

THE ECOLOGY AND DISTRIBUTION OF *PEDIASIA TRUNCATELLA* (ZETT.)
(PYRALIDAE, LEPIDOPTERA) IN THE BOHEMIAN FOREST MOUNTAINS

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A b s t r a c t : *Pediasia truncatella* (ZETTERSTED 1840) (Pyralidae, Lepidoptera) is a subarctic crambine moth, which is very characteristic for forest-tundra and peatland habitats of the northern Holarctic region. The species is monovoltine and its larvae feed on wetland grasses (*Molinia*). The local populations of the Bohemian Forest Mountains represent a highly unique isolated phenomenon of the subarctic fauna in Central Europe associated with montane oligotrophic peatlands. In the Bohemian Forest Mountains, the adults of *P. truncatella* fly from late May until late July. The phenology depends on the altitude of the peat bog localities (between 740 and 1200 m a. s.l.) and the corresponding climatic conditions.

K e y w o r d s : Boreal and subarctic Lepidoptera, peatland, peat bog, forest-tundra, tyrphobiont, biogeography, relics, nature conservation.

Introduction

In 1840 J.W.Zettersted described a new northern crambine moth discovered in Swedish Lapland - "*Chilo truncatellus*". This little known subarctic species was later definitely classified as *Pediasia truncatella* (ZETTERSTED 1840) - see BLESZYNSKI (1965). A comprehensive diagnosis of *P. truncatella* adults is also given by BLESZYNSKI (1965) including a colour illustration (by

F. Gregor) of a specimen collected by J. Soffner in the Bohemian Forest Mountains ("Böhmerwald, Mader"). Further instructive colour illustrations of adults were published by NOVAK & SPITZER (1982) and SPITZER & HAVEL (1985). SOFFNER (1925, 1930) recorded *P. truncatella* ("*Crambus truncatellus*") from the Bohemian Forest Mountains for the first time, but few comparative biogeographical data are available (see VOLDRICH 1963, SPITZER 1975, 1981, ELSNER et al. 1981). The ecology of this species remains unknown. The German and Czech names of *Pediasia truncatella* (ZETT.) should be proposed for educational purposes: Böhmerwald-Zünsler and travarik sumavský, respectively - both derived from the native names of the Bohemian Forest Mountains (Böhmerwald, Sumava) - cf. NOVAK & SPITZER (1982), SPITZER & HAVEL (1985).

General Distribution

Pediasia truncatella seems to be a highly characteristic component of boreal and subarctic fauna of the Holarctic region. In northern European countries, the species is widely distributed in Fennoscandia and northern Russia its most southern peatland localities being near the Baltic Sea (BLESZYNSKI 1965, KROGERUS 1960, KOPONEN et al. 1982). Siberian populations of *P. truncatella* are classified at the level of the subspecies *altaica* STGR. (KOZAKEVIČ 1978) distributed in southern Siberian mountains and northeastern subarctic areas. This subspecies has been recorded from the Amur region as well. *P. truncatella* is also distributed in most of boreal and subarctic Canada (BLESZYNSKI 1965). The species is characteristic of the wet forest-tundra (northern limits of the coniferous forest) and isolated "boreal" oligotrophic *Sphagnum* peatlands at lower latitudes. The European northern limit of the distribution of *P. truncatella* is about 68°30'N in Finnish Lapland (KOPONEN et al. 1982). KROGERUS (1960) recorded the aapa peatland localities with tyrphobiont populations of *P. truncatella* near the Arctic Circle (66-67°N), but in central Finnish Lapland the species is much more eurytopic in the forest-tundra ecotone (MIKKOLA & SPITZER 1983). The isolated "relic" areas of occurrence in peat bogs of more southern latitudes have been found in southern Siberia and in the Bohemian Forest (Böhmerwald, Šumava) as the only Central European mountains.

Study Areas and Methods

Populations of *Pediasia truncatella* have been investigated by the autor in the Bohemian Forest Mountains (Šumava, Böhmerwald). Some comparative data were obtained also in northern Finland (MIKKOLA & SPITZER 1983). Ten peat bogs of the Bohemian Forest Mountains, including the classical localities of SOFFNER (1925, 1930), were visited each year during the period 1966-1986. The adult activity of populations was checked. Two peat bogs were regularly monitored also by light-trapping- the Mrtvý luh bog near Volary, 740 m a.s.l. in 1968-1970 (NOVAK & SPITZER 1972) and the Jezerní slať bog near Kvilda, 1050 m a.s.l. (SPITZER in litt., ELSNER et al. 1981). Females used for oviposition and rearing experiments were collected in the Jezerní slať near Kvilda.

Results and Discussion

DISTRIBUTION IN THE BOHEMIAN FOREST MOUNTAINS: *Pediasia truncatella* is strictly associated with oligotrophic raised *Sphagnum* bogs. The typical plant association (community) is *Pino rotundatae* - *Sphagnetum* Köstner et Flössner 1933 (NEUHÄUSL 1972) of the montane or subalpine bogs - see SPITZER (1975), ELSNER et al. (1981), MIKKOLA & SPITZER (1983). The species has been found in peat bogs starting from 740 m a.s.l. (Mrtvý luh near Volary, Pěkná) up to about 1100-1200 m a.s.l. (a large complex of peatlands near Kvilda and Modrava (Mader). The ten peat bogs investigated are scattered like habitat islands in the completely montane parts of the Bohemian Forest Mountains - from the Vltava Valley (Mrtvý luh, Pěkná) in the Southeast up to the high plateau of the northwestern Plains (Kvilda, Modrava), close to the Bavarian frontier. No records are available from the Upper Austrian slopes of these mountains. *P. truncatella* is always strictly associated with peatlands and seems to be a typical tyrphobiont (SPITZER 1975, MIKKOLA & SPITZER 1983). The associated Lepidoptera species are highly characteristic tyrphobionts or tyrphophilous taxons of the Bohemian Forest Mountains as well: *Glyphipterix haworthana*

(STEPH.), *Athrips pruinoseella* (LIEN. et Z.), *Chionodes viduella* (F.), *Acleris maccana* (TR.), *Olethreutes turfosa* (H.S.), *Epinotia gimmerthaliana* (LIEN. et Z.), *Crambus alienellus* (GERM. et KAULF.), *Udea inquinatalis* (LIEN. et Z.), *Colias palaeno* (L.), *Boloria aquilonaris* (STICH.), *Procllossiana eunomia* (ESP.), *Vacciniina optilete* (KNOCH.), *Corsia sororiata* (HB.), *Anarta cordigera* (THNBG.), *Papestra biren* (GOEZE), *Apatele menyanthidis* (ESP.) and *Celaena haworthii* (CURT.). All these species have also been recorded from the habitats of *P. truncatella* in Finnish Lapland (see KOPONEN et al. 1982, MIKKOLA & SPITZER 1983).

ADULT ACTIVITY AND PHENOLOGY: The adults of *P. truncatella* fly during late afternoon and evenings until approx. 21-22 h. The nocturnal flight activity is influenced by air temperature not as strongly as in other Lepidoptera of the montane zone. The flight period in the Bohemian Forest Mountains depends on altitude and climatic conditions: In the Mrtvý luh bog near Volary (740 m a.s.l.), early adults were observed in late May and early June. Near Kvilda and Modrava (approximately 1100 m a.s.l.) the flight period is confined to an interval between early June and late July. By three years light-trap monitoring of Lepidoptera at the Jezerní sláť bog near Kvilda, several earliest adults were caught on 13th June and the last specimens were observed on 23rd July (1973-1975). The maximum frequency of adults was recorded from late June to early July.

PREIMAGINAL DEVELOPMENT: Eggs, larvae and pupae of *P. truncatella* were never found in the field and; consequently, all data presented here are based on laboratory study. The oviposition was investigated in early July (Jezerní sláť) under seminatural conditions. Each female (n=6) laid 250-300 eggs in a way characteristic of crambine moths. The eggs were spread on wet *Sphagnum* or filter paper. All larvae hatched after 7-10 days (at 5 to 15°C) and started feeding on leaves of the Purple Moore Grass (*Molinia coerulea*). About 20 to 30 % of the larvae (n=60) reached the diapause 3rd instar during late September. The larvae moved to a hibernation place in *Sphagnum* layers, but they did not survive the winter period. Not only is it difficult to arrange an experimental hibernation place, but the natural mortality seems to be very high as well. Further research is badly needed. *P. truncatella* is an obligatory monovoltine species.

Conclusions

Pediasia truncatella (ZETT.) is a subarctic (boreal) circumpolar species, whose relic distribution in peatlands of the Bohemian Forest Mountains is unique for Europe. The isolated populations seem to constitute an endemic geographical race (subspecies). All ecological and biogeographical characteristics of *P. truncatella* support evidence of its tyrphobiont faunal association and history. Isolated populations of *P. truncatella* and associated peatland insect species of the Bohemian Forest Mountains represent nature conservation subjects of all-European importance.

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Fig. 1: Characteristic habitat of *Pediasia truncatella* (ZETT.) in the Bohemian Forest Mountains. - The Jezerní slat peat bog near Kvilda. Photo: K. Spitzer.

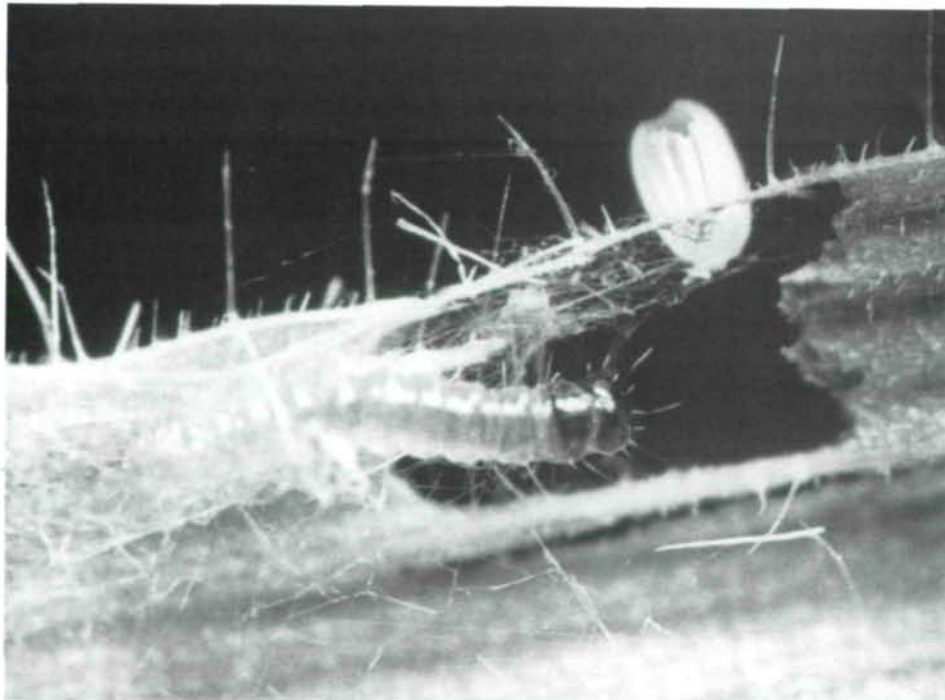


Fig. 2: First instar larva of *Pediasia truncatella* (ZETT.) after hatching. Jezerní slat. Photo L. Havel.

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