

# Biodiversity of selected *Ascomycetes* groups in the Šumava Mountains

## Biodiverzita vybraných skupin askomycetů na Šumavě

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### Abstract

The *Ascomycetes* flora of six remarkable centres of natural biodiversity has been investigated in the Šumava National Park during 1995 and 1996. A survey of 112 taxa and evaluation of their occurrence in particular localities are presented, and accompanied by comparison with pertinent literature. Altogether 103 species are new records for the Šumava National Park, including the 5 species newly described for science (*Capronia obesispora*, *C. perpusilla*, *Ceratosphaeria abietis*, *Chaetosphaeria montana* and *Lasiosphaeria porifera*), which have been discovered in near-natural beech-fir forests. Factors affecting the *Ascomycetes* diversity, and rare and endangered species are discussed.

*Key words:* *Ascomycetes*, *Deuteromycetes*, biodiversity, ecology, endangered species

### Introduction

The Šumava Mts. represent an outstanding area where natural or seminatural ecosystems, particularly relict forest and peatbogs, are still preserved. The localities studied in this project are situated in the strictly protected „first zone“ of the Šumava National Park and represent genuine centres of biological diversity. The species-richness of this region is usually documented mainly by numbers of vascular plants, insects or vertebrates, while many groups of microorganisms, including the *Ascomycetes*, are usually missing in the current studies.

*Ascomycetes* are considered to be the greatest group of fungi with the enormous morphological and ecological variability. In present report the lignicolous perithecial and ascostromatic *Ascomycetes* with their anamorphs have been studied. Some *Deuteromycetes* (mainly *Hypomycetes*) and common lignicolous or herbicolous *Discomycetes* are listed too. It should be stressed that some groups have been studied with only low intensity for a long time on territory in question, some others have not yet been studied at all. From this point of view it seems to be important, that contribution to the knowledge of some *Ascomycetes* of Šumava Mts. has been enabled by the GEF project (ROUDNÁ & PRCHALOVÁ 1996).

### Literature survey and the present state of knowledge

As SOFRON (1967) stated, cryptogamological research on the Šumava Mts. had been fragmentary in the past, usually concentrated on the well known localities or on selected groups of plants and fungi only. *Ascomycetes* don't belong to these groups and there is a very poor knowledge about *Ascomycetes* biodiversity on this territory. This fact is confirmed by over-

views of several authors (SKALICKÝ 1967, 1969; SVRČEK 1965, 1985; VÁŇA 1996). Micromycetes (including *Ascomycetes*) on the broad territory of Šumava Mts. have been studied by Allescher, Höhnel, Maloch, Kirschner, Hilitzer, Cejp, Fechtner, Příhoda, Kubička, Svrček, Holubová and some others. In fact there were particularly phytopathogenic microfungi studied, with only marginal regard to saprophytic *Ascomycetes*. Some few herbarium records have been deposited to National Museum or regional museums, but not yet been published. Concerning to this facts it is possible to understand the absence of *Ascomycetes* research on the localities for presented study given.

Present study is now continued by the *Ascomycetes* monitoring on four of the here mentioned localities and preliminary results are already in press (RÉBLOVÁ & PRAŠIL 1998)

## **Published records are listed in alphabetical order, divided into two parts:**

### **A. Literature data, concerning to the localities studied (including new or rare species published as result of present study).**

#### Černé jezero Lake glacial cirque

*Apiorhynchostoma curreyi* (Rabenh.) E. Müll. (on *Picea abies*, RÉBLOVÁ 1998a).

*Capronia obesispora* Réblová (decayed remnants of wood, RÉBLOVÁ 1998a).

*Ceratosphaeria abietis* Réblová (on *Abies alba*, RÉBLOVÁ 1998a).

*Chaetosphaeria aterrima* (Fuckel) Réblová (on *Fagus sylvatica*, RÉBLOVÁ 1998b).

*Chaetosphaeria ovoidea* (Fr.) Constant., K. Holm & L. Holm. (on *Acer pseudoplatanus*, RÉBLOVÁ 1998b).

*Chaetosphaeria pulviscula* (Currey) C. Booth (on *Fagus sylvatica*, RÉBLOVÁ 1998b).

*Custingophora* anamorph of *Chaetosphaeria aterrima* (Fuckel) Réblová (on *Fagus sylvatica*, RÉBLOVÁ 1998b).

*Lophodermium conigenum* Hilitzer (on *Picea pungens* cones, HILITZER 1929).

*Lophodermium macrosporum* Rehm (on *Picea abies*, HILITZER 1929).

*Lophodermium nervisequium* Rehm (on *Abies alba*, HILITZER 1929).

#### Čertovo jezero Lake glacial cirque

*Chaetosphaeria montana* Réblová (on *Fagus sylvatica*, RÉBLOVÁ 1998c).

*Dictyochaeta* anamorph of *Chaetosphaeria montana* Réblová (on *Fagus sylvatica*, RÉBLOVÁ 1998c).

*Dictyochaeta* sp. (on *Fagus sylvatica*, HOLUBOVÁ-JECHOVÁ 1984).

*Lasiosphaeria porifera* Réblová (on *Picea abies*, RÉBLOVÁ 1998a).

*Menispora glauca* Pers.: Fr anamorph of *Chaetosphaeria ovoidea* (Fr.) Constant., K. Holm &

L. Holm (on rotten wood of broad-leaves trees, HOLUBOVÁ-JECHOVÁ 1973, RÉBLOVÁ 1998b).

*Oidium aureum* Pers.: Fr. (on *Sorbus aucuparia*, HOLUBOVÁ-JECHOVÁ 1968).

*Spadicoides atra* (Corda) S. Hughes (on *Abies alba*, HOLUBOVÁ-JECHOVÁ 1982).

#### Ždanidla Mt

*Capronia perpusilla* Réblová (on wood of *Fagus sylvatica*, RÉBLOVÁ 1996).

#### Roklanská smrčina spruce forest

*Lophodermium tumidum* Rehm (on *Sorbus aucuparia*, HILITZER 1929).

## B. Literature data concerning to the broader Šumava Mts. region:

- Apostemidium* sp. (Boubín, on *Salix*, VELENOVSKÝ 1934 ut *Vibrissea crenulata* Vel. et *V. minima* Vel.).
- Ascotremella faginea* (Peck) Seaver (Boubín, FRIEDERICHSEN & ENGEL 1966, sec. KOTLABA & POUZAR 1991)
- Biscogniauxia repanda* (Fr.: Fr.) O. Kuntze (Šumava Mts., on *Sorbus aucuparia*, POUZAR 1986).
- Bisporella citrina* (Batsch : Fr.) Korf & Carpenter (Šumava Mts., on *Fagus sylvatica*, VELENOVSKÝ 1934 ut *Pezizella nobilis* Vel. et *Rutstroemia sulphurea* Vel., Boubín, KUBIČKA 1960).
- Bulgaria inquinans* (Pers.: Fr.) Fr. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960).
- Camarops tubulina* (Alb. & Schw.: Fr.) Shear (Boubín, on *Picea abies*, SVRČEK 1969 ut *Bolinia tubulina* (Alb. & Schw.: Fr.) Sacc., KOTLABA & AL. 1995).
- Chalara affinis* Sacc. & Berlese (Kvildská slat' peat-bog, Horažďovice, on *Pinus mugo*, *Pinus sylvestris*, HOLUBOVÁ-JECHOVÁ 1984).
- Chalara longipes* (Preuss) Cooke (Zhůřská slat' peat-bog and Velká Niva near Lenora, on *Pinus mugo*, *Picea abies*, HOLUBOVÁ-JECHOVÁ 1984).
- Chloridium virescens* (Pers.: Fr.) W. Gams & Hol.-Jech. var. *caudigerum* (Höhn.) W. Gams & Hol.-Jech. (Sušice, on *Picea abies*, GAMS & HOLUBOVÁ-JECHOVÁ 1976).
- Chlorosplenium aeruginosum* (Nyl.) P. Karsten (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)
- Claussenomyces prasinulus* (P. Karsten) Korf & Abawi (Boubín, on *Fagus sylvatica*, VELENOVSKÝ 1934 ut *Coryne prasinula*).
- Cordyceps ophioglossoides* (Ehrh.: Fr.) Link (Boubín, on *Elaphomyces granulatus*, KUBIČKA 1960).
- Coryne sarcoides* (Jacq.: Fr.) Tul. & C. Tul. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960).
- Cudoniella clavus* (Alb. & Schw.: Fr.) Dennis (Boubín, on wood in the water, KUBIČKA 1960 ut *Cudoniella aquatica* (Lib.) Sacc.).
- Diplococcium clarkii* M.B. Ellis (Boubín, on *Picea abies*, HOLUBOVÁ-JECHOVÁ 1986).
- Endophragmiella biseptata* (Peck) S. Hughes (Boubín, on *Picea abies*, HOLUBOVÁ-JECHOVÁ 1986).
- Exochalara longissima* (Grove) W. Gams & Hol.-Jech. (Kašperské Hory, on *Picea abies*, GAMS & HOLUBOVÁ-JECHOVÁ (1976).
- Fimaria leporum* (Fuck.) Vel. (Boubín, on excrements, KUBIČKA 1960).
- Geopyxis alpina* Höhnel (Boubín, on the ground, VELENOVSKÝ 1934 ut *Geopyxis flavidula* Vel.).
- Gyromitra infula* (Schaeff.: Fr.) Quéf. (Boubín, on *Abies alba*, KUBIČKA 1960).
- Hormiactella fusca* (Preuss) Sacc. (Volyně and Sušice, on *Pinus nigra*, *Picea abies*, HOLUBOVÁ-JECHOVÁ 1978).
- Hyaloscypha* sp. (Vydra, wood of the broad-leaves trees, VELENOVSKÝ 1934 ut *Eriopeziza microscopica* Vel.).
- Hymenoscyphus salicellus* (Fr.) Dennis (Vydra, on *Salix* sp, non *Betula*, VELENOVSKÝ 1934 ut *Helotium rehbergense* Vel.).
- Hypoderma rubi* De Not. (Kdyně, Česká Kubice, Sušice and Lenora, on *Rubus* sp. div., HILITZER 1929).
- Inermisia aggregata* (Berk. & Brome) Svrček (Boubín, no substrate given, VELENOVSKÝ 1934 ut *Pyronema buchsii* Henn.).
- Lachnea stercorea* (Pers.: Fr.) Gill. (Boubín, on excrements, KUBIČKA 1960).
- Lachnum sagarum* Vel. (Modrava, on the grasses, VELENOVSKÝ 1934).
- Lasiobolus equinus* (Müll.) P. Karsten (Boubín, on excrements, KUBIČKA 1960).

- Linodochium formosum* Minter & Hol.-Jech. (Horažďovice, on *Pinus mugo*, MINTER & HOLUBOVÁ-JECHOVÁ 1981).
- Lophodermium apiculatum* Sacc. (Plechý, Jezerní hora, on *Calamagrostis villosa*, HILITZER 1929).
- Lophodermium macrosporum* Rehm (Kdyně, Česká Kubice, on *Picea abies*, HILITZER 1929)
- Lophodermium melaecum* De Not. (Jezerní hora, Tetřeví slat' peat-bog, Weitzfálská slat' peat-bog, on *Oxycoccus* sp., HILITZER 1929).
- Lophodermium nervisequium* Rehm (Královský hvozd, Vydra, Lipka, Hiršov near Všeruby, Čerchov and Ulíkov near Kdyně, on *Abies alba*, HILITZER 1929).
- Lophodermium oxycocci* P. Karsten (Javoří Pila, Jezerní slat' peat-bog and Ferchenhaid, on *Oxycoccus* sp., HILITZER 1929).
- Lophodermium tumidum* Rehm (Javor, Jezerní hora, Weitzfálské slat' peat-bog, Třístoličník, Plechý, Luzný, on *Sorbus aucuparia*, HILITZER 1929).
- Menispora caesia* Preuss (Boubín, on *Fagus sylvatica*, HOLUBOVÁ-JECHOVÁ 1973).
- Mytilinidion rhenanum* Fuckel (Jezerní hora, Kdyně, Čerchov, on *Abies alba* and *Pinus sylvestris*, HILITZER 1929).
- Mitrella palludosa* Fr. (Boubín, on the wood in water, KUBIČKA 1960).
- Morchella esculenta* Pers.: Fr. (Šumava Mts., VELENOVSKÝ 1934).
- Morchella conica* Pers. (Šumava Mts., Velenovský 1934).
- Neobulgaria pura* (Fr.) Petr. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960).
- Octospora humosa* (Fr.) Dennis (Vydra, on the ground, VELENOVSKÝ 1934 ut *Humaria leucostoma* Hedw.).
- Oidium conspersum* (Pers.: Fr.) Linder (Hůrky near Černá, on *Picea abies*, JECHOVÁ 1968).
- Oidium eliposporum* Hol.-Jech. (Boubín, on *Abies alba*, JECHOVÁ 1968).
- Peziza badia* Pers.: Fr. (Boubín, Plechý, on the ground, VELENOVSKÝ 1934 ut *Plicaria badia* var. *montana* Vel.).
- Pezizella chrysostigma* (Fr.) Sacc. (Vydra, on *Cystopteris fragilis*, VELENOVSKÝ 1934 ut *Pezizella sulphurea* Vel.).
- Phaeohelotium vasaense* (P. Karsten) Svrček (Modrava, on the rotten wood, VELENOVSKÝ 1934 ut *Rutstroemia aurea* Vel.).
- Pseudoplectania melaena* (Fr.) Sacc. (Boubín, KOTLABA & AL. 1995)
- Pseudorhizina sphaerospora* (Peck) Pouz. (Boubín, on *Fagus sylvatica*, KAVINA 1926 ut *Gyromitra gabretae* Kavina, VELENOVSKÝ 1934 ut *Ochromitra gabretae* (Kavina) Vel., HERINK 1955).
- Rutstroemia macrospora* (Peck) Kanouse. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)
- Scirrha macrospora* Nitschke ex Fuckel (Železná Ruda, on *Aspidium spinulosum*, VELENOVSKÝ 1934 ut *Xylogramma aspidii*).
- Scutellinia rigidula* (Vel.) Svrček (Šumava Mts., on *Fagus sylvatica*, VELENOVSKÝ 1934 ut *Lachnea gintlii* Vel.).
- Scutellinia scutellata* (L.: Fr.) Lamb. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)
- Scutellinia setosa* (Nees: Fr.) Kuntze (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)
- Septonema fasciculare* (Corda) S. Hughes (Boubín, Volyně, Sušice, on *Picea abies*, *Pinus nigra*, *Pinus sylvestris*, HOLUBOVÁ-JECHOVÁ 1978)
- Spadicoides atra* (Corda) S. Hughes (Boubín, on *Fagus sylvatica*, HOLUBOVÁ-JECHOVÁ 1982)
- Spadicoides bina* (Corda) S. Hughes (Boubín, on *Fagus sylvatica*, HOLUBOVÁ-JECHOVÁ 1982)
- Spadicoides grovei* M.B. Ellis (Boubín, on *Fagus sylvatica*, HOLUBOVÁ-JECHOVÁ 1982)
- Sphaeridium candidum* Fuckel (Horažďovice, on *Pinus nigra*, HOLUBOVÁ-JECHOVÁ 1981)
- Sporidesmium doliiforme* Minter & Hol.-Jech. (Zhůrská slat' peat-bog, on *Pinus mugo*, MINTER & HOLUBOVÁ-JECHOVÁ 1981)

*Symptodiella acicola* B. Kendrick (Horažďovice, on *Pinus* sp., Minter & Holubová-Jechová 1981)

*Tapesia fusca* (Pers.) Fuckel (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)

*Trichosporophora penicilloides* (Roum.) B. Kendrick (Horažďovice, on *Pinus* sp., MINTER & HOLUBOVÁ-JECHOVÁ 1981)

*Trichoglossum hirsutum* (Pers.: Fr.) Boud. (Srní, Horská Kvilda, KOTLABA & AL. 1995)

*Trimmatostroma scutellare* (Berk. & Broome) M.B. Ellis (Zhůřská slať peat-bog, on *Pinus mugo*, MINTER & HOLUBOVÁ-JECHOVÁ 1981)

*Troposporella monospora* (B. Kendrick) M.B. Ellis (Zhůřská slať peat-bog, on *Pinus mugo*, MINTER & HOLUBOVÁ-JECHOVÁ 1981)

*Vibrissea truncorum* Fr. (Boubín, on the wood in water, KUBIČKA 1960)

*Xylaria hypoxylon* (L.: Fr.) Grev. (Boubín, on *Fagus sylvatica*, KUBIČKA 1960)

## Areas studied and methods

Altogether six localities have been taken into research with regard to selected groups of *Ascomycetes* during the years 1995 and 1996. For exact position of localities see the numbers on Figure 1. Brief specification of research plots:

### 1. Černé jezero Lake glacial cirque

Glacial cirque of the largest glacial lake in the Czech Republic, declared as natural reservation in the year 1933, 1006 m a. s. l., on the NW side of Jezerní hora Mt. In the dominant mixed spruce-fir forest research plots were located into two small-area beech woods near the lake level, with mixture of *Abies alba*, *Acer pseudoplatanus*, *Sorbus aucuparia* and *Lonicera nigra*, and to the slope beech forest with fir in continuation of glacial cirque to NW direction.

### 2. Čertovo jezero Lake glacial cirque

This lake has been declared as natural reservation in the year 1933 too. Lake is situated on the SE side of Jezerní hora Mt, 1000 m a. s. l. Research plots are situated in the mixed beech forest in the central part of glacial cirque, in lower part of cirque with *Picea abies* and fallen trunks of *Abies alba* and in older slope beech forest in continuation of glacial cirque to Rozvodí Mt.

### 3. Laka Lake and its close vicinity

The Laka Lake (1085 m a. s. l.) had been formed in the past in a small glacial valley, but then artificial improved by man. There is no true cirque above the Laka Lake and the slopes of Laka Mt above the lake are covered by climatic-climax spruce forest. Research plots are situated in thin spruce forest with admixed young beech trees on the S side of lake, under the several well developed beech trees close to the west bank, and on the herbal undergrowth in the lake vicinity.

### 4. Ždanidla beech forest

Ždanidla Mt (1308 m a. s. l.) is situated in SE direction not far from Laka Lake. Research plots are located to the younger planted beech forest (with mixed *Sorbus aucuparia* and *Picea abies*) in the lower part of SW side of Ždanidla Mt and to the remnants of original slope beech forest (partly scree beech stand) on SW upper part of the mount (about 1150 m a. s. l.).

### 5. Roklanská smrččina spruce forest

Near the central part of Roklanská slat peat-bog, about 6 km SW direction from Modrava settlement, 1100 m a. s. l. The waterlogged spruce forest with numerous small pools and rivulets, which runs into the Roklanský potok brook. Research plot is situated to well-preserved central part of spruce forest with spruce trunks in various degrees of decomposition.

### 6. Mlynářská slat peat-bog

The highland peat-bog about 3 km W direction from Modrava settlement, 1050 m a. s. l. Central part with numerous peat pools and bogs is overgrown by *Pinus mugo* x *pseudopumilio* and surrounded by subnatural managed spruce forest. Research plots situated on the own plot of the peat-bog and under the soliter beech trees on the W margin of peat-bog towards the Roklanský potok brook.



Fig. 1. – Map of the Šumava Mts. (Czech side) indicating the localities studied

Obr. 1. – Mapa české strany Šumavy se zákresy studovaných lokalit

Collection of material on research plots mentioned above has been carried out irregularly in spring, summer and autumn during the years 1995 –1996. Particular attention has been paid to old fir and spruce logs at various stages of decomposition and to old stumps with loosed bark. Other kinds of dead wood, including twigs, branches and limbs, rotten wood in leaf litter and also dead herbaceous stems have been examined. Microscopic determination of collected material has been made using the current mycological methods.

## Results and discussion

### Biodiversity of selected *Ascomycetes* groups on the area studied

The total number of 112 species of *Ascomycotina/Deuteromycotina* groups has been found on 6 localities studied, including 62 teleomorphs and 50 anamorphs. In literature 8 species are given on our localities directly and only 2 of these species are identical with our records. Resulting this 110 species are given for the first time on localities in question. About 68 *Ascomycetes* species from broader Šumava Mts. region have been found in literature. Only 9 species of this number are identical with our finds, resulting 103 species are new records for Šumava Mts. region, including 5 new species for science. The general alphabetical list of species found in the Table 1 is given.. Outline of the major groups studied is following:

<i>Discomycetes</i> .....	14 taxa
<i>Pyrenomyces</i> .....	48 taxa
<i>Hyphomyces</i> .....	45 taxa
<i>Coelomyces</i> .....	5 taxa

Overall survey of species numbers on individual research plots on Figure 2 is given.

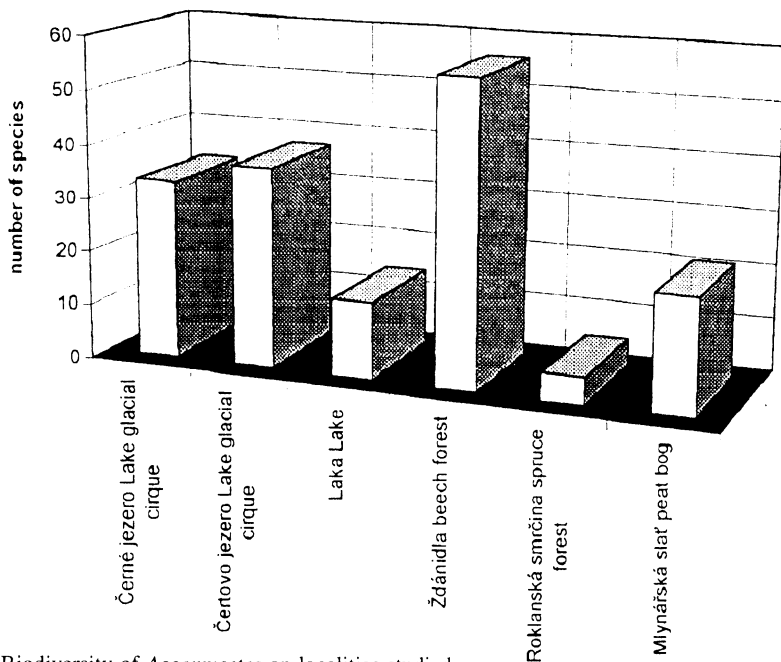


Fig. 2. – Biodiversity of *Ascomycetes* on localities studied  
 Obr. 2. – Biodiverzita askomycetů na studovaných lokalitách

## The evaluation of *Ascomycetes* biodiversity on individual research plots

### 1. Černé jezero Lake glacier cirque

a) Number of taxa found – 33 species.

b) Evaluation of diversity. Lignicolous *Ascomycetes* predominantly on *Fagus* and *Abies* have been studied. Due to research on this locality the final list have been enlarged of 12 species. *Capronia obesispora* and *Ceratospaeria abietis* are new described species for science. *Chaetosphaeria abietis* (the first record from the Czech Republic) and *Ch. fusiformis* (the second record from the Czech Republic, see GAMS ET HOLUBOVÁ -JECHOVÁ 1976) belong to rare species host specific for *Abies alba*. *Valsa friesii* on coniferous host is the rare species, recorded for the first time on Šumava Mts. Another 7 species are new records for Šumava Mts. region.

c) Confrontation with literature data. Only 3 species of *Lophodermium* are given in literature concerning to Černé jezero Lake glacial cirque and these species are not corresponding to our findings. Only 3 species found on this locality are identical with records from the broader area of the Šumava Mts.

d) Significance with respect to *Ascomycetes* diversity. Very valuable locality due to occurrence of fir and a well-preserved natural forest. Type locality of two new species. Presumption of further new species for science is given.

### 2. Čertovo jezero Lake glacier cirque

a) Number of taxa found – 36 species and 1 variety.

b) Evaluation of diversity. Lignicolous ascomycetes on *Fagus*, *Picea* and *Abies* have been studied. Due to research on this locality the final list of species have been enlarged of 11 species and 1 variety. As the most valuable records the new species *Chaetosphaeria montana* and *Lasiosphaeria magica* can be assigned. Some further important findings belong to genera *Capronia*, *Ceratostomella*, *Mytilinidion* and *Chaetosphaeria*. Seven taxa are new records for Šumava Mts. region.

c) Confrontation with literature data. Four species are given in literature from this locality, but only two of them are identical with our findings. Only 5 species of our list are given in literature concerning to the broader Šumava Mts. region, it means 32 taxa are recorded for the first time.

d) Significance with respect to *Ascomycetes* diversity. Very valuable locality with the same quality as in the previous case. Type locality of two new species. Further new species for science can be expected. Together with other lake's glacier cirques a detailed research is recommended.

### 3. Laka Lake and close vicinity

a) Number of taxa found – 14 species.

b) Evaluation of diversity. *Ascomycetes* on herbal hosts have been studied particularly (11 species). Due to research on this locality the final list have been enlarged of 10 taxa, with prevalence of common herbaceous species.

c) Confrontation with literature data. No literature data were available. Concerning to the broader Šumava Mts. region, only 4 species are identical with Laka Lake's records.

d) Significance with respect to *Ascomycetes* diversity. With respect to the various biotops and considerable host variability concentrated on the small territory, really great biodiversity especially of herbaceous species can be expected.

### 4. Ždánidla beech forest

a) Number of taxa found – 56 species.



b) Evaluation of diversity. Lignicolous *Ascomycetes* particularly on *Fagus*, in limited extend on *Sorbus* and *Picea* were studied. Due to research on this locality the final list of species have been enlarged of 25 species. With regard to the great quantity of suitable substrate and good humidity conditions this locality seems to have the greatest biodiversity of *Ascomycetes* among all the localities studied. It is illustrated by record of species new for science (*Capronia perpusilla*) and some further rare species as *Calosphaeria barbirostris* or *Trichosphaeria notabilis*. Altogether 24 records new for Šumava Mts. are given.

c) Confrontation with literature data. No data concerning to this locality were found in literature. Only 3 species given in literature for the broader Šumava Mts. region are identical with those on Ždanidla beech forest recorded.

d) Significance with respect to *Ascomycetes* diversity. Very valuable locality regarding to the aspects mentioned. Type locality of new species and habitat of further rare species.

### 5. Roklanská smrčina spruce forest

a) Number of taxa found – 4 species and 1 variety.

b) Evaluation of diversity. *Ascomycetes* on *Picea abies* have been studied only. In spite of the only host the final list have been enlarged of 3 species. Records of *Actidium nitidum* and *Ceratostomella rostrata* are rare within the territory of whole republic.

c) Confrontation with literature data. The only one record in literature concerns to *Lophodermium tumidum* on *Sorbus aucuparia* (HILTZER 1929), and there is a question, in what distance from the central part of spruce forest it had been found. All species found on this locality were not yet given in literature for Šumava Mts.

d) Significance with respect to *Ascomycetes* diversity. Specific locality with the uniform biotop. Total diversity of *Ascomycetes* is comparatively low, despite of it 3 species on *Picea* were found for the first time on Šumava Mts. region. Valuable locality with specific occurrence of *Ascomycetes*.

### 6. Mlynářská slat' peat-bog

a) Number of taxa found – 21 species.

b) Evaluation of diversity. Lignicolous, herbaceous and some coprophilous *Ascomycetes* were studied. Due to research on this locality the final list of species have been enlarged of 12 species. The rare records: *Gibbera myrtilli*, *Actidium hysteroioides*, *Acrogenospora sphaerocephala*, *Hormiactella asetosa* and *Cheiromycella microscopica*; altogether 11 species are the first records for Šumava region.

c) Confrontation with literature data. No records in literature are given from this locality. Only 2 species given in literature for Šumava Mts. region are identical with those on Mlynářská slat' peat-bog recorded.

d) Significance with respect to *Ascomycetes* diversity. Very valuable locality due to great variability of biotops and hosts. If the detailed study is possible on this and other peat-bogs too, it will be supposed that really great *Ascomycetes* diversity will be revealed.

### **Some factors affecting *Ascomycetes* biodiversity**

All localities studied appear as very valuable regarding to the quality and quantity of *Ascomycetes* recorded. In all cases there were remnants of forests with the natural wood species composition. The long-term and sufficient dampness of rotten wood is provided by the well developed herbal or shrubs layer on majority habitats. The water gradient is set up between the lower and upper part of fallen and decorticated wood. This gradient and uneven water saturation of substrate seem to be important for the local distribution of ascomata on the wood

**Table 1.** — List of species and their hosts found in the individual localities  
**Tabulka 1.** — Seznam druhů a jejich hostitelů na jednotlivých lokalitách

SPECIES - DRUH	HOST - HOSTITEL	LOCALITY - LOKALITA
<i>Acladium</i> anamorph of <i>Botryobasidium conspersum</i> J. Eriksson	<i>Fagus sylvatica</i>	Ždanidla
<i>Acrogenospora sphaerocephala</i> (Berk. et Broome) M.B. Ellis	<i>Picea abies</i>	Mlynaňská peat-bog, Ždanidla
<i>Acidium hysterioroides</i> Fr.	<i>Picea abies</i>	Mlynaňská peat-bog
<i>Acidium nitidum</i> (Ellis) Zogg	<i>Picea abies</i>	Roklanská smrčina spruce forest
<i>Alternaria alternata</i> (Fr.) Keissler	<i>Cirsium palustre</i>	Laka Lake
<i>Apiothynchostoma curreyi</i> (Rabenh.) E. Müll.	<i>Picea abies</i>	Černé L.
<i>Aposphaeria agminalis</i> (Sacc.) Sacc.	<i>Fagus sylvatica</i>	Ždanidla
<i>Ascobolus furfuraceus</i> Pers.: Fr.	excrement	Mlynaňská peat-bog
<i>Ascocoryne sarcoides</i> (Jacquin) Groves et Wilson	<i>Fagus sylvatica</i>	Černé L., Čertovo L.
<i>Aureobasidium pullulans</i> (de Bary) Arnaud	<i>Fagus sylvatica</i>	Ždanidla
<i>Beritia moriformis</i> (Tode : Fr.) De Not.	<i>Fagus sylvatica</i>	Černé L., Ždanidla
<i>Beritia moriformis</i> (Tode : Fr.) De Not. var. <i>latispora</i> Corlett et Krug	<i>Picea abies</i>	Čertovo L., Roklanská smrčina spruce forest
<i>Bispora antennata</i> (Pers.) Mason	<i>Fagus sylvatica</i>	Černé L., Ždanidla
<i>Bisporella citrina</i> (Batsch : Fr.) Korf et Carpenter	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Laka Lake, Ždanidla
<i>Bisporella pallescens</i> (Pers.) Carpenter et Korf	<i>Fagus sylvatica</i>	Černé L.
<i>Botrytis cinerea</i> Pers.: Fr.	<i>Vaccinium uliginosum</i>	Mlynaňská peat-bog
<i>Brachysporium bloxami</i> (Cooke) Sacc.	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Brachysporium nigrum</i> (Link) S. Hughes	<i>Fagus sylvatica</i>	Ždanidla
<i>Calcarisporium arbuscula</i> Preuss	<i>Fagus sylvatica, Picea abies</i>	Ždanidla
<i>Callorina fusarioides</i> (Berk.) Korf	<i>Urtica dioica</i>	Laka Lake, Ždanidla
<i>Calosphaeria barbitrostris</i> (Fr.) Ellis et Everh.	<i>Fagus sylvatica</i>	Ždanidla
<i>Capronia obesispora</i> Réblová	decayed remnants of wood	Čertovo L.
<i>Capronia perpusilla</i> Réblová	<i>Fagus sylvatica</i>	Ždanidla
<i>Capronia pilosella</i> (P. Karst.) E. Müll. et al.	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Ceratospaeria abietis</i> Réblová	<i>Abies alba</i>	Čertovo L.
<i>Ceratostomella cirrhosa</i> (Pers.: Fr) Sacc.	<i>Fagus sylvatica, Picea abies</i>	Černé L., Čertovo L.
<i>Ceratostomella rostrata</i> (Fr.) Sacc.	<i>Picea abies</i>	Roklanská smrčina spruce forest
<i>Ceratostomella</i> sp. 1	<i>Abies alba</i>	Čertovo L.

SPECIES - DRUH	HOST - HOSTITEL	LOCALITY - LOKALITA
<i>Ceratostomella</i> sp. 2	<i>Fagus sylvatica</i>	Ždanidla
<i>Chaetosphaeria abietis</i> (Höhm.) W. Gams et Hol.-Jech.	<i>Abies alba</i>	Černé L.
<i>Chaetosphaeria atterrira</i> (Fueckel) Réblová	<i>Fagus sylvatica</i>	Černé L.
<i>Chaetosphaeria fusiformis</i> W. Gams et Hol.-Jech.	<i>Abies alba</i>	Černé L.
<i>Chaetosphaeria montana</i> Réblová	<i>Abies alba</i>	Čertovo L.
<i>Chaetosphaeria ovoidea</i> (Fr.) Constant., K. Holm et L. Holm	<i>Fagus sylvatica</i>	Černé L., Mlyňařská peat-bog, Ždanidla
<i>Chaetosphaeria pulviscula</i> (Curr.) C. Booth	<i>Fagus sylvatica</i>	Čertovo L.
<i>Chalara insignis</i> (Sacc., Rouss. et Bomm.) S. Hughes	<i>Sorbus aucuparia</i>	Ždanidla
<i>Chetromycella microscopica</i> (P. Karsten) S. Hughes	<i>Picea abies</i>	Čertovo L., Mlyňařská peat-bog
<i>Chloridium lignicola</i> (Mangenot) W. Gams et Hol.-Jech	<i>Fagus sylvatica</i>	Ždanidla
<i>Chloridium preussii</i> W. Gams et Hol.-Jech.	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Chloridium</i> sp.	<i>Picea abies</i>	Čertovo L.
<i>Chromelosporium ochraceum</i> Corda	<i>Fagus sylvatica</i>	Ždanidla
<i>Cladosporium herbarum</i> (Pers.: Fr.) Link	<i>Cirsium palustre</i>	Laka Lake
<i>Coniochaeta subcorticalis</i> (Fueckel) Cooke	<i>Fagus sylvatica</i>	Čertovo L.
<i>Corynespora biseptata</i> M.B. Ellis	<i>Fagus sylvatica</i>	Ždanidla
<i>Cytospora pustulata</i> Sacc. et Roum.	<i>Fagus sylvatica</i>	Ždanidla
<i>Cryptocoryneum condensatum</i> (Wallr.) Mason et S. Hughes	<i>Sorbus aucuparia</i>	Ždanidla
<i>Custingophora</i> anamorph of <i>Ch. atterrira</i> (Fueckel) Réblová	<i>Fagus sylvatica</i>	Čertovo L.
<i>Dasyyscyphus grevillei</i> (Berk.) Masec	<i>Chaerophyllum hirsutum</i>	Laka Lake
<i>Diatrype disciformis</i> (Hoffm.: Fr.) Fr.	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla
<i>Diatrype stigma</i> (Hoffm.: Fr.) Fr.	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla
<i>Dictyochaeta</i> anamorph of <i>Chaetosphaeria montana</i> Réblová	<i>Abies alba</i>	Čertovo L.
<i>Dictyochaeta</i> sp.	<i>Abies alba</i>	Čertovo L.
<i>Diplococcium spicatum</i> Grove	<i>Picea abies</i>	Mlyňařská peat-bog, Roklanská smrčina spruce forest
<i>Endophragmia nanfeldtii</i> M.B. Ellis	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Epicoccium nigrum</i> Link	<i>Cirsium palustre</i>	Laka Lake
<i>Eutypa flavovirens</i> (Fr.) Tul. et C. Tul.	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla

SPECIES - DRUH	HOST - HOSTITEL	LOCALITY - LOKALITA
<i>Eutypa spinosa</i> (Pers.: Fr.) Tul. et C. Tul.	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla
<i>Eutypella quaternata</i> (Pers.: Fr.) Rappáz	<i>Fagus sylvatica</i>	Černé L.
<i>Gibbera myrtilli</i> (Cooke) Petr.	<i>Vaccinium uliginosum</i>	Mlynařská peat-bog
<i>Graphium calicioides</i> (Fr.) Cooke et Massee	<i>Fagus sylvatica</i>	Ždanidla
<i>Hadrotrichum</i> stae of <i>Ustulina deusta</i> (Hoffm.: Fr.) Lind	<i>Fagus sylvatica</i>	Ždanidla
<i>Helicosporium vegetum</i> Nees.: Fr.	<i>Fagus sylvatica</i>	Mlynařská peat-bog
<i>Hormiactella asetosa</i> Hol.-Jeech.	<i>Picea abies</i>	Mlynařská peat-bog
<i>Hymenoscyphus herbarum</i> (Pers.: Fr.) Dennis	<i>Cirsium palustre</i>	Laka Lake
<i>Hymenoscyphus repandus</i> (Phill.) Dennis	<i>Cirsium palustre</i>	Laka Lake
<i>Hymenoscyphus scutula</i> (Pers.) Phill.	<i>Cirsium palustre</i>	Laka Lake
<i>Hypoxyton cohaerens</i> (Pers.: Fr.) Fr.	<i>Fagus sylvatica</i>	Ždanidla
<i>Hypoxyton fragiforme</i> (Scop.: Fr.) Kieckx.	<i>Fagus sylvatica</i>	Černé L., Mlynařská peat-bog, Ždanidla
<i>Lastosphaeria canescens</i> (Pers.: Fr.) P. Karsten	<i>Fagus sylvatica</i>	Černé L., Ždanidla
<i>Lastosphaeria porifera</i> Réblová	<i>Picea abies</i>	Čertovo L.
<i>Lastosphaeria ovina</i> (Pers.: Fr.) Ces. et De Not.	<i>Fagus sylvatica</i>	Ždanidla
<i>Leptosphaeria acuta</i> (Fr.) P. Karsten	<i>Urtica dioica</i>	Laka Lake
<i>Leptosphaeria fockelii</i> Niessl	<i>Calamagrostis vilosa</i>	Mlynařská peat-bog
<i>Libertella faginea</i> Desm.	<i>Fagus sylvatica</i>	Černé L., Mlynařská peat-bog, Ždanidla
<i>Lopodostoma turgidum</i> (Pers.: Fr.) Traverso	<i>Fagus sylvatica</i>	Černé L., Mlynařská peat-bog, Ždanidla
<i>Melanamphora spinifera</i> (Wallfr.) LaFl.	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla
<i>Melanomma pulvis-pyrusii</i> (Pers.: Fr.) Fockel	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Laka Lake, Ždanidla
<i>Menispora ciliata</i> Corda	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Menispora glauca</i> Pers.: Fr.	<i>Fagus sylvatica</i>	Černé L., Ždanidla
<i>Mollisia cinerea</i> (Batsch) P. Karsten	<i>Fagus sylvatica</i>	Černé L., Mlynařská peat-bog, Ždanidla
<i>Monodictys lepraria</i> (Berk.) M.B. Ellis	<i>Picea abies</i>	Černé L.
<i>Mytilinidion rhenanum</i> Fockel	<i>Picea abies</i>	Čertovo L., Ždanidla
<i>Nectria episphaeria</i> Tode.: Fr.	<i>Fagus sylvatica</i>	Čertovo L., Ždanidla
<i>Nectria purtonii</i> (Grev.) Berk.	<i>Fagus sylvatica</i>	Čertovo L.

SPECIES - DRUH	HOST - HOSTITEL	LOCALITY - LOKALITA
<i>Ophiobolus acuminatus</i> (Sow.) Duby	<i>Cirsium palustre</i>	Laka Lake
<i>Periconia britannica</i> M.B. Ellis	<i>Luzula sylvatica</i>	Mlynářská peat-bog
<i>Phaeostalagmus tenuissimus</i> (Corda) W. Gams	<i>Fagus sylvatica</i> , <i>Picea abies</i>	Čertovo L., Ždanidla
<i>Phoma herbarum</i> Westend.	<i>Cirsium heterophyllum</i>	Laka Lake
<i>Pleurothecium recurvatum</i> (Morgan) Höhn.	<i>Fagus sylvatica</i>	Ždanidla
<i>Polydesmia pruinoso</i> (Berk. et Broome) Bond.	<i>Diatrype disciformis</i>	Čertovo L., Ždanidla
<i>Pseudosporotres hughesii</i> M.B. Ellis	<i>Fagus sylvatica</i>	Ždanidla
<i>Pseudosporotres nodosus</i> (Wallr.) M.B. Ellis	<i>Sorbus aucuparia</i>	Ždanidla
<i>Pseudosporotres obclavatus</i> M.B. Ellis	<i>Fagus sylvatica</i>	Ždanidla
<i>Pseudosporotres simplex</i> (Kunze : Fr.) M.B. Ellis	<i>Fagus sylvatica</i>	Ždanidla
<i>Pseudosporotres subuliferus</i> (Corda) M.B. Ellis	<i>Fagus sylvatica</i>	Ždanidla
<i>Pyrenophora bromi</i> (Died.) Drechsler	<i>Calamagrostis vilosa</i>	Mlynářská peat-bog
<i>Scutellinia scutellata</i> (L.) Lambert	<i>Fagus sylvatica</i> , <i>Picea abies</i>	Černé L., Čertovo L.
<i>Schizothecium tetrasporum</i> (Winter) Lundq.	excrement	Mlynářská peat-bog
<i>Spadicoides atra</i> (Corda) S. Hughes	<i>Sorbus aucuparia</i>	Čertovo L., Ždanidla
<i>Spadicoides bina</i> (Corda) S. Hughes	<i>Fagus sylvatica</i>	Mlynářská peat-bog
<i>Sporidesmium larvatum</i> Cooke et Ellis	<i>Picea abies</i>	Roklanská smrčína spruce forest
<i>Tapesia fusca</i> (Pers.) Fackel	<i>Fagus sylvatica</i>	Černé L., Čertovo L., Ždanidla
<i>Tapesia</i> sp.	<i>Fagus sylvatica</i>	Černé L.
<i>Trichocladium opacum</i> (Corda) S. Hughes	<i>Fagus sylvatica</i>	Černé L.
<i>Trichosphaeria notabilis</i> Mouton	<i>Fagus sylvatica</i>	Ždanidla
<i>Tubercularia vulgaris</i> Tode : Fr.	<i>Fagus sylvatica</i>	Černé L., Ždanidla
<i>Trinatosstromma scutellare</i> (Berk. et Broome) M.B. Ellis	<i>Picea abies</i> , <i>Pinus pseudopumilio</i>	Čertovo L., Mlynářská peat-bog
<i>Tubeufia cerera</i> (Berk. et Curtis) C. Booth	<i>Fagus sylvatica</i>	Mlynářská peat-bog
<i>Valsa ambiens</i> (Pers.: Fr.) Fr.	<i>Fagus sylvatica</i>	Čertovo L., Laka Lake, Ždanidla
<i>Valsa friesii</i> (Duby) Fackel	<i>Abies alba</i>	Černé L.
<i>Xylaria hypoxylon</i> (L.) Grev.	<i>Fagus sylvatica</i>	Černé L.
<i>Xylaria longipes</i> Nitschke	<i>Fagus sylvatica</i>	Černé L.

Abbreviations:

Černé L. = Černé jezero Lake glacial cirque Čertovo L. = Čertovo jezero Lake glacial cirque Mlynářská peat-bog = Mlynářská slat' peat-bog

and also for resulting species diversity of lignicolous saprophytic *Ascomycetes*. Some other factors influencing *Ascomycetes* occurrence are sufficient amount and variety of utilizable substrate. As example a comparison of two localities (Roklanská smrčina spruce forest and Ždanidla beech forest) can serve. Both localities are characterized by narrow spectrum of hosts, but they differentiate considerably by the natural conditions and consequently by the dominant tree species. Due to a great amount of utilizable wood and suitable habitat (scree forest at the upper part and source area at the lower part, both on SW side of the mountain) a total number reached 56 species, and the greatest diversity of lignicolous *Ascomycetes* has been proved on Ždanidla beech forest. In case of Roklanská smrčina spruce forest, where only the one type of the vegetation (homogenous spruce forest) is situated, only 5 taxa have been found. Moreover this result is influenced by the fact, that many *Ascomycetes* do not prefer the resinous wood of conifers.

### The rare and endangered species

*Chaetosphaeria montana* with *Dictyochaeta* anamorph has been found and described as a taxon new to science on *Abies alba* only in Čertovo jezero Lake glacier cirque (type locality). *Ch. montana* seems to be endangered species, fixed on *Abies* in relict forests. Insufficient regeneration of fir may caused total extinction of this new and rare species.

Analogous conditions influence the occurrence of another two *Chaetosphaeria* species (*Ch. abietis* and *Ch. fusiformis*). Both species are known only on fir in Černé jezero Lake glacier cirque and are fixed on wood and inner side of partly peeled off bark. For this reason they are endangered by fir extinction on this habitat.

During this research another new species have been described (*Capronia perpusilla*, *C. obesispora*, *Ceratospaeria abietis* and *Lasiosphaeria porifera*), related by their occurrence to remnants of natural beech-fir forest.

The *Mytiliniaceae* involves some further rare and endangered species, e.g. *Actidium hysteroioides*, *A. nitidum* and *Mytilinidion rhenanum*. These species are fixed on cut cross sections of stumps and trunks and partly peeled off bark of *Picea abies* and *Pinus mugo* × *pseudopumilio*. If this substrates is removed, the species in question will lose their biotops and become extinct.

Another rare and interesting species are *Calosphaeria barbirostris*, *Capronia pilosella*, *Ceratostomella rostrata*, *Gibbera myrtili*, *Trichosphaeria notabilis* and *Valsa friesii*.

For retaining of all above mentioned species as well as the entire *Ascomycetes* diversity some recommendations to the management can be given:

1. Natural regeneration of fir and beech must be supported on the area of their original occurrence.
2. Abandoning of fallen trunks and stumps to their spontaneous decomposition.
3. The long-term task seems to be restoration ecology of natural beech-fir forest and gradual substitution of artificial spruce forest.

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