-2007; 3 larvae in Turmsteinquelle, 01-07-2008; 1 larva in the tuff spring near Köblalm, 04-07-2008 (in each case leg. Gerecke); 2 pupae in the Pichelmayerschütt spring in Bruckgraben, 02-07-2008. At two locations, the preimaginal stadiums of the sibling species *Simulium* (*N.*) c*arpathicum* have been associated; for the rest, *Simulium (N.) bertrandi*, *Simulium (N.) brevidens*, *Simulium (N.) cryophilum* as well as *Simulium (N.) oligotuberculatum* could be found in the associated fauna.

## 4 *Simulium (Nevermannia) oligotuberculatum* (Knoz 1965)

The first Austrian proof of this comparably rare high-mountain species dates 29-05-2005 from the Central Alps in the area of Zillertal, less than 100 km from the German occurrence in Chiemgauer Alpen (Seitz & al. 1995) and in Berchtesgaden National Park (Seitz 2004) (fig. 2). The individuals were found in two small spring brooks close to Zellberg at an altitude of 1850 m a.s.l. (2 pupae) as well as close to Rastkogelhütte at an altitude of 2200 m a.s.l. (1 pupa). While the associated fauna at the lower site comprised *Prosimulium rufipes* (2 larvae), *Simulium (N.) brevidens* (2 larvae, 3 pupae) and *Simulium* cf. *maximum* (1 larva), the one at the higher site consisted of *Prosimulium latimucro* (1 larva) and *Simulium (N.) brevidens* (1 pupa). With an altitude of 835 m a.s.l., the third site, the spring brook of Turmsteinquelle (Gesäuse National Park, see above), is located considerably lower. Here, it was possible to collect a total of 12 larvae and 3 pupae on 01-07-2008, together with 4 pupae of *Simulium (N.) brevidens* and 3 larvae of *Simulium (N.) bavaricum* (s.a). Comparison with the hypsometric data regarding the occurrence of *Simulium (N.) oligotuberculatum* published until now shows that this location is the currently lowest ever recorded place of occurrence in the whole natural range reaching from the Pyrenees or the French and Italian West Alps (Clergue-Gazeau & Vincon 1993) in the North-Easter direction to Jeseniky Mountains (fig. 2) and the Western Carpathians (Knoz 1965, Jedlicka 2006).

## 5 Conclusion

For Austria, it has up to now been possible to record 45 black fly species (Car & Lechthaler 2002). Together with the 3 new findings presented above, the number of species is only slightly lower than in Germany where there are 52 species (Zwick & Werner 1999, Seitz & Forster 2004, Seitz & Adler 2009), however higher than in the well-explored neighboring countries Slovakia and the Czech Republic with 46 and 43 species respectively (in each case with *S. galeratum* (sub. nom. *reptantoides*) as a separate species, Jedlicka & Knoz 2006) and North Italy (area of the South Alps) with 43 taxa (Car 2000). Compared to the other neighbours Liechtenstein (4 species, Car & Moog 1993), Switzerland (34 taxa, Glatthaar 1998), Slovenia (28 taxa, Car 2000), and Hungary (25 species, Deak 2009) the differences are naturally more apparent. If you assume a potential number of species of 65 for Central Europe (cf. Jedlicka & al. 2004), more findings can be expected in Austria in the future due to its special location.

#### Acknowledgements

My special thanks goes to Prof. Peter H. Adler, Clemson, for providing the chromosomal examinations at *Simulium* (*E.*) *petricolum.* I also thank Prof. L. Jedlicka, Bratislava, for precious references as

well as the translation of a Slovakian text section and PD Dr. Reinhard Gerecke, Tübingen, for collecting individuals. My special thanks goes to Dr. Harald Haseke, member of the Gesäuse National Park Administration, who has not only made the International Fountain Weeks possible but has also made the field examinations a lasting event. And finally I thank Alexandra Braun for supporting me in the translation of this text.

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*Received*: 2009-07-28