

## Fungal diversity in the Czech Republic. New species of *Apiorhynchostoma*, *Capronia*, *Ceratospaeria* and *Lasiosphaeria*

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*Apiorhynchostoma occulta*, *Capronia obesispora*, *Ceratospaeria abietis*, *Ceratospaeria incolorata* and *Lasiosphaeria porifera* are described and illustrated as new species. These species were collected on decayed wood and bark of both deciduous and coniferous trees in the Czech Republic. Two additional collections of *L. porifera* were also made in France and Ukraine.

Keywords: Ascomycetes, wood-inhabiting fungi, systematics

An intensive study of lignicolous ascomycetes in the Czech Republic was carried out during 1996 and 1997. In this paper I report five species, which are described as new to science. *Apiorhynchostoma occulta* sp. nov., *Capronia obesispora* sp. nov., *Ceratospaeria abietis* sp. nov. and *Lasiosphaeria porifera* sp. nov. were collected in the glacial cirques of the lakes Černé jezero and Čertovo jezero in the Šumava Mts. National Park. *Ceratospaeria incolorata* sp. nov. was collected in the Křivoklátsko protected landscape area. Two additional collections of *Lasiosphaeria porifera* were made in the Eastern Carpathian Mts. in Ukraine and in the Central Pyrenées in France. In this paper these species are described and illustrated and their relationships with related species are discussed.

### Material and methods

Herbarium specimens were rehydrated in 3% KOH and subsequently studied in 100% lactic acid, water, Congo Red (aq.) or Melzer's reagent. Two types of microscopy were used in this study. These are indicated in the legends to the photographs as bright field (BF) and phase contrast (PC). Photographs were taken in Congo Red (aq.) and Melzer's reagent.

The attempts to culture *Apiorhynchostoma occulta* and *Lasiosphaeria porifera* on CMA and PCA media were unsuccessful. Ascospore germination was not observed.

## List of species

### 1. *Apiorhynchostoma occulta* Réblová, sp. nov. – Figs. 5–7, 8a–e.

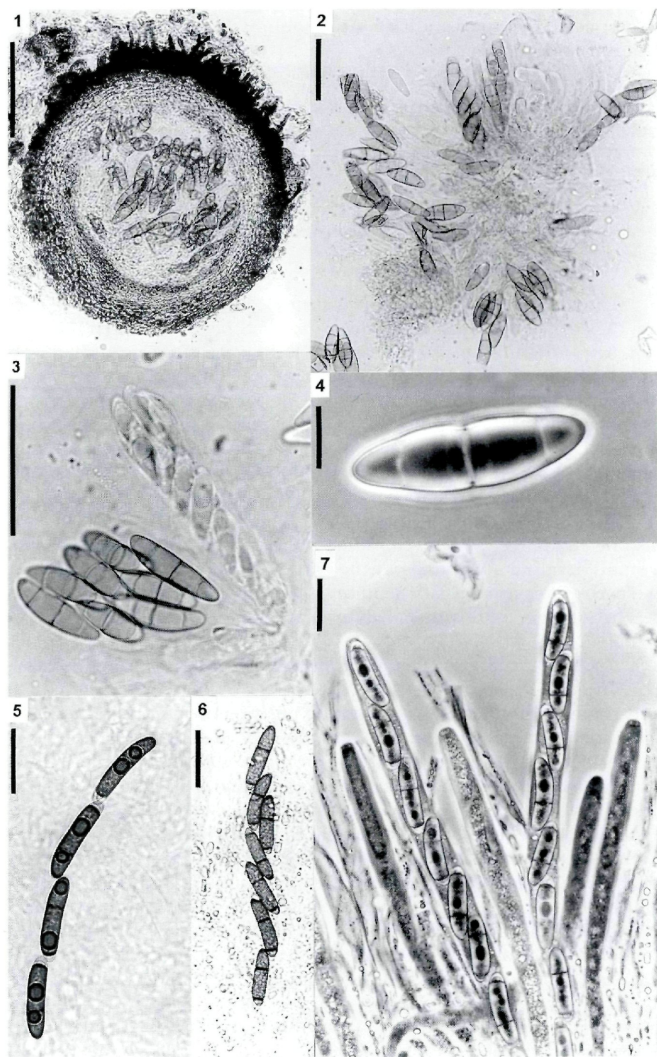
Stromata pustulata, immersa, ut maculae obscurae ligno innata, ascomatibus immersis, 770–825  $\mu\text{m}$  alta, 640–770  $\mu\text{m}$  lata, singulariter erumpentibus, saepe seriatim dispositis, nigris. Paraphyses persistentes, copiosae, filiformes. Asci (136.5–) 143–182.5(–189) pars sporifera  $\times$  (8.5–)9.5–10.5(–11.5)  $\mu\text{m}$ , unitunicati, cylindraceo-clavati, apice non amyloideo. Ascospores (22–)24–30.5(–31)  $\times$  4.5–5(–7)  $\mu\text{m}$ , cylindraceae usque suballantoideae, 2-septatae, cellula basali 2–4  $\mu\text{m}$ , duobus cellulis inaequaliter magnis obscurae brunneis, 1-stichae in parte superiori ascorum.

Holotypus. – Bohemia meridionalis, montes Sumava, Železná Ruda, in trunco putrido *Piceae abietis* (L.) Karst., 22 Oct. 1996, leg. M. Réblová PRM 842971.

**Etymology.** – From the latin ‘occultus’, referring to the inconspicuous appearance of the immersed ascomata.

Stromata clypeate, 395–440  $\mu\text{m}$  wide, consisting of greyish-brown, septate interwoven hyphae, the hyphae also surround the upper part of the ascomata visible as elevated darkening of the surface of the wood around the necks. – Ascomata immersed, solitary to gregarious, usually in regular linear groups, ampulliform, 770–825  $\mu\text{m}$  high and 640–770  $\mu\text{m}$  diam., black, with stout, cylindrical, separately erumpent necks 385–440  $\mu\text{m}$  high and 275–330  $\mu\text{m}$  wide, pulvinate at their apices, slightly projecting. – Ascomatal wall ca. 44–66  $\mu\text{m}$  wide, lateral wall consisting of two layers, the outer layer of brown, thick-walled cells, *textura angularis* to *textura prismatica*, the inner layer of thin-walled, hyaline to subhyaline, elongated, compressed cells, *textura prismatica*. – Ostiolar canal periphysate. – Paraphyses 2–3  $\mu\text{m}$  wide, persistent, abundant, filiform, septate, longer than asci. – Asci (136.5–)143–182.5(–189) *pars sporifera*  $\times$  (8.5–)9.5–10.5(–11.5)  $\mu\text{m}$ , unitunicate, 8-spored, cylindrical-clavate, long stipitate, the bottom part of the stipe dissolving at maturity, truncate at the top, ascus apex non-amyloid with a distinct, shallow, refractive apical annulus, 4  $\mu\text{m}$  wide and 1  $\mu\text{m}$  deep. – Ascospores (22–)24–30.5(–31)  $\times$  4.5–5(–7)  $\mu\text{m}$ , cylindrical, straight to slightly curved to suballantoid, aseptate, 2-septate, non-constricted at the septa, with a hyaline basal cell 2  $\times$  4  $\mu\text{m}$  and two dark brown cells divided by the septum slightly below the middle, the shorter brown cell with an apical germ pore at the end, with a thin hyaline epispore surrounding the ascospore. Some mature ascospores

Figs. 1–7. 1–4. *Capronia obesipora* (PRM 842972). – 1. Vertical section of the ascoma. – 2. Asci containing ascospores. – 3. Mature and immature asci. – 4. Ascospore. – 5–7. *Apiorhynchostoma occulta* (PRM 842971). – 5, 6. Ascospores. – 7. Asci with ascospores. – Figs. 1–3, 5, 6: BF; 4, 7: PC. – Scale bars: 1–3 = 50  $\mu\text{m}$ ; 4 = 10  $\mu\text{m}$ ; 5–7 = 20  $\mu\text{m}$ .



observed with a small, hyaline appendage at the end of the shorter brown cell. Ascospores uniseriate to obliquely uniseriate, randomly orientated in the ascus.

Material examined. – CZECH REPUBLIC, Southern Bohemia, Šumava Mts., glacial cirque of the Černé jezero Lake near Železná Ruda, on a decayed trunk of *Picea abies*, 22 Oct. 1996, M. Réblová, PRM 842971.

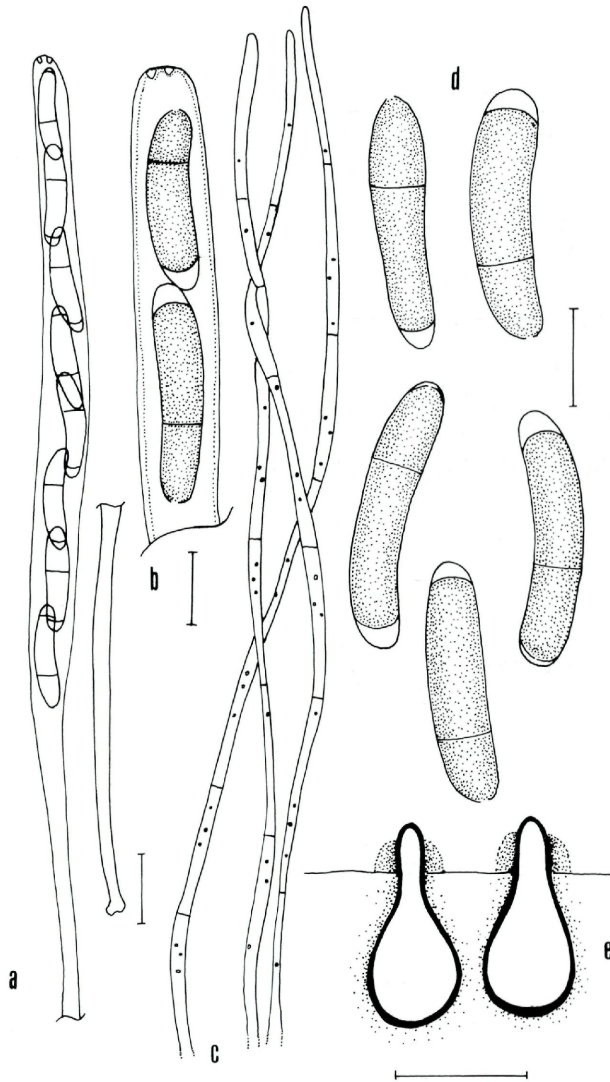
Habitat. – Saprobe on decaying wood of coniferous trees (e.g. *Picea abies*).

Known distribution. – Europe: Czech Republic, known only from the type locality.

Three species of *Aporhynchostoma* Petr. have been described, viz. *A. curreyi* (Rabenh.) E. Müll., the type of the genus (Müller & von Arx, 1962), *A. altipetum* (Peck) F. Rappaz (Rappaz, 1995) and *A. tumidum* (Cooke) Sivan. (Sivanesan, 1975b). Of these species *A. occulta* bears some resemblance to *A. curreyi* but it differs in the cylindrical to subballantoid, longer and narrower ascospores while those of *A. curreyi* described from the lectotype (Rabenh. Fungi europ. 250) by Müller & von Arx (1962; ascospores  $14\text{--}27 \times 5\text{--}10 \mu\text{m}$ ) and Hyde (1998; ascospores  $20\text{--}27.5 \times 7.5\text{--}10 \mu\text{m}$ ) and illustrated by Rogers & al. (1994) are ellipsoid, shorter and wider. *A. occulta* should also be compared with *A. tumidum* which possesses ascospores with a small, hyaline appendage at the end of the shorter brown cell, but the ascospores are equally septate, slightly constricted at the middle septum, longer and wider, the asci are longer-sized than those of *A. occulta*.

*Aporhynchostoma* should be placed in the Clypeosphaeriaceae G. Winter as suggested by Barr (1989; 1990; 1994), Untereiner (1993) and Hyde (1998). Barr (1990) used the position of the ascomata as the main delimiting criterion to separate the genera of the Clypeosphaeriaceae. Within the family *Aporhynchostoma* is closely related to *Endoxyla* Fuckel and it is separated by the ascomata developing under clypeus. Hyde (1998) considered the ascomata of *Aporhynchostoma* to be not clypeate and placed *Endoxyla* in the Boliniaceae Rick as suggested by Hawksworth & al. (1995). In the collection of *A. occulta*, the clypei overlying the ascomata are well developed. Material of *A. occulta* was compared with that of *Endoxyla macrostoma* Fuckel (Herb. M. Réblová 1066/97), the type of the genus, collected in the same locality. Ascospores of *A. occulta* were observed

Fig. 8a–e. *Aporhynchostoma occulta* (PRM 842971). – a. Ascus containing ascospores. – b. Ascus apex with the apical annulus. – c. Paraphyses. – d. Ascospores. – e. Habit sketch of the ascomata. – Scale bars: a = 20  $\mu\text{m}$ ; b = 10  $\mu\text{m}$ ; c = 20  $\mu\text{m}$ ; d = 10  $\mu\text{m}$ ; e = 500  $\mu\text{m}$ .



to be surrounded by a thin, hyaline epispore, while this character has not been seen in *E. macrostoma*, and it is not reported for any *Endoxyla* species (Untereiner, 1993; Barr, 1994). Ascus apex of *A. occulta* is non-amyloid, as in *E. macrostoma*, but the apical anulus appears to be larger and more distinct compared to that of *E. macrostoma*. The bottom part of the ascus is deliquescent and the paraphyses are persistent, septate, filiform and longer than the asci in both *A. occulta* and *E. macrostoma*. Other differences between *A. occulta* and *E. macrostoma* could not be found.

The attempts to culture *A. occulta* were unsuccessful. Ascospore germination was not observed.

## 2. *Capronia obesipora* Réblová, sp. nov. – Figs. 1–4, 9a–c.

Ascomata superficialia vel pro parte immersa, globosa, obscure fusca ad nigra, 120–150  $\mu\text{m}$  lata, 130–160  $\mu\text{m}$  alta, dense setosa, setis unicellularibus, apice obtuse angustatis. Asci 92.5–103  $\times$  34.5–38  $\mu\text{m}$ , bitunicati, 8-sporei. Ascospores (29.5–)32.5–39(–42)  $\times$  10.5–12.5  $\mu\text{m}$ , fusiformes, 4-cellulares, strangulatae, cinereo-ad olivaceo-virides.

Holotypus. – Bohemia meridionalis, montes Šumava, Železná Ruda, in terra, in ligno putridissimo muscis emortuis tecto (cum *Thelocarpon epibolum* Nyl.), 23 Oct. 1996, leg. Z. Palice, PRM 842972.

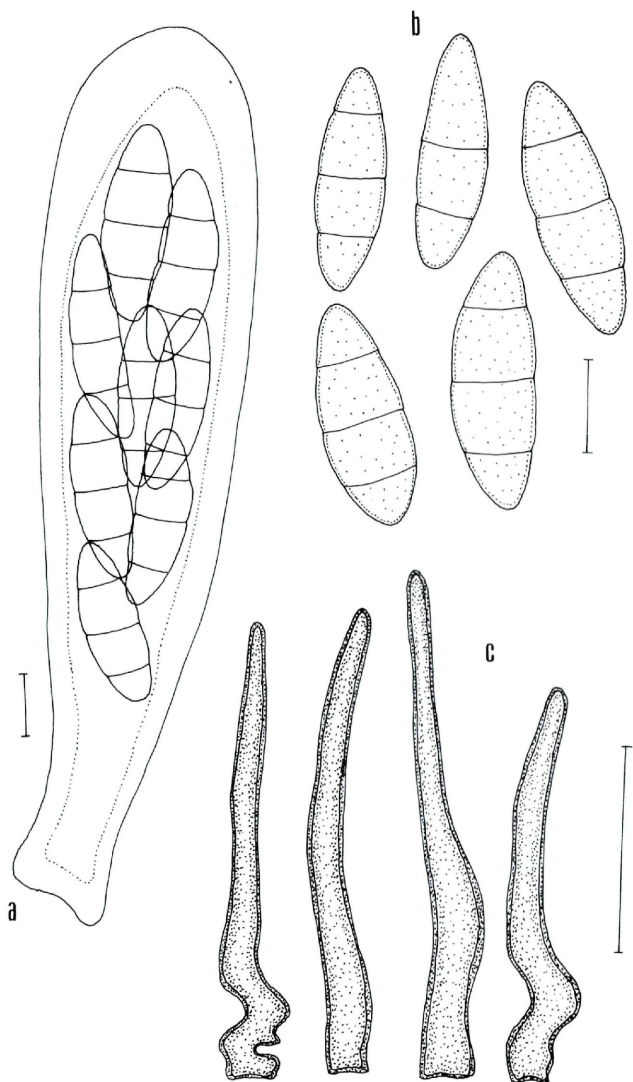
Etymology. – From the latin ‘obesus’, referring to the length and large diameter of the ascospores.

Ascomata superficial or partly embedded in the host tissue, globose, non-papillate, 120–150  $\mu\text{m}$  diam. and 130–160  $\mu\text{m}$  high, dark brown to black, in the upper part densely setose and covered by scattered, opaque, thick-walled protruding cells; setae 15.5–31  $\times$  2–3  $\mu\text{m}$ , non-septate, tapering towards the apex, blunt, straight or curved. – Ascomatal wall ca. 33–51  $\mu\text{m}$  wide, consisting of thick-walled, dark brown, pseudoparenchymatic cells becoming paler towards the interior. – Pseudoparaphyses absent. – Periphysoids not observed. – Asci 92.5–103  $\times$  34.5–38  $\mu\text{m}$ , bitunicate, 8-spored, broadly rounded and thick-walled at the top, shortly stipitate. – Ascospores (29.5–)32.5–39(–42)  $\times$  10.5–12.5  $\mu\text{m}$ , fusiform, 4-celled, smoky to olive-green, slightly constricted at the septa, 2–3-seriate in the ascus.

Material examined. – CZECH REPUBLIC, Southern Bohemia, Šumava Mts., glacial cirque of the Černé jezero Lake near Železná Ruda, on bare ground, on pieces of decayed wood among remnants of decayed musci (cum *Thelocarpon epibolum* Nyl.), 23 Oct. 1996, Z. Palice (PRM 842972, holotype).

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Fig. 9a–c. *Capronia obesipora* (PRM 842972). – a. Ascus containing ascospores. – b. Ascospores. – c. Setae. – Scale bars: a–c = 10  $\mu\text{m}$ .



Habitat. – Saprobic on decaying remnants of wood.

Known distribution. – Europe: Czech Republic, known only from the type collection.

About fifty species of *Capronia* have been described (Barr, 1972; 1991; Candoussau & Sulmont, 1972; Müller & al., 1987; Untereiner, 1994; 1995; 1997; Untereiner, Straus & Malloch, 1995; Hsieh, Chen & Sivanesan, 1997; Réblová, 1997). *Capronia obesispora* is similar to several species of *Capronia* possessing transversely 3-septate ascospores and non-collabent ascomata bearing short setae in the upper part or around the apex. The most similar species are the lignicolous *C. coronata* Samuels with ascospores  $(10-)\text{11.5-13.5(-15.5)} \times (2-)\text{3.6-4.7(-5)} \mu\text{m}$  and asci  $47.5-55.5(-57) \times (7-)\text{7.6-9.6} \mu\text{m}$  (Müller & al., 1987), *C. pilosella* (P. Karsten) E. Müll. & al. with ascospores  $10.6-14.8 \times 3.4-4.9 \mu\text{m}$  and asci  $33.9-52.7 \times 8.4-11.1 \mu\text{m}$  (Untereiner, 1997), and a fungicolous *C. spinifera* (Ellis & Everh.) E. Müll. & al. with ascospores  $(10-)\text{12-15.5} \times 3.5-4.5 \mu\text{m}$  and asci  $27-44 \times 7.5-15.5 \mu\text{m}$  (Bigelow & Barr, 1963). Among these species *C. obesispora* is clearly distinct because of the much larger ascospores and asci.

An attempt to culture *C. obesispora* was not made.

### 3. *Ceratosphaeria abietis* Réblová, sp. nov. – Figs. 10a–d.

Ascomata immersa, singularia vel gregaria, globosa vel subglobosa, fusca ad nigra, 400–600  $\mu\text{m}$  lata, ostiolo centrali elongato, cylindraceo, recto vel subcurvato, subiculo sparsio tecta. Paraphyses copiosae, hyalinae. Asci 198–242 [pars sporifera 136.5–176]  $\times$  8.5–9.5  $\mu\text{m}$ , unitunicati, 8-spori sed saepe tantum 4-spori, cylindraceo-clavati, longe stipitati. Ascospores (25.5–)33.5–41(–45)  $\times$  7–8.5  $\mu\text{m}$ , fusiformes, 3(–4–5)-septatae, rectae vel curvatae, subconstrictae, hyalinae, uniseriatae.

Holotypus. – Bohemia meridionalis, montes Šumava, Železná Ruda, subtus ad corticem *Abietis albae* Mill., 22 Oct. 1996, leg. M. Réblová, PRM 842974.

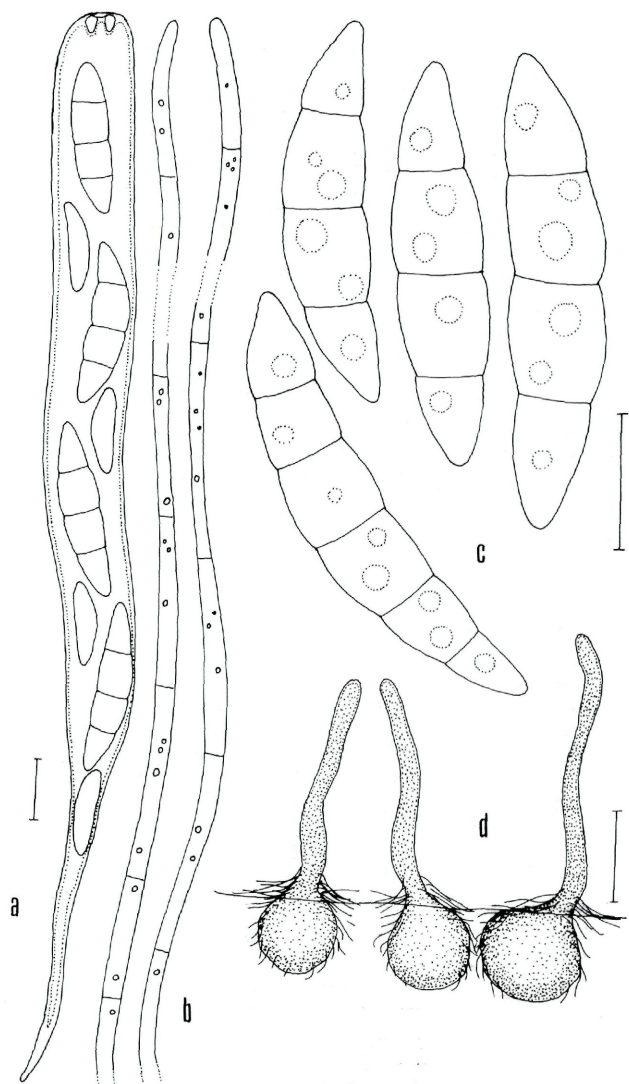
Etymology. – From the latin ‘abies’, referring to the host tree.

Ascomata immersed, scattered to gregarious, globose to subglobose, dark brown to black, 400–600  $\mu\text{m}$  diam., each ascoma with a central neck protruding above the surface of the substrate. Ascomata surrounded by a sparse subiculum consisting of sterile, branched, septate, greyish-brown hyphae 3.5–4.5  $\mu\text{m}$  wide, which often also covers the bottom part of the necks. Neck 680–1200  $\mu\text{m}$  long and 200–240  $\mu\text{m}$  diam., cylindrical, straight or slightly curved, pulvinate at the top. Ostiolar canal periphysate. – Ascomatal wall ca. 50–

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Fig. 10a–d. *Ceratosphaeria abietis* (PRM 842974). – a. Ascus containing four mature and four aborted ascospores. – b. Paraphyses. – c. Ascospores. – d. Habit sketch of the ascomata. – Scale bars: a–c = 10  $\mu\text{m}$ ; d = 500  $\mu\text{m}$ .





75  $\mu\text{m}$  wide, coriaceous, lateral wall consisting of two layers, the outer layer of dark brown, thick-walled, polyhedral cells, *textura angularis* to *textura prismatica*; the inner layer of paler to subhyaline, thin-walled, compressed and elongated cells, *textura prismatica*; the lateral wall of the neck of brown cells, *textura porrecta*. – Paraphyses (3)–4–5  $\mu\text{m}$  wide, persistent, abundant among asci, septate, hyaline, filled with small oil drops and longer than asci. – Asci 198–242 [*pars sporifera* 136.5–176]  $\times$  8.5–9.5  $\mu\text{m}$ , unitunicate, 8-spored but often only 4 ascospores are developed and the other 4 remain aborted and one-celled, cylindrical-clavate, truncate above, with long, slender, tapering stipe, ascial apex non-amyloid with a distinct, refractive apical annulus 4  $\mu\text{m}$  wide and 1.5–2  $\mu\text{m}$  high. – Ascospores (25.5–)33.5–41(–45)  $\times$  7–8.5  $\mu\text{m}$ , fusiform, straight or inequilateral, 3–4(–5)-septate, constricted at the septa, some mature ascospores observed with the middle or the end cells slightly inflated, hyaline, uniseriate in the ascus.

Material examined. – CZECH REPUBLIC, Southern Bohemia, Šumava Mts., glacial cirque of the Černé jezero Lake near Železná Ruda, on the inner side of the bark of *Abies alba*, 22 Oct. 1996, M. Réblová (PRM 842974, holotype); *ibid.*, on wood and inner side of the bark of *Abies alba*, 22 Oct. 1996, M. Réblová (Herb. M. Réblová 870/96, 888/96).

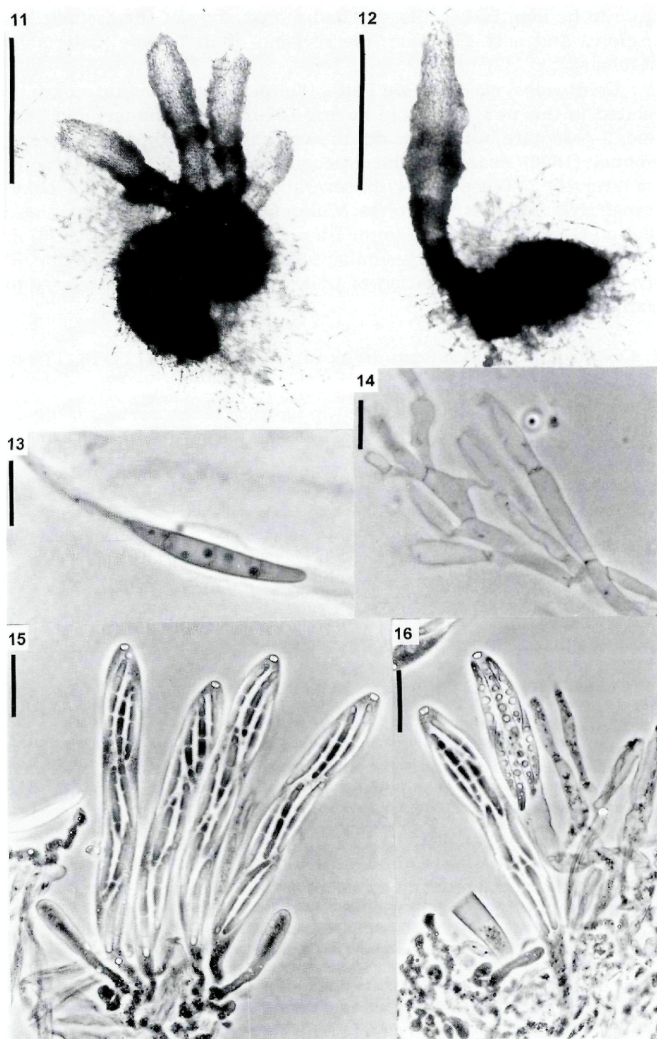
Habitat. – Saprobic on rotten wood and inner side of decaying bark of a coniferous tree (e.g. *Abies alba*).

Known distribution. – Europe: Czech Republic, known only from the type locality.

Tsuda & Ueyama (1977) monographed the genus *Ceratosphaeria* Niessl and distributed the species among 7 groups. Their generic concept appears to be rather heterogeneous and includes many unrelated taxa. Recently, *C. lampadophora* (Berk. & Broome) Niessl, the type of the genus, was re-examined and re-described by Hyde & al. (1997). *Ceratosphaeria abietis* is clearly distinguishable from all the species of *Ceratosphaeria* previously described by its larger asci and ascospores and occurrence on the wood and bark of *Abies alba*. *C. abietis* should be compared with *Ceratosphaeria fragilis* Wilberforce, *Ceratosphaeria fuscella* (P. Karsten) Sacc., *C. pusilla* (Fuckel) Sacc. and *C. rhenana* (Auersw.) G. Winter. These species have shorter 1–3-septate ascospores and asci and the ascogata are provided with much shorter necks. Judging from the protologues and the original

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Figs. 11–16. *Ceratosphaeria incolorata* (PRM 842973). – 11, 12. Ascogata. – 13. Germinating ascospore. – 14. Paraphyses. – 15, 16. Mature asci and ascospores. – Figs. 11, 12: BF; 13–16: PC. – Scale bars: 11, 12 = 500  $\mu\text{m}$ ; 13, 14 = 10  $\mu\text{m}$ ; 15, 16 = 20  $\mu\text{m}$ .



illustrations of *Ceratosphaeria fragilis* and *C. rhenana*, both species seem to be identical in the size and morphology of the ascoma, ascospores and asci. However, the revision of their type material is necessary.

*Ceratosphaeria occultata* Feltg. (Feltgen, 1903) would seem to be related to this new species in having 190–210 × 10 µm asci and hyaline, 3–5-septate but ellipsoidal to ovoidal, 19–23 × 8 µm ascospores. Höhnelt (1906) examined the type material and found ascospores transversely 7–9-septate with several longitudinal septa. Höhnelt transferred Feltgen's species to *Rhamphoria* Niessl as *R. occultata* (Feltg.) Höhnelt. According to the literature data (Sivanesan, 1976) *R. occultata* seems to be very similar to both *R. bevanii* Sivan. and *R. separata* Munk. Examination of their type material is necessary to confirm this.

#### 4. *Ceratosphaeria incolorata* Réblová, sp. nov. – Figs. 11–16, 17a–b, 18a–b.

Ascomata singularia, immersa, denique superficialia, subglobosa, 200–330 µm lata, 180–260 µm alta, subiculo pallide brunneo parte basali tecta, ostioliis 1–4 eccentricis, cylindraceis, usque ad 1000 µm longis. Paraphyses sparsae. Asci 99–126 × 9.5–10.5 µm, unitunicati, 8-spori, cylindraceo-clavati, stipitati, apice truncato, non amyloideo. Ascospores 27–32.5 × 4–5 µm, fusiformes, 3(–5)-septatae, subconstrictae, cellulis binis medialibus majoribus, 2–3-seriatae.

Holotypus. – Bohemia centralis, Křivoklátsko regio protecta, in ligno nudo rami adhuc vivi *Sambuci nigrae* L. in cella humida laboratorio culta, 17 Aug. 1996, leg. M. Réblová, PRM 842973.

**Etymology.** – From the latin 'incoloratus', referring to the almost colourless upper part of the neck.

Ascomata scattered, immersed or semi-immersed in the host tissue or superficial, brown, subglobose, 200–330 µm diam. and 180–260 µm high, collapsing inwards when dry, sitting in a sparse subiculum composed of pale brown, septate, thick-walled, branched hyphae 2–4 µm wide growing out from the base of the ascoma. Ascomata with 1–4 central to mostly lateral, fasciculate necks curving upwards. Neck up to 1000 µm long, irregularly cylindrical; narrowest at the base 57.5–60.5 µm diam. and widest in the middle part 96.5–126.5 µm diam., slightly tapering towards the top, 39–48 µm diam., rounded at the top, paler to subhyaline towards the top. – Ascomatal wall ca. 19–27 µm wide, coriaceous, in the surface view *textura epidermoidea*, lateral wall consisting of two layers, the outer layer of thick-walled, brown cells becoming thinner-walled towards the interior, *textura prismatica* to *textura angularis*; the inner layer of subhyaline to hyaline, elongated and compressed cells, *textura prismatica*; the lateral wall of the neck of pale brown to subhyaline,

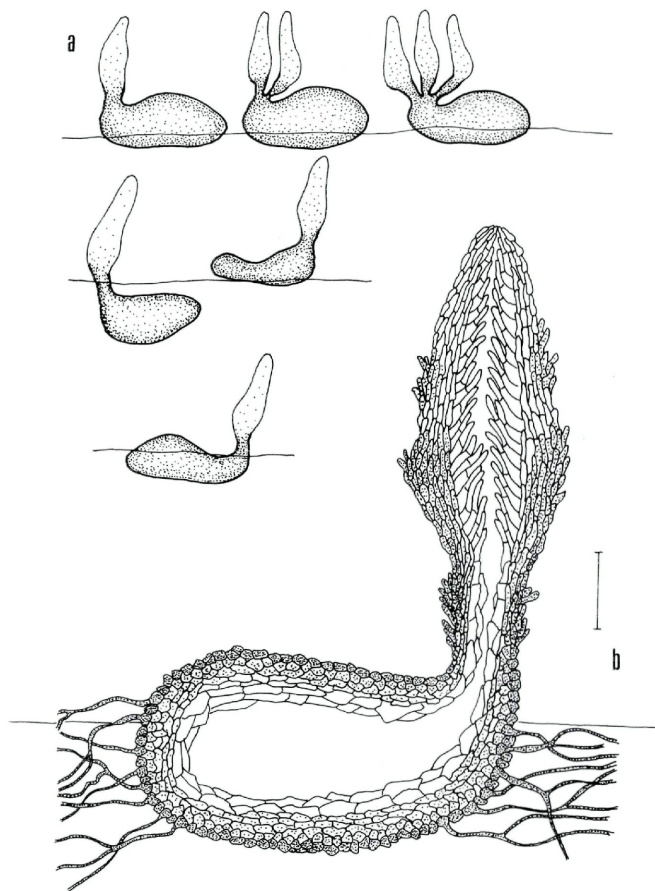


Fig. 17a-b. *Ceratosphaeria incolorata* (PRM 842973). - a. Habit sketch of the ascomata. - b. Median, longitudinal section of the ascoma. - Scale bar: b = 100  $\mu$ m.

thin-walled cells, *textura prismatica*. - Ostiolar canal periphysate. - Paraphyses 3-5(-6)  $\mu$ m wide, persistent, sparse, septate, hyaline, constricted, longer than asci. - Asci 99-126  $\times$  9.5-10.5  $\mu$ m, unitunicate, 8-spored, cylindrical-clavate, truncate above, shortly

stipitate, staining deeply when treated with a solution of Congo Red, ascus apex non-amyloid with a distinct, refractive apical annulus 5  $\mu\text{m}$  wide and 3  $\mu\text{m}$  high, which does not stain in a solution of Congo Red. – Ascospores 27–32.5  $\times$  4–5  $\mu\text{m}$ , fusiform, straight or inequilateral, 3(–5)-septate, non-constricted or slightly constricted at the septa, the two middle cells the largest ones, hyaline, 2–3-seriate in the ascus, germinating with a germ tube at both ends.

**Material examined.** – CZECH REPUBLIC, Central Bohemia, Křivoklátsko protected landscape area, valley of the Klíčava Brook near Nové Strašecí, on bare wood of a living branch of *Sambucus nigra* cultivated in a moist chamber culture, 17 Aug. 1996, M. Réblová (PRM 842973, holotype).

**Habitat.** – Lignicolous, saprobe on bare wood of *Sambucus nigra*.

**Known distribution.** – Europe: Czech Republic, known only from the type collection.

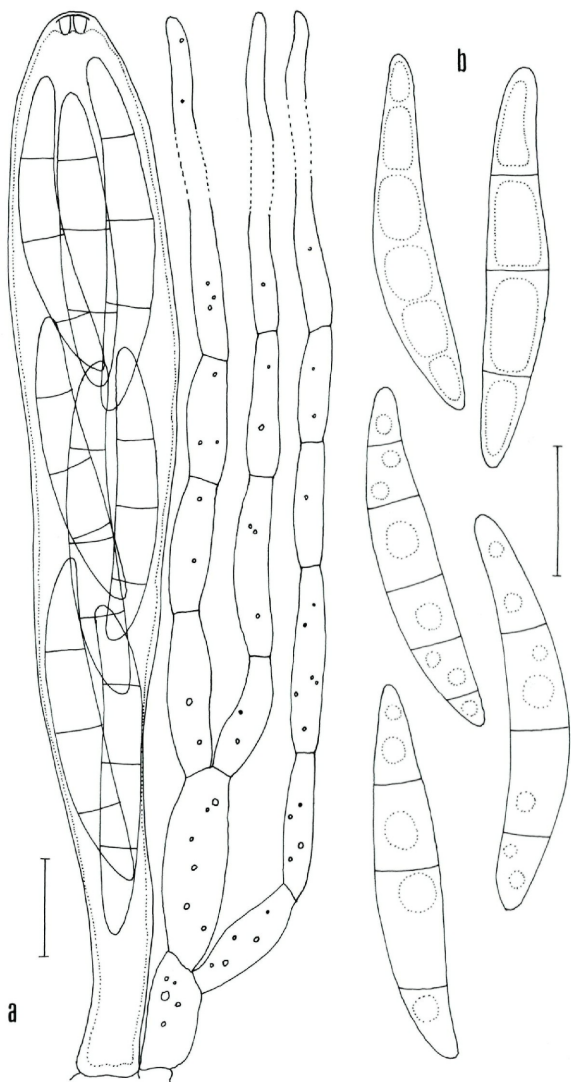
*C. incolorata* grew in a moist chamber culture on bare wood cut off the living branch of *Sambucus nigra* from a part which showed cankerous growth. The ascomata, having 1–4 fasciculate central to mostly lateral necks, paler in their upper part, appeared on the substrate surface four weeks after cultivation. The character of multi-beaked ascomata has already been described for *Ceratostomella multirostrata* (Fuckel) Sacc. (Fuckel, 1870) of the Clypeosphaeriaceae G. Winter possessing 2–6 necks growing out from one point of the ascoma. A similar case of the occurrence of a hyaline neck is known from *Ceratostomella hyalostoma* (Munk) Untereiner (Munk, 1965) while other species of *Ceratostomella* have black necks.

*C. incolorata* superficially resembles *Magnaporthe grisea* (Hebert) M. E. Barr (Hebert, 1971) of the Magnaportheaceae Cannon, a necrotrophic pathogen, associated with the *Pyricularia grisea* (Cooke) Sacc. anamorph. *M. grisea* is similar to *C. incolorata* in characters of multi-beaked ascomata with beaks hyaline when young and becoming brownish with age but differs in the morphology of its asci which later deliquesce and mostly contain a poorly developed apical opening, while the asci of *C. incolorata* are persistent and contain a large, well developed refractive apical annulus; in the absence of paraphyses, which are present and abundant among the asci of *C. incolorata*, and in its nutrition.

*C. incolorata* should also be compared with *Annulatascus* Hyde of the Lasiosphaeriaceae Nannf. emend. Lundq. (Hyde, 1992). Both

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Fig. 18a–b. *Ceratostomella incolorata* (PRM 842973). – a. Ascus with ascospores and paraphyses. – b. Ascospores. – Scale bars: a–b = 10  $\mu\text{m}$ .



fungi have ascomata immersed, semi-immersed or superficial with long, lateral beaks curving upwards. The ascomata in *Annulatascus* are black and have one beak of the same colour. The asci of *Annulatascus* as well as those of *C. incolorata* have a large, elongate, non-amyloid apical annulus. Ascospores are unicellular or seldom transversely 3-septate, surrounded by a thin sheath in *A. velatipora* Hyde or unicellular with polar mucilaginous appendages in *A. bipolaris* Hyde. The ascospores of *C. incolorata* are generally transversely 3(–5)-septate, without any appendages or sheath.

This new fungus is placed with some reservations in the genus *Ceratospaeria* Niessl of the Lasiosphaeriaceae, whose members are saprobes occurring on decaying bark and wood, because of the peculiar appearance of the fasciculate, eccentric necks, paler in their upper part, a character which is atypical of that genus. In the combination of subhyaline, fasciculate and eccentric necks and long cylindrical to fusiform, 3(–5)-septate ascospores *C. incolorata* is clearly distinct from all the species of *Ceratospaeria* previously described.

5. ***Lasio-sphaeria porifera*** Réblová, sp. nov. – Figs. 19–26, 27a–c.

Ascomata superficialia, ovata ad subglobosa, 600–700  $\mu\text{m}$  lata, 600–800  $\mu\text{m}$  alta, tuberculata, nuda, non papillata ad papillata, ostiolata, subiculo sparso insidentia, pariete laterali coriaceo, conspecte areolato, cellulis poris Munkii instructis. Paraphyses persistentes, copiosae, filiformes. Asci 92.5–132 pars sporifera  $\times$  22.5–28  $\mu\text{m}$ , uniloculari, 8-spori, cylindraceo-clavati, stipitati, apice non amyloideo, annulo apicali refractivo. Ascospores (26–)28–31.5(–34.5)  $\times$  (5–) 6–7(–8.5)  $\mu\text{m}$ , cylindraceae usque allantoideae, 1–3-septatae, laeves, hyalinae, maturae pallide brunneae, 2–3-stichae vel irregulariter accumulatae in parte superiore ascorum.

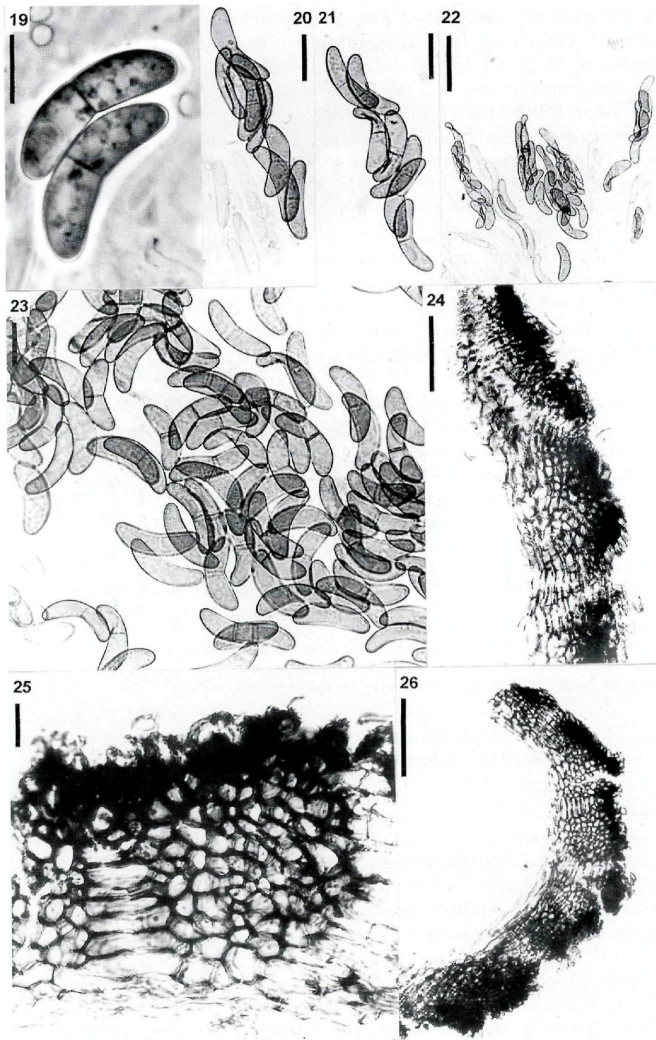
Holotypus. – Gallia, in ligno putrido trunci *Abietis albae* Mill., 13 July 1997, leg. M. Réblová, PRM 842970.

Etymology. – From the latin ‘poriferus’, referring to the presence of Munk’s pores in the ascomatal wall.

Ascomata superficial, scattered, oval to subglobose, dark brown to black, 600–700  $\mu\text{m}$  diam. and 600–800  $\mu\text{m}$  high, tuberculate, glabrous, non-papillate or slightly papillate, ostiolate, sitting in a sparse subiculum composed of brown, septate, branched hyphae 2–2.5  $\mu\text{m}$  wide, old ascomata perforated by a rounded pore at the top. – Ascomatal wall coriaceous, in old ascomata brittle, lateral wall areolate, with Munk’s pores in wall cells, consisting of two layers. The outer layer is a complicated structure, ca. 55–88  $\mu\text{m}$  wide, *tex-*

Figs. 19–26. *Lasio-sphaeria porifera* (PRM 842970). – 19. Ascospores. 20–22. Mature asci and ascospores. – 23. Ascospores. 24–26. Longitudinal section of the ascomatal wall. – Figs. 19: PC; 20–26: BF. – Scale bars: 19 = 10  $\mu\text{m}$ ; 20, 21 = 20  $\mu\text{m}$ ; 22 = 50  $\mu\text{m}$ ; 23 = 20  $\mu\text{m}$ ; 24 = 50  $\mu\text{m}$ ; 25 = 10  $\mu\text{m}$ ; 26 = 50  $\mu\text{m}$ .





*tura angularis*, composed of polyhedral, thick-walled cells 5–7  $\mu\text{m}$  diam. with the wall 1.5–2  $\mu\text{m}$  thick, on the exterior heavily pigmented. These cells form triangular or polygonal-shaped plates connected by long, cylindrical cells 5–8  $\mu\text{m}$  diam. with the wall 1.5–2  $\mu\text{m}$  thick, *textura prismatica*, arranged in columns from the inner side to the outer side of the ascumatal wall and forming a porose structure or arranged radially among plates. The exterior of the ascumatal wall is heavily pigmented, in crushed ascumata the areolate character is hardly visible in the surface view. The inner layer ca. 22–37  $\mu\text{m}$  wide, *textura prismatica*, composed of non-pigmented, thin-walled, elongated, compressed cells 5–11.5  $\mu\text{m}$  diam., arranged in 3–4 rows. – Ostiolar canal periphysate. – Paraphyses 3–4  $\mu\text{m}$  wide and up to 250  $\mu\text{m}$  long, persistent, abundant, septate, hyaline, branched. – Asci 92.5–132 *pars sporifera*  $\times$  22.5–28  $\mu\text{m}$ , with a stipe 11.5–47  $\mu\text{m}$  long, unitunicate, 8-spored, cylindrical-clavate, rounded to slightly truncate above, ascal apex non-amyloid. Annulus 5  $\mu\text{m}$  wide and 1–1.5  $\mu\text{m}$  high, distinct, refractive, arranged 1–9  $\mu\text{m}$  beneath the apex; subapical chamber and plasmatic body not seen. – Ascospores (26–)28–31.5(–34.5)  $\times$  (5–)6–7(–8.5)  $\mu\text{m}$ , cylindrical to allantoid, 1–3-septate, sometimes slightly constricted at the middle septum, smooth-walled, hyaline when young, pale brown at maturity, 2–3-seriate or irregularly clustered in the upper part of the ascus.

**Material examined.** – FRANCE, Central Pyrénées, Bagnères de Luchon, valle du Lys, Bois du Mont du Lys, on decorticated wood of a trunk of *Abies alba*, 13 July 1997, M. Réblová (PRM 842970, holotype). – CZECH REPUBLIC, Southern Bohemia, Šumava Mts. National Park, glacial cirque of the Čertovo jezero Lake near Zelezná Ruda, on a decayed trunk of *Picea abies*, 28 Aug. 1997, M. Réblová (Herb. M. Réblová 993/97). – UKRAINE, Eastern Carpathian Mts., Kvasi near Rachiw, on the left bank of the Tisa River, on decorticated wood of a trunk of *Abies alba*, 28 June 1997, M. Réblová (Herb. M. Réblová 930/97).

**Habitat.** – Saprobic on bare, decaying wood of coniferous trees (e.g. *Abies alba*, *Picea abies*).

**Known distribution.** – Europe: Czech Republic, France, Ukraine.

Although *L. porifera* resembles some members of the Nitschkia-ceae (Fitzp.) Nannf. in the appearance of the glabrous, tuberculate, non-papillate to slightly papillate ascumata and presence of Munk's pores, it is clearly distinct by the presence of defined ostiolum, the lack of "Quellkörper" and the pseudoparenchymous centrum of the ascoma which contains cylindrical, persistent paraphyses at maturity.

*L. porifera* superficially recalls species of *Bertia* de Not. (Sivanesan, 1978; Corlett & Krug, 1984; Krug & Corlett, 1988; Hsieh, Chen & Sivanesan, 1995; Hyde, 1995), but they differ markedly in

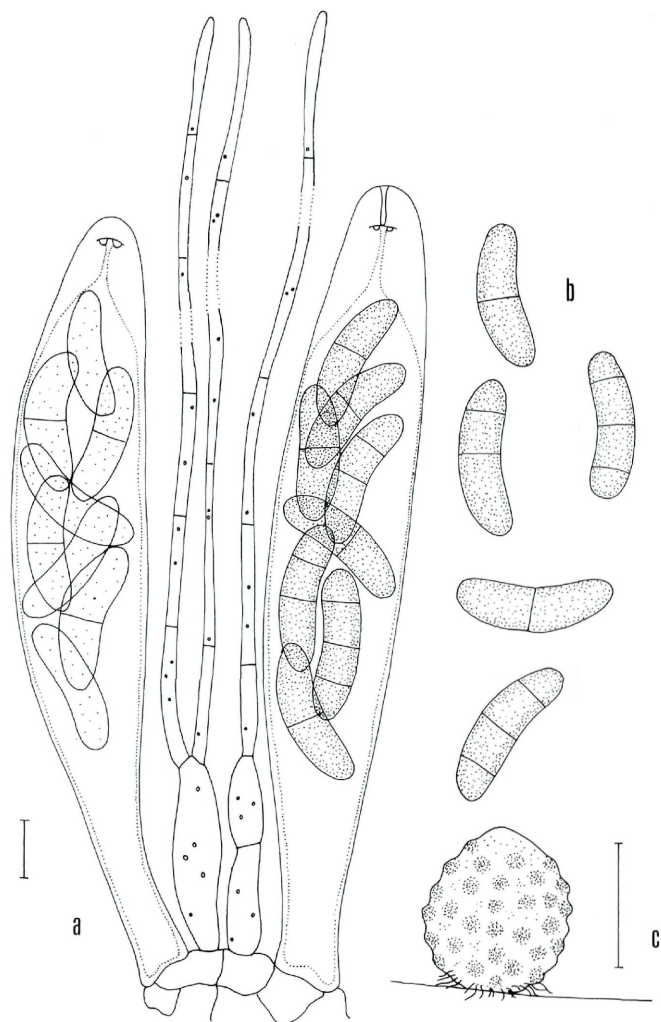


Fig. 27a-c. *Lasiophaeria porifera* (PRM 842970). - a. Young (left) and mature (right) asci with ascospores and paraphyses. - b. Ascospores. - c. Habit sketch of the ascomata. - Scale bars: a-b = 10  $\mu$ m; c = 500  $\mu$ m.

many ways. Herbarium material of *Bertia moriformis* (Tode: Fr.) de Not. (Herb. M. Réblová 530/94, 497/94, 498/94) and *B. moriformis* (Tode: Fr.) de Not. var. *latispora* Corlett & Krug (Herb. M. Réblová 887/96, 896/97, 1098/97) was examined and compared with that of *L. porifera*. Ascumata of *L. porifera* lack a short cylindrical base present in *B. moriformis*, have a well-defined ostiolum, and the ostiolar canal is periphysate. In *B. moriformis* the ostiolum is not defined, at the top of the cavity many thin-walled, polyhedral cells are arranged which disappear towards the top of the ascoma, thus a canal-like structure is formed. The asci in *B. moriformis* are long stipitate, deliquescent early, arising from a basal cushion, while those of *L. porifera* are short stipitate, not deliquescent, arising from the inner layer of the ascumatal wall. Paraphyses are lacking at maturity in *B. moriformis* but present at maturity and abundant in *L. porifera*. Ascospores in *B. moriformis* are hyaline, pale brown in *L. porifera*. I concluded that *L. porifera* fits better in the rather wide concept of the genus *Lasiosphaeria* Ces. & de Not. than in *Bertia*, and it is distinguished as a separate species of the genus.

The ascumatal wall of *L. porifera* shows an areolate character in the lateral wall. It is one of the peridium types known of *Lasiosphaeria* species and has already been described by Fernier (1954) for *Bombardia manihotis* Fernier [= *Cercophora striata* (Ellis & Everh.) Lundq.; Lundqvist, 1972] and *Lasiosphaeria dichrospora* Ellis & Everh. [= *Eosphaeria uliginosa* (Fr.) Höhnelt; Petrini & al., 1984]. An areolate peridium was found also in *Cercophora areolata* Lundq., *C. silvatica* Lundq. and *C. coprophila* (Fr.) Lundq. (Lundqvist, 1972) and *Bombardia macrocarpa* Carroll & Munk (Carroll & Munk, 1964). It should be taken into account that this peridium type can be found in more taxa of the Lasiosphaeriaceae. Carroll & Munk (1964) tried to explain the origin of the areolate peridium which develops during the growth of the ascoma.

Carroll & Munk (1964) described *Lasiosphaeria pyramidata* Carroll & Munk to possess an areolate peridium. This species differs from *L. porifera* in the conical ascumata sitting in a dense subiculum with the upper portions deeply and sharply 4-6 sulcate, the presence of a refractive sphere just beneath the apical annulus and hyaline, finally 1-celled, geniculate and larger (45-55 × 4-5 µm) ascospores provided with a short, blunt appendage 4-5 µm long at the distal end (Carroll & Munk, 1964; Podlahová, 1974). *Lasiosphaeria dactylina* Webster (Hilber & al., 1987b) is another species of the genus with an areolate peridium and atypical occurrence on culms of grasses. Hilber & al. (1987b) described the lateral ascumatal wall as weakly areolate but in surface view the wall shows a distinct areolate character. *L. dactylina* is distinct from *L. porifera* in its habitat, the setose, erumpent superficial ascumata and in the size [48-57(-66) ×

3.4–4.6  $\mu\text{m}$ ] and shape of the ascospores, which are cylindrical, in the lower part obliquely geniculate and strongly pointed. A subapical chamber and plasmatic body beneath the apical annulus were likewise not seen in *L. porifera*.

Podlahová (1974) introduced the section *Glabratae* Podlahová for species of the genus *Lasiosphaeria* having the glabrous, carbonaceous ascomatal wall and included there *L. spermoides* (Hoffm.: Fr.) Ces. & de Not. and *L. pyramidata*. *L. porifera* should belong to this section. *L. spermoides* is distinct from *L. porifera* in the obpyriform ascomata, a shape which is atypical of the genus and occurs rather in *Bombardia* (Fr.) P. Karsten or *Chaetosphaerella* E. Müll. & C. Booth, and in the ascospores, which are rather cylindrical and geniculate and remain 1-celled to 1-septate and hyaline also at maturity.

*L. porifera* should be compared with *L. canescens* (Pers.: Fr.) P. Karsten, *L. heterostoma* P. Karsten, *L. strigosa* (Albert. & Schw.: Fr.) Sacc. and *L. stuppea* Ellis & Everh. which have the characters of ascospores in common. All these species possess ascospores which are pale brown at maturity, more or less allantoid, 1-celled to several septate but their ascomata are setose or appendaged, because of hyphal appendages on ascomata of *L. stuppea* and the ascomatal wall is without tubercules and does not display an areolate character.

Munk pores were observed in the ascomatal wall of *L. porifera*. This character is not restricted to the Nitschkiaceae, where it occurs in all members of the family, but several genera of the Lasiosphaeriaceae also possess this feature, e.g. *Lasiobertia* Sivan. (Sivanesan, 1978), *Lasiosphaeriella* Sivan. (Sivanesan, 1975a), *Lasio-sphaeria hirsuta* (Fr.) Ces. & de Not. [= *Lasiosphaeria tuberculata* Carroll & Munk; Podlahová, 1974] and *Cercophora appalachianensis* Hilber & Hilber (Hilber & al., 1987a). So far, Munk's pores have not been described for any of the species of the Lasiosphaeriaceae having the areolate peridium type.

In mature and older asci a porus-like structure was observed to develop at the ascal apex towards the annulus (Fig. 27a).

The attempts to culture *L. porifera* were unsuccessful. Ascospore germination was not observed in any collection.

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