Noteworthy records of corticioid fungi from Ichnia National Nature Park

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Abstract. Corticioid fungi constitute a heterogeneous group in terms of origin; they belong to various orders of Agaricomycetes (Basidiomycota). According to the available data, ca 280 species of this group have been so far recorded in Ukraine. As compared to other countries of Europe, diversity of corticioid fungi in Ukraine has been insufficiently studied. We made observations and collected corticioid fungi in June–October, 2016 and in March–October, 2017 in forests and woods of Ichnia National Nature Park (Ichnia District, Chernihiv Region, Ukraine). Upon identification of the herbarium specimens collected over the study area, we recorded 90 species of corticioid fungi. This article reports three noteworthy records of corticioid fungi. Two species, Amylocorticium canadense and Tubulicrinis glebulosus, are new records for Ukraine; another one, Aleurodiscus dextrinoideocerussatus, is a rare species both in Ukraine and globally, collected in our country for the second time, and a new record for the Forest-Steppe zone. The specimens were examined in 5% aqueous potassium hydroxide solution, Melzer’s reagent and Lactophenol cotton blue. For all the species, we provide descriptions of the examined specimens, along with the original photos, substrate specialization and global distribution details. The collected specimens are deposited in the Mycological Herbarium of the M.G. Kholodny Institute of Botany, National Academy of Sciences of Ukraine (KW-M).

Keywords: Ukraine, Left-Bank Forest-Steppe, Amylocorticales, Hymenochaetales, Russulales, Aleurodiscus dextrinoideocerussatus, Amylocorticium canadense, Tubulicrinis glebulosus

Introduction

Corticioid fungi (Basidiomycota) constitute a group of fungi, which is heterogeneous in terms of origin. Fungi of this group form morphologically similar basidiocarps due to convergence. Basidiomata of these fungi are fully resupinate or effuse-reflexed, hymenophore shape varies from smooth to almost poroid, reticulate or ipricoid and long-toothed (Jülich, Stalpers, 1980; Yurchenko, 2006; Zmitrovich, 2008).

Most of corticioid fungi are xylosaprotrophs. Thus, along with polypores they are important components of forest ecosystems, being the major fungal destructors, degrading lignin and cellulose in the nature. Insignificant number of these fungi are pathogens of vascular plants and mycorrhiza-forming fungi (Yurchenko, 2006).

Nowadays, about 1,800 species of corticioid fungi are known in the world (Mueller et al., 2006). In the temperate zone of Europe, 611 species of them are reported (Mueller et al., 2006). Currently, ca. 280 fungi of this group have been recorded in Ukraine (Akulov et al., 2003; Küffer et al., 2004; Usichenko, 2009; Bernicchia, Gorjón, 2010; Ordynets, Yurchenko, 2010; Ordynets, Akulov, 2011; Ordynets et al., 2011). As compared to other countries of Europe, the corticioid fungi diversity in Ukraine is still insufficiently studied (Akulov et al., 2003; Ordynets, Yurchenko, 2006). Corticioid fungi of the Left-Bank Forest-Steppe have been studied very unevenly. For instance, there are about 100 species of these fungi known for the Kharkiv Forest-Steppe, the best-studied area in this zone (Akulov et al., 2003; Usichenko, 2009). Before we started our surveys, no records of corticioid fungi distribution were reported from Ichnia National Nature Park. Therefore, further examination of these fungi in Ukraine is desirable.

Materials and methods

Materials used in this research comprise corticioid fungi collected in June–October, 2016 and in May–October, 2017 in the forests of Ichnia National Nature Park. Ichnia National Nature Park is located in the north of Ukraine, in Ichnia District, Chernihiv Region. The park's total area is 9,665.8 hectares. This
area, according to the zoning proposed by V. Heluta 
(1989) in *Flora Gribov Ukrainy*, belongs to the Left-
Bank Forest-Steppe zone. Unique characters of the 
natural vegetation in Ichnia National Nature Park are 
determined by its position in the northern part of the 
Left–Bank Forest-Steppe. In terms of the vegetation 
cover, the forests prevail, as forest coverage constitutes 
83%. The forestlands are of rather limited size, being 
located relatively evenly all over the park's territory. 
Among the peculiar features of Ichnia National Nature 
Park, overlapping of oak, hornbeam and lime forest 
areas is worth mentioning (Zhyhalenko, 2009). The 
park's hornbeam forests make up the eastern boundary 
of the natural range of this species (Zhyhalenko, 2009). 
Pine forests prevail here, although large areas are also 
covered with birch and oak forests. Pine forests are 
located mainly in the northern part of the park, while 
oak and hornbeam-oak forests occupy the central 
and southeastern parts, and lime forests are found in 
the western part of the park. The alder forests occur 
along the beds of the Udai and Ichenka rivers and their 
tributaries. Significant areas are covered with pine forest 
stands (Zhyhalenko, 2009).

The specimens were examined in 5% aqueous 
potassium hydroxide solution, Melzer's reagent and 
Lactophenol cotton blue. For identification of the 
specimens, a number of monographs and articles 
on systematics and diversity of corticioid fungi were 
used (Eriksson, Ryvarden, 1973; Eriksson, Weresub, 
1974; Jülich, Stalpers, 1980; Núñez, Ryvarden, 1997; 
Ghobad-Nejhad et al., 2009; Bernicchia, Gorjón, 
2010). The species distribution was analyzed based on 
the checklist of aphyllophoroid fungi of Ukraine (Akulov 
et al., 2003) and various publications on corticioid 
fungi of Ukraine (Küffer et al., 2004; Usichenko, 2009; 
Ordynets, Yurchenko, 2010; Ordynets et al., 2011).

The nomenclature of the species follows the *Index 
Fungorum* database [http://www.indexfungorum. 
org/names/names.asp]. The collected specimens are 
deposited in Mycological Herbarium of the M.G. 
Kholodny Institute of Botany, National Academy 
of Sciences of Ukraine (*KW-M*).

**Results and discussion**

Among the herbarium specimens we collected over 
the studied area, 90 species of corticioid fungi were 
identified. Some of them had been reported earlier 
(Shevchenko, 2017). This article reports details about 
two species of corticioid fungi, *Amylocorticium canadense* 
and *Tubulicrinis glebulosus*, which are new for Ukraine, 
and one species, *Aleurodiscus dextrinoideocerussatus*, 
which is rare in Ukraine. These species belong to various 
orders of *Agaricomycetes*.

The reported taxa are listed in systematic order. The 
nomenclature is followed by information on morphology, 
specimens examined, ecological peculiarities and 
distribution of the species. The original photographs of 
specific macro- and micromorphological structures are 
provided for each species.

*Amylocorticaceae* K.H. Larss., Manfr. Binder & 
Hibbett

*Amylocorticaceae* Jülich

*Amylocorticium canadense* (Burt) J. Erikss. & 
Weresub, *Fungi Canadenses*, no. 127 (Ottawa): no. 45. 
1974 (Fig. 1; a, b)

Basidioma resupinate, effused, adherent, soft to 
submembranaceous, up to 0.5 mm thick. Hymenial 
surface smooth, almost easily detachable in small pieces 
from the subiculum, cream to very pale yellow, slightly 
cracked on drying, immediately darkening when 
treated with KOH. Subiculum sulphureous yellowish, 
yellowish-brown, tomentose or fimbriate, almost black 
when treated with KOH. Margin determinate, abrupt 
or thinning out, smooth to finely byssoid, yellow to 
yellowish-brown, lighter to concolorous with the 
subiculum. Hyphal system monomitic, all hyphae with 
fibulate septa; subhymenial ones 2.5–3.5(4.0) μm in 
diameter, vertically oriented, compactly arranged, thin-
walled, hyaline; subicular ones loosely intertwined, 
regular, 3.5–4.5 μm, with thickening wall, hyaline to 
yellowish. Cystidia absent. Basidia narrowly clavate 
to subcylindrical, (15)20–25 × 4–5 μm, hyaline; 4 
sterigmata up to 4 μm long. Basidiospores narrowly 
elipsoid to cylindrical, slightly allantoid, usually 
biguttulate with two drops towards each end of the 
spores, in side view often slightly bent, (4.0)4.5– 
5.0(6.2) × 1.6–2.5 μm, thin-walled, weakly amyloid, 
not cyanophilous.

**Specimens examined:** Ukraine, Chernihiv Region, 
Ichnia District, Ichnia National Nature Park, 
Peliukhivka village, forest stand of *Pinus sylvestris* L., 
August 07, 2016, *KW-M* 70877, 70878; outskirts of 
Peliukhivka village, mixed forest, on fallen branches of 
*Pinus sylvestris*, August 07, 2016, *KW-M* 70876.

**Ecological peculiarities:** on fallen branches of 
angiosperms (Bernicchia, Gorjón, 2010) and 
gymnosperms (*Abies* Mill., *Picea* A. Dietr., *Pinus* L., 
*Tsuga* (Endl.) Carrière) (Gilbertson, Lindsey, 1989; 
Boidin, Gilles, 1990).
Fig. 1. Macroscopic and microscopic peculiarities of *Amylocorticium canadense* KW-M 70877 (a, b) and *Tubulicrinis glebulosus* KW-M 70875 (c–e); a – general view of basidioma of *A. canadense*, arrow indicates the location of basidioma darkening when treated with KOH; b, e – basidiospores; c – general view of basidioma of *T. glebulosus*; d – smooth and encrusted lyocystidia (bars: a, c – 1 cm, d – 20 µm b, e – 5 µm)
trama, smooth, clamps present at all septa. Cystidia (lyocystidia) cylindrical, 50–120 × 5.5–9.0 µm, thick-walled, with lumen, that gradually expanding towards the apex, some of them being encrusted with crystals in the terminal part, apex of lyocystidia thin-walled, narrowly obtuse; some lyocystidia slightly amyloid, apical thin-walled part of lyocystidia rapidly dissolving in 5% KOH. Basidia hyaline, clavate with a median constriction, 14–22 × 4.5–5.0 µm, thin-walled, with four subulate sterigmata (4.0–5.5 × 0.7–0.8 µm).

Basidiospores hyaline, cylindrical to slightly allantoid, in side view slightly bent, 6–7 × 1.8–2.2 µm, thin-walled, smooth, with homogeneous contents, neither amyloid, nor dextrinoid or cyanophilous.

Specimens examined: Ukraine, Chernihiv Region, Ichnia District, Ichnia National Nature Park, July 17, 2016, outskirts of Peluckhivka village; September 16, 2016, outskirts of Khaienky village, Tsybanovka Stow, square 18. On fallen branches of Pinus sylvestris, KW-M 70874, 70875.
Ecological peculiarities: on fallen branches of angiosperms (Hallenberg, 1984; Maekawa, 2002; Zmitrovich, 2003) and gymnosperms (Bernicchia, Gorjón, 2010).

Distribution. Europe: Austria, Albania, Belarus, Belgium, Bosnia and Herzegovina, Croatia, Estonia, Finland, France, Germany, Greece, Italy, Macedonia, Norway, Portugal, Russia, Slovenia, Spain, Sweden, Switzerland, United Kingdom (Bernicchia, Gorjón, 2010). Asia: Russia (Zmitrovich, 2003; Viner et al., 2016), China (Maekawa, 2002), Taiwan (Lin, Chen, 1990), Turkey (Ghobad-Nejhad et al., 2009). Africa: Morocco (Telléría et al., 2016). North America: Canada (Hallenberg, 1984), Mexico (Spirin, Ryvarden, 2016), the USA (Martin, Gilbertson, 1977). South America: Argentina (Rajchenberg, 2002).

The species is a new record for Ukraine.

Russulales Kreisel ex P.M. Kirk, P.F. Cannon & J.C. David

Stereaceae Pilát

Aleurodiscus dextrinoideocerussatus Manjón, M.N. Blanco & G. Moreno, in Moreno, Blanco & Manjón, Mycotaxon 39: 351. 1990 (Fig. 2)

Basidioma resupinate, effused, waxy when fresh, cracked after drying, hymenial surface is smooth to slightly tuberculate, whitish, cream to pale yellowish, margin clearly differentiated. Hyphal system monomitic, generative hyphae with clamps, hyaline, thin-walled, 2.0–3.5 µm wide. Acanthophyses abundant, basal smooth, about 30 × 3.0–3.5 µm, apically with numerous protuberances and branches with indextrinoid reaction in the apical part. Gloeocystidia cylindrical, fusiform to moniliform with several constrictions, 70–100 × 8–10 µm, with yellowish granular content. Basidia subclavate 45–50 × 6–7 µm, with four sterigmata and with a basal clamp. Basidiospores subglobose-subovoid with small apiculus, 7.0–7.5 × 4.2–5.0 µm, smooth, thin-walled, slightly amyloid.

Remarks: both samples from Ukraine, the one found in Ichnia National Nature Park and another in Luhansk Nature Reserve (Ordynets et al., 2013), show no acanthophyses dextrinoid reaction. Moreover, they have subglobose-subovoid basidiospores, unlike the original description, where the spores thereof are of ellipsoid-subovoid shape.

Specimens examined: Ukraine, Chernihiv Region, Ichnia District, Ichnia National Nature Park, August 06, 2016, Kuty Stow, square 42. On attached branch of dead tree of Robinia pseudoacacia L., KW-M 70873.

Ecological peculiarities: on decayed wood, preferably of deciduous trees but may also occur on coniferous wood (Núñez, Ryvarden, 1997; Boidin, Gilles, 2001; Ghobad-Nejhad et al., 2008; Ordynets et al., 2013; Urbizu et al., 2014; Telléría et al., 2016).

Distribution. Europe: Croatia, France, Italy, Portugal, Spain, Ukraine (Bernicchia, Gorjón, 2010). Asia: Iran (Ghobad-Nejhad et al., 2008), Nepal (Núñez, Ryvarden, 1997). Africa: Morocco (Telléría et al., 2016). North America: Mexico (Urbizu et al., 2014).

According to A. Bernicchia and S. Gorjón (Bernicchia, Gorjón, 2010), it is a rare species all over Europe, recorded from some Mediterranean countries. In Ukraine, this species was reported only once from Luhans Nature Reserve (Ordynets et al., 2013).

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Кортициоїдні гриби належать до різних порядків класу Agaricomycetes (Basidiomycota) і складають гетерогенну походження групу грибів. В Україні, за сучасними даними, відомо близько 280 видів грибів цієї групи. У порівнянні з іншими країнами Європи, видове різноманіття кортициоїдних грибів України досліджено значно гірше. Матеріалами для цієї статті були зразки, зібрані протягом червня—жовтня 2016 р. та березня—жовтня 2017 р. у лісових угрупованнях Ічнянського національного природного парку (Ічнянський р-н, Чернігівська обл., Україна). На основі аналізу власних гербарних матеріалів в районі дослідження нами було виявлено 90 видів кортициоїдних грибів. В статті приведені дані об интересних находках трьох видів грибів. Два із них (Amylocorticium canadense та Tubulicrinis glebulosus) — нові для України, один (Aleurodiscus dextrinoideocerussatus) є рідкісним як в Україні, так і у світі, вдруге обнаружен задокументований в молочній кислоті. Дослідження проводилися на основі тимчасових микропрепаратів, у 5%-ному водному розчині гідроксиду калію, реактиві Мельцера та бавовняному синьому в молочній кислоті. Для всіх видів приводяться описи досліджених зразків, що супроводжуються перво оригинальними фотографіями, інформацією про субстратну специалізацію та про поширення у світі. Собранные зразки переданы в Національний гербарій Институту ботаніки им. М.Г. Холодного НАН України (KW-M).

Ключові слова: Україна, Лівобережий Лісостеп, Amylocorticiales, Hymenochaetales, Russulales, Aleurodiscus dextrinoideocerussatus, Amylocorticium canadense, Tubulicrinis glebulosus