

TYPE STUDIES OF SEVERAL SPECIES OF LACHNACEAE (ASCOMYCOTA, HELOTIALES)

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Abstract. Six species currently placed in Lachnaceae were examined microscopically, based on the type material. As a result, *Belonidium procopii* is considered to possibly belong to *Proliferodiscus*, *Dasyscypha bubakii* is considered as a synonym of *Lachnellula fuscanguinea*, *Dasyscyphus silvicola* is considered a species close to *Psilachnum chrysostigmum*, *Peziza elegantula* is transferred to *Lasiobelonium*, *Peziza koerberi* is considered as belonging to Cyphellopsidaceae, and *Trichopeziza adenostylidis* is lectotypified and shown to be different from *T. adenostylidis* ss. Raitviir. A less known species related to *Lachnella alboviolascens*, *L. uvicola*, is reported from a historical specimen collected by J. Peyl.

■ Key words: taxonomy, typification, *Lachnella*, *Lachnellula*, *Psilachnum*, *Proliferodiscus*, *Solenopezia*

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Introduction

During the author's studies of the taxonomy of *Trichopeziza* FÜCKEL, and during a study of biodiversity in selected fungal groups in Boubínský prales virgin forest (Holec et al. 2015), several type specimens were revised. The present study includes fungal species considered as belonging to the genera *Flagelloscypha* DONK, *Lachnella* FRIES, *Lasiobelonium* ELLIS et EVERHART, *Psilachnum* HÖHNEL, and *Trichopeziza*. The main part of the work was thus focused on Lachnaceae RAITVIIR. Two of the studied species should be excluded from the Lachnaceae, one of them is considered a species close to *Psilachnum chrysostigmum* (FRIES) RAITVIIR (Hyaloscyphaceae NANNFELDT) and the other one was found to belong to Cyphellopsidaceae JÜLICH. The original descriptions of the studied species mostly lack information about the characteristics of ascus bases or ionomidotic reaction (Korf 1958) or reactions of the ascoapical apparatus (Baral 1987). In this article, descriptions of the revised specimens and photographs are presented. Taxonomic pertinence of the studied species are proposed and discussed.

Methods

Single apothecia or part of the apothecia from a herbarium specimen were rehydrated with tap water under a stereo microscope allowing a piece of the apothecium to be taken for microscopic studies. The microcharacters were studied in tap water, 3% KOH aqueous solution, Melzer's reagent (MLZ), Lugol's solution (IKI: 1% iodine, 3% KI in distilled water) and in an exceptional case in lactophenol with cotton blue (slide heated). 3% KOH aqueous solution was used for descriptions, measurements and pretreatment. When not otherwise stated, colours were also described in KOH, but whenever important, tap water was used for examining colour under the microscope. The material was studied using an Olympus SZ-61 stereo microscope and an Olympus BX-51 microscope, usually with an oil immersion lens, in some cases using Nomarski contrast (DIC). Photographs were taken using an Olympus Camedia C-5050 digital camera. Colours were described according to Anonymus (1969). The number of measurements for the described taxa are presented in Tab. 1. Abbreviations: OCI = oil content index (relative to

Table 1. Number of measurements. The upper cell of the table contains number of studied specimens and number of measured fruitbodies, the other cells contain number of specimens, number of fruitbodies and number of measurements, all separated by commas.

	<i>B. procopii</i>	<i>D. bubakii</i>	<i>D. silvicola</i>	<i>P. elegantula</i>	<i>T. adenostylidis</i>
diam. of apothecia	1,31	1,2	1,9	1,2	1,10
length of hairs	1,1,4	1,1,2	1,1,5	1,1,13	1,1,2
width of hairs	1,1,4	2,2,4	1,1,10	1,1,9	1,1,2
width of paraphyses	1,1,7	2,2,11	1,1,6	1,1,3	1,1,2
exceeding the asci	1,1,4	2,2,7	1,1,5	–	1,1,4
length of asci	1,1,6	2,2,2	1,1,11	–	1,1,5
width of asci	1,1,6	2,2,4	1,1,11	–	1,1,5
ascospores	1,1,4	2,2,4	1,1,13	–	1,1,2

	<i>P. koerberi</i>	<i>L. alboviolascens</i>	<i>L. uvicola</i>
diam. of fruitbodies	1,8	1,9	1,7
length of hairs	1,1,1	1,1,5	1,1,3
width of hairs	1,1,5	1,1,7	1,1,9
cystidia	–	1,1,4	1,1,5
basidioles	1,1,6	–	1,1,19
length of basidia	–	1,1,2	1,1,3
width of basidia	–	1,1,2	1,1,4
sterigmata	–	1,1,1	1,1,2
basidiospores	1,1,4	1,1,5	1,1,9

spore volume, 5 = maximum). Herbarium acronyms are cited in accordance with Thiers (<http://sweetgum.nybg.org/science/ih/>). Abbreviations of exsiccatae collections are used according to Triebel and Scholz (<http://index.botanisches-taatsammlung.de/>).

Results and discussion

Belonidium procopii SVRČEK,
Česká Mykol. 42(2): 76, 1988.

Plate 1, Figs 1–17.

Description. Dried apothecia 0.18–0.85 mm in diam., sessile, with dilute orange to orange discs and white hairs. Ectal excipulum of hyaline, towards exterior yellow-ochre t. angularis on flanks, changing to t. porrecta at upper margin. Hairs 74–86(–130) µm long, 3–4.8 µm wide, ca. 6–7(–9)-septate, hyaline, relatively densely warted in water, sparsely warted in KOH and almost smooth in MLZ. Asci 64–73 × 4.3–5.4 µm, with a characteristic basal protuberance divided by a septum, ascus pore in MLZ: no reaction, KOH/MLZ: blue, IKI: red, KOH/IKI: blue. Ascospores 11.5–14 × 1.6–2.2 µm, 0(–1)-septate, OCI = 2–4. Paraphyses narrowly lanceolate, smooth, 2.4–4 µm wide, exceeding the asci by 2–11.5 µm.

Specimen studied: the Czech Republic, Central Bohemia, Praha-Hlubočepy, Prokopské valley, grassland vegetation on calcareous soil above Daleje, alt. 280–300 m, on *Coronilla varia* and *Centaurea scabiosa*, 21 August 1982, leg. M. Svrček, PRM 919510 (holotype).

Discussion. As already stated by Svrček (1988a), *Belonidium procopii* has some similar characteristics as *Trichopeziza adenostylidis* (REHM) RAITVIIR, especially in the hyaline hairs and yellowish discs, but *T. adenostylidis* differs in its larger apothecia, longer hairs and low oil content in the ascospores. *Trichopeziza lizonii* (SVRČEK) BARAL et E. WEBER (Chlebická 2013) differs from *B. procopii* as its brown hairs show a ionomidiotic reaction, and it has larger ascospores. The apothecia of *Belonidium procopii* appeared to me to have a different construction than those of the genus *Trichopeziza*. Therefore it was compared with *Proliferodiscus inspersus* (BERKELEY et M. A. CURTIS) J. H. HAINES et DUMONT (Haines and Dumont 1983) during the present study. *Belonidium procopii*, however, was observed to have an ectal excipulum composed of isodiametric cells at the flanks (Pl. 1, Fig. 12), hairs and excipulum without dextrinoid or other reaction in MLZ or MLZ after KOH, no purple or violet reaction of the excipulum or hairs in KOH and larger ascospo-

res contrary to the generic description (Haines and Dumont 1983) – a species with rather large ascospores, however, was transferred to *Proliferodiscus* by Baral (Hofton et al. 2009). *Belonidium procopii* is also similar to *Lachnellula* P. A. KARSTEN in some characters (e.g. colour of disc and hairs, densely warted hairs, structure of excipulum). But *Lachnellula* is restricted to conifers according to Baral (<http://invivoveritas.de/keys/lachnellula-key/>) and possesses hair warts that are insoluble in KOH (Baral pers. comm.). Moreover, *Belonidium procopii* in this study was observed to have narrow, pointed paraphyses but also plainly developed lanceolate paraphyses (Pl. 1, Fig. 9), which are unusual in *Lachnellula*. *Capitotricha* (RAITVIIR) BARAL differs in having specific hairs with relatively thick walls and the presence of apical or lateral crystals. The ectal excipulum is composed of isodiametric cells and a hemiamyloid reaction by the ascoapical apparatus was observed during this study, supported by the observation published by Svrček (1988a: no reaction in MLZ) and thus confirm the distinctness of this species from *Cistella tenuicula* (P. A. KARSTEN) RASCHLE (Quijada et al. 2015). *Cistella tenuicula* differs from *B. procopii* also by its shorter hairs with less septa, and up to 3-septate ascospores (Quijada et al. 2015). It seems likely that the observed structure of the excipulum and the shape and lipid content of ascospores may partly resemble *Erioscyphella* KIRSCHSTEIN as redefined by Perić and Baral (2015). Contrary to previous publications (e.g. Haines and Dumont 1984) this genus also includes among others species with shorter ascospores and temperate distribution, according to the redefinition. The typical shape of hairs of *Erioscyphella* (hairs widened in central/lower part) is also seen in *B. procopii*, however, only poorly developed. The shape of *B. procopii* hairs was observed to be rather cylindrical and *Trichopeziza*- or *Proliferodiscus*-like.

The taxonomic position of *Belonidium procopii* has not been resolved in this study. It is considered here as possibly belonging to *Proliferodiscus*.

Dasyscypha bubakii KLIKA,
Ann. Mycol. 20(5/6): 290, 1922.

Pl. 2, Figs 1–9.

Description. Closed dried apothecia 0.6–1 mm in diam., ca. 1 mm high, stalked, covered with cinnamon hairs. Hairs at least 125 µm long, 4.1–4.6 µm wide, dilute buff, densely warted, hair wall 0.8 µm thick. Asci 83–89 × 8.5–9 µm, arising from croziers, ascus pore with no reaction in MLZ after KOH pretreatment. Ascospores 12.5–15 × 4.3–4.8 µm, non-septate, OCI = 0.5–1.5(–2). Paraphyses filiform, simple or rarely with irregularly swollen or branched apex, 2.1–3.1 µm wide in apical part, 1.7–2.2 µm wide in lower part, exceeding the asci by 0–7(–14.5) µm.

Specimens studied: Slovakia, Vysoké Tatry Mts., Popradské pleso lake, on cones of *Pinus mugo*, July 1922, leg. J. Klika, PRM 7880. – Slovakia, Vysoké Tatry Mts., Mlynická dolina valley, on *Pinus mugo* cones, July 1922, leg. J. Klika, PRM 127129.

Discussion. Klika (1922) mentioned that his species is different in both macroscopic view and microscopically from *Dasyscypha fuscousanguinea* REHM, but did not specify in which characters. In comparison with Rehm's description

(Rehm 1881) of *D. fuscanguinea*, Klika (1922) quotes longer stalks (2–3 mm), broader ascospores (7 µm) and wider asci (12–14 µm) contrary to my revision. Length of ascospores (14 µm) quoted by Klika and dilated paraphyses quoted by him can, however, refer to *Lachnellula fuscanguinea* (REHM) DENNIS, rather than to *Lachnellula pini* (BRUNCHORST) DENNIS, when compared with descriptions of these species by Hahn and Ayers (1934). According to the studied original material, *Dasyscypha bubakii* is considered here as a synonym of *Lachnellula fuscanguinea*. According to Index herbariorum (<http://sweetgum.nybg.org/science/ih/>, accessed on 2015-12-11), the material collected by J. Klika is reported only from the PRM herbarium. No more material of *D. bubakii* was found in the PRM herbarium, except for one later specimen collected in 1923. The specimen (Vysoké Tatry Mts., Popradské pleso lake, on cone of *Pinus mugo*, PRM 129726) contains old material: parts of two apothecia without hymenia only.

Lachnellula fuscanguinea (REHM) DENNIS, Persoonia 2(2): 184, 1962.

= *Dasyscypha bubakii* KLIKA, Ann. Mycol. 20(5/6): 290, 1922.

Dasyscyphus silvicola SVRČEK,
Česká Mykol. 31(3): 133, 1977.

Pl. 3, Figs 1–21.

Description. Dried apothecia 0.07–0.26 mm in diam., short-stalked, hairy, white. Rehydrated apothecium whitish to hyaline with hyaline stalk, 0.32 mm in diam., 0.19 mm high, stalk 0.09 mm long, 0.05–0.07 mm wide, purplish date to date brown at its basis. Ectal excipulum hyaline, thin (the entire excipulum is only 12–22 µm thick in the studied, mature apothecium), composed of prismatic cells except for one row at the surface which is composed of ± isodiametric or isodiametric cells; prismatic cells 9–10 × 4 µm, isodiametric cells 4–9 × 4.5–8 µm. Hairs cylindrical, rarely subclavate, 17–32 µm long, 2.8–4.6 µm wide, 2–3-septate, hyaline, sparsely warted, in lower part (0–2/3) frequently smooth. Hairs of another apothecium clavate, subclavate or less frequently cylindrical, 9–19.5 µm long, 3.7–4.2 µm wide, (0–)1–2-septate, hyaline, with scattered warts, in lower part (up to 2/3) often smooth. Asci 21.5–30.5 × 3.5–5.3 µm, arising from simple septa, ascus pore in MLZ: no reaction, KOH/MLZ: blue, IKI: red, KOH/IKI: blue. Ascospores 6.4–9 × 1.5–1.8 µm, non-septate, OCI = 1. Paraphyses filiform, 1.6–1.8 µm wide, or narrowly lanceolate to lanceolate, 2.3–3.9 µm wide, exceeding the asci by 0–7.5 µm.

Specimen studied: the Czech Republic, Southern Bohemia, Šumava Mts., Zátoň near Lenora, Boubínský prales virgin forest, on *Dryopteris austriaca* ssp. *dilatata*, 22. V. 1976, leg. M. Svrček et J. Kubička, PRM 802658 (holotype).

Discussion. According to the overall set of characters (tiny apothecia, frequent absence of warts on lower parts of hairs, shape of asci, etc.), *D. silvicola* is not considered here as a member of *Lachnum* but as belonging in the Hyaloscyphaceae. It seems to be very similar to *Cistella grumosa* SENN-IRLET et AEBERHARDT (Raitviir 2004, Baral et al. 2005), but *D. silvicola* differs in up to 3-septate hairs being narrower at the apex, in shorter asci and longer and narrower

ascospores. According to Raitviir (2004), paraphyses of *Cistella grumosa* are cylindrical to narrowly lanceolate and 2–4 µm wide while Baral et al. (2005) state that the paraphyses of *C. grumosa* are consistently cylindrical. In the studied material of *D. silvicola*, the lanceolate paraphyses described and illustrated by Svrček (1977a), were partly present. *Dasyscypha pteridialis* GRADDON is also very similar in character but, according to Graddon's (1977) description, the apothecia are gregarious with ochraceous discs and the ascospores finally 1-septate, longer than in *D. silvicola* and *C. grumosa*. All the three species are reported to have a broadened dark brown base on the stalk (Graddon 1977, Baral et al. 2005, this study: Pl. 3, Figs 1–4, 16, 18). In *Cistella*, the warts on the hairs remain permanent in microscopy reagents according to Raitviir (2004), and they can also be observed in plates by Quijada et al. (2015). Thus, *D. silvicola* seems not to belong to the genus *Cistella*. Brown hyphae on the surface of the stalk base are present in some species of the genus *Ciliolarina* (Svrček 1977b, Raitviir 2004). In *D. silvicola*, however, the character of the stalk-base is probably different from *Ciliolarina*. According to Stip Helleman's opinion (pers. comm.), *D. silvicola* would better be placed in *Psilachnum*; he also would consider the warts on hairs as an exudate. It seems to be close to *Psilachnum chrysostigmum*, but differs in the presence of the exudate, in asci arising from simple septa, no reaction of ascus pore in MLZ (described also by Svrček in the protologue), and partly lanceolate paraphyses when compared with description of *P. chrysostigmum* by Hosoya and Otani (1997).

Peziza elegantula P. A. KARSTEN,
Syn. Peziz. Ascob. Fenn., p. 24, 1861.

Pl. 4, Figs 1–15.

Description. Closed dried apothecia ca. 0.2–0.4 mm in diam., ca. 0.2–0.35 mm high, short-stalked, cup-shaped, covered by purplish chestnut hairs, part of apothecium put in KOH 0.55 mm wide and 0.4 mm high, with stalk 0.12 mm long and 0.16 mm wide. Fragment of apothecium released purple-violet colour in 3% KOH (Pl. 4, Fig. 3). Hairs 104–153 × 3.1–3.7 µm on flanks (in KOH or water), 33–48 × 3.0–3.1 µm at margin (in KOH), septate in intervals 10–19 µm on flanks (in KOH), 16–16.5 µm at margin (in KOH), in water hyaline or more frequently with dilute purple-blood red tint, in lower 1 to 3 cells rusty tawny to chestnut, with scattered hyaline or concolorous warts and larger purplish chestnut warts, hair wall in KOH 0.6–0.9 µm thick on flanks. When KOH is added to a water mount, the flank hairs turn green to leaf-green with larger fuscous black warts, marginal hairs dilute green with only concolorous warts, cells of excipulum surface cinnamon to brick, 5–10 × 4–7.5 µm (resp. 4.5–6 µm wide in surface view, 4–7.5 µm wide in median section), hymenium subhyaline with green tint. In preparation to KOH, hairs and hymenium are greenish grey, cells of excipulum surface amber to date-brown, medullary excipulum subhyaline with greenish grey tint composed of cells up to 18 × 2.5 µm, but mostly 1.5–2 µm broad in median section. Hymenium immature, with short, subacute paraphyses 1.5–2 µm wide (KOH) and a young ascus 32.5 × 4.5 µm (KOH), arising from a crozier, ascus pore with no reaction

in MLZ after KOH pretreatment (perhaps because too immature, see also fourth paragraph of discussion).

Specimen studied: Finland, Tavastia, Lempäälä, prope Kukkola (?ca. 8 km N of Lempäälä), on *Epilobium*, Sept. 1860, leg. P. A. Karsten, herb. Karsten (H), no. 3377 (holotype).

Additional specimens studied (not included to the description above): U.S.A., Wyoming, Medicine Bow Mts., Nash Fork, on *Delphinium subalpinum*, 7 Aug. 1950, leg. F. Petrak, PRM 876258, Reliquiae Petrakianae, no. 2021, as *Dasyscyphus leucostomus* REHM (specimen containing two species, *Solenopezia* cf. *leucostoma* (REHM) RAITVIIR and *Peziza* aff. *elegantula*). – Slovakia, Nízke Tatry Mts., in valley Trangoška [near Bystrá], on foot of Veľký Gápel, area with calcareous soil, 1600 m a.s.l., on *Delphinium* sp., 8 Sept. 1960, leg. M. Svrček, PRM 614196 (specimen containing *Solenopezia leucostoma*). – Slovakia, Belianske Tatry Mts., in valley “Kotlina Siedmich prameňov” [near Tatranská Kotlina], on *Cimicifuga foetida*, 6 Aug. 1956, leg. M. Svrček et J. Kubička, PRM 855801 (specimen containing *Solenopezia leucostoma*).

Discussion. The studied holotype specimen clearly compares with the original description (Karsten 1861). The taxon was originally described as a species possessing purplish blackish-brown, fibrillose striate apothecia with a short stalk or without any stalk (group ‘Substipitatae’ in Karsten’s work), fimbriate margin, bent inwards, and slender paraphyses. Later Karsten’s descriptions, based on more material, refer again to purplish blackish-brown, sessile to short-stalked apothecia (Karsten 1869, 1871). I studied the holotype because the substipitate apothecia and slender paraphyses seemed to me to indicate that it should be excluded from *Trichopeziza* in which it had been placed e.g. by Raitviir (1993) and Raitviir and Järv (1997).

Ascospores were not observed during this study of the holotype specimen, neither were they observed in the holotype specimen by Dennis (1956) and Huhtinen (in herb.), and nor were they described in the protologue by Karsten (1861). According to Karsten (1869), the ascospores are fusoid-oblong or fusoid-elongated, non-septate, $6\text{--}13 \times 2 \mu\text{m}$, and the asci cylindrical, $50\text{--}70 \times 5 \mu\text{m}$. According to Dennis (1956), ascospores of the species measure $9\text{--}12 \times 2 \mu\text{m}$, and paraphyses are cylindrical, $1.5 \mu\text{m}$ wide, pointed at the tip but only slightly longer than the asci. Schmidt and Schmidt (1991) described the ascospores as $10\text{--}14 \times 1.8 \mu\text{m}$ and paraphyses cylindrical with pointed tips up to $1.5 \mu\text{m}$ wide according to material collected in Germany.

The species is unusual in the green colour of its hairs in KOH. This reaction is also known in *Solenopezia leucostoma* (e.g. Svrček 1988b). I was able to study several specimens of *Solenopezia leucostoma* deposited in the herbarium PRM, and also North-American material of a species similar to *Peziza elegantula* but differing from it, e.g., by larger asci, yet being considered as congeneric. The results are presented here: Specimen PRM 876258 from the U.S.A. contains two species, old apothecia of *Solenopezia* cf. *leucostoma* and apothecia of *Peziza* aff. *elegantula* (Pl. 2, Fig. 13). *Solenopezia leucostoma* differs from *T. elegantula* in its darker, urn-shaped apothecia with a conspicuous white collar (white inner margin, PRM 876258, PRM 614196, PRM 855801), filiform

paraphyses, asci arising from simple septa, and hyaline, densely warted short hairs (like periphyses) on the inner margin, slightly tapering towards their rounded apex (PRM 614196, PRM 855801).

The *Peziza* aff. *elegantula* material, PRM 876258, possesses snuff brown to brown vinaceous apothecia, $0.4\text{--}0.57 \text{ mm}$ in diam., $0.33\text{--}0.5 \text{ mm}$ high in dried state, with flank hairs hyaline with a buff (4D) or dilute pistachio-green tint in KOH, with the basal 2 to 3 cells vinaceous to dark brick, $187\text{--}207 \times 2.5\text{--}3.8 \mu\text{m}$, hair wall $0.6\text{--}0.7 \mu\text{m}$ thick, asci $73\text{--}87 \times 5.8\text{--}7.6 \mu\text{m}$, arising from croziers, with or without blue reaction of ascus porus in MLZ after pretreatment with KOH (probably according to the developmental stage of the asci), paraphyses cylindrical, septate, anastomosing, $2.0\text{--}2.7 \mu\text{m}$ wide, exceeding the asci by $0\text{--}17.5 \mu\text{m}$, in lateral part of hymenium branched and with enlarged apices (to $2.5\text{--}2.6 \mu\text{m}$). Free ascospores or clearly developed ascospores in asci were not observed. In comparison with the holotype of *Peziza elegantula*, this specimen has a slightly larger and paler apothecia and slightly longer and narrower hairs. Also the asci are longer in this specimen when compared to the descriptions of *P. elegantula* by Karsten (1869), Dennis (1956) and Schmid and Schmid (1991).

The transfer of *Peziza elegantula* to *Lasiobelonium* in this study is based on the observed structure of the ectal excipulum (Pl. 4, Figs 7, 8), on the fact that the apothecia are stalked (Pl. 4, Fig. 4) and that there was no conspicuously raised margin with densely warted periphysis-like hairs typical of the genus *Solenopezia* SACCARDO (Pl. 4, Fig. 15). There are, however, several characters which show close affinity to the genus *Solenopezia*. A green colour of hair in KOH is also known from some species of *Solenopezia* and from *Trichopeziza araliae* RAITVIIR (Raitviir 1995), the position of which requires revision. Species of the genus *Solenopezia* have, according to Raitviir et al. (1991), a raised excipular margin which is visible and white also in dried apothecia, e.g. in *S. leucostoma* (PRM 855801; Pl. 2, Fig. 14), but only slightly raised when fresh and incurved when dry in *S. lamoureaana* RAITVIIR (Raitviir 1995). A raised excipular margin is not present in *Peziza elegantula* according to microscopic examination in this study. The hairs near the margin (Pl. 4, Fig. 11) are shorter than flank hairs, but they do not differ qualitatively from the flank hairs (both marginal and flank hairs are usually somewhat pointed at the apex and both are in the apical part usually less coloured; no difference in shape of the concolourous warts or striking difference in thickness of the wall were observed). The hairs (Pl. 4, Fig. 6) and the ectal excipulum cells of the holotype specimen are thick-walled when observed in MLZ (Pl. 4, Fig. 10, excipulum near the base of cup). MLZ is probably the medium which was used by Raitviir for microscopic observations (e.g. Raitviir 1973) and the reason why he was describing the hairs of *Trichopeziza* as smooth (Raitviir 1987). *Solenopezia* has a sessile apothecia and cylindrical paraphyses as previously stated (Svrček 1988b, Raitviir et al. 1991, Raitviir 1993, 1995, 2003), but, e.g., *Solenopezia solenia* paraphyses are quoted as “cylindrical, pointed” (Raitviir 1973). Paraphyses of *Peziza* aff. *elegantula* which are seemingly mature in the specimen PRM 876258 were not found to be significantly different from *S. leucostoma*. Raitviir (1980) described the paraphysis range in *Lasiobelonium* as pointed cylindrical to

distinctly lanceolate and he also described the hairs as mostly with brown walls in the basal or the middle part, apically hyaline, rarely totally hyaline. The basal cells of hairs, including the hair wall, in all the material used in this study, were brown according to my observation (*P. elegantula*: H 3377; two species in PRM 876258; *S. leucostoma*: PRM 614196, PRM 855801).

Phylogenetic relationships of *Solenopezia* and *Lasiobelonium* still remain unresolved because of the limited number of sequences available in public databases (Cantrell and Hanlin 1997, Hosoya et al. 2010).

A white collar was not microscopically observed in *Peziza elegantula* in this study and the genus *Solenopezia* is defined by the presence of a white collar, and because the shape of the apothecia is different (Pl. 2, Fig. 13), the species is here considered as belonging to *Lasiobelonium*. A new combination is proposed.

Lasiobelonium elegantulum (P. A. KARSTEN) ŠANDOVÁ, comb. nov. (Mycobank MB 815254) Basionym: *Peziza elegantula* P. A. KARSTEN, Syn. Peziz. Ascob. Fenn., p. 24, 1861.

Peziza koerberi PEYL, Lotos 8: 31, 1858.

Pl. 2, Figs 10–12, Pl. 5, Figs 1–24.

Description. Material on ?Cyperaceae (Pl. 2, Figs 10–12, *Flagelloscypha*): Dried fruitbodies 0.1–0.45 mm in diam., outer surface whitish with dilute buff tinge (4D), covered with white hairs, often bearing a small circular brown lid (probably a part of plant tissue) up to 0.05 mm in diam. at the top of the fruitbody. Rehydrated fruitbody stalked, with 0.07 mm long, 0.05 mm wide stalk and 0.17 mm high, 0.18 mm wide cup. Hairs in water more than 120 µm long, 3.2–4.3 µm wide, hyaline to subhyaline, except for the basal part and mostly, except for the apical part, roughly warted ('with crystalloids'), crystalloids up to 3(–3.3) µm long, apical part of hair without crystalloids 0–29 µm long, tapering, in various parts 1.3–3.0 µm wide, basal part of hair 2.2–3.3 µm wide. In water, the hair wall in the apical part up to 1.0 µm thick, hair wall in the central part up to 0.9 µm thick, hair wall in the basal part 0.7 µm thick. Basidioles hyaline, with rounded apices, 13.5–23 × 3.8–5.7 µm, with basal clamp (KOH). Basidia were not recorded in the present study, but hopefully may be found during a detailed study of the specimen. Basidiospores hyaline, containing several lipid-bodies, 7.3–9.6 × 4.6–6.3 µm, average length 8.23 µm, average width 5.53 µm, l/w ratio 1.2–2.1 (KOH).

Material on grass (Pl. 5, Figs 1–11, *Lachnella alboviolascens* (ALBERTINI et SCHWEINITZ) FRIES): Dried fruitbodies 0.3–0.52 mm in diam., 0.32–0.42 mm high, sessile, outer surface dilute fulvous to dilute cinnamon, covered with long white hairs, subiculum not present. Hairs in water 150–230 µm long, 5.0–6.5 µm wide, hyaline, densely warted, hair wall 1.0–2.2 µm thick, basal parts of hairs in KOH hyaline or weak dilute buff (4D). Cells of surface tissue of frb. subhyaline, with dilute buff tinge, up to 4.2 µm wide in median section (water), the cells in surface view 10–17(–25) × 4.4–5.7 µm (KOH). Cystidia hyaline, with rounded or asymmetrical apex, 38–42.5 × 5.3–6.1 µm, with basal clamp (KOH). Septate hymenial elements hyaline, with rounded or asymmetrical apex, upper cell of size 36.5–67 × 5.2–7.3 µm divided by a septum with no clamp (KOH). Basidia 104–109 ×

10.5–11 µm (KOH). Sterigmata ca. 10 × 2.3 µm (KOH). Basidiospores hyaline, containing numerous lipid-bodies, 10–13 × 6.5–9 µm, average width 7.34 µm, l/w ratio 1.41–1.68 (KOH).

Material on *Pelargonium* (reidentified here as *Vitis*, Pl. 5, Figs 12–24, *Lachnella uvicola* (SPEGAZZINI) COOKE): Dried fruitbodies 0.25–0.57 mm in diam., sessile to short-stalked, surface of stalk pale ochre (5E to 6F), outer surface of cup dilute ochre (9H), covered with white hairs, subiculum not present. Hairs in water 150–170 µm long, 4–5.2 µm wide, hyaline, densely warted, hair wall 1.4–1.9(–2.3) µm thick, basal parts of hairs in KOH dilute buff-fulvous. Cells of surface tissue of frb. dilute fulvous (in water), elongated, 2.9–4.4 µm wide (KOH). Cystidia or young hymenial elements rare, hyaline, with tapering to rounded apices, narrower than other elements, 30–37.5 × 4.2–5.6 µm, with basal clamp (KOH). Basidioles hyaline, with rounded to conical apices, (30–)41–70.5 × 6.8–8.6(–9) µm, with basal clamp (KOH); one exceptional element (probably immature basidium) of size 81 × 11.5 µm was seen. Basidia 44.7–52 × (8.7–)10.5–12 µm (KOH). Sterigmata ca. 6 × 1–1.3 µm (KOH). Basidiospores hyaline, 11.6–13.2 × (7.5–)8.1–9.0 µm, average width 8.37 µm (KOH), 12.2–13.5 × 8.5–8.8 µm, average width 8.63 µm (MLZ), l/w ratio 1.35–1.72 (KOH), 1.44–1.53 (MLZ).

Specimens studied: the Czech Republic, Kačina near Kutná Hora, on ?Cyperaceae, 1857, leg. J. Peyl, PRM 934750 (syntype). – the Czech Republic, in a greenhouse, on grass, January 1858, leg. J. Peyl, PRM 934749 (syntype). – the Czech Republic, in a greenhouse, on *Pelargonium*, leg. J. Peyl, PRM 727564 (syntype).

Discussion. There was only one specimen of *Peziza koerberi* (PRM 727564) housed in the PRM herbarium. During my examination, however, it became clear that the specimen contains material which is considered as belonging to three species, and that it includes different dates on Peyl's original envelopes. Therefore the specimen has been divided.

The *Pelargonium* part was the larger part of the specimen. I found three pieces of grass culm among this material: two of them having a grass node, while one had a serrate leaf margin. These were given a new specimen number: PRM 934749. Additional material, probably containing leaves of Cyperaceae (leaf pith, leaf epidermis and leaf veins) in two of Peyl's envelopes labelled Kačín, 1857, is now recorded as specimen PRM 934750.

The size of basidiospores from the studied material located on *Pelargonium* (PRM 727564) best fits the size quoted for *Lachnella uvicola* by Agerer (1983). It also corresponds in the absence of a subiculum. Hair apices of *L. uvicola* were described as acute to subobtuse by Spegazzini (1899) – I also observed the same in Peyl's material. According to Agerer (1983), *Lachnella uvicola* differs from *L. villosa* (PERSOON) DONK in lacking sterile elements in the hymenium (see also Piątek and Bujakiewicz 2004, Knudsen 2012 for *L. villosa*). Irregular outgrowths beyond the hymenium surface are mentioned in the description of *L. uvicola* by Agerer (1983) and I also observed similar outgrowths in the studied material (Pl. 5, Figs 19, 21, 24). The substrate was considered as *Pelargonium* by Peyl and is here reidentified as *Vitis* (based on character of the bark and nodes).

The material on grass (PRM 934749) has smaller basidiospores compared with most modern literature, but based on the shape and size of the basidia, the material is considered here to be conspecific with *Lachnella alboviolascens* as described by Agerer (1983). A single basidiospore of $14.2 \times 11.2 \mu\text{m}$, not included to the description above, was seen, pushed between the hymenial tissue and cover glass (Pl. 5, Fig. 8).

The material on ?Cyperaceae (PRM 934750) is considered here as belonging to *Flagelloscypha*. Detailed study is needed for a decision as to whether it differs from *Flagelloscypha minutissima* (BURT) DONK which was considered possible according to Agerer (1975). The material appears to be suitable for selection as the lectotype because of the substrate, *Fimbristylis gracilis* (Cyperaceae), which is quoted by Peyl in the protologue.

Trichopeziza adenostylidis (REHM) RAITVIIR,

Eesti NSV Tead. Akad. Toim., Biol., 36(4): 317, 1987.

Pl. 6, Figs 1–10.

Basionym: *Lachnum adenostylidis* REHM,
Ann. Mycol. 11(5): 392, 1913.

Description. Dried apothecia 0.7–1.45 mm in diam, sessile, with saffron-orange to orange-apricot discs and saffron to ochre (9H) outer surface covered by white hairs. Hairs ca. 240–275 μm long, ca. 3.3–3.8 μm wide, ca. 13-septate (at least 11-septate), hyaline, with scattered warts. Asci 75.5–80.5 \times 4.2–5.1 μm , arising from croziers, ascus pore in MLZ: faintly blue, KOH/MLZ: blue, IKI: greyish blue, lower half of the channel greyish red or greyish blue, KOH/IKI: blue. Ascospores ca. 12–16 \times 1.8–2.0 μm , 0(–1)-septate, germinating ascospores frequently 1-septate, OCI = 0–1(–2). Paraphyses lanceolate, 5–5.5 μm wide, exceeding the asci by 9.5–20(–26) μm .

Specimen studied: Germany, Bayerische Alpen, im hinteren Wimbachtal am Watzmann, on decaying stems of *Adenostyles alpina*, July 1913, leg. Rehm, S(F) 69053 (lectotype, designated here), Rehm, Ascomyc. Exs., no. 2059.

Another specimen studied (not included in the description): same collection data, S(F) 69054, specimen from the exsiccate collection Rehm, Ascomyceten, no. 2059.

Discussion. According to the original description (Rehm 1913), *Lachnum adenostylidis* is a species with large, sessile apothecia (2–3 mm in diam.) with white-yellowish discs and long (up to 300 μm) hyaline hairs. The examined material agrees with the original description. It possesses some characters which are not usual in *Trichopeziza*, especially the colour of the disc and the thick inner part of the medullary excipulum. Raitviir (1980) illustrated a similarly structured excipulum in *Lasiobelonium nazarovae* Raitv. The generic position of *T. adenostylidis* or *L. nazarovae* was, however, not investigated in the present study.

Belonidium adenostylidis (REHM) RAITVIIR ss. Raitviir (1970) and Schmid and Schmid (1991) is considered here as different from the type because the hairs are only up to 150 μm long, respectively 160 μm long, and discs bright ochraceous, respectively pale ochraceous, with an occasional pink tinge.

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Explanations of the plates

PLATE I

Belonidium procopii (PRM 919510, holotype):

- 1–2. apothecia;
3. ascospores;
4. margo;
5. ascospore and hair;
6. hairs;
- 7–8. ascus apex;
9. paraphyses;
10. hairs;
11. asci;
12. excipulum;
- 13–14. hairs;
15. asci with basal protuberances;
16. excipulum;
17. cells of excipulum.

3–4, 9–16 in KOH; 5–7, 17 in MLZ; 8 in MLZ after KOH.
 Scale bars: 1–2 = 0.5 mm; 3–17 = 10 µm.

PLATE 2

Lachnellula fuscanguinea (PRM 7880, syntype of *Dasyscypha bubakii*)

1. substrate;
2. apothecia;
3. hairs;
4. excipulum;
- 5–6. paraphyses;
7. ascospores;
8. crozier;
9. asci with ascospores.

Peziza koerberi, PRM 934750 (syntype)

10. substrate;
11. fruitbody;
12. hair.

Lasiobelonium aff. *elegantulum* and *Solenopezia* cf. *leucostoma* (PRM 876258)

13. apothecia.

Solenopezia leucostoma (PRM 855801)

14. apothecia.

3–9 in KOH; 12 in water. Scale bars: 1 = 5 mm; 2, 10, 13–14 = 0.5 mm; 3–9, 12 = 10 μ m; 11 = 0.25 mm.

PLATE 3

Dasyscyphus silvicola (PRM 802658, holotype)

- 1–3. apothecia;
 4. part of apothecium placed in water;
 - 5–7. ascospores;
 8. excipulum;
 9. hair;
 10. excipulum and hairs;
 - 11–12. asci;
 13. paraphysis;
 - 14–15. excipulum and hairs;
 16. basis of apothecium;
 17. hair;
 18. basis of apothecium;
 19. hairs;
 20. paraphyses;
 21. paraphysis.
- 5, 19, 20 in MLZ; 6, 21 in IKI after KOH; 7–18 in KOH; 10 using Nomarski contrast. 2, 4, 6–9, 11–15, 17, 21: apothecium 1; 3, 5, 10, 16, 18–20: apothecium 2. Scale bars: 1–4 = 0.5 mm; 5–21 = 10 μ m.

PLATE 4

Lasiobelonium elegantulum (H 3377, holotype of *Peziza elegantula*)

- 1–2. apothecia;
- 3–4. part of apothecium placed in KOH;
5. hairs;
6. detail of hairs;
7. ectal and medullary excipulum in median section;
8. excipulum in basal part of cup;
9. young paraphyses and ascus;
10. excipulum in basal part of cup;

11. marginal hairs;
12. surface of excipulum;
- 13–14. hairs;
15. margo.

3–5, 7–9, 11–12, 14–15 in KOH; 13 in water; 6, 10 in MLZ. Scale bars: 1–4 = 0.5 mm; 5 = 20 μ m; 6–15 = 10 μ m.

PLATE 5

Lachnella albviolascens (PRM 934749, syntype of *Peziza koerberi*)

1. fruitbodies;
2. basidiospores;
3. cystidium;
4. hymenial element with septum;
5. hairs;
6. bases of hairs;
7. excipulum with bases of hairs;
8. basidiospore;
- 9, 10. hairs;
11. basidium;

Lachnella uvicola (PRM 727564, syntype of *Peziza koerberi*)

12. fruitbodies;
13. cystidia;
14. basidia;
15. basidioles;
16. ?immature basidium;
17. hairs;
18. hair;
19. surface of hymenium and basidiospores;
20. hairs;
21. surface of hymenium and basidiospores;
22. hymenial element with septum;
23. apices of hairs;
24. hymenium and basidiospores.

2–4, 8–11, 13–17, 19, 22 in KOH; 5–7, 20 in water; 18, 21, 24 in MLZ; 23 in lactophenol with cotton blue. Scale bars: 1, 12 = 0.5 mm; 2–11, 13–24 = 10 μ m.

PLATE 6

Trichopeziza adenostylidis (S(F) 69053, lectotype)

1. apothecia;
2. paraphyses, ascospores and asci;
3. hairs;
4. ectal excipulum;
5. hair;
6. ascospores;
7. asci;
8. apothecium in median section;
9. paraphysis, ascus and ascospore;
10. ectal excipulum.

2 in IKI after KOH; 3–6, 9 in KOH; 7 in MLZ after KOH; 8, 10 in MLZ. Scale bars: 1 = 0.5 mm; 2–10 = 10 μ m.

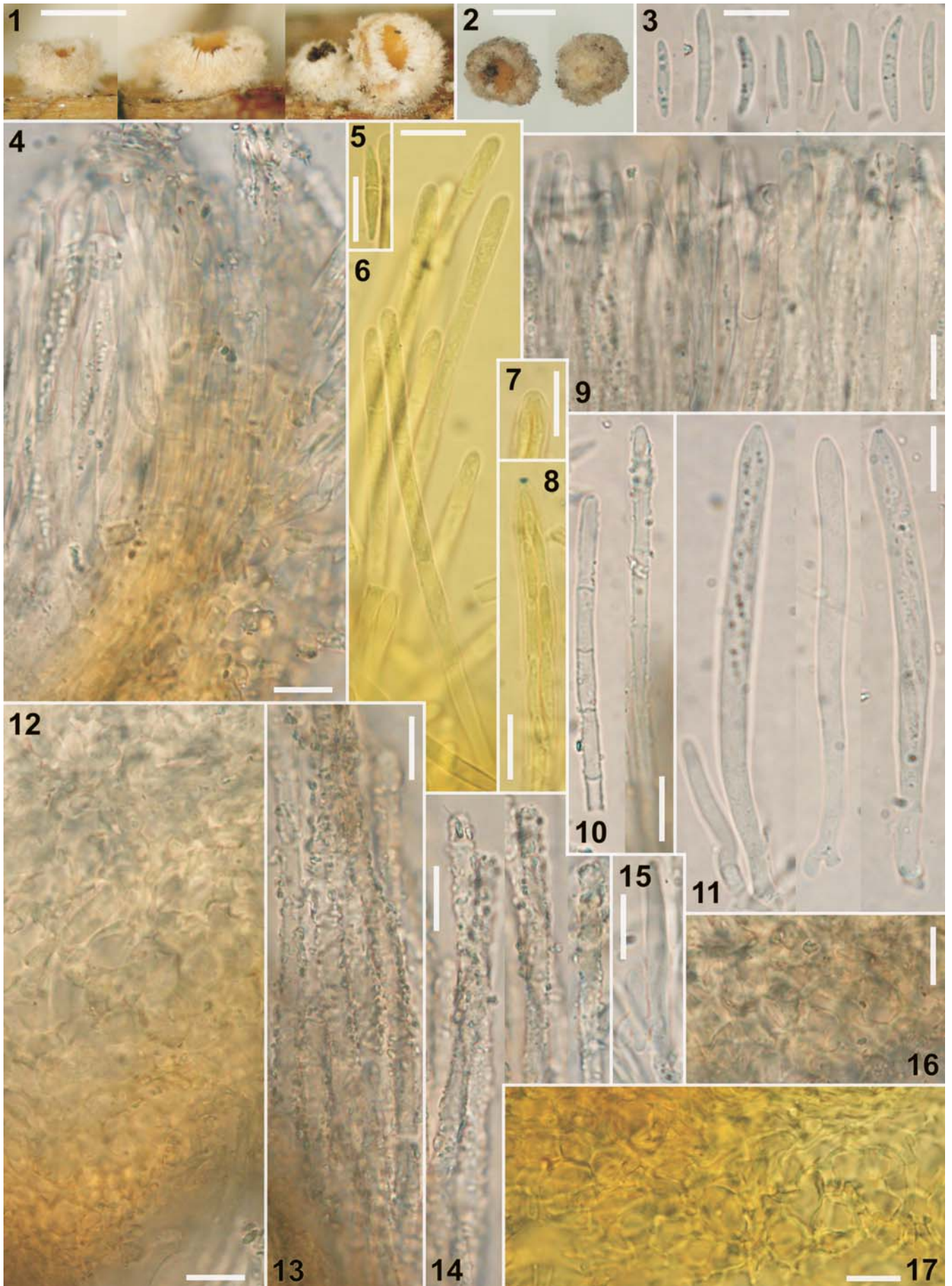
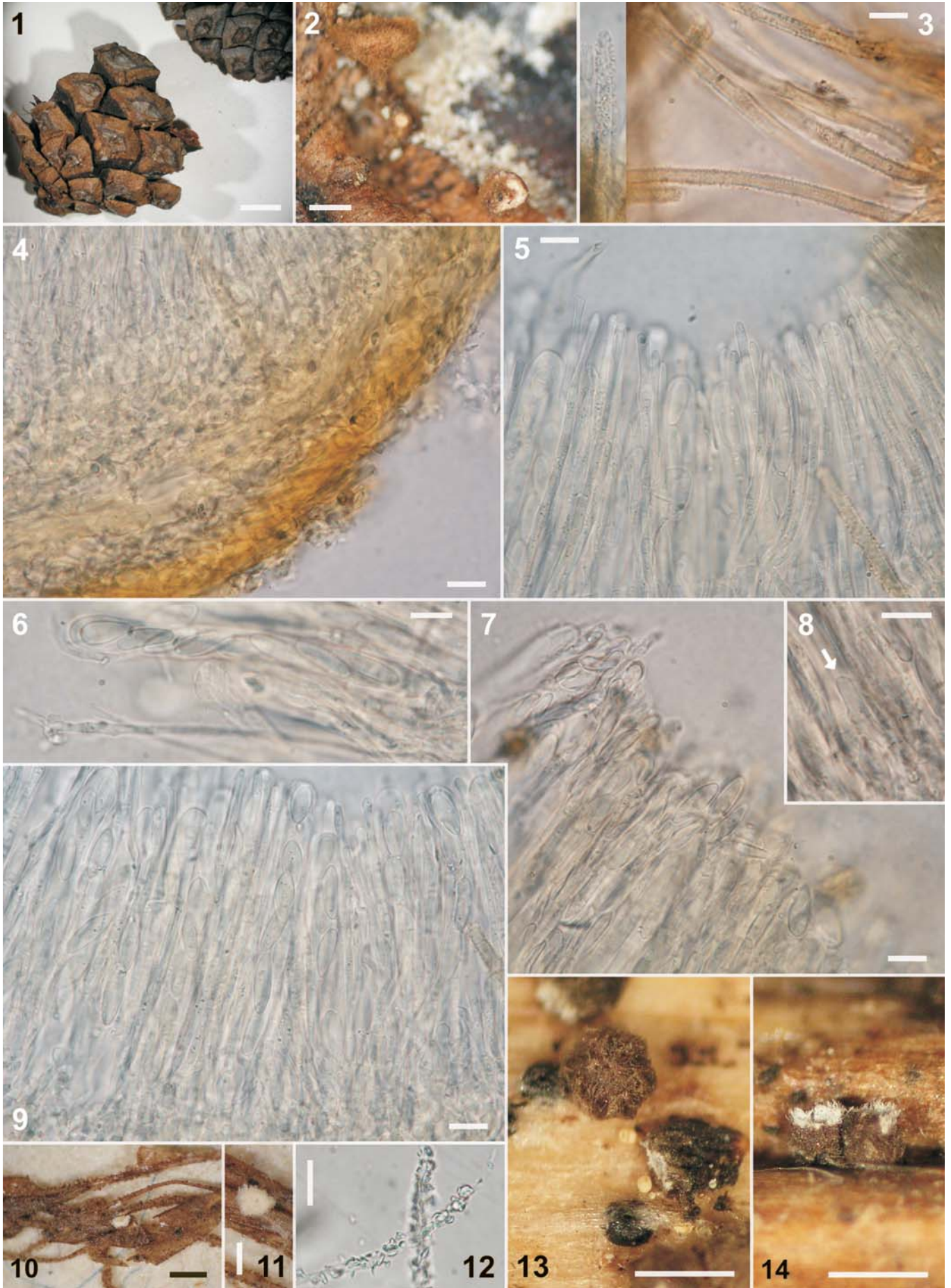


PLATE 2



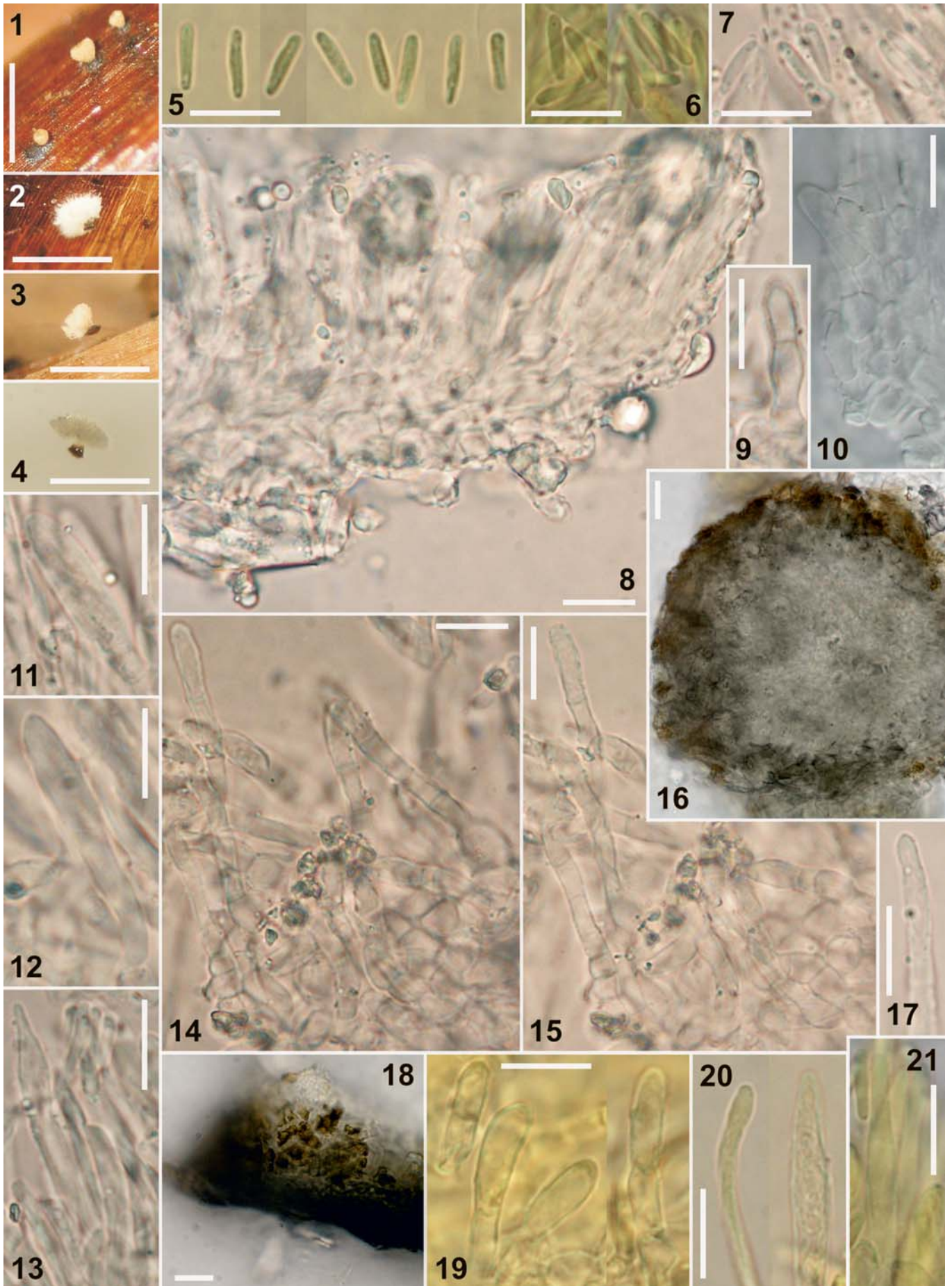
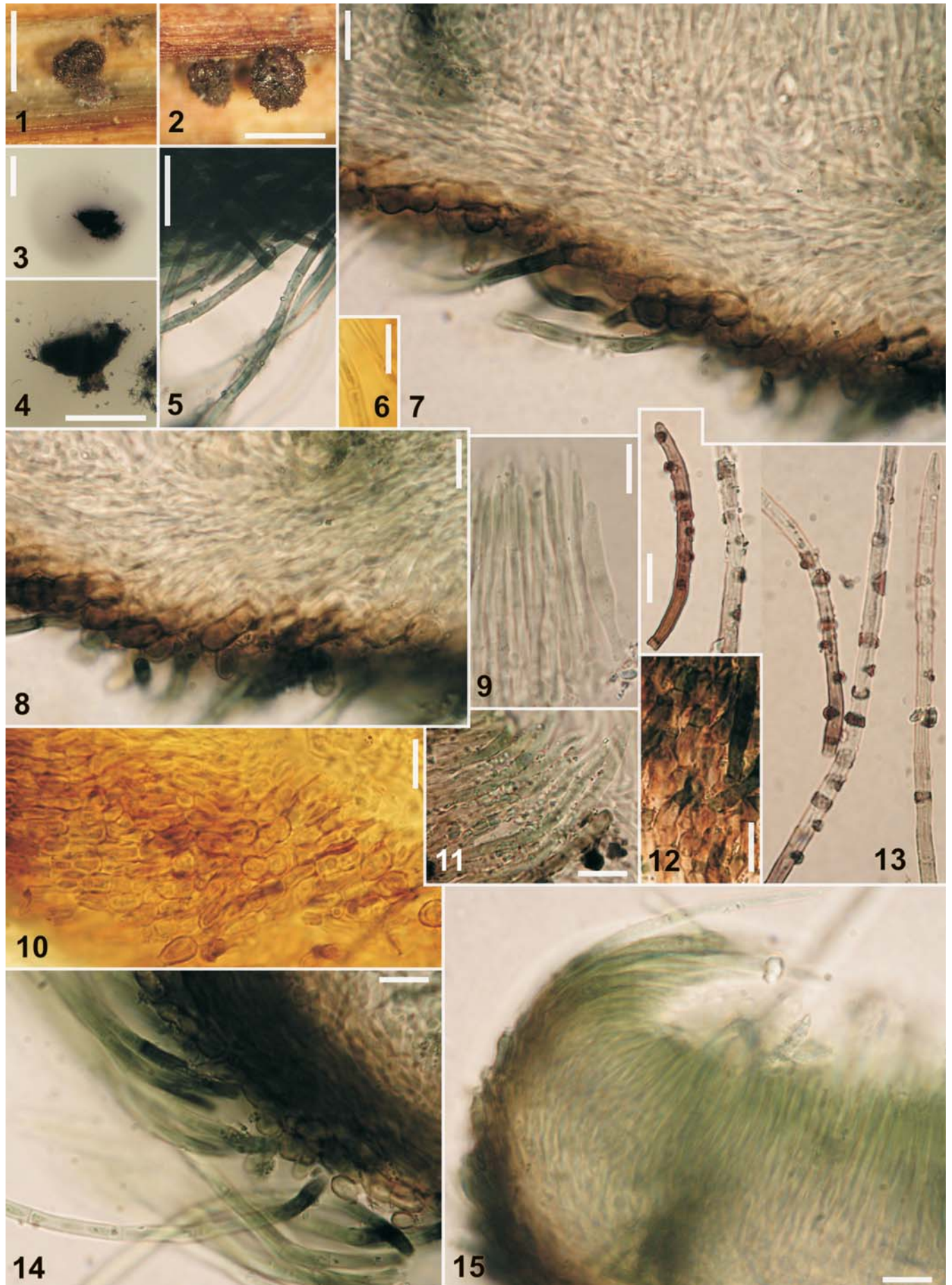


PLATE 4



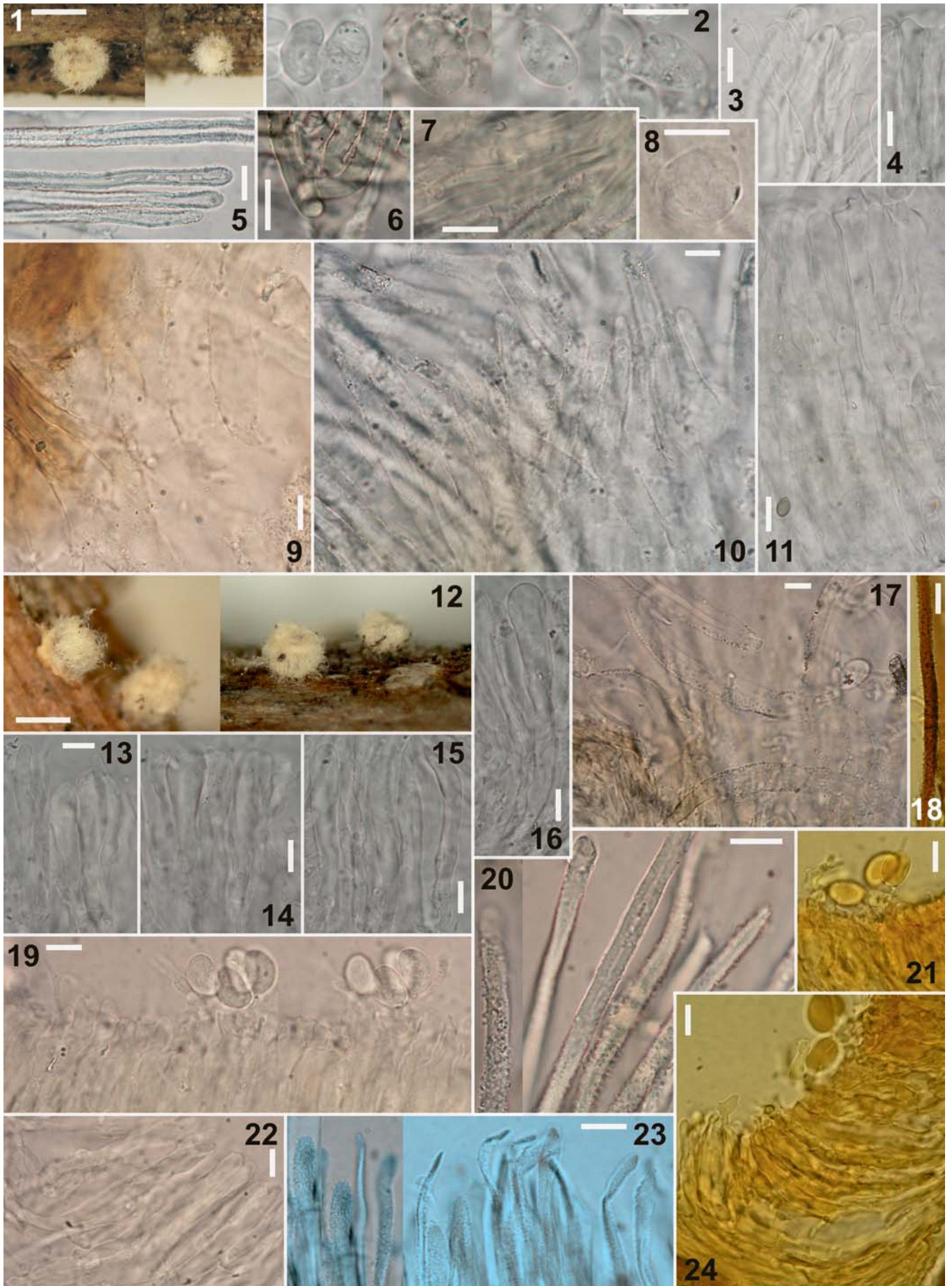


PLATE 6

