Erebia oeme (Hübner, 1804) (Lepidoptera, Nymphalidae) in the Făgăraş Mountains (Southern Carpathians)

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Summary: The first record of *Erebia oeme* in the central South Carpathians (Făgăraş Mts.) is reported and further records in Retezat Mts. (southwestern Carpathians). Apparently, the species is rare in the Carpathians, but should be more widely distributed as thought. The subspecific classification of *E. oeme* from the Carpathians and their conservation value is discussed.

Key words: *Erebia oeme*, distribution, biogeography, morphology, butterfly, Carpathians.

Introduction

Although widely distributed in the Pyrenees, Massif Central, Alps and the Balkan mountain systems (Tolman and Lewington 1998, Kudrna 2002, Lafranchis 2007), *Erebia oeme* (Hübner, 1804) was only very recently recorded from the Romanian Carpathians from the southern part of Retezat Mts. (Dinca *et al.* 2011). The species prefers montane-subalpine moist grasslands where the larval food plants (i.e. *Carex, Juncus, Poa, Festuca* and other sedges and grasses) are growing. The structure of the grasslands is complemented with rocky slopes and scattered stands of spruce (*Picea abies*). The species is mentioned to be found not only on moist subalpine grasslands, but also in subalpine extensively used dry grasslands with tall herbaceous vegetation (Schweizerischer Bund für Naturschutz 1987, Stettmer *et al.* 2007). According to these references, caterpillars take one or two years for their development, depending on altitude and microclimate of the habitat. Adult butterflies fly from mid-June to mid-August at altitudes from 800 to 2000 m asl, but up to 2800 m asl in the Swiss Alps.

General distribution and taxonomic subdivision of *E. oeme*

According to Warren (1936), *E. oeme spodia* ranges from the Eastern Bavarian Alps to Salzburg, Styria, and Carinthia, up to the Carnic Alps, Velebit Mts. (northern Croatia), Bosnia-Herzegovina (Trebevic: type locality of *E. oeme vetulonia* Fruhstorfer, 1918), Montenegro and Northern Albania. He also suggests that the individuals from the Julian Alps probably also belong to this taxon. However, Carnelutti & Michieli (1960) have described *E. oeme pseudospodia*, closely related to *E. oeme vetulonia*, while *E. oeme pacula* Fruhstorfer, 1918 occurs in the western part of the same mountains (i.e. west of the Trenta valley). Fruhstorfer (1918) also described *E. oeme zagora* from the Rila and Rhodope Mts., considered by Warren to be *E. oeme spodia* f. *zagora* restricted to Bulgaria. Abadjiev (1993, 2001) stated that *E. oeme spodia* occurs in the western and central Stara Planina, in Rila, Pirin and Rhodope Mts., but is missing from the Vitosha Mts. These latter data already suggested that *E. oeme* should also occur in the Southern Carpathians.

Warren (1936) mentioned on the possible occurrence of *E. oeme* in the Carpathians: "I have not found any record of the occurrence of the species in the Transylvanian Alps, but if it should be there, there is little doubt that it would also be f. *vetulonia*." Warren's statement was based on the old record of *E. oeme spodia* f. *vetulonia* from the Northern Carpathians (Branyisko, near Presov, Abafi *et al.* 1896). Further old records for this region were given by Hruby (1968: Lower Tatra, Liptovské Hole, High Tatra, Belanské Tatry). These records, however, remained unconfirmed and have been recently questioned (some details see: Dinca *et al.* 2011). Thus, Kudrna (2002) did not include this species for the Northern Carpathians.

Egg and larval morphology of *E. oeme* The egg is yellowish when laid and is changing to a darker yellow or grey-yellow colour after a few days. It seems to be the only egg in the *Erebia* genus lacking distinct ribs (Fig. 1.a; 1.b).

The caterpillar has a bone-white colouring with

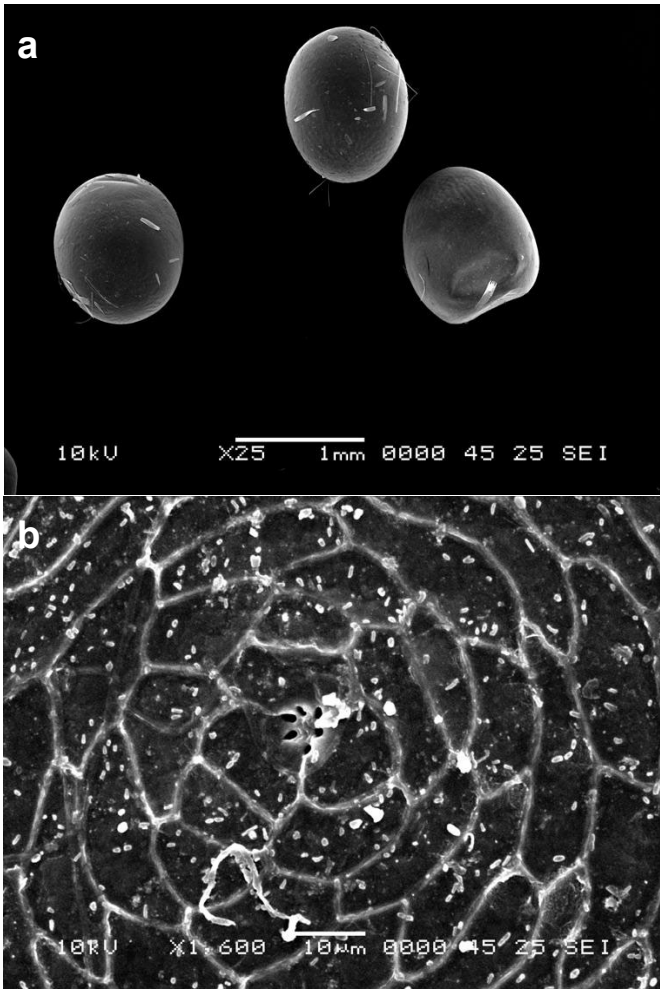

Fig. 1. The structure of the egg of *Erebia oeme spodia.* 1a: scanning electron micrographs (SEM); 1b: micropyl area (SEM) (foto C. Mihali).

Fig. 2. *Erebia oeme* caterpillar (L1) from the Alps (foto David Jutzeler).

Fig. 3. *Erebia oeme* pupa from the Alps (foto David Jutzeler).

obvious lateral and lateral dorsal stripes (Fig. 2). The length of the dorsal hairs does not exceed 0.5 mm (Schweizerischer Bund für Naturschutz 1987).

The pupa is also bone-white with dark lines and spots, which mark the abdominal segments, the alar appendages, the legs and the head (Fig. 3).

The adult looks very much like *E. medusa*, from which it is distinguished by the black ocelli with gleaming white pupils. The antennal club tip is black beneath, while it is pale brown in *E. medusa*.

Results

Occurrence and habitat of *Erebia oeme* in the Făgăraş and Retezat Mts. One specimen of *Erebia oeme* was captured by T. Schmitt in the Făgăraş Mts., Cabana Capra 19 July 2004. L. Rakosy, T. Schmitt and Z. Varga returned to the same area at 28 July 2010 and collected three individuals at an altitude of 1600-1700 m. Besides *E. oeme*, we also observed *Erebia manto trajanus, E. epiphron transylvanica, Erebia sudetica radnaensis, E. medusa* and *Boloria pales carpathomeridionalis*.

The habitats of *E. oeme* in the Făgăraş Mts. has to be classified as extensively used moist pastures, at altitudes of 1500-1700 m asl, with a southern, south-eastern or south-western exposition (Fig. 4). These slopes are generally only moderately grazed, as they are mostly rather steep, dissected by gravel stripes and eroded ditches.

An additional individual of *E. oeme* was captured below the peak of Iorgovan (Retezat Mts.) at 1750 m asl in subalpine grasslands with *Pinus mugo* shrubs, 01. August 2011. *Erebia cassioides neleius*, *E. euryale syrmia* and *E. epiphron transylvanica* were other common ringlet species at this locality, other remarkable butterflies were a large population of *Aricia artaxerxes* and some individuals of *Polyommatus dorylas*.

Thus, In the Carpathians, *E. oeme* was found between 800 and 1700 m, and the observed flight period spans from 25 June to 01 August.

Discussion

Biogeography and subspecific status The modelled distribution based on the currently known distribution data and the hereon calculated climatic niches of the Climatic Risk Atlas of European Butterflies (Settele *et al.* 2008) already indicated, among others, the putative presence of *E. oeme*, also in the Făgăraş Mts. of the Southern Carpathians. Thus, our investigations confirm the distribution predictions of the Climatic Risk Atlas for the Bright-eyed Ringlet. It has been, however, often observed that the actual distribution of some *Erebia* species is much more scattered in the Carpathians than it would be suggested by climatic envelope modelling (e.g. *E. pharte, E. sudetica, E. pronoe*).

Fig. 4. Habitat of *Erebia oeme spodia* in the Făgăraş Mountains, South Carpatians – Cabana Capra 1550m altitude.

The known Southern Carpathian material is too limited for a reasonable discussion of the subspecific classification. The few known specimens known from the Southern Carpathians are mostly similar to the smaller and duller ones from Rila and Pirin Mts., while specimens from the Rhodope Mts. are generally larger and brighter in coloration with larger ocelli (Fig. 5, 6). Rebel and Zerny (1931) suggest the complete similarity of Albanian, Bosnian and Bulgarian *E. oeme* individuals and believe that they all should represent *E. oeme vetulonia*. They consider *E. oeme zagora* as synonym with *vetulonia*.

Their opinion agrees with the observation that a clear western-eastern subdivision at the Balkan Peninsula only exists in alpine species of the highest levels (e.g. *Erebia pandrose* (*E. /sthennyo/ infraclara* in western mountains from Julian Alps through Durmitor to the Northern Albanian Alps), *E. gorge, E. cassioides, Boloria pales*), while species of the lower (sub-)alpine levels seem to be less differentiated (e.g. *Erebia ligea herculanea, E. euryale syrmia, E. oeme, E. ottomana, Boloria graeca, Lycaena candens*, Varga 1975). In general, the mountains of the Balkan Peninsula are poor in such alpine species of moist grasslands (e.g. *E. pharte, E. sudetica,* do not occur; *E. manto* and *E. albergana* are extremely local). On the other hand, some species with large distributions at the Balkans often only reach the southwestern parts of the Southern Carpathians (e.g. *E. cassioides neleus, Coenonympha rhodopensis schmidtii*).

Fig. 5. *Erebia oeme spodia* from the Făgăraş Mt, Romania.

Fig. 6. *Erebia oeme spodia* from Pirin Mountains, Bulgaria.

Conservation aspects Nothing is known about this species' conservation status in Romania, as it was not recorded before 2011. However, we assume that the intensive grazing with high numbers of livestock, as well as the spreading of the forests at lower altitudes and the water drainages supplying the artificial lakes, represent factors affecting and threatening the presence of this species in the Southern Carpathians. As it is highly likely that *E. oeme* will also be recorded in other massifs of the Southern Carpathians (e.g. Cindrel, Parang, Retezat and Godeanu Mts.), conservation priority should be given to identified populations.

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