

Revision of three *Melanomma* species described by L. Fuckel

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Fuckel introduced the genus *Melanomma* for non-stromatic pyrenomycetes possessing both hyaline and dark coloured ascospores. Two out of five species having hyaline ascospores have been transferred to *Chaetosphaeria*. The present paper deals with the remaining three species, viz. *Melanomma aterrima*, *M. conica* and *M. papillata*. Examination of their type and other material and culture studies have shown that *Melanomma aterrima* is another species belonging to the genus *Chaetosphaeria* associated with a *Custingophora* anamorph. A new combination, *Chaetosphaeria aterrima* comb. nov., is proposed. *Melanomma conica* and *M. papillata* are regarded as conspecific with *Chaetosphaeria ovoidea* and *C. pulviscula*, respectively. Ascospore culture of *C. pulviscula* produced *Menispora caesia* and synanamorph similar to *Phialophora* sp. Type and recent material of *Melanomma fallax* and *Chaetosphaeria glauca* have also been studied. Both species are identical with *Chaetosphaeria ovoidea* and are included in its synonymy. *Chaetosphaeria aterrima*, *C. pulviscula* and *C. ovoidea* are listed with their full synonymy and notes on their previous descriptions and illustrations.

Key words: Ascomycotina, Lasiosphaeriaceae, *Chaetosphaeria*, *Custingophora*, systematics.

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Fuckel zařadil do rodu *Melanomma* nestromatické druhy pyrenomycetů s hyalinními i tmavě zbarvenými výtrusy. Z pěti druhů s hyalinními výtrusy byly již dva přeřazeny do rodu *Chaetosphaeria*. Tento článek pojednává o zbývajících třech druzích, *Melanomma aterrima*, *M. conica* and *M. papillata*. Na základě revize typového a dalšího herbářového materiálu a kultivačních studií bylo zjištěno, že *M. aterrima* patří do rodu *Chaetosphaeria* a je doprovázena anamorfou z rodu *Custingophora* je navržena nová kombinace, *C. aterrima* comb. nov. Na základě revize typového a dalšího materiálu je druh *M. conica* ztotožněn s druhem *Chaetosphaeria ovoidea* a druh *Melanomma papillata* s druhem *Chaetosphaeria pulviscula*. Byl rovněž studován typový a další herbářový materiál druhů *Melanomma fallax* a *Chaetosphaeria glauca*. Oba druhy jsou ztotožněny s druhem *Chaetosphaeria ovoidea* a jsou zahrnuty do jeho synonymiky. Druhy *Chaetosphaeria aterrima*, *C. pulviscula* a *C. ovoidea* jsou uvedeny s plnou synonymikou a s údaji o jejich předchozích popisech a vyobrazeních v literatuře.

INTRODUCTION

The genus *Melanomma* Nitschke ex Fuckel was introduced by Fuckel (1870) for lignicolous pyrenomycetes with superficial, small, black ascomata, 2-3-septate or rarely non-septate ascospores and was placed by the author in the Lophiostomae of the Sphaeriacei. In the genus, species with both brown and hyaline ascospores were mixed. Apart from six species with dark coloured ascospores, the genus accommodates another five species possessing hyaline ascospores (Fuckel 1870, 1872), namely *Melanomma aterrima* Fuckel, *M. conica* Fuckel,

M. ovoidea (Fr.) Fuckel, *M. papillata* Fuckel and *M. pomiformis* (Pers.: Fr.) Nitschke. These species, except for the latter, were transferred by Saccardo to the genus *Zignoella* (Sacc.) Sacc. *Zignoella* was described by Saccardo (*Michelia* 1: 346, 1878) as a subgenus of *Melanomma* and later (Saccardo, *Syll. Fung.* 2: 214, 1883) as a genus. Saccardo (1878) gave a list of twenty-seven species of *Zignoella* without indicating type species. The type was selected later by Clements and Shear (1931), who chose *Zignoella pulviscula* (Currey) Sacc. Saccardo (1883) comprehensively defined *Zignoella* for a group of fungi having non-stromatic, carbonaceous ascomata, 8-spored asci, paraphyses and hyaline, multi-septate ascospores and divided it into four subgenera: *Trematostoma*, described as: perithecia majuscula, dein late pertusa, typice basi insculpta, and three others, which have the following description in common: perithecia minuta, vix pertusa, sublitera, but differ in the number of septa in the ascospores: *Eu-Zignoella* with 3-septate ascospores, *Zignaria* with at first 1-septate ascospores and *Zignoina* possessing 1-celled ascospores, often multiguttulate when young.

Winter (1885) did not accept the genus *Zignoella* and preferred to accommodate the species placed in *Trematostoma* by Saccardo, in *Trematosphaeria* Fuckel. He also followed Fuckel's placement of species with hyaline ascospores (Saccardo's *Eu-Zignoella*, *Zignaria* and *Zignoina*) in *Melanomma*.

Munk (1957) acknowledged *Zignoella* and mentioned two species from Denmark, *Zignoella fallax* (Sacc.) Sacc. and *Zignoella pulviscula* (Currey) Sacc. The author placed *Zignoella*, together with *Ceratosphaeria* Niessl, *Debaryella* Höhnel, *Endoxyla* Fuckel, *Lentomita* Niessl and *Rhamphoria* Niessl, in the Rhamphorioideae Munk of the Diaporthaceae Höhn. ex Wehm. (= Valsaceae Tul. et C. Tul., Eriksson and Hawksworth 1993).

Booth (1957, 1958) studied anamorph-teleomorph connections of two *Zignoella* species and transferred them to *Chaetosphaeria* Tul. et C. Tul. In the genus, Booth placed the type species *Zignoella pulviscula* under *Chaetosphaeria pulviscula* (Currey) C. Booth with the anamorph *Menispora caesia* Preuss. Hence *Zignoella* becomes a synonym of *Chaetosphaeria* in the broader sense (Booth 1957; Müller 1987). Booth (1957) also brought *Zignoella ostioloidea* (Cooke) Sacc. under the synonymy of *Chaetosphaeria myriocarpa* C. Booth. It has the anamorph *Chloridium clavaeforme* (Preuss) W. Gams et Hol.-Jech. (Gams and Holubová-Jechová 1976).

Dennis (1978) included both *Chaetosphaeria*, with hyaline, 1-septate ascospores, and *Zignoella*, with hyaline, 3-septate ascospores, in the Trichosphaeriaceae Winter.

Cannon, Hawksworth and Sherwood-Pike (1985) recognized both genera and reported eleven species of *Zignoella* and ten of *Chaetosphaeria* both of the Trichosphaeriaceae from Great Britain.

According to Barr (1990b) *Chaetosphaeria* belongs to the Lasiosphaeriaceae Nannf. emend. Lundq. and *Zignoella* is mentioned as a synonym. According to the author the Lasiosphaeriaceae accommodate a group of species with superficial or immersed becoming erumpent ascomata; ascomatal walls of relatively large, pseudoparenchymatous cells, at times containing Munk pores; relatively wide, delicate, deliquescent paraphyses if present; basal asci narrow, with an amyloid or non-amyloid apical annulus; hyaline, light brown or versicoloured ascospores; an enteroblastic-phialidic arrangement of the conidia. Therefore, *Chaetosphaeria* is better placed in this family than in the Trichosphaeriaceae, in which species are included having superficial ascomata; ascomatal walls of compressed rows of cells; narrow, thin walled paraphyses; asci basal or peripheral with shallow, with a non-amyloid apical annulus; hyaline or lightly pigmented ascospores; a holoblastic arrangement of the conidia (Barr 1990b).

Constantinescu et al. (1995) transferred two other *Zignoella* species to *Chaetosphaeria*: *Chaetosphaeria ovoidea* (Fr.) Constant. et al. with the synanamorphs *Menispora glauca* Pers.: Fr. and *Phialophora* sp. (Holubová-Jechová 1973; Constantinescu et al. 1995) and *Chaetosphaeria pygmaea* (P. Karst.) Constant. et al. with the anamorph *Phialophora phaeophora* W. Gams. The authors noted that the position of several species referred to *Zignoella* is not yet clear.

Zignoella is a very heterogeneous taxon with a broad generic concept in which the presence of hyaline, transversely septate ascospores was considered as the main delimiting character in the past. Partial studies on some *Zignoella* species have showed that different taxa were erroneously placed in the genus. Some species having unitunicate asci and hyaline multi-septate ascospores have already been transferred to other genera, e.g. *Ceratosphaeria* (Munk 1957; Teng 1996), *Chaetosphaeria* (Booth 1957, 1958; Holubová-Jechová 1973; Barr 1991; Barr et al. 1986; Barr et al. 1996; Constantinescu, Holm and Holm 1995), *Discostroma* Clem. (Barr et al. 1986), *Saccardoella* Speg. (Berlese 1894; Hyde 1992; Barr 1994) and *Vialaea* Sacc. (Müller and Arx 1962). Several species were found to have bitunicate asci and were consequently excluded from *Zignoella* and accommodated in other genera, e.g. *Exarmidium* (Barr and Boise 1985), *Massarina* Sacc. (Holm 1957), *Pseudotrachia* Kirschst. (Barr 1990), *Teichosporella* (Sacc.) Sacc. (Barr 1981), *Thyridaria* Sacc. (Barr 1990) and *Trematosphaeria* Fuckel (Winter 1885; Holm 1957). Based on literature data and experience with recent and type material of some *Zignoella* species it is obvious that the genus includes rather unrelated taxa and requires a critical revision. Following Booth's (Booth, Mycol. Pap. 68: 10, 1957) and Müller's (Müller, Systema Ascomycetum 6: 156, 1987) acceptance of *Zignoella* as a synonym of *Chaetosphaeria*, for the taxa remaining to be placed in that genus, Cooke's generic name *Zignoina* Cooke has to be reinstated, at least as an interim measure (Eriksson and Hawksworth 1987).

MATERIAL AND METHODS

Single ascospores of *Chaetosphaeria aterrima*, *C. pulviscula* and *C. ovoidea* were isolated with the aid of a single-spore isolator on CMA agar. Colony characters were taken from PCA cultures grown at 10 °C and 25 °C under 10 days darkness and 10 days under cool white fluorescent light. The resulting culture of *C. aterrima* is deposited under No. 3027 in the Culture Collection of Fungi (CCF) at Charles University in Prague.

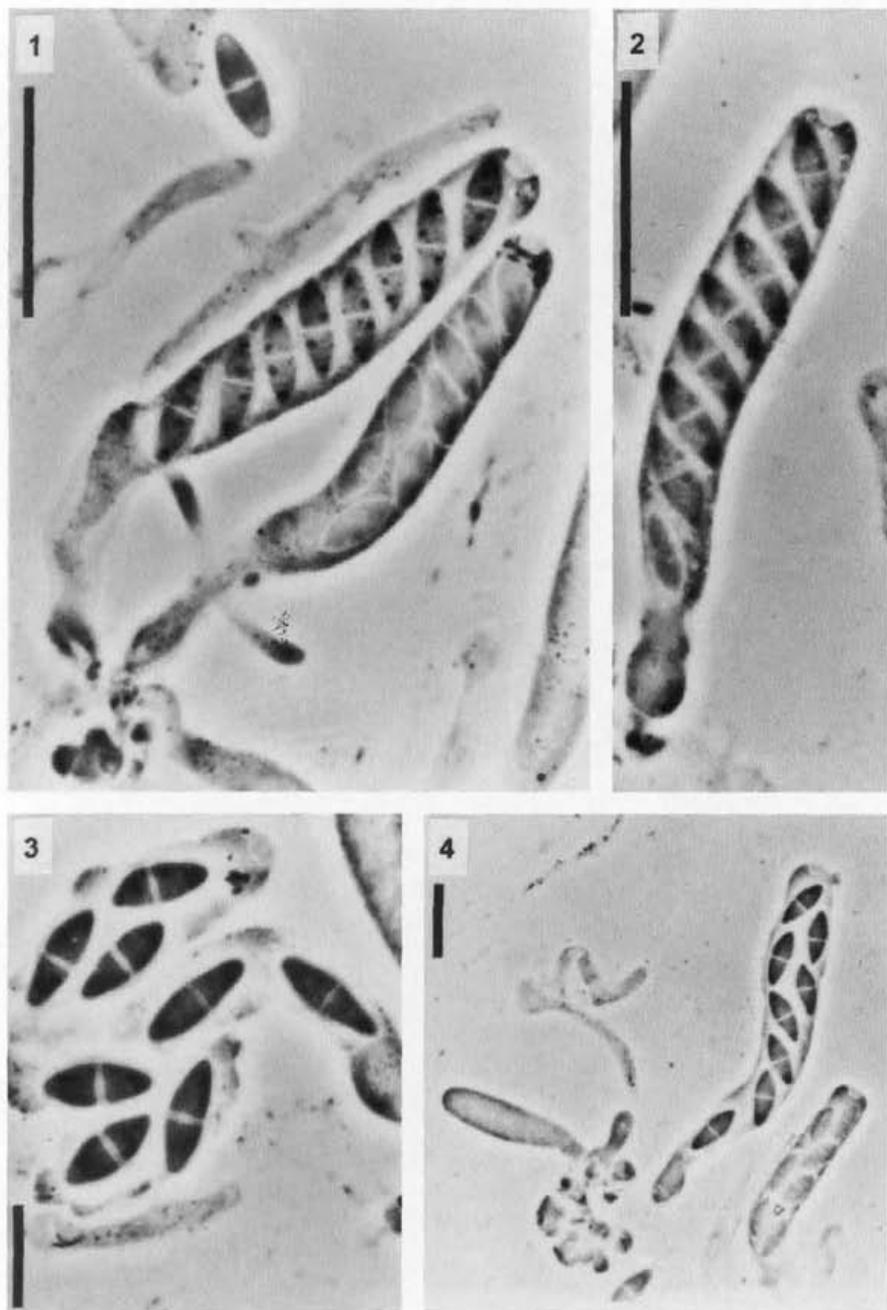
Dry herbarium specimens were briefly rehydrated in 3% KOH and subsequently studied in 100% lactic acid, cotton blue in lactic acid, Congo Red (aq.) or Melzer's reagent. Two types of microscopy were used in this study. These are indicated in the legends to the illustrations as bright field (BF) and phase contrast (PC). Photographs were taken with the specimens in Melzer's reagent and Congo Red (aq.). The abbreviations of the herbaria and institutes which kindly lent the material are cited in accordance with the Index Herbariorum (Holmgren et al. 1990).

M.R. is the abbreviation for M. Réblová in the lists of material examined.

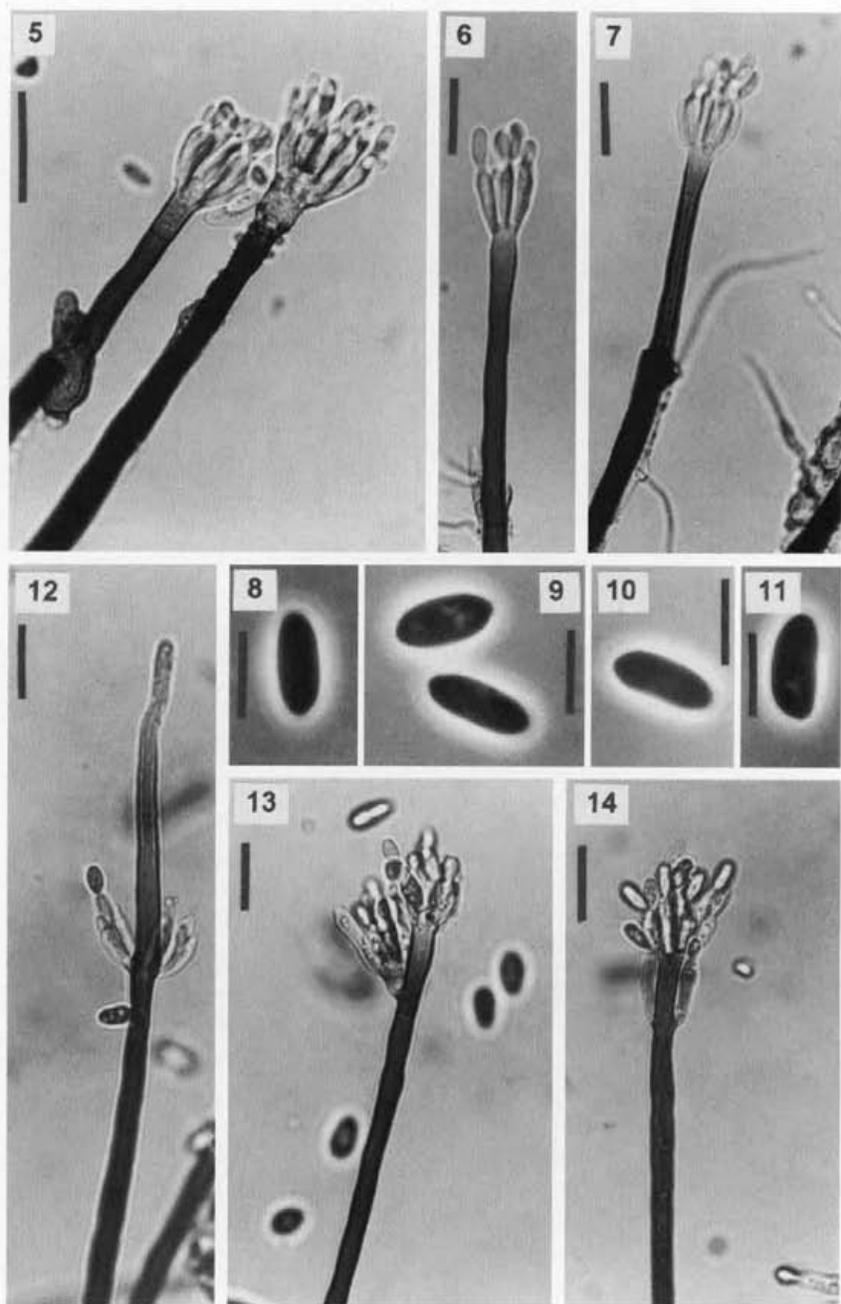
RESULTS AND DISCUSSION

The examination of the original and recent material of *Melanomma aterrima*, *M. conica* and *M. papillata* revealed that *Melanomma aterrima* is another species in the genus *Chaetosphaeria* associated with a *Custingophora* anamorph, a new combination, *Chaetosphaeria aterrima* (Fuckel) comb. nov., is proposed. The teleomorph-anamorph connection was proved by culture studies. The recent material of *Melanomma conica* and *M. papillata* was collected during the years 1990-1997 on wood and decayed bark of different kinds of deciduous trees. These two *Melanomma* species are conspecific with *Chaetosphaeria ovoidea* and *Chaetosphaeria pulviscula*, respectively. Ascospore cultures of *C. ovoidea* produced synanamorphs *Menispora glauca* and *Phialophora* sp. as described by Constantinescu et al. (1995). Ascospore culture of *C. pulviscula* produced synanamorphs *Menispora caesia* and *Phialophora* sp., the latter is described here. *Chaetosphaeria aterrima*, *C. pulviscula* and *C. ovoidea* are listed with their full synonymy and references to previous descriptions and illustrations.

Several other species are considered. The type collection of *Chaetosphaeria glauca* was examined and it was concluded that it is correctly placed in the synonymy of *Chaetosphaeria ovoidea*, as suggested by Constantinescu et al. (1995). Two exsiccatae from Petrak's Flora Bohemiae et Moraviae exsiccata labelled as *Zignoella papillata* (Fuckel) Sacc. and *Zignoella ovoidea* (Fr.) Sacc. have also been examined. Both are mentioned in the synonymy of *Chaetosphaeria pulviscula* and *C. ovoidea*, respectively. In the present paper, *Melanomma fallax* Sacc.



Figs 1-4. *Chaetosphaeria aterrima* (Fuckel) Réblová. 1, 2. Asci with ascospores; 3. Ascospores; 4. Ascus with ascospores. Figs 1-4: PC. Figs 1-4 from G - holotype. Scale bars: 1, 2 = 20 μ m; 3, 4 = 10 μ m.



Figs 5-14. *Custingophora* sp. anamorph of *Chaetosphaeria aterrima* (Fuckel) Réblová. 5-7. Apex of the conidiophores with phialides and phialoconidia; 8-11. Phialoconidia; 12-14. Apex of the conidiophores with phialides and phialoconidia. Figs 5-7, 12-14: BF; 8-11: PC. Figs 5-11 from nature (Herb. M.R. 871/96); 12-14 from living culture, cultivated on PCA agar (CCF 3027). Scale bars: 5-7, 12-14 = 20 μ m; 8-11 = 10 μ m.

(Saccardo 1877) is also involved. The type material of *M. fallax* has not been examined. A very common lignicolous fungus was described under this name, which according to the characters observed on the recent material, well conforms to the descriptions given by Saccardo (1877), Winter (1885), Munk (1957) and Dennis (1978) and those of *Melanomma conica*, *Chaetosphaeria glauca* and *C. ovoidea* (Fuckel 1870; Holubová-Jechová 1973). *Melanomma fallax* is therefore identical with *Chaetosphaeria ovoidea* and is reduced to its synonymy.

Of five *Melanomma* species with hyaline, transversely septate ascospores described by Fuckel (1870), two have been already transferred to *Chaetosphaeria*. *Melanomma pomiformis* with a *Stachybotrys* anamorph (Booth 1957) was transferred by Müller (Müller and Arx 1962) and *Melanomma ovoidea* by Constantinescu et al. (1995). *Chaetosphaeria pomiformis* (Fuckel) E. Müll. should be excluded from the genus as was already suggested by Barr (1990b) and retained in *Melanopsamma* Niessl. in the Niessliaceae Kirschst. It can be distinguished from other species of *Chaetosphaeria* by the collabent ascomata; soft-textured, three-layered ascomatal wall, presence of periphysoides and the morphology of the ascus and ascospore which reminds that of the Hypocreales. Also the anamorph *Stachybotrys* is rather hypocreaceous than sphaeriaceous (Barr 1990b).

LIST OF REVISED SPECIES

Unless otherwise indicated, the accepted names are preceded by an asterisk.

1. *Melanomma aterrима* Fuckel, Jahrb. Nassau. Ver. Naturk. 25-26, Nachtr. 1: 304, 1872. – basionym.

≡ *Zignoella aterrима* (Fuckel) Sacc., *Michelia* 1: 346, 1878.

* ≡ *Chaetosphaeria aterrима* (Fuckel) Réblová, comb. nov.

Figs 1-4; 15a-c.

Ascomata superficial with the base slightly immersed, solitary or in groups of 2-4, globose to subglobose, ostiolate, papillate, 230-270 μm wide and 250-350 μm high, glistening, black, glabrous, bearing conidiophores identical with those arising from the substrate surface. Ascomatal wall 33-37 μm thick, *textura prismatica*, consisting of two layers. Outer layer of thick-walled, melanised cells; inner layer of hyaline, compressed, elongated cells. Ostiolar canal periphysate. Paraphyses abundant among the asci, branching, anastomosing, septate, hyaline, 2-3 μm wide. Asci unitunicate, 8-spored, (54-)56-65(-74) \times 7-8(-9) μm , arising from a broad hymenium, cylindrical, shortly stipitate, truncate to broadly rounded at the top, ascus apex non-amyloid with a well visible apical annulus. Ascospores fusiform, 10-13 \times 3-4 μm , 2-celled, with a thick, refringent wall and a median septum, non-constricted or slightly constricted, hyaline, smooth-walled, each cell filled with 1-2 oil drops, 1-2-seriate in the ascus.

Anamorph. *Custingophora* sp.

Figs 5-14; 16a-c; 17a-b.

Characteristics in culture. Colonies on CMA, MEA, OA and PCA grow slowly, attaining a diameter of about 8-12 mm within 10 days at 25 °C. Colonies on the three former media have a yeast-like character, whitish to ivory, not sporulating. Colonies on PCA whitish, aerial hyphae densely developed, sporulating. Parallel sets of colonies on those media were cultivated in darkness and under cool white fluorescent light for another 10 days at 25 °C and all attained a diameter of about 20-22 mm. Colonies on CMA, MEA and OA media sporulated in 14 days, those growing in darkness sporulated more poorly. Sporulation on PCA is more pronounced compared to other used media. Sporulation on OA is better than on CMA and MEA. Conidiophores arising all over the colony in the aerial mycelium. In culture conidiophores were simple or sympodially branched by successive, single proliferation. Proliferations arise subapically from the vesicle or from the conidiophore, developing successively up to 3 per conidiophore. Conidiogenous cells as under natural conditions. Phialoconidia were of the same size as under natural conditions but more conspicuously truncate and apiculate at the proximal end.

On the natural substrate conidiophores were sparsely scattered, solitary or fasciculate, arising from the substrate surface or covering the ascomata. Conidiophores macronematous, unbranched, septate, erect, with one to occasionally three percurrent proliferations per conidiophore, up to 220 μm high, (5-)6-7 μm wide in the middle and 15-16 μm wide at the base, dark brown, paler towards the apex and enlarging apically to form a more or less distinct vesicle. The vesicle pale brown to subhyaline, clavate, smooth, roughened with increasing age, 7-11 μm wide and 11-14 μm high, bearing phialides in the upper part. Phialides (12-)14-16(-19) \times 4-6 μm , uniseriate, hyaline, parallel, cylindrical to clavate, straight or curved from the edge of the vesicle, collarettes indistinct. Phialoconidia forming slimy heads at the top of the conidiophore, (8-)9-13 \times (3-)4-5 μm , hyaline, smooth, elliptic, slightly truncate at the proximal end, with two large vacuoles. The placement of the vacuoles in the conidium recalls a median septum. The thin, non-refractive median septum was seen in several mature conidia in the recent material (Herb. M.R. 871/96; Fig. 16b). Those conidia were not joined in the slimy head at the top of the conidiophore but were found attached to the ascomatal surface or the basal part of the conidiophore, so the median septum may develop much later.

Material examined. 1) Type material. Germany: Aepfelbach, on a branch of *Fagus sylvatica*, autumn, leg. Fuckel (G - holotype of *Melanomma aterrimum*).

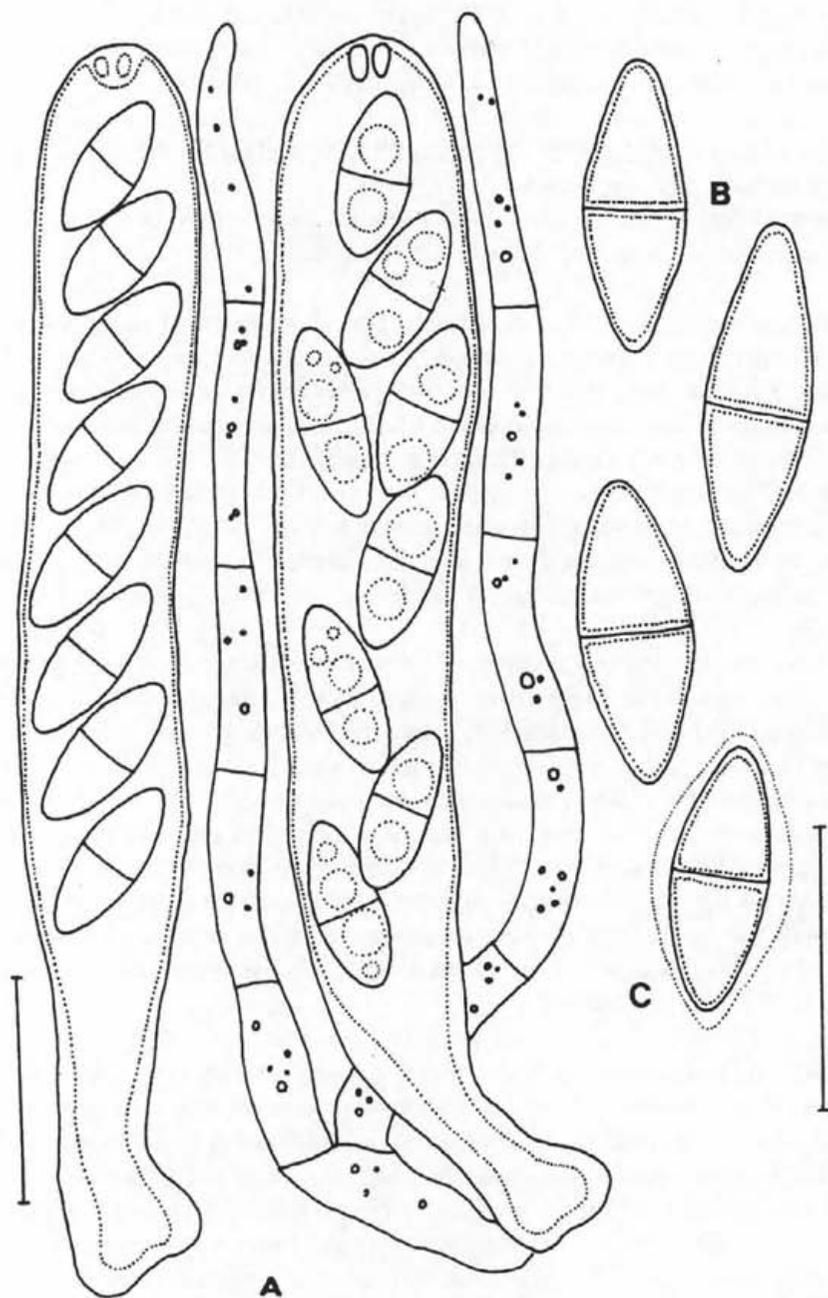


Fig. 15A-C. *Chaetosphaeria aterrima* (Fuckel) Réblová.
A. Asci with paraphyses and ascospores; B. Ascospores; C. Ascospores with a thin hyaline sheath.
A-C from G - holotype. Scale bars: A-C = 10 μ m.

2) Additional material. Czech Republic: Southern Bohemia, Šumava Mts., glacial cirque of the lake Černé jezero near Železná Ruda, on a decayed stump of *Fagus sylvatica*, 23.X.1996, leg. M. R. (Herb. M. R. 871/96).

Descriptions. Fuckel (1872: 304); Saccardo (1883: 216); Winter (1885: 245).

Known host. *Fagus sylvatica*.

Habitat. Saprobe on the bare, decorticated wood of a deciduous tree.

Distribution. Europe: Germany, Czech Republic.

The asci treated by a solution of Congo Red show a distinct thickening at the top where the apical annulus is placed. The apical annulus appears to be indistinct and does not stain in Congo Red, whereas when treated by Melzer's reagent the apical annulus is well visible, refractive, the ascus apex without any mark of the subapical space or thickening. The mature ascospores treated by a solution of Congo Red appear to be enclosed in a 1-1.5 μm thick gelatinous sheath which later disappears, as examined in phase contrast (Figs. 1-4; 15c). The ascospores treated by Meltzer's reagent do not show any mark of a gelatinous sheath when examined in both light microscopy or phase contrast - they appear smooth-walled (Fig. 15a-b).

C. aterrma most closely resembles *Chaetosphaeria aspergilloides* M.E. Barr et Crane (Barr and Crane 1979) found on wood in a tropical greenhouse in Mexico, also associated with a *Custingophora* anamorph. *Chaetosphaeria aspergilloides* is almost identical in the morphology of the ascomata (275 μm wide and 330 μm high), asci (50-64 \times 7.5-9 μm) and two-celled ascospores (9-11 \times 4-5 μm) with *Chaetosphaeria aterrma*, but they can be clearly distinguished by characters of the associated anamorphs. The *Custingophora* anamorph of *Chaetosphaeria aspergilloides* possesses taller conidiophores, larger vesicles and phialides; however, the phialoconidia of both *Custingophora* species are similar in size. The type material of *Chaetosphaeria aspergilloides* could not be examined, for the type material (NY) was not located.

The *Custingophora* anamorph found in the recent material (Herb. M.R. 871/96) associated with ascomata and also found growing in culture is identical with that found in the type material of *Melanomma aterrma*. It is of interest that the character of sympodially and subapically proliferating conidiophore, typical of *Custingophora* Stolk et al., was observed in culture only. Natural material shows conidiophores without any marks of sympodial proliferations but with 1-3 percurrent proliferations per conidiophore. Barr and Crane (1979) neither observed the sympodial and subapical proliferation of the conidiophore. Only simple, non-proliferating conidiophores were described in the protologue. The *Custingophora* anamorph of *Chaetosphaeria aspergilloides* was not cultivated.

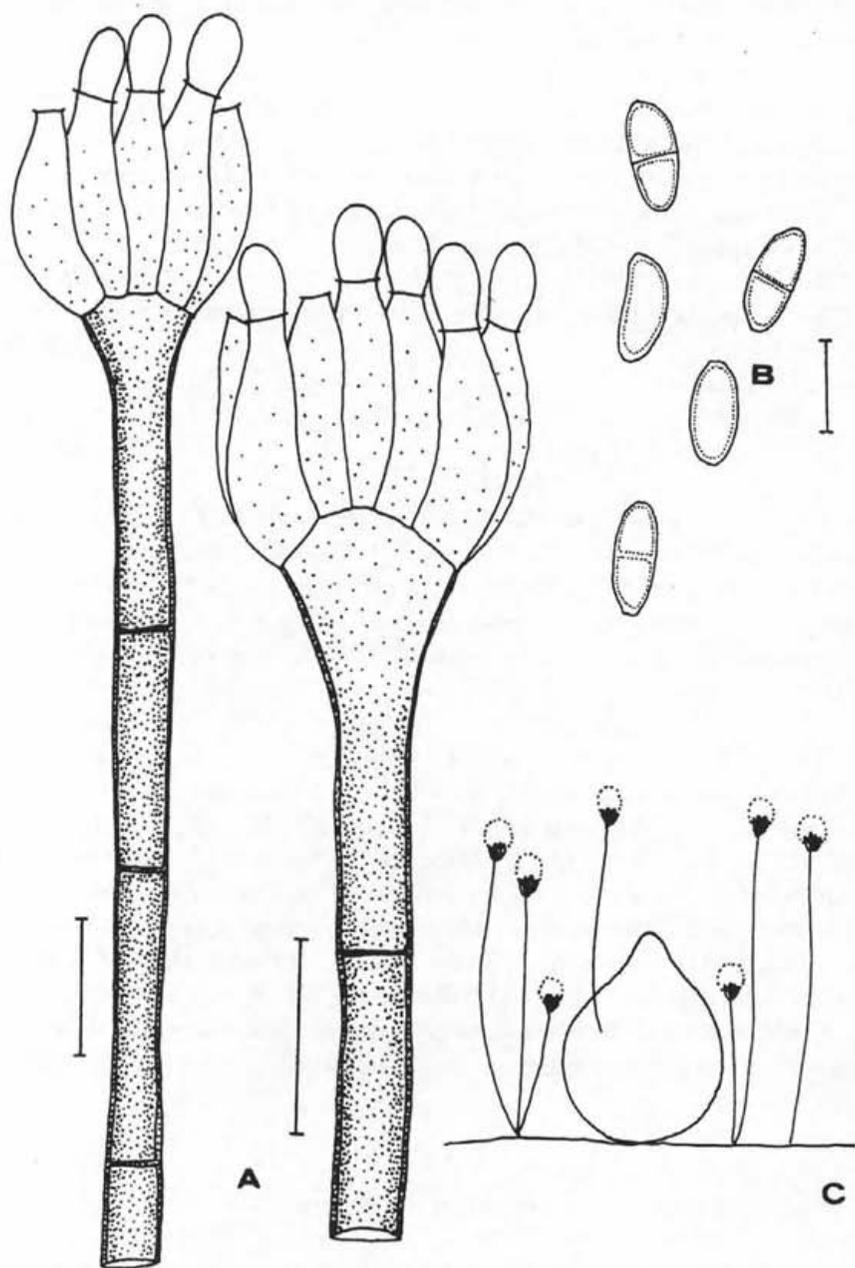


Fig. 16A-C. *Custingophora* sp. anamorph of *Chaetosphaeria aterrime* (Fuckel) Réblová.
 A. conidiophores with vesicles and phialides; B. Phialoconidia; C. Habit sketch of the ascomata
 and conidiophores. A-C from nature (Herb. M. R. 871/96). Scale bars: A, B = 10 μ m.

The present collection of *C. aterrima* apparently represents the first record of this species since its description by Fuckel (1870).

2. *Melanomma papillata* Fuckel, Jahrb. Nassau. Ver. Naturk. 23-24: 159, 1870.
 ≡ *Zignoella papillata* (Fuckel) Sacc., Michelia 1: 346, 1878.
 = *Sphaeria pulviscula* Currey, Trans. Linn. Soc. Lond. 12: 320, 1859.
 ≡ *Melanomma pulviscula* (Currey) Sacc., Myc. Ven. Spec. p. 114, 1873.
 ≡ *Zignoella pulviscula* (Currey) Sacc., Michelia 1: 346, 1878.
 ≡ *Psilosphaeria pulviscula* (Currey) Stevenson, Mycologia Scotica, p. 387, 1879.
 * ≡ *Chaetosphaeria pulviscula* (Currey) C. Booth, Naturalist 1958: 88, 1958.

Fig. 19a,b.

Synanamorphs. *Menispora caesia* Preuss, Linnea 24: 119, 1851. Fig. 19c,e.
Phialophora sp. described here. Fig. 19d,f.

Characteristics in culture. Ascospores of one specimen of *Chaetosphaeria pulviscula* (Herb. M.R. 1124/97) were isolated. The ascospores germinate rapidly and branched or unbranched hyphae emerge within 24 hours from the end or intercalary cells of the ascospore. Several ascospores gave rise to the synanamorph *Menispora caesia* and others to the synanamorph *Phialophora* sp. Mixed colonies of *Menispora caesia* and *Phialophora* sp. growing from one ascospore were not observed. Both *Menispora caesia* and *Phialophora* sp. were cultivated at 10 °C under 12 h darkness alternating with 12 h cool white fluorescent light. Colonies of *Menispora caesia* are greyish to dark brown on PCA, grow slowly, attaining a diameter of about 8-10 mm within 20 days at 10 °C, aerial hyphae densely developed, margins of the colony fimbriate. Colonies of *Phialophora* sp. are whitish to greyish on PCA, attaining a diameter of about 10-13 mm within 20 days at 10 °C, aerial hyphae densely developed, margins of the colony fimbriate. Both synanamorphs sporulated well in 1-2 month cultivated on CMA and PCA, preserved at 10 °C under 12 h darkness alternating with 12 h cool white fluorescent light. Conidiophores of both synanamorphs arising from the center towards the margins all over the whole colony in the aerial mycelium. Exudate and diffusible pigment absent.

Phialophora sp. synanamorph.

The conidiogenous cells are phialides, borne directly on the aerial hyphae or, seldom supported by a cylindrical, erect cell. They are slightly pigmented with a darker collarete, 7-25 µm long and 2-3 µm wide in the middle. Phialoconidia formed in slimy heads, hyaline to slightly pigmented and darker in mass, ellipsoidal to cylindrical, straight or slightly curved, rounded at the distal end and apiculate at the proximal end, (5-)6-7.5 × 1-1.5 µm.

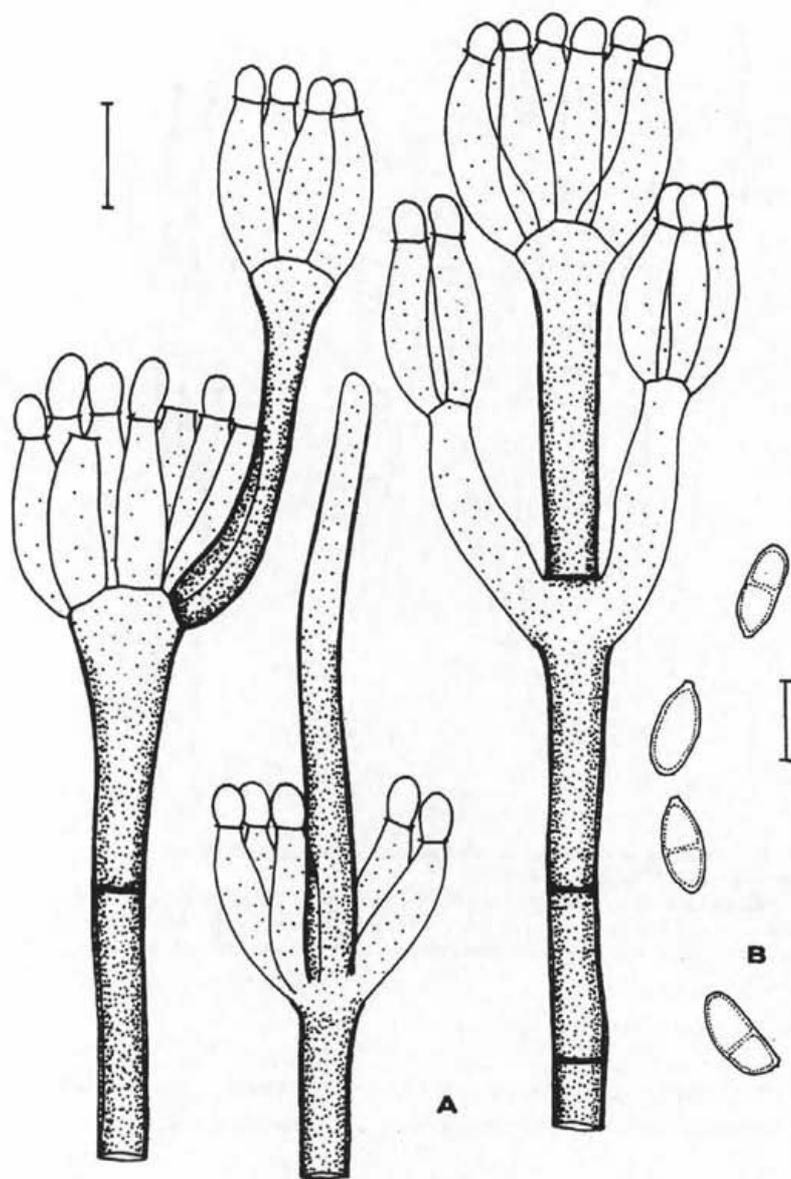


Fig. 17A, B. *Custingophora* sp. anamorph of *Chaetosphaeria aterrma*.
A. Conidiophores with vesicles and phialides; B. Phialoconidia. A, B from living culture,
cultivated on PCA agar (CCF 3027). Scale bars: A, B = 10 μ m.

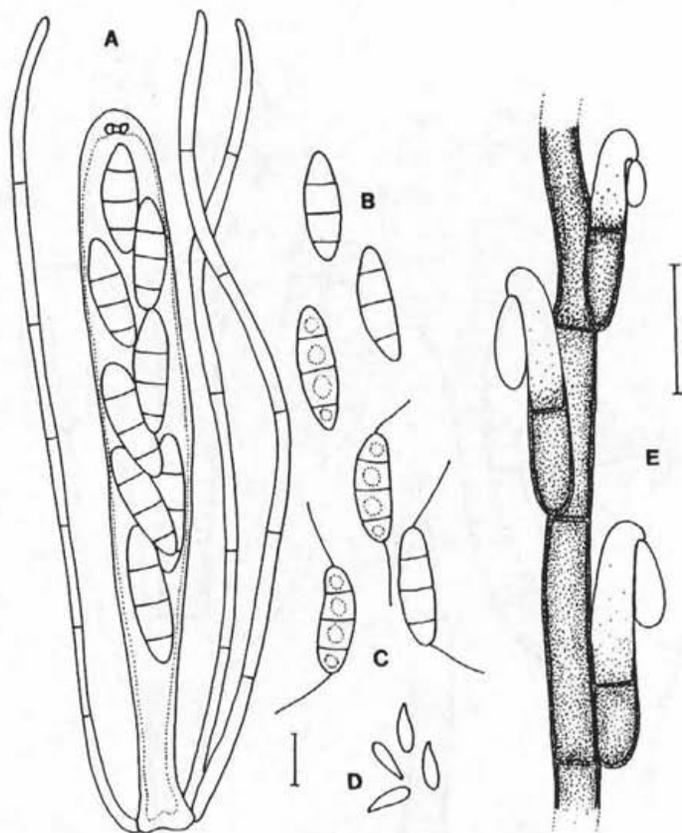


Fig. 18A-E. *Chaetosphaeria ovoidea* (Fr.) Constant. et al. and its synanamorphs *Menispora glauca* Pers.: Fr. and *Phialophora* sp.
 A. Ascus with ascospores and paraphyses; B. Ascospores; C. Phialoconidia of *Menispora glauca*;
 D. Phialoconidia of *Phialophora* sp.; E. Part of conidiophore with phialides of *Menispora glauca*.
 A, B from Herb. M.R. 1060/97; C-E from living culture, cultivated on PCA agar. Scale bars:
 A-E = 10 μ m.

The *Phialophora* sp. synanamorph of *Chaetosphaeria pulviscula* differs in the larger phialoconidia from the *Phialophora* sp. synanamorph of *Chaetosphaeria ovoidea*.

Menispora caesia Preuss synanamorph.

Conidiophores macronematous, mononematous, arising on aerial hyphae, straight or slightly flexuous with 2 or 4 lateral side branches, brown, paler towards the apex, septate, up to 140 μ m long and (3.5-)4-5 μ m wide in the

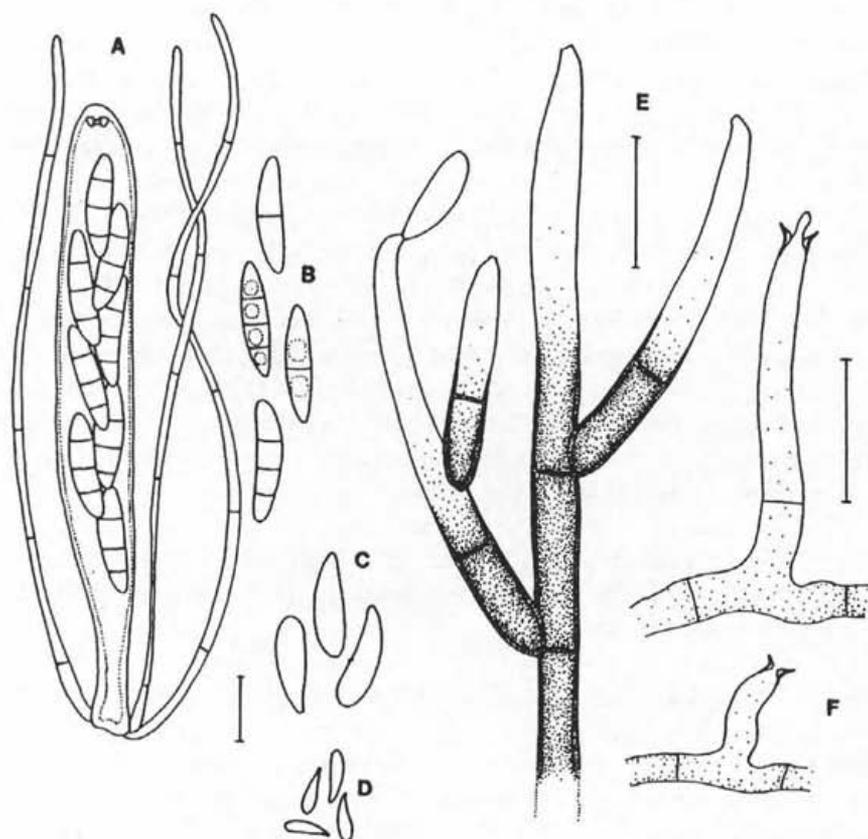


Fig. 19A-F. *Chaetosphaeria pulviscula* (Currey) C. Booth and its synanamorphs *Menispora caesia* Preuss and *Phialophora* sp.

A. Ascus with ascospores and paraphyses; B. Ascospores; C. Phialoconidia of *Menispora caesia*; D. Phialoconidia of *Phialophora* sp.; E. part of conidiophore with phialides of *Menispora caesia*; F. Phialides of *Phialophora* sp. A, B from Herb. M.R. 1124/97; C-F from living culture, cultivated on PCA agar. Scale bars: A-F = 10 μ m.

middle. Branches directed upward, often bearing secondary and tertiary branches. Solitary phialides develop at the end of the main conidiophore and on its lateral branches. Phialides are one-celled, cylindrical, subhyaline, straight, 20-40 μ m long and 3-4.5 μ m wide, tapering towards the apex and slightly curved towards the conidiophore, terminating in an open end. Phialoconidia form slimy colourless heads around the apex of the phialide; hyaline, cylindrical to oval, slightly curved, narrowly rounded at the distal end and more tapered at the proximal end, non-septate, 15-20 \times 2.5-3.5(-4) μ m, lacking setulae.

Material examined. 1) Exsiccatae. Fuckel's Fungi rhenani, No. 2166 (G – as *Melanomma papillata*). – Petrak's Flora Bohemiae et Moraviae exsiccata, No. 2097, Lfg. 42; (Czech Republic: Moravia, Podhoří near Hranice na Moravě, on *Fagus sylvatica*, 2.X.1924, leg. F. Petrak; PRM 482574 – as *Zignoella papillata*).

2) Type material. Germany: Mühlwiese near Hattenheim, on decayed wood of *Quercus* sp., spring, leg. Fuckel (G – holotype of *Melanomma papillata*).

3) Additional material. Czech Republic: Central Bohemia, Ploskov near Lány, on *Alnus glutinosa*, 26.V.1994, leg. M.R. (Herb. M.R. 534/94); nature reserve Týřovické skály, Týřovice near Rakovník, on *Quercus robur*, 12.IX.1993, leg. M.R. (Herb. M.R. 380/93); Southern Bohemia, Novohradské hory Mts., virgin forest Žofínský prales near Pivonice, on *Fagus sylvatica*, 20.V.1997, leg. M.R. (Herb. M.R. 920/97); Šumava Mts., glacial cirque of the lake Černé jezero near Železná Ruda, on *Fagus sylvatica*, 27.VIII.97, leg. M.R. (Herb. M.R. 1089/97, 1103/97); Moravia, river-side virgin forest Cahnov near Lanžhot, on *Quercus* sp., 15.X.1997, leg. M.R. (Herb. M.R. 1124/97).

Descriptions and illustrations. Winter (1885: 244); Saccardo (1883: 214; 1891: 860); Booth (1957: 10, Fig. 4; 1958: 88, Figs. i-j); Munk (1957: 190); Holubová-Jechová (1973: 331, Fig. 2.2).

Known hosts. *Acer campestre*, *Alnus glutinosa*, *Fagus sylvatica*, *Populus nigra*, *Quercus robur*, *Quercus* sp., *Robinia pseudoacacia*.

Habitat. A lignicolous saprobe on bark, inner surface of bark and decorticated wood of many kinds of deciduous trees at different stages of decay. The ascomata are sometimes accompanied by mycelium of the anamorph forming greyish-brown, cushion-like, velvety colonies. Frequently both teleomorph and anamorph occur independently of each other.

Distribution. Cosmopolitan in the temperate zone.

It is a commonly collected fungus, clearly distinguishable from other species of *Chaetosphaeria* by its 1-3-septate, fusiform, 18-23(-25) × 3-4 μm ascospores and the *Menispora caesia* anamorph. During the study of fresh and herbarium material an interesting character of the asci, ascospores and elements of the hamathecium has been observed. All examined specimens, including the type of *Melanomma papillata*, had the paraphyses, asci and ascospores containing a large amount of tiny colourless oil drops. Masses of them also occurred loosely among the paraphyses. In the asci, the oil guttules were aggregated especially in their upper parts. The guttules become reddish-brown when treated with Melzer's reagent (dextrinoid reaction) and stain brick-red in a solution of Congo Red. This character has never been observed in *Chaetosphaeria ovoidea*, which seems to be the closest species, nor in any other *Chaetosphaeria* species. The delayed formation

of the transverse septa, which develop in the sequence 2:1:2 is typical of the genus *Chaetosphaeria*. This feature is well visible in *C. pulviscula*.

3. *Melanomma conica* Fuckel, Jahrb. Nassau. Ver. Naturk. 23-24: 160, 1870.
 ≡ *Zignoella conica* (Fuckel) Sacc., Michelia 1: 346, 1878.
 = *Sphaeria ovoidea* Fr., Syst. Mycol. 2: 459, 1822.
 ≡ *Melanomma ovoidea* (Fr.) Fuckel, Jahrb. Nassau. Ver. Naturk. 23-24: 159, 1870.
 ≡ *Zignoella ovoidea* (Fr.) Sacc., Michelia 1: 346, 1878.
 * ≡ *Chaetosphaeria ovoidea* (Fr.) Constant. et al., Mycol. Res. 99: 586, 1995.
 Fig. 18a, b.
 = *Melanomma fallax*, Sacc., Michelia 1: 41, 1877.
 ≡ *Zignoella fallax* (Sacc.) Sacc., Michelia 1: 346, 1878.
 = *Chaetosphaeria glauca* Hol.-Jech., Folia Geobot. Phytotax. 8: 322, 1973.

Synanamorphs. *Menispora glauca* Pers.: Fr., Syst. Mycol. 3: 450, 1832.

Fig. 18c-e.

Phialophora sp., Constant. et al., Mycol. Res. 99: 586, 1995.

Fig. 18d.

Characteristics in culture. Ascospores of four specimens of *Chaetosphaeria ovoidea* (Herb. M.R. 1013/97, 1060/97, 1135/97, 1136/97) were isolated. The ascospores germinate rapidly and branched or unbranched hyphae emerge within 24 hours from the end or intercalary cells of the ascospore. In all cases several ascospores gave rise to the synanamorph *Menispora glauca* and others to the synanamorph *Phialophora* sp. Mixed colonies of *Menispora glauca* and *Phialophora* sp. growing from one ascospore were not observed. Both *Menispora glauca* and *Phialophora* sp. were cultivated at 10 °C under 12 h darkness alternating with 12 h cool white fluorescent light. Colonies of *Menispora glauca* are greyish to dark brown on PCA, grow slowly, attaining a diameter of about 8-12 mm within 20 days at 10 °C, aerial hyphae densely developed, margins fimbriate. Colonies of *Phialophora* sp. are ivory to whitish or in various shades of grey on PCA, grow slowly, attaining a diameter of about 12-15 mm within 20 days at 10 °C, aerial hyphae densely developed, margins fimbriate. Both synanamorphs sporulated well in 1-2 month cultivated on CMA and PCA, preserved at 10 °C under 12 h darkness alternating with 12 h cool white fluorescent light. The *Phialophora* synanamorph sporulated usually 7-14 days later than the *Menispora glauca* synanamorph. Bright orange diffusible pigment present around each colony in 2-month-old culture on CMA preserved at 4-6 °C in darkness. The size and morphology of the conidiophores, conidiogenous cells and phialoconidia of both synanamorphs agree well with those given by Constantinescu et al. (1995) and Hughes and Kendrick (1963).

Constantinescu et al. (1995) reported the scarce mycelium of the *Phialophora* sp. synanamorph from 10-18 month-old slant cultures on 1 % MA preserved at 6-8 °C in darkness.

Material examined. 1) Exsiccatae. Petrak's Flora Bohemiae et Moraviae exsiccata, No. 855, Lfg. 18; (Czech Republic: Moravia, Hrabůvka near Hranice na Moravě, on wood, 29.X.1913, leg. F. Petrak; PRM 797145 – as *Zignoella ovoidea*).

2) Type material. Germany: Oestrich, on a decorticated branch of *Sambucus racemosa*, spring, leg. Fuckel (G – holotype of *Melanomma conica*). – Czech Republic: Central Bohemia, Jevanské lesy near Vyžlovka, on the bark of a trunk of *Quercus petraea* (*Menispora glauca* associated), 9.V.1967, leg. V. Holubová-Jechová (PRM 714763 – holotype of *Chaetosphaeria glauca*).

3) Additional material. Czech Republic: Central Bohemia, nature reserve Týřovické skály, valley of the brook Úpořský potok near Skryje, on a branch of *Fagus sylvatica* (*Menispora glauca* associated), 12.IX.1993, leg. M. R. (Herb. M. R. 370/93); *ibid.*, on a trunk of *Quercus petraea* (*Menispora glauca* associated), 22.X.1964, leg. V. Holubová-Jechová (PRM 887143); Lánská obora, Ploskov near Lány, on a trunk of *Carpinus betulus* (*Menispora glauca* associated), 26.V.1994, leg. M. R. (Herb. M. R. 541/94); Lánská obora, Kouglova ohrádka near Lány, on a trunk of *Carpinus betulus*, 26.IV.1995, leg. M. R. (Herb. M. R. 565/95); Southern Bohemia, Blanská kotlina, valley of the river Malše near Blansko, on a branch of *Corylus avellana*, 20.III.1971, leg. R. Podlahová (PRM 731875); Šumava Mts., on the slopes of Mt. Spáleníště (949 m a.s.l.) near Stožec, on a branch of *Fagus sylvatica* (*Menispora glauca* associated), 5.V.1995, leg. M. R. (Herb. M. R. 616/95); Šumava Mts., on the slopes of Mt. Spáleníště (949 m a.s.l.) near Stožec, on a branch of *Acer pseudoplatanus*, 5.V.1995, leg. M. R. (Herb. M. R. 613/95); Šumava Mts., on the slopes of Mt. Černý les (1007 m a.s.l.) near Záhvozdí, on the inner surface of bark of *Fagus sylvatica*, 6.V.1995, leg. M. R. (Herb. M. R. 601/95); Šumava Mts., nature reserve Medvědice, Černý Kříž near Volary, on *Acer pseudoplatanus*, 18.IX.1997, leg. M.R. (Herb. M.R. 1013/97), Šumava Mts., glacial cirque of the lake Černé jezero near Železná Ruda; on *Fagus sylvatica*, 27.VIII.97, leg. M.R. (Herb. M.R. 1060/97, 1135/97, 1136/97), Moravia, Bílé Karpaty Mts., on the slopes of Mt. Velká Javořina (970 m a.s.l.) near site called "Kamenná bouda" (c. 660 m a.s.l.), on a branch of *Fagus sylvatica*, 27.VII.1970, leg. V. Holubová-Jechová (PRM 720914). – Finland: Turku, Ruissalo, on *Quercus* sp., summer, 1869, leg. P. A. Karsten (H 4508); Turku, Ruissalo, on bark, 1.IX.1868, leg. P. A. Karsten (H 4509); Turku, Ruissalo, on wood of *Quercus* sp., summer, 1869, leg. P. A. Karsten (H 4510). – Slovak Republic: Central Slovakia, site called "Tri vody" near Lubietová, on a branch of *Fagus sylvatica*, 27.V.1971, leg. R. Podlahová (PRM 731896);

on the slopes of Mt. Hrb (1250 m a.s.l.) near Lubietová, on a branch of *Fagus sylvatica*, 26.V.1971, leg. R. Podlahová (PRM 731895). – Ukraine: Carpathian Mts., Bliznica near Rachiv, on *Fagus sylvatica*, 29.VI.1997, leg. M.R. (Herb. M.R. 937/97).

Descriptions and illustrations. Berlese (1894: Tab. 94, Fig. 2); Saccardo (1883: 214, 215); Winter (1885: 244); Munk (1957: 189, Fig. 70a); Dennis (1978: 368, Fig. 14b); Holubová-Jechová (1973: 322, Fig. 1.1).

Known hosts. *Acer pseudoplatanus*, *Alnus glutinosa*, *Carpinus betulus*, *Corylus avellana*, *Cotoneaster integerrimus*, *Fagus sylvatica*, *Hippophae rhamnoides*, *Sambucus nigra*, *Quercus petraea*, *Quercus* sp.

Habitat. The fungus occurs on bark, on the inner surface of bark and on wood at different stages of decay. Sometimes the *Menispora glauca* anamorph is associated, forming effuse, cushion-like, velvety, greyish to brown colonies and surrounds the dark, minute ascomata. Frequently both teleomorph and anamorph occur independently of each other. The best time for fructification of the teleomorph seems to be from May to August.

Distribution. Cosmopolitan in the temperate zone.

Chaetosphaeria ovoidea is widespread in the temperate zone on different kinds of deciduous trees and shrubs. It is, together with *C. pulviscula*, the most common species of *Chaetosphaeria* in this region. The species is variable in the size of the ascospores, which I found to be 22-29(-30) × 4-4.5(-6.2) μm. In some cases, the presence of the longer ascospores is connected to a larger size of the asci, but it does not prove to be regular. As mentioned above, the delayed formation of septa is typical of *Chaetosphaeria*. The young ascospores of *C. ovoidea* usually contain one septum, and two other distinct, refractive septa develop at maturity. The longer ascospores [27-29(-30) μm long] may occasionally contain four septa, but this character appeared very irregularly and no correlation with the size of the ascospores or asci and the occurrence of the fourth septum could be found. The variability of the ascospore size could be one of the reasons for the long list of synonyms.

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