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Cheiromycina ananas is a synonym of *Dictyocatenulata alba*, a widespread, lichenized, synnematous hyphomycete herewith reported as new for Europe

Cheiromycina ananas, ein Synonym von *Dictyocatenulata alba*, ein weitverbreiteter, lichenisierter, Synnemata-bildender Hyphomycet, hier neu für Europa gemeldet

Paul DIEDERICH, Zdeněk PALICE & Damien ERTZ

Summary: A relatively common and widespread lichenized, synnematous hyphomycete collected mainly on the smooth bark of different trees in Central and Eastern Europe proved to belong to *Dictyocatenulata alba*. The species was known from Central and North America and Asia, and is herewith newly reported from Europe. *Cheiromycina ananas*, previously known only from the type collection in the U.S.A., is considered as a new synonym of *D. alba*. A description and illustrations are provided to show the morphological variability of the species.

Zusammenfassung: Es wurde gezeigt, dass ein relativ häufiger, lichenisierter, Synnemata-bildender Hyphomycet, welcher vorwiegend auf glatten Rinden von verschiedenen Baumarten in Mittel- und Osteuropa gesammelt wurde, zu *Dictyocatenulata alba* gehört. Die Art war aus Mittel- und Nordamerika und aus Asien bekannt, und wird hier zum ersten Mal aus Europa gemeldet. *Cheiromycina ananas*, welche zuvor nur von dem Typus aus den USA bekannt war, wird als neues Synonym von *D. alba* angesehen. Eine Beschreibung und Abbildungen zeigen die morphologische Variabilität der Art.

Introduction

The genus *Cheiromycina* B. SUTTON was originally introduced by SUTTON & MUHR (1986) for a sporodochial hyphomycete growing on lignum at the base of a *Picea* trunk. It produces flabelliform to palmate conidia developing from large, subspherical conidiogenous cells in deep grey to olivaceous sporodochia.

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HAWKSWORTH & POELT (1986) recognized that the species is lichenized and represents one of the very few known hyphomycetous lichens. Two additional lichenized *Cheiromycina* species with similar conidiomatal and conidial characters were eventually published: *C. petri* D. HAWKSW. & POELT (HAWKSWORTH & POELT 1990), and *C. reimeri* PRINTZEN (PRINTZEN 2007).

APTROOT & SCHIEFELBEIN (2003) described two further *Cheiromycina* species with unusual characters. *C. globosa* APTROOT & SCHIEFELB. produces aseptate, subspherical conidia in flat, white sporodochia on the bark of *Acer platanoides*, and *C. ananas* APTROOT & SCHIEFELB. muriform conidia in white, hemispherical sporodochia on the bark of *Fagus sylvatica*.

During the past ten years we collected or received many specimens of an unusual synnematous hyphomycete developing over a very thin, dark green (when wet) or greyish green (when dry) lichenized thallus, mainly on smooth bark. The study of many specimens left no doubt that the thallus, on which these synnemata grow, belongs to them, which means that our material represents a synnematous lichen. We realized that this material represents a species closely related to *Cheiromycina ananas*, differing by elongate, synnematous conidiomata (versus sporodochia) and much smaller conidia, 7–14 µm long (versus 20–30 µm). However, a study of all our specimens showed that the height of the synnemata is very variable; even within one specimen, and some conidiomata are so much reduced in height that they look like sporodochia. Examination of the isotype of *C. ananas* revealed conidia much smaller than those described in the original description, similar in size to those of our material. We concluded that all our material belongs to *C. ananas*, and that the type of that name is atypical with reduced synnemata.

A careful examination of the literature yielded an older name representing the same species, *Dictyocatenulata alba* FINLEY & E. F. MORRIS, of which *Cheiromycina ananas* becomes a younger synonym. *D. alba* was originally described as a bark-inhabiting synnematous fungus, and only recently LENDEMER & HARRIS (2004) demonstrated that the species is lichenized.

The aim of this paper is to establish the new synonymy of *Cheiromycina ananas*, to report the species as new to Europe, to show its known world distribution, and to draw the attention of this peculiar, often misunderstood or misidentified lichen to European lichenologists.

It is a pleasure for us to dedicate this paper to Volkmar WIRTH on the occasion of his 65th birthday.

Material and methods

We studied an isotype of *Cheiromycina ananas* from ABL and many specimens of *Dictyocatenulata alba* from various herbaria (see specimens below). Co-

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nidiomata were either examined entirely or in section in water or lactophenol cotton blue, sometimes following a slight pressure on the cover glass.

Results

Dictyocatenulata alba FINLEY & E. F. MORRIS, Amer. Midl. Nat. **77**: 201 (1967); type: U.S.A., New Hampshire, Chocorua, on bark of *Fagus grandifolia*, Sept. 1904, W. G. FARLOW 200a (FH–holotype, non vid.).

Syn. nov.: *Cheiromycina ananas* APTROOT & SCHIEFELB., Mycol. Res. **107**: 106 (2003); type: U.S.A., Maryland, Baltimore, Patapsco Valley State Park, Avalon, 39°20′ N, 76°50′ W, on bark of *Fagus sylvatica* in mixed forest, 23 June 2001, A. APTROOT 50794 (B–holotype, non vid.; ABL–isotype!).

Syn.: *Stilbum glomerulisporum* ELLIS & EVERH., North American Fungi no. 3597 (1898), nomen nudum.

Thallus crustose, effuse, contiguous, smooth, surface greyish green (when dry) or dark green (when wet), matt; in section very thin, irregularly developed, not distinctly corticate; photobiont frequently immersed in the substrate, trentepohlioid, cells 7–12 µm. Conidiomata synnemata, determinate, single, rarely branched, (0–)100–1500 µm tall; stipe cream coloured, smooth, 25–175 µm diam.; fertile zone convex, white, the same diameter as the stipe or rarely up to 300 µm, upper surface uneven when covered by conidial agglomerations, when eroded becoming concave and cream coloured (same colour as stipe). Hyphae of stipe parallel, dense, hyaline, cells 5–17 µm long and 1–2 µm in diam. Conidiophores arising from stipe hyphae and similar to them, up to 3 µm in diam. Conidiogenous cells hyaline, smooth, either originating directly from the synnemata and then elongate cylindrical, 5–11 × 2.5–3 µm, or from other conidia and then frequently "2-celled", each cell subcylindrical to slightly claviform, often thicker close to the conidia, 3–6.5 × 1.5–3 µm, one of the cells acting as conidiogenous cell, the other as conidiophore (it is often difficult to identify in squash preparations which one of both conidia is being produced from the other one), resulting in chains of several conidia. Conidia subspherical to shortly ellipsoid, muriform, mostly 10–25(–40)-cellular, hyaline, 7–14(–18) × 7–11 µm; individual cells subspherical to shortly ellipsoid, smooth, mostly 2.5–3.5 µm diam.

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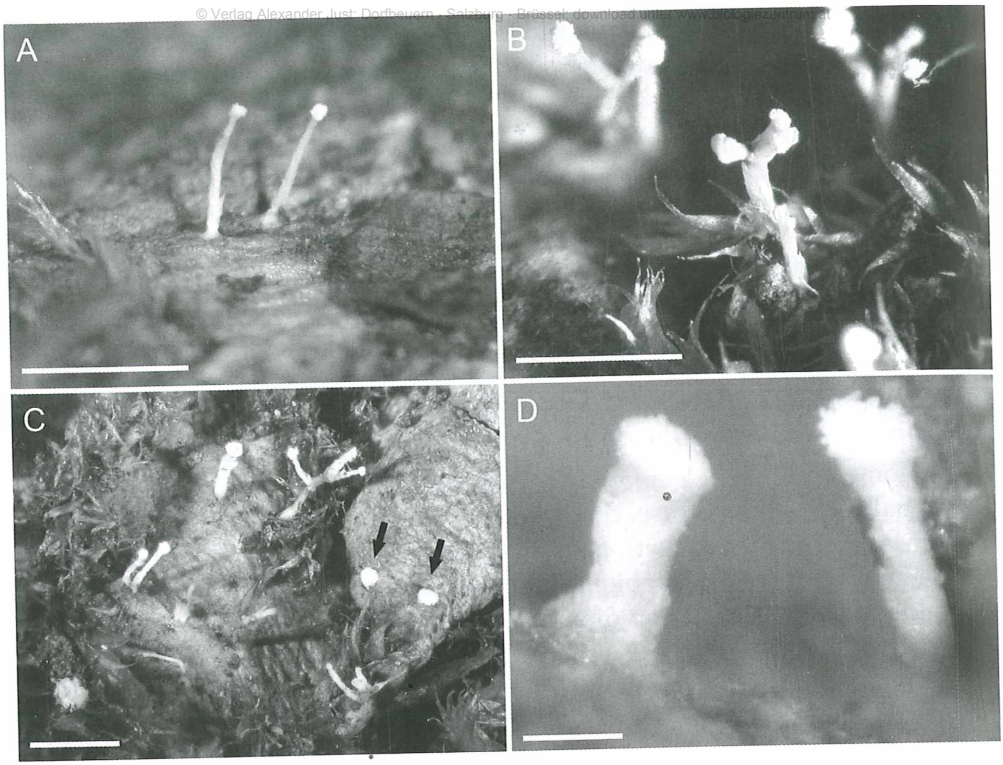

Fig 1: *Dictyocatenulata alba*. A: long, slender synnemata; B: branched synnemata; C: mixture of normal (left), branched (top) and short, 'sessile' synnemata with a reduced stipe (right, arrows); D: synnemata at a high magnification showing the rough surface of the fertile zone (right synnema) representing conidial agglomerations (A-C: S. L. JONESON 859; D: Z. PALICE s. n., Austria, Kesselbach). Scales: A-C = 1 mm, D = 0.2 mm.

Distribution and ecology: *Dictyocatenulata alba* was known from Canada, the USA, Cuba, Panama, India and Japan (HARRIS & LENDEMER 2006, LENDEMER & HARRIS 2004, MORRIS & FINLEY 1967, SEIFERT et al. 1987). We report it herewith as new for Europe and Russia (eastern Siberia, Primorsky Krai). It seems to be widespread and locally common in Central and Eastern Europe, but obviously rare or possibly absent in W-Europe. European collections were made mainly in humid broad-leaved and mixed forests, often in valleys near a stream. The material examined by us mainly grew on the smooth bark of *Acer pseudoplatanus*, *Betula*, *Fagus sylvatica* and *Quercus*, frequently at the shaded base of the stem. It has also been collected twice on rocks (LENDEMER & HARRIS 2004). The species usually forms extensive patches not intermingled with other lichens, although *Coenogonium pineti* (ACH.) LÜCKING & LUMBSCH was several times recorded in the near proximity. Fig. 4 shows the known world distribution of the species.

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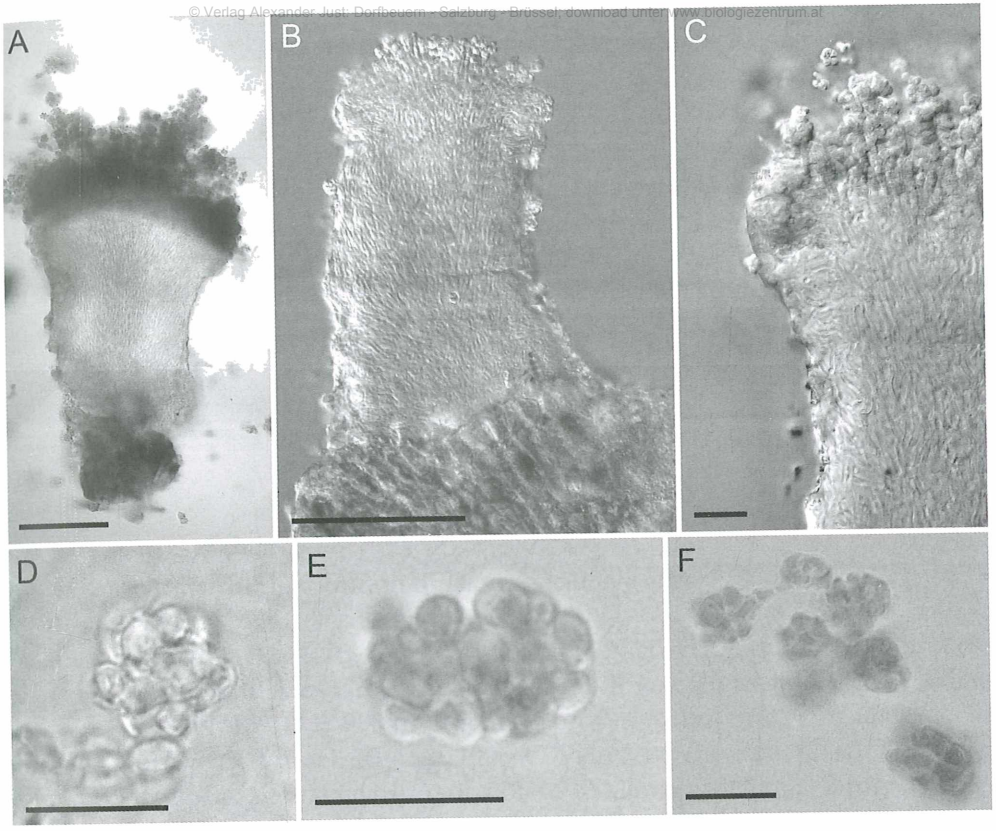

Fig 2: *Dictyocatenulata alba*. A: entire synnema in lactophenol cotton blue; B: synnema in differential interference contrast (DIC); C: idem, showing conidiogenesis; D-F: muriform conidia in squash preparations (F shows the production of a conidium from another one, top left) (A-C, E-F: Z. PALICE s. n., Austria, Kesselbach; D: isotype of *Cheiromycina ananas)*. Scales: A-B = 100 µm, C = 20 µm, D-F = 10 µm.

Additional specimens examined: Austria: Oberösterreich, Mühlviertel, valley of Kesselbach, c. 800 m, on basis of *Fagus*, 5 Aug. 1997, Z. PALICE (BR, PRA); ibid., Mt Bärenstein, NNE slope, 890 m, on *Sorbus*, 5 Aug. 1997, Z. PALICE (PRA). **Czech Republic**: W Bohemia, Šumava Mts, surroundings of Hamry village near Železná Ruda, [probably] on bark of *Fagus*, June 1906, M. SERVÍT (PRC) (sub *Coniocybe hyalinella);* ibid., valley of creek Svarožná (Büchel-Bach) W of Železná Ruda, NE of the creek c. 500 m from German Czech border, 49°09'18" N, 13°10'57" E, 910 m, spruce forest, on *F. sylvatica*, 12 Oct. 1999, C. PRINTZEN

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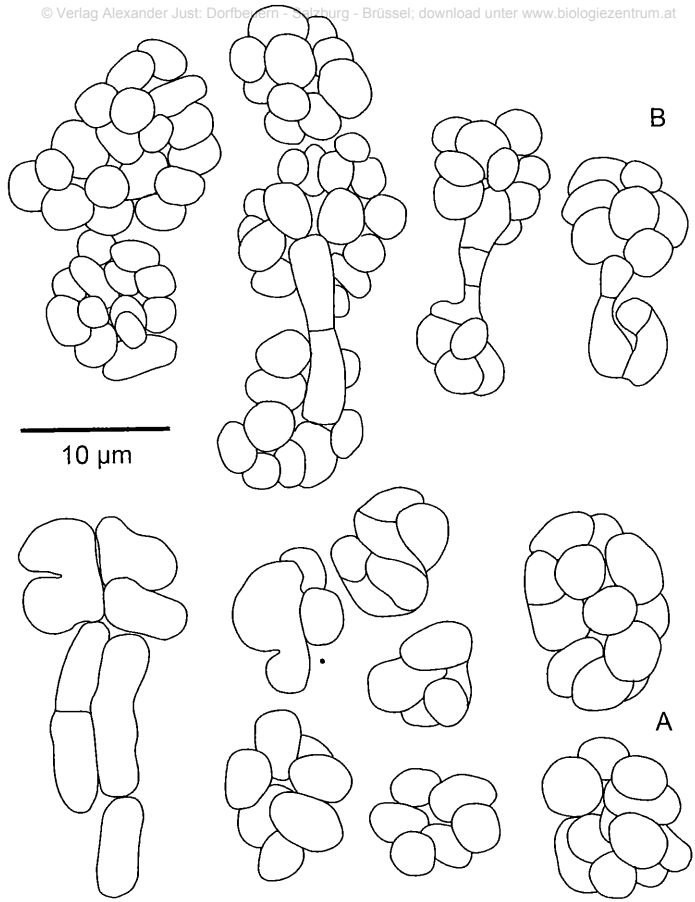

Fig. 3: *Dictyocatenulata alba*, conidia and conidiogenesis (observed in a squash preparation, and thus only fragments of conidial chains visible) (A: Z. PALICE s. n., Czech Republic, S Bohemia Šumava Mts, 1996; B: Z. PALICE s. n., Austria, Kesselbach).

(hb PRINTZEN); S Bohemia, Šumava Mts, Mt Jelení vrch, c. 3 km S of Černý Kříž, 850-900 m, rest of deciduous mountain forest, at basis of *Fagus sylvatica*, 15 Oct. 1995, Z. PALICE (PRA); ibid., remnants of mountain beech forest, at base of *F. sylvatica*, 1996, Z. PALICE (PRA, hb DIEDERICH); ibid., E slope of Mt Studničná and Mt Hraničník, 48°45′30″ N, 13°55′ E, 1050 m, mixed forest of *Picea*, *Fagus* and some *Acer pseudoplatanus* close to a creek, base of *F. sylvatica*, 6 Aug. 1996, J. HALDA, Z. PALICE & C. PRINTZEN (hb PRINTZEN); E Bohemia, Sudeten, Krkonoše Mts, Mt Liščí hora, valley of Kotelský potok brook, c. 700 m, 29 July 2001, Z.

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Fig. 4. Known world distribution of *Dictyocatenulata alba*.

PALICE (PRA, hb DIEDERICH). **Germany**: Bayern, Niederbayern, NSG "Höllbachgespreng" c. 1,2 km E des Groβen Falkenstein NE von Zwiesel, NE des Höllbaches, 49°05'20" N, 13°18' E, 990 m, Bestand von *F. sylvatica* und *A. pseudoplatanus* am Bach, auf *Fagus*-Wurzel, 10 Aug. 1996, C. PRINTZEN (hb PRINTZEN). **Poland**: S Poland, Gorce Mts, Kamienica stream valley, 1000 m, corticolous, 2 July 1999, P. CZARNOTA (GPN). **Romania**: Bihor Mts, Padiş area, Cheile Galbenei gorge, not far from yellow (triangle) tourist footpath, 46°33'30" N, 22°50' E, 700 m, on *Fagus* by a brooklet, 29 July 1998, Š. BAYEROVÁ, J. HALDA & Z. PALICE 807 (PRA). **Russia**: Primorsky Krai, inland from Uspeniya Bay, 42°49'10" N, 133°30'22" E, *Quercus* dominated overstory, open understory on hillside, at base of *Quercus* in moss-duff-soil-rotten bark, 19 July 1999, S. L. JONESON 859 (WTU). **Slovakia**: W Carpathians, Muránska planina plateau, Nová Maša, 48°48'35-40" N, 20°01'30-40" E, 800-860 m, deciduous forest with dispersed *Picea* along an unnamed brook (a parallel stream with the Rácov brook), E-wards of that, on bark of *A. pseudoplatanus*, 17 Oct. 1999, A. GUTTOVÁ, V. ORTHOVÁ & Z. PALICE 4656 (PRA); E Carpathians, N.P. Poloniny, Nová Sedlica: nature reserve Stužica, fir-beech forest in the valley of Stužická rieka, 49°04'30-45" N, 22°31'20"-22°32" E, 700-740 m, bark of *Fagus*, 14 June 2002, A. GUTTOVÁ & Z. PALICE 7453 (PRA). **Ukraine**: E Carpathians, Svidovec Mts, valley of Stanislava brook, 1200 m, on *Fagus*, 30 June 1997, Z. PALICE (PRA). **U.S.A.**: New York, Ulster Co., Catskill Mts, NE Frost Valley, along State Route 47, 0.7 miles (along road) from Biscuit Brook bridge, 41°59.6' N, 74°29.2' W, 700 m, corticolous on shaded roots of *Betula*, 10 Sept. 1992, T. TØNSBERG 17800 (BG L-71713).

Discussion

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The genus *Dictyocatenulata* (for a detailed description and illustrations, and especially for the interpretation of the conidiogenesis, see MORRIS & FINLEY 1967 and SEIFERT et al. 1987) differs from *Cheiromycina* by several important characters. Species of *Cheiromycina* s. str. (i. e. without *C. ananas* and *C. globosa)* have sessile sporodochia (a section of which is illustrated in SUTTON & MUHR 1986, fig. 1C), palmately branched conidia, and relatively large (at least in the type species), subspherical to shortly ellipsoid conidiogenous cells (PRINTZEN 2007, fig. 1). *Cheiromycina globosa* has unicellular, globose to slightly ellipsoid conidia; as the authors did not recognize conidiogenous cells, they wondered if the globose conidia might be homologous structures to the globose conidiogenous cells in the generic type species. *Dictyocatenulata alba* has distinct synnemata of a variable height, muriform conidia, and a very distinct conidiogenesis.

Synnemata of *Dictyocatenulata alba* are variable in height, being mostly 200–500 µm tall. In the Russian specimen examined, many synnemata are up to 700 µm high or even more, often branched in the upper part and therefore with several fertile 'heads' (Fig. 1B). Some conidiomata in the same specimen are extremely short and might be mistaken for sporodochia (Fig. 1C). According to measurements by MORRIS & FINLEY (1967) and SEIFERT et al. (1987) the synnemata may even exceed the height of 1000 µm, reaching 1200 µm, or 1500 µm, respectively. The conidiomata in the type collection of *Cheiromycina ananas* are very short, with a reduced synnematal stipe. APTROOT & SCHIEFELBEIN (2003) described the conidia of *C. ananas* as being 10–40-cellular, usually with one 'extruding hyphal cell', 20–30 × 10–20 µm. Conidia in the entire other material examined by us just measured 7–14 × 7–11 µm, and for a long time we wondered if this different conidial size would justify the recognition of two distinct species. The large conidial size obtained by APTROOT & SCHIEFELBEIN (2003) may at least partly result from including the 'extruding hyphal cell' (almost surely representing conidiogenous cells attached to the conidia in squash preparations) that the authors observed in many conidia. Conidia represented in their figures 8–10 measure 17.5-23 µm in length when using the scale bars of the figures, and excluding the 'extruding hyphal cell' We examined sections through two conidiomata in the isotype specimen: one didn't show any conidia at all, and the other had a few conidia c. 10 µm in diam. (Fig. 2D), perfectly fitting in size the other specimens examined. We consider therefore that the deviating conidial measurements might result from a different way of measuring, and possibly also from a type specimen of *C. ananas* with some relatively large conidia. We conclude that *C. ananas* does not represent a distinct species, but that the type is an abnormal specimen of *Dictyocatenulata alba* with reduced synnemata.

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