

Biodiversity of butterflies and moths in the National Park Hohe Tauern

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Summary

The author gives an overview about research activities on butterflies and moths of the National Park Hohe Tauern (Austria) which already began in the late 18th century and culminated in a popular book in 2008. The faunal composition of all representative ecosystems was recorded during the last 20 years. Species richness proved extremely high with about 1300 taxa. The discovery of local endemics is of particular interest for the park management. Several species of Lepidoptera are potential bioindicators, particularly with respect to climatic change and intensification or abandonment in agriculture.

Keywords

butterflies, moths, species diversity, endemics, bioindication

Aims and duration of project

Starting in 1988, a major intention was a survey of the entire faunal composition of butterflies and moths in the National Park Hohe Tauern covering all ecosystems through an intensified inventory of these groups. Under the auspices of the Tiroler Landesmuseum Ferdinandeum in Innsbruck, the first intensive field programme was organized in East Tyrol, lasting 10 years. Simultaneously further local inventory programmes were undertaken in Salzburg and Carinthia. However, despite the extensive sample data sets which partially date back to the late 18th century no complete survey had been published. Therefore sponsored by the National Park Hohe Tauern, a co-operative research programme between the museums in Klagenfurt, Innsbruck and Salzburg was initiated, with the publication of a popular book on the fauna of butterflies and moths being defined as a major goal. This supplementary inventory lasted from 2003 to 2007.

Area of Study

The National Park Hohe Tauern (Austria) is the largest protected area in Central Europe, covering altogether about 1.800 sq. km and ranging from about 1000 to 3798 m s.l. Therefore an area-wide inventory was not aspired and would have gone far beyond available resources considering the size of area as well as the vast number of species to be expected. Alternatively the field research exemplarily covered all types of terrestrial biotopes of the major ecosystems in the PA: wetland habitats, mountain pastures and alpine grassland, forests, dwarf-shrub zones, rocky habitats and alpine scree. Furthermore the sites were scattered over the entire protected area, mainly in East Tyrol from 1988 to 1998 and with a special focus on insufficiently explored areas of Salzburg and Carinthia during the last years.

Methods

The collecting methods were selected to enable a registration of a maximum amount of species within a limited number of excursions.

Due to the night activity of about 85% of central European Lepidoptera mainly light-trapping methods were chosen but also traditional sampling methods during day-time:

- illuminated white sheet (light source 125W UV)
- light tower (light source 15W-20W UV)
- automatic light traps (light source 8W-15W UV)
- usage of a dip net
- visual registration of day-active species

visual registration of larvae and leaf-miners
usage of bait (sugar-wine mixture)
usage of pheromones

In general several of these methods were used simultaneously.

Results and Discussion

The conservation of autochthonous species diversity is one of the major tasks in this and other nature reserves. However, exactly this diversity was grossly unknown or at most insufficiently known for many organisms including Lepidoptera.

First attempts of faunistic studies date back into the late 18th century. Sigismund von Hohenwarth, the later third Bishop of Linz, collected insects and plants in the Hohe Tauern and described striking new species which are still valid today, e.g. *Zygaena exulans* and *Caloptusia hohenwarthi*. Later on famous scientists such as Josef Mann, Otto Staudinger and Josef Klimesch visited the area, particularly the surroundings of Großglockner. Beside a large number of interesting records, several new taxa have been described by these earlier generations of scientists. Their studies combined with the recent inventory resulted in an alpha diversity of 1296 species of butterflies and moths (HUEMER & WIESER, 2008). A statistical analysis of Beta diversity, e.g. species which are unique to each of the ecosystems, has not been conducted yet and will be subject to a further publication.

The actual fauna is almost completely based on postglacial recolonisation, with the exception of maybe a few taxa which could have survived on nunataks. Arctic and Alpine, Continental and Mediterranean species can be separated. Furthermore migrating species are widespread in the National Park. Of particular interest for conservational aspects are a number of local or regional endemics including the recently described *Aspilapterix spectabilis*, *Ancylis habeleri*, *Sphaleroptera dentana* or very latest *Sciadia tenebraria taurusica*. In consideration of molecular data, further fascinating taxonomical results may still be expected in future.

The majority of taxa is rather stenotopic than eurytopic and hence usually restricted to few biotopes within one of the major ecosystems. Due to their sensitivity to climatic change and/or anthropogenic influence such as fertilization or abandonment of alpine grassland several species are potential candidates for a prospective bioindication study.

References

HUEMER P. & WIESER C. (2008): Schmetterlinge. Wissenschaftliche Schriften, Nationalpark Hohe Tauern, Tyrolia Verlag, 224 pp.

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