

Lepidoptera associated with the Notigalė peat bog (Lithuania)

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The research of nocturnal Macrolepidoptera using a Jalas automatic light trap was carried out in the Notigalė peat bog (northern Lithuania) in 2000. A total of 4974 Lepidoptera specimens belonging to 285 species have been registered. Fifteen species (5 tyrphobiotic and 10 tyrphophilous) were obligatorily associated with peat bogs. The abundance of 22 Lepidoptera species was equal to or greater than 1% of all individuals in the community. Four abundant species (*Lycophotia porphyrea*, *Coscinia cribraria*, *Perconia strigillaria*, and *Thalera fimbrialis*) were trofically associated with *Calluna vulgaris*. The tyrphoneutral *Lycophotia porphyrea* (13% of all individuals) and the tyrphophilous *Nola aerugula* (12.8%) were the dominant species in the lepidopteran community. Other stenotopic Lepidoptera species made up from 1.2% to 1.69% of all individuals. In total, the stenotopic bog species made up 20.8% of all individuals registered in the bog. Thus, the lepidopteran community and vegetation data show a regression of the peat bog studied.

Key words: Lepidoptera, peat bog, Lithuania

INTRODUCTION

Peat bogs are unique ecosystems having specific vegetation and fauna formed after the last glacial period. Wetlands are probably the most vulnerable of all nature conservation areas (Barbier et al., 1996; Duffey, 1978). Intensive agriculture and land drainage decreased the proportion of wetlands in Europe (Dapkus, 2000; Moser, 1992; Raeymakers, 1999) and thus led to a decrease or extinction of some stenotopic Lepidoptera species living in bogs (Jaroš, Spitzer, 1995; Kontiokari, 1999; Spitzer, 1994; Spitzer, Jaroš, 1993).

Some Lithuanian peat bogs have remained in a natural state (e.g., Čepkeliai and Žuvintas mire complexes), but most of them had been drained and became highly fragmented, isolated, or naturally overgrown by forest. The structure of Lepidoptera communities living in Lithuanian bogs is very sensitive to the change of vegetation (Dapkus, 2000, 2001 b). The present study deals with the research of Lepidoptera in a semi-natural peat bog located in northern Lithuania.

MATERIALS AND METHODS

Nocturnal Lepidoptera were investigated in the Notigalė peat bog in 2000 (Fig. 1). The studies were carried out constantly every night from April till Novem-

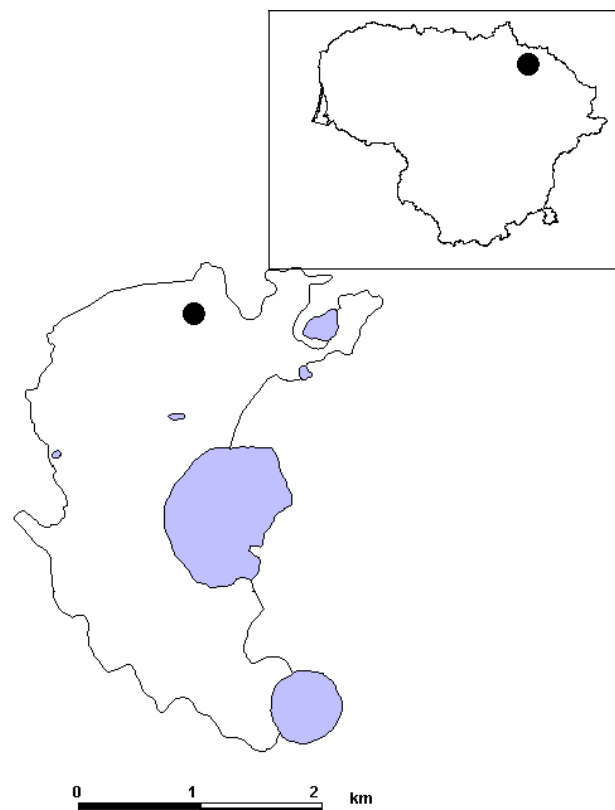


Fig. 1. The map of Notigalė peat bog and its location in Lithuania. A black dot indicates the position of the light trap in 2000

ber. Lepidoptera species were attracted into a J alas automatic light trap using a 160 W blended lamp bulb (J alas, 1960; Söderman, 1994). One trap was operated in a homogeneous habitat and emptied once a week (31 samples have been obtained during the research). The captured specimens were identified to a species level. Only species belonging to the superfamilies Lasiocampoidea, Bombycoidea, Drepanoidea, Geometroidea, and Noctuoidea were used in the analysis. The nomenclature of Lepidoptera was used following O. Karsholt & J. Razowski (Karsholt, Razowski, 1996). The ecological terminology was that of K. Mikkola & K. Spitzer (Mikkola, Spitzer, 1983), K. Spitzer (Spitzer, 1994), K. Spitzer & J. Jaroš (Spitzer, Jaroš, 1993): tyrphobiotic species are strongly associated with peat bogs, while tyrphophilous taxa are more abundant in bogs than in adjacent habitats. Tyrphoneutral species live in various habitats and show no preference for bogs.

The structure of vegetation was evaluated in the study site. The composition of trees and their height were registered from 3 randomly selected 5×5 m squares (Fig. 2). The coverage of different undergrowth species was registered using four 0.25×0.25 m randomly selected subsquares in each big square (Table 1).

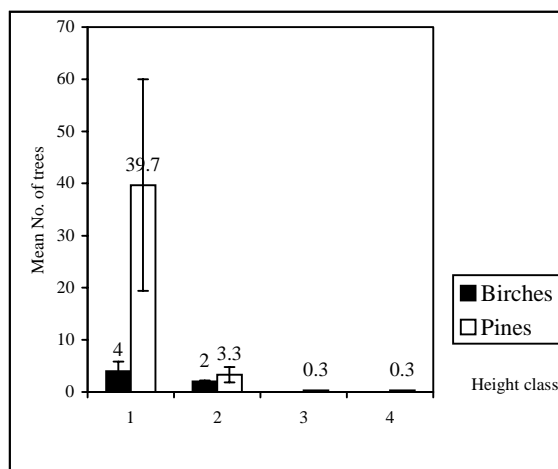


Fig. 2. Mean number of trees and their height per 5×5 m square in Notigalė peat bog in 2000. Height classes: 1 – <1 m, 2 – <2 m, 3 – <3 m, 4 – <5 m height

Table 1. Mean coverage of undergrowth plant species in the subsquares of 0.25×0.25 m in Notigalė peat bog in 2000

Species	Coverage (%)
<i>Sphagnum</i> spp.	34.3
<i>Calluna vulgaris</i>	46.9
<i>Andromeda polifolia</i>	0.3
<i>Empetrum nigrum</i>	1.3
<i>Eriophorum</i> sp.	17.2
Total	100.0

DESCRIPTION OF THE STUDY SITE

The Notigalė peat bog (552 ha) is located in Kupiškis district, northern Lithuania (Fig. 1). Lake Notigalė is in the eastern part, while a small lake adjoins the bog in the southern part. Some small pools are scattered throughout the bog. Dense *Ledo-Pinetum* communities with *Ledum palustre* and *Vaccinium uliginosum* shrubs grow at the edge of the bog. The biggest part of the bog is rather open and the microrelief is flat (sparse *Ledo-Pinetum* communities without *Ledum palustre* or *Vaccinium uliginosum* predominate), but there are many young and low (up to 1 m height) pines (approximately 40 trees per 5×5 m²) (Fig. 2). Single pines are scattered throughout the bog and are up to 5 m high. There are some birches (*Betula* sp.) reaching up to 2 m in height (6 trees per 5×5 m²). The analysis of undergrowth vegetation shows that *Calluna vulgaris* is the predominant species (coverage 46.9%) (Table 1). *Sphagnum* mosses make up 34.3% while *Eriophorum* sp. 17.2% of the subsquare. There are some places covered with *Empetrum nigrum* (1.3%). *Andromeda polyfolia* and *Oxycoccus palustris* are found sporadically throughout the bog.

RESULTS AND DISCUSSION

A total of 4974 Macrolepidoptera specimens belonging to 11 families and 285 species were registered in the peat bog during the research (Fig. 3). The majority of species belonged to Noctuidae (114 species) and Geometridae (102) families. Fifteen Lepidoptera species were obligatorily associated with peat bogs. Five of them were tyrphobiotic (*Coenophila subrosea*, *Acrionicta menyanthidis*, *Lithophane lamda*, *Carsia sororiata*, and *Eupithecia gelidata*) and 10 tyrphophilous.

The abundance of 22 species was equal to or greater than 1% of all registered individuals and they made up the core of the community (Table 2).

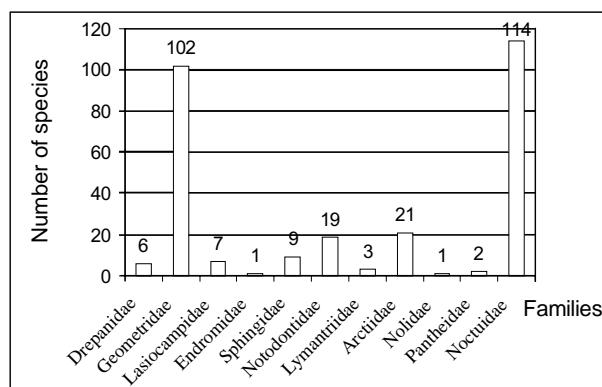


Fig. 3. Number of Lepidoptera species registered in Notigalė peat bog in 2000

Table 2. Most abundant Lepidoptera species in Notigalė peat bog in 2000.
TB – tyrphobiontic, TF – tyrrophilous species

Species	Ecological group	No. of individuals	Abundance (%)
<i>Lycophotia porphyrea</i> (Denis & Schiffermüller, 1775)		645	13.0
<i>Nola aerugula</i> (Hübner, 1793)	TF	637	12.8
<i>Thumata senex</i> (Hübner, 1808)		237	4.8
<i>Coscinia cribraria</i> (Linnaeus, 1758)		143	2.9
<i>Eilema lutarella</i> (Linnaeus, 1758)		129	2.6
<i>Orthosia gothica</i> (Linnaeus, 1758)		113	2.3
<i>Cleora cinctaria</i> (Denis & Schiffermüller, 1775)		108	2.2
<i>Diacrisia sannio</i> (Linnaeus, 1758)		100	2.0
<i>Eulithis testata</i> (Linnaeus, 1761)		96	1.9
<i>Achlya flavicornis</i> (Linnaeus, 1758)		93	1.9
<i>Eilema complana</i> (Linnaeus, 1758)		86	1.7
<i>Agrochola helvola</i> (Linnaeus, 1758)		85	1.7
<i>Dendrolimus pini</i> (Linnaeus, 1758)		82	1.6
<i>Coenophila subrosea</i> (Stephens, 1829)	TB	79	1.6
<i>Cerastis rubricosa</i> (Denis & Schiffermüller, 1775)		75	1.5
<i>Euthrix potatoria</i> (Linnaeus, 1758)		68	1.4
<i>Acronicta menyanthidis</i> (Esper, 1789)	TB	67	1.3
<i>Hypenodes humidalis</i> Doubleday, 1850	TF	63	1.3
<i>Perconia strigillaria</i> (Hübner, 1787)		60	1.2
<i>Carsia sororiata</i> (Hübner, 1813)	TB	59	1.2
<i>Thalera fimbrialis</i> (Scopoli, 1763)		55	1.1
<i>Cybosia mesomella</i> (Linnaeus, 1758)		50	1.0

Their total abundance was 62.9% of all individuals caught during the research period. Five species were typical bog dwellers, and they made up 18.2% of all individuals. The tyrrophilous species *Nola aerugula* (12.8%) was one of the obvious dominants in the lepidopteran community. Other stenotopic species were less abundant and made up from 1.2% to 1.6% of all individuals (*Coenophila subrosea* 1.6%, *Acronicta menyanthidis* and *Hypenodes humidalis* 1.3% each, and *Carsia sororiata* 1.2%). Some bog species were presented as single individuals (e.g., *Eupithecia gelidata*, *Syngrapha interrogationis*, and *Lithophane lamda*). In total, tyrphobiontic and tyrrophilous species made up 20.8% of all individuals in the community.

Seventeen tyrphoneutral species making the core of the community (their abundance was equal or greater than 1% of all individuals) were registered. The results have shown that the tyrphoneutral *Lycophotia porphyrea* (13% of all individuals) was the dominant species in the lepidopteran community. Other tyrphoneutral species were less abundant: *Thumata senex* 4.8%, *Coscinia cribraria* 2.9%, *Eilema lutarella* 2.6%, *Orthosia gothica* 2.3%, *Cleora cinctaria* 2.2%, *Perconia strigillaria* 1.2%, and *Thalera fimbrialis* 1.1% of all individuals (Table 2). Their total abundance was 44.7%. As singletons, 83 tyrphoneutral species and as doubletons 39 species were registered.

The relict tyrphobionts and some tyrrophilous taxa are the best bioindicators of successional chan-

ge or constancy of peat bogs (Spitzer et al., 1999). The obtained data indicate that the peat bog contains a small number of specific Lepidoptera species in comparison to other Lithuanian peat bogs (Dapkus, 2000; 2001a; 2001b). The number of species making the core of the community is quite low, and only 5 of them are typical bog dwellers. Total abundance of all stenotopic species is not high (20.8% of all individuals in the community). Populations of tyrphobiontic species (*Coenophila subrosea*, *Acronicta menyanthidis*, *Lithophane lamda*, *Carsia sororiata*, and *Eupithecia gelidata*) are small and not abundant. *Lycophotia porphyrea*, *Perconia strigillaria*, *Thalera fimbrialis*, *Thumata senex*, *Eilema lutarella*, *Diacrisia sannio*, and *Cybosia mesomella* are considered to be tyrrophilous species in Central and Northern Europe (Pöyry, 2001; Spitzer, Jaroš, 1993; Spitzer et al., 1996). These species are quite abundant in the study bog as well, but additional data should be gathered in order to make some conclusions about their ecological preference in Lithuania. Almost half of the species registered in the bog are found as singletons or doubletons. They are invaders from adjacent habitats that do not establish populations due to specific microclimatic conditions characteristic for peat bogs (Mikkola, Spitzer, 1983; Spitzer, Jaroš, 1993).

The results show that *Lycophotia porphyrea* and *Nola aerugula* are obvious dominants in the lepidopteran community. The former species is trophi-

cally connected with *Calluna vulgaris*, while the latter with birches (*Betula* spp.) (Spitzer, Jaroš, 1993). Tyrphoneutral species *Coscinia cribraria*, *Perconia strigillaria*, and *Thalera fimbrialis* feed on *Calluna vulgaris* too, and their abundance is more than 1% of all individuals in the community studied. Similar results have been obtained from the partly drained Palios peat bog (its open part is covered with dense scrubs), where *Lycophotia porphyrea*, *Thalera fimbrialis*, and *Nola aerugula* were the dominant species (Dapkus, 2001b). Thus, the presense of these Lepidoptera species and their high abundance show some succesion and dryness of the peat bog studied. The vegetation structure confirms this conclusion, as there are many young and low pines (*Pinus sylvestris*) growing in the studied bog. Besides, *Calluna vulgaris* is the dominant plant species covering the surface of the bog, and these scrubs show a regression of peat bogs (Seibutis, 1959).

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NOTIGALĖS AUKŠTAPELKEI PRIERAIŠŪS DRUGIAI

S a n t r a u k a

Naktinių drugių (Macrolepidoptera) tyrimai naudojant Jalas modelio automatinę šviesinę gaudyklę atlikti 2000 m. Notigalės aukštapelkėje (Kupiškio r.). Tyrimų metu surinkti 4974 individai, priklausantys 285 rūšims. Aptikta 15 stenotopinių pelkių drugių rūšių (5 tirtobiontai ir 10 tirtofilų). Tyrimų metu užreg istruotos 22 drugių rūšys, kurių gausumas yra didesnis nei 1% nuo visų individų bendrijoje. Gausiai aptiktos trofiškai su šiliniaus viržiais (*Calluna vulgaris*) susijusios drugių rūšys (*Lycophotia porphyrea*, *Coscinia cribraria*, *Perconia strigillaria*, *Thalera fimbrialis*). *Lycophotia porphyrea* (gausumas 13%) ir tirtofilas *Nola aerugula* (12,8%) yra pagrindiniai dominantai drugių bendrijoje. Kitų stenotopinių drugių rūšių gausumas mažesnis (1,2–1,6%). Iš viso stenotopinių drugių rūšių gausumas pelkėje yra 20,8% nuo visų individų bendrijoje. Taigi drugių bendrijos, taip pat augalijos sudėtis rodo aukštapelkės regresavimą.

Raktažodžiai: Lepidoptera, aukštapelkė, Lietuva