CZECH MYCOLOGY
Publication of the Czech Scientific Society for Mycology

Volume 53 December 2001 Number 2

Notes on the taxonomy and distribution of Aphyllophorales I.

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Pouzar Z. (2001): Notes on the taxonomy and distribution of Aphyllophorales I. – Czech Mycol. 53: 121–131

Two new species of corticioid Aphyllophorales (Basidiomycetes) are described. *Thanatephorus brevisporus* Pouz. is a species close to *T. fusisporus* (J. Schröt.) Hauerslev et P. Roberts, differing however in shorter, more rounded spores, known from the Czech Republic, Slovakia and Ukraine, growing on rotten wood of broad-leaved trees. *Dendrothele wojewodae* Pouz. is close to *D. acerina* (Pers.: Fr.) P. A. Lemke, but is distinct by its subglobose spores. It is known from the Czech Republic and Ukraine, from bark of living trees of *Acer pseudoplatanus*.

Key words: *Aphyllophorales, Corticiaceae* s.l., new species, *Thanatephorus brevisporus* Pouz., *Dendrothele wojewodae* Pouz.

Pouzar Z. (2001): Poznámky k taxonomii a rozšíření nelupenatých hub I. – Czech Mycol. 53: 121–131

Popisují se dva nové druhy kornatcovitých hub řádu Aphyllophorales (Basidiomycetes): *Thanatephorus brevisporus* Pouz., druh blízce příbuzný druhu *T. fusisporus* (J. Schröt.) Hauerslev et P. Roberts, avšak lišící se kratšími a kulatějšími výtrusy; je znám z České republiky, Slovenska a Ukrajiny z hnijícího dřeva listnatých stromů; *Dendrothele wojewodae* Pouz. je velmi blízký druhu *D. acerina* (Pers.: Fr.) P. A. Lemke, ale liší se skoro kulovitými výtrusy; je znám z České republiky a z Ukrajiny, z kůry živých klenů – *Acer pseudoplatanus*.

INTRODUCTION

During the years 1994–2001 a study of the order Aphyllophorales in the South Bohemian mountains of Šumava (mainly the Šumava National Park) has been carried out. Soon it, however, appeared that these mountainous or even to some degree also boreal species should be compares with those of southern and more thermophilous nature. Hence a study of these fungi started in forests in the vicinity of Prague where such a mycoflora is richly represented. These studies resulted in the recording of several rare species too, some of which appeared to be undescribed. In this first contribution two new interesting species of *Corticiaceae* sensu lato are described and discussed.

Thanatephorus brevisporus Pouz. spec. nov.

Carposomata effusa, hypochnoidea, cremea usque pallide ochracea. Hyphae absque nodis, glabrae, fere tenuiparietales, basales 7–10 μm latae, horizontales in angulos rectos ramificatae, mediae 6–7,5 μm, verticales, laxe contextae. Basidia 14–18 μm longa et 10–12 μm lata in parte distale, leviter vel late clavata, haud constricta, bisterigmatica, nonnumquam tri-, raro tetrasterigmatica; sterigmata 8–11 μm longa et basim 2–3.5 μm lata, solum leviter subarcuata vel fere recta. Sporae 9–12.5 × 7–9.5 μm, subglobosae usque breviter ovoideae, fere tenuiter tunicatae, glabrae, apice cum mamilla distincta, isodiametrica, saepius leviter elongata, seu raro apex sporarum in conum latissimum, brevemque terminatus. Hyphae, basidia, sterigmata sporaeque cyanophilae, sed haud dextrinoideae et haud amyloideae.

Holotypus: Bohemia, Voškov apud Karlštejn, *Carpinus betulus* – ad truncum iacentem, 7. V. 2001, leg. Z. Pouzar, PRM 895056, in Museo Nationale Pragae asservatur.

Paratypus: Slovakia, silva virginea "Badínsky prales" apud Badín prope Banská Bystrica, ad truncum iacentem *Fagi sylvaticae* 4. VIII. 1973, leg. Z. Pouzar PRM 895057.

Fruitbodies resupinate, when young forming very small tufts, soon confluent to become hypochnoid or mucedinoid, comparatively widely spread over the substratum, colour cream to pale ochraceous. Basal hyphae rather sparse, those parallel close to the substratum 7–10 μm wide. Median vertical hyphae loosely arranged 6–7.5 μm broad. Subhymenium of shortly septate hyphae, 7–9 μm broad. Clamp-connections completely missing. All structures without incrustations. Hyphal ends similar to cystidia, scattered in the hymenium of some few specimens (typically developed in PRM 895057), frequently arising from the hymenium close by basidia, straight 27–50(-90) μm long, 6–8 μm broad at the basis and 5–7.5 μm broad in the upper half, cylindrical, sometimes in central part slightly broadened, some 1–3× slightly but abruptly constricted, rounded at the top, 1–2 × (at most 3×) septate, sometimes without septa, filled with strongly cyanophilous content. Basidia 14–18 μm long and 10–12 μm broad in distal part, narrowly to broadly clavate, not constricted, bisterigmatic, only some tristerigmatic and few tetrasterigmatic. Sterigmata only slightly arcuate to almost straight, 9–11 μm long and 2–3.5 μm broad at base. Spores 9–12.5 × 7–9.5 μm, subglobose to shortly ovoid, at the apex with a distinct isodiametric or at most slightly elongate mammiform outgrowth, a few spores broadly coniformly terminated; richly producing spores by repetition. All hyphae, basidia and spores with cyanophilous, but indextrinoid and inamyloid walls.

Distribution and ecology

Thanatephorus brevisporus is so far known from three localities in the Czech Republic (two in Bohemia, one in Moravia), five in Slovakia and one in Ukraine (Transcarpathian region). This species could occur from the lowlands (elevation 152 m in Ranšpurk Virgin Forest) to mountains up to an elevation of about 1000 m in the Slovak Carpathians (Vrátna dolina in Veľká Fatra and Poľana near Detva possibily at 1200 m). It is known only from strongly rotten wood of broad-leaved trees, especially *Fagus sylvatica, Tilia platyphyllos, Carpinus betulus, Acer pseudoplatanus* and also *Ulmus* sp.

Material studied

Czech Republic

1. Bohemia, Voškov ap. Karlštejn, (area tuta); *Carpinus betulus* – ad truncum iacentem 7. V. 2001, leg. Z. Pouzar, PR 895056 (holotype). Ibid. *Tilia platyphyllos* – ad truncum iacentem 7. V. 2001, leg. Z. Pouzar, PRM 894928.
2. Bohemia, Karlštejn, loco "Vodopády" (Bubovické vodopády); ad ligna putrida arboris frondosae iacentis, 29. VII. 1962, leg. Z. Pouzar, PRM 793513.
3. Moravia, silva virginea "Ranšpurk" ap. Lanžhot; in trunco putrido *Ulmi* sp., 28. VII. 1970, leg. Z. Pouzar, PRM 803635.

Slovakia

4. Montes Veľká Fatra, in valle "Vrátna dolina" (sub Ostredok); in cortice *Fagi sylvaticae* (truncus iacens), 4. VII. 1953, leg. F. Kotlaba et Z. Pouzar, PRM 803634.
5. Silva virginea "Badínsky prales" sub monte Laurín prope Badín ap. Banská Bystrica, ca 800 m s.m.; ad truncum iacentem *Fagi sylvaticae*, 4. VIII. 1973, leg. Z. Pouzar, PRM 895057 (paratype).
6. In silvis virgineis montis Poľana ap. Detva, ca 1200 m s.m.; ad ligna *Fagi sylvaticae*, 25. VI. 1952, leg. A. Pilát, PRM 189589, 189599.
7. In silvis Jasov ap. Košice; ad codicem *Aceris pseudoplatani*, 27. VI. 1965, leg. F. Kotlaba, PRM 803633.
8. In monte "Malý Milič" prope Slanská Huta (h.p. Slanec); ad truncum putridum *Fagi sylvaticae*, 17. VII. 1964, leg. F. Kotlaba et Z. Pouzar, PRM 803636.

Ukraine

9. Transcarpathian Region (olim Carpatorossia), Jalinka prope Kosovská Polana; VII. 1930, leg. A. Pilát, PRM 189598.

When studying rather rich material of *Thanatephorus fusisporus* (J. Schröt.) Hauerslev et P. Roberts [*Uthatobasidium fusisporum* (J. Schröt.) Donk], collected in the vicinity of Prague in autumn 2000 and in spring 2001, it appeared

that the variability of spore size and form in this species is more restricted and narrower than presumed earlier. This experience led to the conclusion that short-spored specimens represent an independent species, which is described here as *Thanatephorus brevisporus* Pouz. spec. nov. The main body of the spore is in most spores of this species almost isodiametric, with the length nearly equating the breadth. Only the rather strongly developed apiculus and the striking apical projection on the opposite end of the spore breaks the spore isodiametry.

The original idea of a possible distinguishing of three taxa in the *Thanatephorus fusisporus* complex instead of two, comes from Rogers (1943, p. 107) who, however, came to the opposite solution: "The two, or three, smaller units are easier to define or to insert in a key; but the one species is the natural group." [he named the species *Pellicularia flavescens* (Bonord.) D. P. Rogers]. Our experience with this complex leads nevertheless to the distinction of three species, rather than merging all three morphotypes into one species. Besides the rather rare species *Thanatephorus ochraceus* (Massee) P. Roberts, which is characterised by a rounded spore apex (without a protuberance) there are two taxa in which spores bear an apical outgrowth. One is *Thanatephorus fusisporus* (J. Schröt.) Hauerslev et P. Roberts, in which the spore apex is gradually attenuating towards the terminal protuberance, the other is *Thanatephorus brevisporus* Pouz. spec. nov., in which the spore apex is abruptly outgrowing from the top, which is however rounded or abruptly conically formed. There are some individual spores, in almost every specimen, which display the opposite character viz. attenuated spores in *T. brevisporus* and the apex-rounded (with a terminal protuberance) in *T. fusisporus*, but if taking a representative majority of spores, the result is quite unambiguous. The second character – the number of sterigmata – is of slightly lower value, even if in *T. brevisporus* the basidia have generally two sterigmata, but with a tendency to form three sterigmata and few basidia even four sterigmata. The situation in *T. fusisporus* is quite opposite: generally basidia have four sterigmata, mixed however with basidia bearing three, but some basidia are also bisterigmatic. I am distinguishing three species, being well aware that there could be some objections, as the mentioned transitional spores and basidia exist. But the rather rich available material can easy be split according the criteria cited, hence its recognition at the level of species seems to be substantiated. Nevertheless Roberts (1999) includes both species with apical outgrowth on spores in one broadly defined *Thanatephorus fusisporus* (see his figures 41 and 42).

The nomenclature of this group has been explained by Rogers (1935, 1943), Donk (1958), J. Eriksson (1958) and Roberts (1998). The name *T. fusisporus* could confidently be applied to the species with spores having an attenuated spore apex as in the original diagnosis this character is clearly indicated: "Sporen 11–15 μ

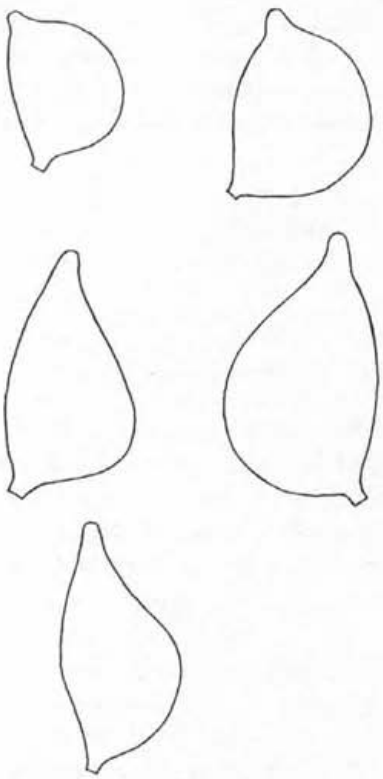

Fig. 1. *Thanatephorus brevisporus* Pouz. – two spores in upper part. – *Thanatephorus fusisporus* (J. Schröt.) Hauerslev et P. Roberts – three spores in lower half.

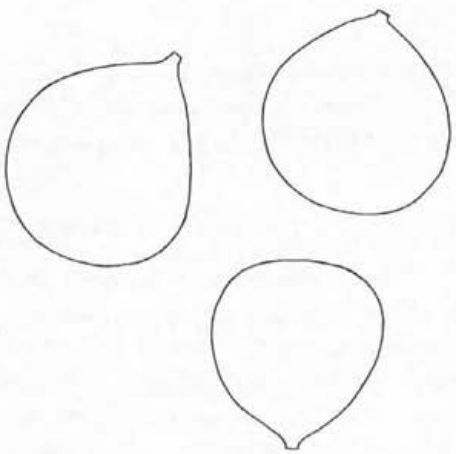

Fig. 2. *Dendrothele wojewodae* Pouz. – spores.

(einzeln bis 17) μ lang, 7–10 μ breit, an beiden Enden stark verschmalert, ..." (Schroeter 1888, p. 416).

Dendrothele wojewodae Pouz. spec. nov.

Carposoma resupinatum, siccum, firme adhaerens, 15–115 μm crassum, maculas irregulares formans, albidum seu pallide griseolum, aliquantulum leviter griseo-rubescens. Hyphae basales 1–3 μm latae, tenuiter tunicatae, haud incrustatae, nodoso-septatae. Cystidia 15–25 × 7–10 μm, elongato ovoidea vel late ellipsoidea, in carposomate inclusa, in cacumine saepe cum appendice hyphali 3–14 μm longo, 1–1.8(-2,5) μm lato, usque 3 × strangulato, haud incrustato.

Dendrohyphidia 1–1.5 μm lata, breviter dendroide ramosa, tenuiter tunicata usque solida, leviter cyanophila, incrustatione crystallina tenuiter saepissime tecta. Basidia 27–40 × 7–11 μm, tetrasterigmatica, late cylindrica, pariete in parte basali leviter incrassata et fortiter dextrinoidea et cyanophila. Sporae 9–12 × 8–11 μm, globosae seu subglobosae, pariete tenui, glabra, cyanophila, haud amyloidea et non dextrinoidea.

Holotypus: Bohemia, montes Šumava, mons "Ždanidla" ap. Prášily; *Acer pseudoplatanus* – ad corticem trunci vivi 8. X. 2000, leg. Z. Pouzar, PRM 895055, in herbario Musei Nationalis Pragae asservatur.

DESCRIPTION

Fruitbody corticioid, resupinate of firm and of hard consistency, rather thin (15–115 μm), forming irregular spots 1–2.5 μm broad, with determinate and adnate margin, colour of hymenium whitish or pale greyish with a slight greyish-rose tinge. Hyphal system monomitic, generative hyphae inconspicuous, 1–3 cm broad, thin-walled, hyaline, with clamps on all septa, inamyloid, indextrinoid, but distinctly cyanophilous, partly incrusted with minute crystals. Cystidia embedded (not projecting) 15–25 × 7–10 μm, elongately ovoid or broadly ellipsoidal to cylindric-ellipsoidal, with wall slightly thickened, hyaline, top rounded or obtuse-conical, sometimes with a hyphal outgrowth (appendix), 3–14 μm long and 1–1.8(-2.5) μm broad, thin-walled, hyaline, when longer up to 3 × strangulated, not incrusted, sometimes twice or three times ramified in the middle part. Dendrohyphidia 1–1.5 μm broad, richly branched, thin– to thick-walled or some also solid, slightly cyanophilous, covered mostly with crystalline incrustations. Basidia 27–40 × 7–11 μm, tetrasterigmatic, broadly cylindric, mostly slightly constricted in the middle part, thin-walled, but in the lower half with a slightly thickened wall and here strongly dextrinoid (especially striking in collapsed ones), strongly cyanophilous, inamyloid. Sterigmata ca. 8–11 × 1.5(-2) μm, only slightly curved. Spores 9–12 × 8–11 μm, globose or subglobose, with distinct basal apiculus, wall comparatively thin, completely glabrous, not amyloid, not dextrinoid, but distinctly cyanophilous.

The name *Dendrothele wojewodae* is dedicated to prof. dr. Władyslaw Wojewoda (Kraków) who contributed substantially to our knowledge of fungi, on the occasion of his forthcoming 70^{th} birthday.

Somewhat similar to our new species is *Dendrothele globulispora* Boidin et Lanquetin, known from one specimen, collected in the Central African Republic, spores of which are smaller viz. 7–8.2 × 6–7(-7.5) μm, compared with those

of *D. wojewodae*, which are 10.5–12 × 9.5–11 μm. Spores of *D. griseocana* (Bres.) Bourd. et Galz. are slightly similar, but in this species clamp-connections on basal hyphae are completely lacking, whereas in *D. wojewodae* they are invariably present. The main difference is, however, the absence of hymenial hyphal pegs (formed of hyphidia) in *D. wojewodae*, contrary to their constant presence in *D. griseocana*. Our new species could be compared with *D. incrustans* (P. A. Lemke) P. A. Lemke, with which it shares the same form and almost also the same size of spores, but our species differs very strikingly by its cystidia, part of which is provided with an apical digitiform outgrowth (cystidia completely lacking in *D. incrustans*). Such cystidia are characteristic of *Dendrothele acerina* (Pers.: Fr.) P. A. Lemke, a species evidently closely related, but distinct in possessing quite different spores. *Dendrothele wojewodae* and *D. acerina* share an important character viz. the presence of clamp-connections on hyphae. Even if Lemke (1964, p. 728) indicated the absence of clamps in *D. acerina*, Boidin et al. (1996) quite correctly treated this species as a clamp-bearing one. To observe clamps in *Dendrothele* it is necessary to study hyphae on the very bottom of the fruitbody, close to the bark tissue (or even the mixture of fungal tissue and cells of bark).

DISTRIBUTION AND ECOLOGY

Dendrothele wojewodae is known from four localities: two in the Šumava Mountains in Southern Bohemia and two in the Transcarpathian Region in Ukraine. On all four localities it was collected in virgin forests at an elevation from 700 to 1200 m s.m.. In all four cases the substrate is the outer side of bark-chips of living trees of *Acer pseudoplatanus*. It is necessary to look for this fungus in other places to verify our tentative supposition that *D. wojewodae* is a species of montane forests at high elevations.

MATERIAL STUDIED

1. Czech Republic, Bohemia, montes Šumava, in monte Ždanidla, declive merid.-orient. ap. Prášily, ca. 1200 m s.m.; *Acer pseudoplatanus* – ad corticem trunci vivi, 8. X. 2000, leg. Z. Pouzar, PRM 895055 (holotype).
2. Czech Republic, Bohemia, montes Šumava, loco "Dračí skály" sub Čeňkova Pila, in valle rivi Vydra. ca. 700 m s.m., *Acer pseudoplatanus* – ad corticem trunci vivi, 29. IX. 2001, leg. Z. Pouzar, PRM 895172
3. Ukraine, Transcarpathian Region, in valle rivi Liščenka prope vicum Trebušany, in silvis virgineis (*Abies alba, Picea excelsa, Fagus silvatica*), alt. 800–1000m s.m.; matrix: *Acer pseudoplatanus*, VIII. 1936, leg. A. Pilát, PRM 29086.
4. Ukraine, Transcarpathian Region, Žámer prope Kobylecká Polana; ad cortices *Aceris pseudoplatani*, VIII. 1929, leg. A. Pilát, PRM 650787.

Notes on the variability of spore – wall amyloidity in the *Dendrothele acerina* complex

When studying the *D. acerina* complex the most striking phenomenon appears to be the elsewhere not met variability of spore-wall amyloidity in species of this group. Amyloidity of the spore-wall is a rather constant character in fungi, not displaying a more conspicuous unsteadiness. Here we are, however, confronted with the rare feature of fluctuation of spore-wall amyloidity from almost absent to rather strong. In *Dendrothele acerina* material was studied, collected one day (13. VII. 2001) on three different trees of *Acer campestre* in one forest (on the bottom of Radotín Valley near Prague). These specimens were examined the day after collecting. In one collection only collapsed spores were amyloid whereas freshly developed, even fully ripened ones were completely inamyloid. In the collection from another tree amyloidity was very rare, except for a few old, almost nearly collapsed spores (the majority of completely collapsed spores being not amyloid). In the third specimen amyloid spores were very frequent. Not only fully ripened ones, but also those on basidia, and not infrequently also the small, just developing spores were amyloid. Nevertheless, no specimen of *D. acerina* studied completely missed amyloidity. In the closely related species *D. alliacea*, amyloidity of the spore-wall is much stronger and more striking. In all specimens studied some degree of amyloidity was observed (none of the spores was completely inamyloid). In some spores, however, the wall is interpenetrated by diffused, minute amyloid granules, hence the spore-wall is dark nebulous greyish, in other specimens the spore-wall is irregularly spotted by an amyloid substance (mostly in the central part of the spore). In *D. wojewodae* spores are inamyloid, only in one slide four underdeveloped spores were observed on one collapsed basidium with very faintly amyloid walls. A few fully disintegrated, collapsed spores were observed as amyloid.

Amyloidity in the group of *Dendrothele acerina* could be taken into account in taxonomic considerations, but with restraint, having in mind its high degree of variability.

A key to the Central European species of *Dendrothele* (recorded or expected possibly to occur here)

1a Spores with one or several outgrowths or protuberances on their top 2
1b Top of spores rounded or amygdaloid-acuminate (with no outgrowth) 4
2a Spores with three to five outgrowths (on their top) ..... *D. tetracornis*
2b Spores with one outgrowth or protuberance on the top 3
3a Spores up to 7 μm broad ..... see *D. amygdalispora*
3b Spores more than 7 μm broad ..... *D. citrisporella*

4a Spores strongly allantoid (cylindrical and curved) 28–32 × 10–12 μm ..... *D. dryina*
4b Spores not curved (ellipsoidal, subglobose, globose, amygdaloid, ovoid) ... 5
5a Spores amygdaloid (top part a broad cone) ..... *D. amygdalispora*
5b Spores rounded at their top 6
6a Basidia mostly with two or three sterigmata 7
6b Basidia mostly with four sterigmata 8
7a Protruding fascicles of dendrohyphidia in the hymenium, spores almost subglobose ..... *D. griseocana*
7b No protruding fascicles of hyphidia in the hymenium, spores ovoid or short ellipsoidal ..... *D. commixta*
8a Spores prolonged ellipsoidal, more than 14 μm long ..... *D. alliacea*
8b Spores broadly ellipsoidal, ovoid or subglobose to globose, at most 14 μm long 9
9a Cystidia absent, sterigmata 2–3 ..... see *D. commixta*
9b Cystidia present, sterigmata mostly 4 10
10a Spores broadly ellipsoidal to ovoid ..... *D. acerina*
10b Spores globose to subglobose ..... *D. wojewodae*

Notes on species treated in the key

Dendrothele acerina (Pers.: Fr.) P. A. Lemke. Illustr.: Eriksson and Ryvarden (1975) p. 352, fig. 144a: Lemke (1964) p. 728, fig. 1; Boidin et al. (1996) p. 91, fig. 1Ac. Very frequent, especially on bark of living trees of *Acer campestre* and some other trees.

Dendrothele alliacea (Quél.) P. A. Lemke. Illustr.: Eriksson and Ryvarden (1975) p. 352, fig. b-f; Boidin et al. (1996) p. 91, fig. 1 Al; Kotiranta and Saarenoksa (2000) p. 18, fig. 11 a-f. In Europe widely distributed, common on bark of living trees of oaks (*Quercus* spec. div.), but also on *Ulmus, Juglans, Tilia, Salix, Robinia, Acer* and *Alnus*; also in North America and recorded from South Africa. A species very closely related and similar to *D. acerina*, from which it could be distinguished by the slightly narrower and longer spores – the largest spores are mostly longer than 14 μm. The breadth of spores is also different: in *D. alliacea* mostly 6–7 μm, in *D. acerina* 7–8 μm. The smell of fresh fruitbodies is characteristic, reminding of *Allium porrum* L. – hence the appropriate epithet "alliacea".

Dendrothele amygdalispora Hjortst. Illustr.: Eriksson and Ryvarden (1975) p. 361, fig. 147 (as *Dendrothele* sp.); Hjortstam (1987) p. 57, fig. 1B; Kotiranta and Saarenoksa (2000) p. 19, fig. 19a-d. Known only from Norway (on bark of *Prunus padus* = *Padus avium*) and Finland (*Salix, Corylus*), possibly also in

France (see Boidin et al. 1996, p. 93). Besides the spore form, it is characterised by tetrasterigmatic basidia and absence of clamps.

Dendrothele citrisporella Boid. et Duhem. Illustr.: Boidin et al. (1996) p. 100, fig. 3A. Known only from the western part of France on bark of *Salix* and *Arbutus unedo*. Basidia bisterigmatic, clamps and cystidia absent.

Dendrothele commixta (Höhn. et Litsch.) J. Erikss. et Ryv. Illustr.: Eriksson and Ryvarden (1975) p. 356, fig. 145; Boidin et al. (1996) p. 100, fig. 3Co. Known from Sweden, Norway, Poland, Czech Republic and France (also from New Zealand); on bark of oaks (*Quercus* spec. div.). Characteristic by absence of cystidia, complete absence of amyloidity and dextrinoidity, presence of clamp-connections and mainly by its basidia having two to three sterigmata.

Dendrothele dryina (Pers.) P. A. Lemke. Illustr.: Boidin et al. (1996) p. 100, fig. 3D. Known with certainty only from Western Europe, on bark of oaks (*Quercus* spec. div.); the large allantoid spores are diagnostic. The name is probably not definitive, due to uncertainty of the interpretation of the basionym *Thelephora dryina* Pers. 1822.

Dendrothele griseocana (Bres.) Bourd. et Galz. Illustr.: Boidin et al. (1996) p. 102, fig. 4G; Eriksson and Ryvarden (1975) p. 358, fig. 146. Rather rare species growing on bark of living trees like *Salix, Ulmus, Acer* and some other trees. Characteristic by pegs of dendrohyphidia scattered on fruitbody, emerging like teeth from the hymenium, also by the absence of clamps, almost globose spores, bisterigmatic basidia and absence of cystidia.

Dendrothele tetracornis Boid. et Duhem. Illustr.: Boidin et al. (1996) p. 102, fig. 4T. Known only from France, growing on bark of living oaks (*Quercus* spec. div.) and *Populus nigra*.

ACKNOWLEDGMENTS

The author would like to thank dr. Jan Holec, National Museum, Prague, for his highly effective help during our common collecting trips in Šumava mountains. The study was financially supported by a Ministry of Culture of the Czech Republic Grant (no. RK 99P030MG002).

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