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Ascomycetes from Danube islands in Bratislava (Slovakia)

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ABSTRACT: Research on biodiversity of macrofungi of Danube islands Sihoť and Sedláčkov ostrov (city of Bratislava) resulted in 26 species of Ascomycetes. Ecology, chorology and taxonomy of selected taxa of Discomycetes and Pyrenomycetes was studied.

KEYWORDS: Ascomycetes, Discomycetes, Pyrenomycetes, islands, Danube, Slovakia

Introduction

River floodplain forests become extremely endangered in this century and there are only scarce data on fungi of those habitats. This was the reason why senior author's project has been focused on biodiversity of two Danube islands, Sihoť and Sedláčkov ostrov in western part of the city of Bratislava.

Field research and taxonomic studies of islands' macrofungi resulted in 26 species of Ascomycetes (Discomycetes and Pyronomycetes), including some taxa specific for floodplain habitats and few rare in Slovakia, such as *Trichophaeopsis bicuspis, Trichophaea variornata,* and *Peziza isabellina,* and *Scutellinia legaliae* is reported for the first time in Slovakia. Where data were available ecology or host-fungus relationships are discussed. Taxonomy and nomenclature of selected rare species are analyzed.

Nomenclature follows names accepted in the Checklist of Slovak fungi (LIZOŇ & BACIGÁLOVÁ 1998). Taxonomy concepts of treated genera and species are those provided by authors and their papers cited in the list of references.

Reviewed paper summarizes data on ascomycetous macrofungi of two Danube islands, a part of a larger project on biodiversity of macrofungi of that area.

Material and methods

Field research. The study is based predominantly on authors' field research in 1997-1999 and is supplemented by some herbarium specimens (SLO) and published records. Field trips were irregular, in intervals of few days to 2 weeks also due to flooding (collecting of Ascomycetes was an integral part of research on biodiversity of all macrofungi).

Laboratory research. Before vaucher specimens were dried macromorphologic characters were noted and sketch drawings were taken. Later herbarium specimens were studied for micromorphological characters: they were rehydrated in 3% KOH solution and subsequently studied in water, standard Congo Red solution, Cotton Blue solution in lactic acid and Melzer's reagent. Collections are deposited in SLO (Dept. of Botany, Komensky University, Bratislava and few of them in the herbarium of the Forestry and Wood-Technology Museum in Zvolen (abreviated here as LDM).

Studied area

Location. Island Sedláčkov ostrov (city of Bratislava): latitude 48° 10' 13" – 48° 09' 45" and longitude 16° 59' 13" – 16° 59' 55", 1.2 km long and 0.3 km wide, 19.45 ha, altitude 133 – 142 m a. s. l.

Island Sihoť (city of Bratislava): latitude 48° 09' 19" – 48° 08' 33" longitude 17° 01' 00" – 17° 03' 30", 3 km long and 1.2 km wide, 141.23 ha, altitude 133 – 142 m a. s. l.

Geology and soils. Bedrock is formed by weathered granite covered by 10 – 12 m river sediments. Soils, due to flooding and high water table, are generally classified in the group of fluvisols.

Vegetation. Studied area is considered to belong to the phytogeographical county Podunajská nížina (FUTÁK 1984). According to the geobotanical map of Slovakia (MICHALKO & al. 1987) islands have been covered by primary flood-plain forests of plant communities *Salicion albae*, *Salicion triandrae* p.p. and *Ulmenion*. Danube water level significantly determines forest communities because it also regulates directly ground water conditions (average monthly level at the Bratislava - Petržalka station varies between 128.97 and 132.51 m a. s. l.). Forest are floded irregularly with the maximum in summer and spring months.

Water-works. Both islands house important wells and other water-works which supplies with drinking and technological water western parts of the city. They belong to the 1st zone of the sanitary protection of water resources.

Annotated list of recorded Ascomycetes

The list covers all collected and reported taxa in studied area. Fungi are divided into two trofic groups, terrestial and wood-inhabitang species. Degree of wood-decomposition is expressed in three stages: 1. more-or-less intact wood, 2. decaying wood, structure of wood and bark is partly damaged, 3. rotten wood, structure of wood and bark is almost unrecognizable (noted as 1-3 with host-substrate).

Terrestrial species

Aleuria carbonicola (J. MORAVEC) J. MORAVEC
Sedláčkov ostrov: on deposited soil, 10 June 1997 (SLO).
This species was originaly treated within *A. cornubiensis* (MORAVEC 1972) and the majority of collections under this name belong to *A. carbonicola*.

Ascobolus behnitziensis KIRSCHST.
Sihoť: on deposited soil, 20 Aug. 1997 (SLO, LDM).
This species is one of the few members of the genus growing on soil.

Morchella semilibera DC.
Sihoť: among leaves litter, 20 April 1994 (RADOVÁ 1995); in herbaceous cover of *Lamium* sp., *Anthriscus* sp., 21 April 1998 (SLO). Sedláčkov ostrov: in herbaceous cover along concrete pathway, 20 April 1998 (SLO); in herbaceous cover next to the well, 21 April 1998 (SLO); in herbaceous cover on forest track, 26 April 1998 (SLO).
M. semilibera is a common species of flooded and un-flooded woods accompanying rivers and bigger streams.

Morchella esculenta (L.) PERS.
Sihoť: among leaves litter, 20 April 1998 (SLO).

Morchella rimosipes DC.
Sihoť: on deposited soil, 20 April 1994 (SLO).
It can be easily distinguished from *M. semilibera* by having furrowed stipe.
warts).

Peziza isabellina W. G. SMITH
Sihoť: on deposited soil, 20 Aug. 1997 (LDM).
For notes and details see Taxonomic remarks.

Peziza granulosa SCHUM. sensu BRES.
Sihoť: among leaves litter, 1985 (SLO).
Forming tiny apotecia this species is probably overlooked and also confused with *P. granularis.*

Peziza phyllogena COOKE
Sedláčkov ostrov: on deposited soil, 10 June 1997 (SLO).
This is a summer species often confused with *P. badia*, which grows mostly in fall and has an incomplete reticulate ornamentation of spores (ornamentation in *P. phyllogena* is composed of isolated warts.

Scutellinia legaliae LOHMAYER & HÄFFNER
Sihoť: on deposited soil, 20 Aug. 1997 (LDM).
For notes and details see Taxonomic remarks.

Trichophaea variornata KORF & W.-Y. ZHUANG
Sihoť: on deposited soil, 20 Aug. 1997 (LDM).
For notes and details see Taxonomic remarks.

Trichophaeopsis bicuspis (BOUD.) KORF & ERB
Sihoť: on deposited soil, 20 Aug. 1997 (SLO, LDM).
For notes and details see Taxonomic remarks.

Verpa bohemica (KROMBH.) J. SCHRÖT.
Sedláčkov ostrov: among leaves litter, 1991 (ZÁHOROVSKÁ 1997); among leaves litter, 9 April 1997 (SLO).

Wood-inhabiting species

Ascocoryne sarcoides (Jacq.) J. W. GROVES & D. E. WILSON
Sihoť: on bark of fallen trunk of *Populus nigra* (1.), 26 Nov. 1997 (SLO); in holes of bark of fallen trunk of *Populus nigra* (2.), 26 Nov. 1997 (SLO).
Widely distributed species in Slovakia with majority of records in mountain beech forests.

Bisporella citrina (BATSCH) KORF & S. E. CARP.
Sedláčkov ostrov: on naked wood of fallen trunk of *Negundo aceroides* (2.), 21 Oct. 1998 (SLO); on naked wood of fallen trunk of a deciduous tree (3), 26 Oct. 1998 (SLO).

Daldinia concentrica (BOLTON) CES. & DE NOT.
Sihoť: on bark of fallen trunk of *Fraxinus excelsior* (2.), 7 Aug. 1997 (SLO); on naked wood of fallen trunk of *Fraxinus excelsior* (2.), 22 Oct. 1997 (SLO); among mosses on naked wood of fallen trunk of cf. *Fraxinus excelsior* (3.), 22 Oct. 1997 (SLO); on naked wood of fallen trunk of *Negundo aceroides* (2.), 23 June 1998 (SLO); on bark of fallen trunk of *Negundo aceroides* (2.), 30 June 1998 (SLO); among mosses on naked wood of fallen trunk of *Fraxinus excelsior* (2.), 10 March 1999 (SLO).

Hypocrea citrina (PERS.) FR.
Sihoť: on naked wood of fallen trunk of cf. *Ulmus* sp. (3.), 6 Aug. 1997 (SLO).
Common species in mountain beech forests.

Hypoxylon fuscum (PERS.) FR.
Sedláčkov ostrov: on bark of fallen trunk of *Populus nigra* (2.), 2 Sept. 1998 (SLO).
According to JU & ROGERS (1996) *H. fuscum* is associated with the members of Betulaceae, such as *Alnus* and *Corylus*.

Hypoxylon rubiginosum (PERS.) FR.
Sedláčkov ostrov: on bark of fallen trunk of deciduous tree (2.), 24 June 1997 (SLO); on bark of fallen twig of deciduous tree (1.), 24 June 1998 (SLO); Sihoť: on bark of fallen trunk of *Negundo aceroides* (2.), 30 June 1998 (SLO); on naked wood of fallen trunk of *Negundo aceroides* (3.), 21 July 1998 (SLO).
PETRINI-KLIEBER (1985) distinguishes three variety based on teleomorphs.

Hypoxylon ticiniense L. E. PETRINI
Sedláčkov ostrov: on bark of fallen trunk of *Swida sanguinea* (1.), 26 June 1997 (SLO); on bark of fallen trunk of deciduous tree (2.), 2 July 1997 (SLO); on bark of fallen twig of *Fraxinus excelsior* (3.), 8 Jan. 1998 (SLO); on naked wood of fallen trunk of deciduous tree (2.), 20 July 1998 (SLO); Sihoť: on naked wood of fallen trunk of *Negundo aceroides* (3.), 23 June 1998 (SLO); on naked wood of fallen trunk of *Acer campestre* (2.), 29 July 1998 (SLO); on naked wood of fallen trunk of deciduous tree (2.), 24 Sept. 1998 (SLO); on bark of fallen trunk of deciduous tree (2.), 16 Oct. 1998 (SLO).
The species was described only recently (PETRINI-KLIEBER 1985) and it seems to be associated predominantly with floodplain habitats.

Peziza apiculata COOKE
Sihoť: on bark of fallen trunk of *Negundo aceroides* (3.), 23 Sept. 1997 (SLO).
P. apiculata is reported as growing on wood but it may occur also on soil as documented by our collections from the National park Slovenský raj.

Peziza micropus PERS.
Sedláčkov ostrov: on twig semiimmersed in soil of deciduous tree (3.), 20 May 1994 (SLO); on bark of fallen trunk of *Populus nigra* (2.), 26 Oct. 1998 (SLO); Sihoť: on naked wood of fallen trunk of *Populus nigra* (3.), 18 Aug. 1997 (SLO); on naked wood of fallen trunk of cf. *Fraxinus excelsior* (3.), 7 Oct. 1997 (SLO); on bark of fallen trunk of *Populus nigra* (3.), 22 Oct. 1997 (SLO); on pieces of wood laying on soil (3.), 20 April 1998 (SLO).

Sarcoscypha austriaca (BECK) BOUD.
Sedláčkov ostrov: on bark of fallen twig of deciduous tree (2.), 26 March 1998 (SLO).

Sarcoscypha coccinea (JACQ.) COOKE
Sihoť: on pieces of wood of deciduous tree immersed in soil (2.), 25 March 1998 (SLO).
Most data published under this name are dubious because *Sarcoscypha coccinea* auth. represents an aggregate taxon, including *S. austriaca, S. coccinea,* and *S. emarginata* now. Results of ongoing project on *Sarcoscypha* (by authors of this paper and P. LIZOŇ) with data on taxonomy, ecology and distribution in Slovakia will be published soon.

Scutellinia crinita (BULL.) LAMBOTTE
Sihoť: among mosses on fallen trunk of deciduous tree (3.), 18 Aug. 1997 (LDM); on naked wood of fallen trunk of *Fraxinus excelsior* (2.), 5 Nov. 1998 (SLO); Sedláčkov ostrov: on naked wood of fallen trunk of deciduous tree (3.), 26 Nov. 1997 (SLO).
The species is closely related to *S. scutellata* and differs in having shorter hairs.

Xylaria hypoxylon (L.) GREV.
Sihoť: on bark of fallen trunk of *Fraxinus excelsior* (3.), 16 Oct. 1998 (SLO).

Xylaria polymorpha (PERS.) GREV.
Sedláčkov ostrov: on stump of deciduous tree (2.), 14 Oct. 1993 (SLO); on stump of deciduous tree (2.), 20 Oct. 1994 (SLO); on stump of deciduous tree (2.), 9 April 1997 (SLO); Sihoť: on roots of *Populus nigra* (1.), 8 July 1994 (SLO); on root of deciduous tree (2.), 11 Aug. 1997 (SLO); on bark of fallen trunk of *Fraxinus excelsior* (2.), 22 Oct. 1997 (SLO).

Taxonomy remarks

Scutellinia legaliae LOHMEYER & HÄFFNER (Fig. 1)

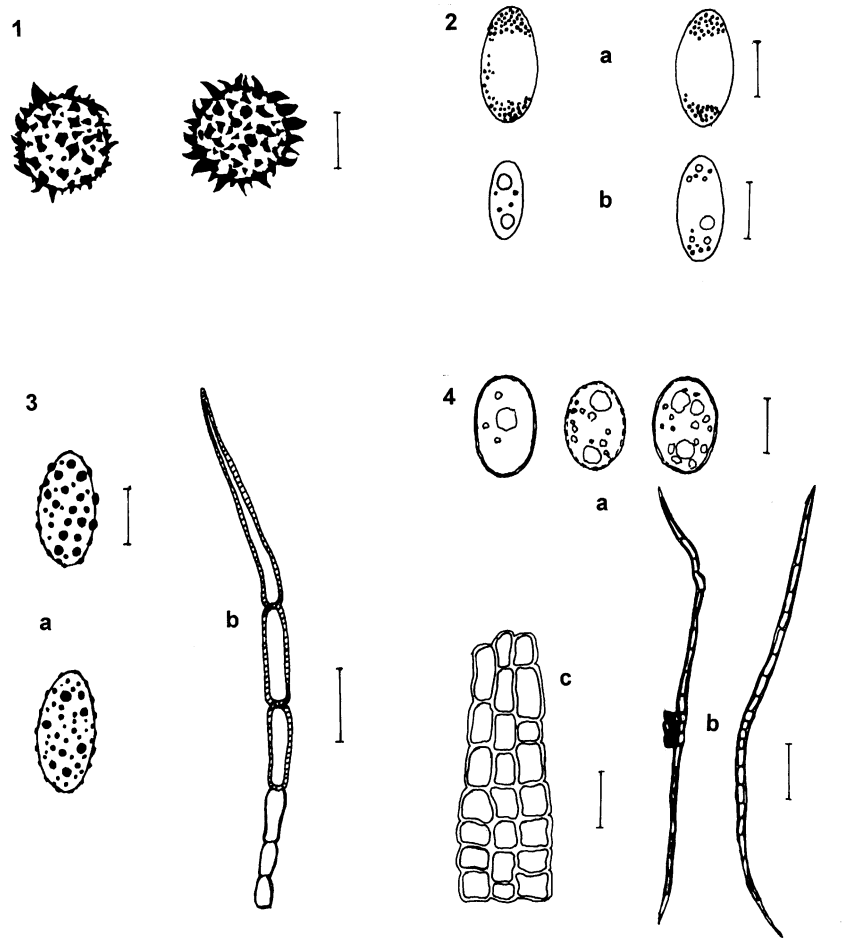
Syn.: *Scutellina trechispora* var. *macracantha* LE GAL ex DONADINI
[≡ *Ciliaria asperior* var. *macracantha* LE GAL, nom. nud.]

Apothecia 3-4 mm diam., sessile, disc-shaped, hymenium red to orange-red, externally paler, covered by septate brown hairs. Ectal excipulum composed of globose to oval cells, 30-50 µm wide. Medullary excipulum of interwoven textura intricata, hyphae 4-8 µm thick. Marginal hairs slightly longer than hairs on receptacle, brown to dark brown, straight or slightly curved, pointed at the apex, with bi- and tri- furcate base, 2-5 septate, deep-rooting, 100-480 × 15-28 µm, with walls 2.2-4.5 µm thick. Asci 8-spored, cylindrical, operculate, non-amyloid, 220-280 × 16-20 µm, with a pleurorhynchouse base. Ascospores globose, hyaline, multiguttulate or 1-guttulate, ornamented, 16.8-18.0 µm diam. Spore ornamentation consists of conical, pointed, often flame-like spines 2.2-4.8 µm long and 2.0-2.5 µm thick at the base. Paraphyses filiform, septate, 2-3 µm thick, enlarged at the apex to 6-9 µm.

Specimen examined: Slovakia, Bratislava, Island Sihoť, on deposited soil, 20 Aug. 1997 (LDM 000156).

Globose ascospores pointed conical spines and medium sized hairs with bi- to tri-furcate base are the most distinctive characters of this species. *S. trechispora* with globose ascospores, ornamented by conical but truncate spines and long hairs with multifurcate base may be confused with our species.

S. legaliae is obviously rare and it is reported from Slovakia for the first time here. Before it was reported only from Germany, Switzerland, France (LOHMEYER & HÄFFNER 1983), England (YAO & SPOONER 1996), and former Soviet Union



Figs. 1-4. Fig. 1. *Scutellinia legaliae:* ascospores (bar = 10 µm); Fig. 2. *Peziza isabellina:* a – mature ascospores, b – immature ascospores (bar = 10 µm); Fig. 3. *Trichophaea variornata:* a – ascospores (bar = 10 µm), b – hair (bar = 30 µm); Fig. 4. *Tichophaeopsis bicuspis:* a – ascospores (bar = 10 µm), b – hairs (bar = 100 µm), c – ectal excipulum on margin (bar = 20 µm).

(KULLMAN 1982, as *S. diaboli* p. p.). SCHUMACHER (1990) described the species as member of warm temperate group but an another collection in Slovakia was located in high elevation (Mts. Poľana, on sandy soil, 780 m a. s. l., LDM 000457).

***Peziza isabellina* W. G. SMITH (Fig. 2)**

Syn.: Peziza subisabellina (Le Gal) P. Blank & al.

Apothecia 2.5 cm diam., sessile, shallow cupulate, hymenium purple- brown, receptacle covered by not very dense warts, paler than disc. Flesh relatively thick, 0.4 cm. Ectal excipulum of textura globulosa, composed of 3-5 layers of globose to pyriform cells, 15-35 µm broad. Medullary excipulum of textura intricata, cells 10-40 x 6-20 µm. Asci 8- spored, cylindrical, operculate, with pleurorhynchouse base, diffusely blueing in squash mounts, 260-300 x 18-22 µm. Ascospores ellipsoid to slightly fusiform, hyaline, with small granules on poles, 22.7-24.0 x 12.0-13.5 µm. Paraphyses cylindrical, 5-8 µm thick, enlarged to 10-13 µm at the apices.

Specimen examined: Slovakia, Bratislava, Island Sihoť, on deposited soil, 20 Aug. 1997 (LDM 000157).

Ascal amyloidity of the members of the genus *Peziza* is restricted to the apical part of asci. Diffuse blueing of asci in squash mounts of *P. isabellina,* as first mentioned by BOUDIER (1906, 1909), indicate that this species should not be treated in *Peziza*. Taxonomy and nomenclature of *Peziza isabellina* is currently under scrutiny.

The species was collected in Slovakia also in Bratislava - Rusovce on wood of *Populus sp.*, in Mts. Nízke Tatry on soil and wood debris of *Alnus* sp., in Zvolen on rotten wood of *Salix alba* and in National park Slovenský raj on loamy soil. It prefers wet habitats on banks of rivers and streams and ascocarps on wood are usualy bigger than those on soil.

***Trichophaea variornata* KORF & W.-Y. ZHUANG (Fig. 3)**

Misapl.: *Trichophaea pseudogregaria* (Rick) Boud.

Apothecia 2.0-3.5 mm, shallow cupulate, discoid, disc grayish-white, receptacle brown-gray, covered by septate, light brown superficial hairs, paler towards the both ends, pointed or obtuse at the apices, usually in fascicles of 2-7, towards the margin longer, 80-310 x 9.0-11.3 µm, walls 1.9-2.2 µm thick. Ectal excipulum of textura globulosa to textura angularis, cells hyaline, 11-29 µm diam., superficial cells light brown. Medullary excipulum of textura intricata, hyphae 2.8-6.2 µm thick. Asci 8-spored, cylindrical, operculate, non-amyloid, 172-238 x 12.0-13.5 µm. Ascospores slightly fusiform, hyaline, with one large oil guttule, ornamented, 19.1-22.3 x 9.9-11.2 µm. Ornamentation consists of warts of different size, 0.5-2.0 µm wide and to 1.8 µm high. Paraphyses filiform, 2.0-2.7 µm thick, enlarged at the apices to 4.5 µm.

Specimen examined: Slovakia, Bratislava, Island Sihoť, on deposited soil, 20 Aug. 1997 (LDM 000159).

KANOUSE (1958) erroneously used the name *Trichophaea pseudogregaria* for an American collection, which is conspecific with our species. Kanouse's misapplied name was used later by SVRČEK (1962, 1981) for Bohemian and Slovak collections of *T. variornata.* LE GAL (1947) pointed out that *T. pseudogregaria* and *T. paludosa* are closely related. Later YAO & SPOONER (1996), studying type specimens, confirmed conspecifity of both species, as suggested earlier by SEAVER (1928).

***Trichophaeopsis bicuspis* (BOUD.) KORF & ERB (Fig. 4)**

Syn.: *Trichophaea bicuspis* Boud.

Apothecia 1.5 - 2.0 mm diam., obconical, hymenium grayish-white, receptacle pale brown, covered by straight or curved, usually bifurcate, thick walled septate dark brown hairs, 380-810 x 10-18 µm, with walls 3.3-4.5 µm thick. Hairs originate from outer cells of ectal excipulum. Hairs at the base of receptacle cylindrical, flexuous, thin-walled, septate, light brown to hyaline, 100-430 x 3.4-4.5 µm. Ectal excipulum of textura globulosa-angularis, near the margin arranged in vertical rows, composed of thick-walled angular cells, bellow of globose to angular cells, outer layer of light brown cells, 6.0-13.5 µm diam. Medullary excipulum of textura intricata, hyphae 2-3 µm thick. Asci 8-spored, subcylindrical, tapered below, operculate, non-amyloid, 190-245 x 13.7-14.6 µm. Ascospores broadly ellipsoid, hyaline, with several non-oleaginous inclusions, 15.8-18 x 10.8-11.3 µm. Paraphyses filiform, 2 µm thick, enlarged at the apices to 2.5-3.5 µm.

Specimen examined: Slovakia, Bratislava, Island Sihoť, on deposited soil, 20 Aug. 1997 (LDM 000158).

Trichophaeopsis is delimited from *Trichophaea* by its usually bifurcate, seta-like hairs, outer layer of ectal excipulum of verticaly oriented rows of thick-walled cells and ascospores lacking (true) oil guttules. As noted by KORF (1977), spores have, instead of oil guttules, resinous inclusions.

Hairs in *Trichophaeopsis* are attached to a row of 2-3 surface of ectal excipulum cells (visible only in radial section) as mentioned by KANOUSE (1958). Hairs in *Trichophaea* arise, in contrary, from a single cell. Another feature in *Trichophaeopsis* is the presence of two types of hairs, as in *T. bicuspis* and *T. latispora* J. MORAVEC (MORAVEC 1979) while in some species of *Trichophaea*, such as *T. gregaria* (REHM) BOUD., *T. variornata* and *T. woolhopeia* (COOKE & W. PHILLIPS) BOUD. we have observed only a single type of hairs.

The species seems to be not very rare in Slovakia even it was previously reported only two times (LIZOŇ 1970; DERMEK 1978).

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