

FIRST FIND OF *TUBEUFIA CEREAE* (TUBEUFIALES,
DOTHIDEOMYCETES) FROM BULGARIA

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Received on February 17, 2021

Presented by V. Golemansky, Member of BAS, on April 27, 2021

Abstract

Tubeufia genus, represented by *Tubeufia cerea*, is reported as new to Bulgaria. It was found on old stromata of *Diatrype stigma* on oak twigs in the Eastern Forebalkan. This finding is presented with concise description and original illustrations. Available information from published sources is briefly discussed, and data on the distribution and ecology of *T. cerea* is applied.

Key words: Balkan mycota, *Diatrype*, fungicolous fungi, South East Europe, *Tubeufia*

Introduction. Genus *Tubeufia* Penzig & Sacc. was erected in 1897 to accommodate three species characterized by white, cream-pink to brownish, oblong to ovoid ascomata, and cylindrical, fusiform to vermiform multiseptate ascospores [1,2]. *Tubeufia cerea* (Berk. & M.A. Curtis) Höhn. has been recovered in 2009 as strongly supported monophyletic group outside the Pleosporales [3]. More recently [4,5] accepted family Tubeufiaceae in the Tubeufiales (Dothideomycetes), a fact predicted by [6]. *Tubeufia cerea* is known in the temperate and tropical regions on old stromata of pyrenomycetes and on very rotten, dead deciduous wood [7–9]. This species has broader distribution range among the other north-temperate members of *Tubeufia* [10], thus suggesting its occurrence in the region of Eastern Europe.

Material and methods. The studied specimen has been collected in July 2017 on dead oak twig in the Eastern Forebalkan (Northern Bulgaria). Air-dried

material is preserved in the Mycological Collection, Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences (SOMF). Photographs were taken with the aid of Canon PS A460 under Boeco BM-180/T/SP LM and Boeco B3500 dissecting stereomicroscope. Chemical reactions were tested in 5% KOH, pH-dependent colour reaction was observed in lactophenol and Cotton Blue in lactophenol (recipies after KIRK et al. [11]). Microscopic examination of microstructures was performed in semipermanent microscope slides in tap water; measurements were made with the help of specialized software for digital images Carnoy 2.0 [12]. Identification was made generally after MUNK [9], BARR [10] and CANNON [13]. Size of ascomata, asci and spores is presented with their minimum and maximum values, and with ranges calculated from the mean $\pm$ standard deviation, along with their minimum and maximum values outlined in brackets.

Results.

Tubeufia Penzig & Sacc., *Malpighia*, 11: 517, 1897, emend. Booth, *Mycol. Pap.*, 94: 10, 1964.

Tubeufia cerea (Berk. & M.A. Curtis) Höhn., *Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Kl., Abt. 1*, 128: 562, 1919; *Sphaeria cerea* Berk. & M.A. Curtis, *Grevillea*, 4: 108, 1876 (Fig. 1).

Ascomata perithecia, (130–) 165 ± 18 (–200) $\times$ (110–) 190 ± 30 (–240) μm , $n = 25$, generally (110–) 140 ± 27 (–215) μm in diameter, $n = 20$, superficial, scattered solitary, or in small groups of up to 10–15, globose or subglobose, smooth, papillate, slightly collapsing inwards when dry, dull yellow to light brownish when old, darker in the central papilla (Fig. 1A). *Peridium* (15–) 20–35 μm , composed of cells about (7–) 8.5 ± 1.2 (–10) $\times$ (4–) 6.4 ± 0.9 (–7) μm in diameter, $n = 15$, yellowish in lactophenol, not changing colour in solution of potassium hydroxide (Fig. 1B). *Asci* 60–95 $\times$ 10–12.5 μm , bitunicate, cylindrical to claviform, 8-spored, parallel, arranged in fascicles (Fig. 1C). *Pseudoparaphyses* 1–1.5 μm wide, $n = 10$, hyaline, $\pm$ parallel (Fig. 1C). *Ascospores* 35–45 $\times$ 2.5–3.5 μm , $n = 20$, hyaline, elongate, narrow, subfusiform, straight or slightly curved, tapering at the tips, 7–10-septate, guttulate, not constricted at septa (Fig. 1C). *Asexual morph* not observed in natural environment.

Specimen examined. Bulgaria: Eastern Forebalkan, Lovech district, Troyan Municipality, Golyama Zhelyazna village, along the road to Toplya Cave natural landmark, alt. 405 m, 06.07.2017, leg. & det. D. Stoykov, on black old stroma of *Diatrype stigma* (Hoffm. : Fr.) Fr. on dead oak twig, SOMF 30254.

Known distribution and ecology. Europe (Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Italy, Lithuania, the Netherlands, Poland, Portugal, Russia, Slovakia, Sweden, United Kingdom), Asia (India, Taiwan, Thailand), Afrika (Congo), North and South America (Argentina, Canada, Guyana, Puerto Rico, USA, Venezuela), New Zealand. Reported as fungicolous fungus on overmature and old effete dark stromata of *Bertia moriformis* (Tode : Fr.) De Not., *Coryneum lanciforme* (Fr. : Fr.) Volgmayr & Jaklitsch, *Diatrype*

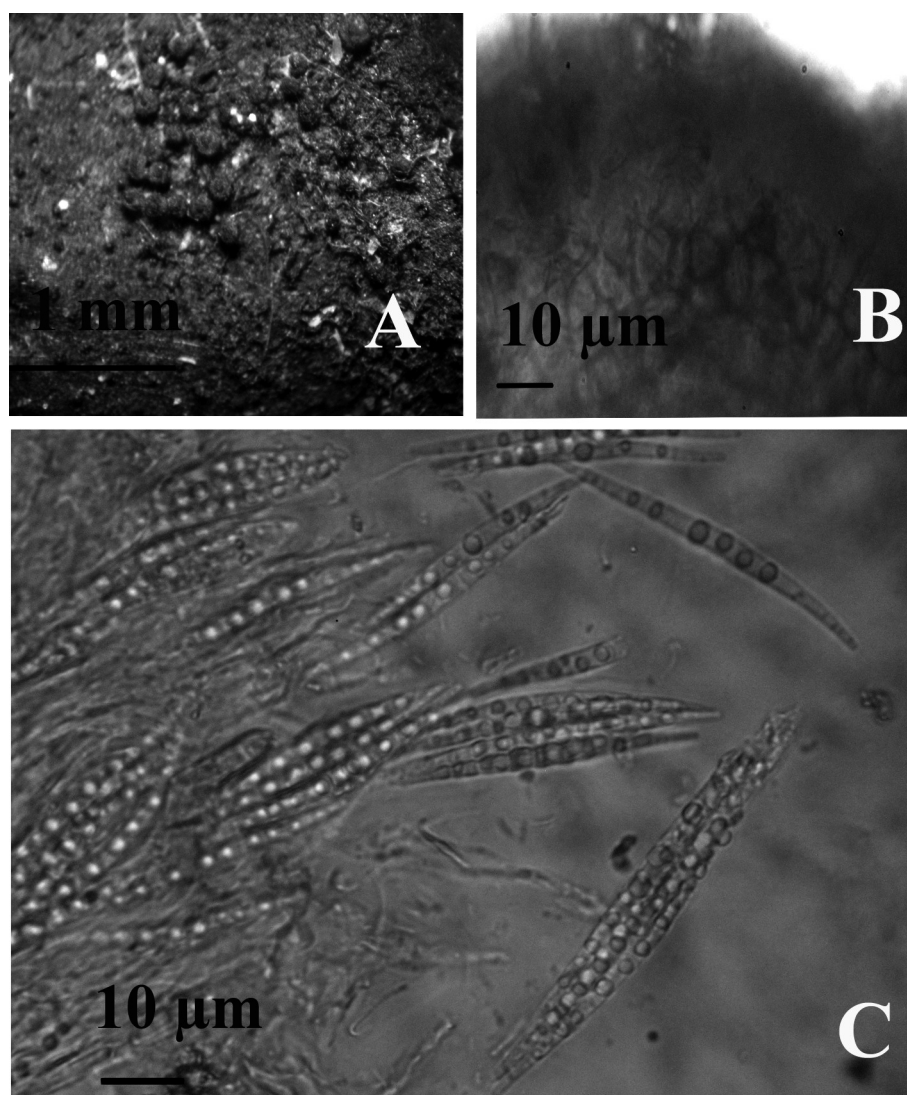


Fig. 1. *Tubeufia cerea*: A. Ascomata on old stroma of *Diatrype stigma* from oak bark, SOMF 30254 (ex situ); B. View of ascomatal wall, in water; C. Asci, ascospores and pseudoparaphyses, in water

disciformis (Hoffm. : Fr.) Fr., *D. stigma* (Hoffm. : Fr.) Fr., *D. undulata* (Pers. : Fr.) Fr., *Diatrypella verruciformis* (Ehrh) Nitschke, *Eutypa hydnoidea* (Fr.) Höhn., *E. maura* (Fr. : Fr.) Fuckel, *Biscogniauxia* sp., *Diatrype* sp., *Eutypella* sp., *Hypoxylon* sp., *Massaria* sp., *Nummularia* sp., ascomata or black stromata of other pyrenomycetes, and mycelium of ascomycetes; recorded on fallen branches, rotten deciduous wood and bark, and herbaceous substrata [1,2,7–10,13–17].

Comments. The Bulgarian specimen generally resembles the known information about *T. cerea* regarding its morphology and the ascospore size, and

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Comparative data for size and septation of ascospores of *Tubeufia cerea*

Author	Ascospores (μm), septation
MUNK [9]	36–48 $\times$ 2.5–3.5
BOOTH [14]	40–50 $\times$ 3–5, 7–10-septate
ROSSMAN [7]	(40–)45–50(–55) $\times$ (2.5–)3–4(–7)
BARR [10], KODSUEB et al. [16]	(27–)30–52 $\times$ 2.5–3.5(–4.5), (5–)7–10(–13)-septate
CHLEBICKI & SKIRGIEIHO [15]	36–48 $\times$ 3–3.8
ELLS & ELLIS [8]	30–50 $\times$ 3–5, 7–11-septate
CANNON [13]	39–47 $\times$ 2.5–4, 7–10-septate
SÁNCHEZ & BIANCHINOTTI [2]	38–48(–58) $\times$ 3–6, 6–11-septate
BOONMEE et al. [5]	35–46 $\times$ 3–5, 8–9-septate
STOYKOV, this study	35–45 $\times$ 2.5–3.5, 7–10-septate [(35–) 40.6 $\pm$ 2.7 (–45) $\times$ (2.5–) 2.9 $\pm$ 0.3 (–3.5), $n = 20$]

septation (Table 1). We can see that the width of the spores in *T. cerea* is a quite variable character, with ranges from (2.5–)3–7 μm , according to the different authors [7,10,14]. Munk [9] presented the detailed description of *T. cerea* under the name of *Ophionectria cerea* (Berk. & M.A. Curtis) Seaver. Subsequently [14] described and illustrated *T. cerea* with perithecia covered by septate yellow hairs usually seen on the upper half, a character known in some species of *Acanthostigma*. MUNK [6] noted that *Tubeufia corynespora* Munk, with 12–14-celled spores (50–70 $\times$ 4 μm) and *T. minuta* Munk, with 3-celled spores (16–21 $\times$ 3–4 μm) are similar to *T. cerea*, and considered the latter as an intermediate form, mentioning the soft structure of ascomatal wall and pseudoparaphyses. ROSSMAN [7] provided synonymy and studied the type collection of *Sphaeria cerea* from old stroma of *Diatrype stigma* in North America and other different collections. In her work she found the type specimen ‘exhausted’, and after the examination of numerous other specimens with bitunicate asci, the author concluded they conform well to the original description in [14], based exclusively on the studying of the type collection. BOONMEE et al. [5] studied the genus *Helicosporium* Nees and assigned the sexual morph of *Tubeufia cerea* (collection BPI 1107327) to *Helicosporium vegetum* Nees.

Tubeufia cerea is known from the temperate areas of the northern hemisphere, with some records reported in the tropics [13]. Although the present find in Bulgaria appears the south-easternmost in Europe (Fig. 2), further field studies will most probably reveal the occurrence of this species in other countries on the Balkan Peninsula. Taking into account the distribution area of its common fungal hosts, e.g. *Coryneum lanciforme*, *Diatrype stigma*, *D. disciformis*, *D. undulata*, and *Di-*



Fig. 2. Map of the locality of *Tubeufia cerea* (Northern Bulgaria, Eastern Forebalkan)

atrypella verruciformis [7–10,15], *T. cerea* could be searched for also in Albania, Greece, the Republic of North Macedonia, Romania, Serbia and Turkey [18,19].

Acknowledgements. The author has worked on the “Phylogeny, distribution and sustainable use of fungi” project.

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