

First record of *Dendrothele nivosa* (Basidiomycota) for the Balkans on a new host, Savin juniper

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Dendrothele nivosa is a rare Mediterranean lignicolous species, growing on representatives of the genus *Juniperus*, hitherto unknown from the Balkans. This wood-decaying fungus was collected on living branches of Savin juniper, a rare and protected plant species, included in the Bulgarian Biological Diversity Act. *Dendrothele nivosa* is considered to be a white rot saprobe with a restricted range following the distribution of the juniper host. This study is aimed at providing information on the first find of *D. nivosa* in the Balkans, i.e. in the southwestern part of Bulgaria, on a new substrate, as well as on the possible impact of the fungus on the host population.

Key words: lignicolous species, rare species, host interaction, *Juniperus sabina*.

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Lambevska-Hristova A., Bancheva S., Karadelev M. (2022): První nález *Dendrothele nivosa* (Basidiomycota) pro Balkán na novém hostiteli, jalovci chojky. – Czech Mycol. 74(1): 25–32.

Dendrothele nivosa je vzácný mediteránní lignikolní druh rostoucí na zástupcích rodu *Juniperus*, z Balkánu dosud neznámý. Tato dřevožijná houba byla sebrána na živých větvích jalovce chojky, vzácné a chráněné dřeviny, zahrnuté v bulharském zákoně o biologické rozmanitosti. Je považována za saprotrofní druh, způsobující bílou hnilobu a mající omezený areál, který sleduje rozšíření hostitelského jalovce. Článek informuje o prvním nálezu druhu *D. nivosa* na Balkáně, konkrétně v jihozápadní části Bulharska, na novém substrátu, a také posoudit jeho vliv na populaci hostitelské dřeviny.

INTRODUCTION

Dendrothele Höhn. et Litsch. (1907) is described as a heterogeneous corticioid genus including species with crust-like fruitbodies and sterile papillae composed of finely branched hyphae (dendrohyphidia), crystals in the context, and by large basidiospores with distinct and usually cyanophilous walls. Several molecular phylogenetic studies have shown that it is a highly polyphyletic group (Goranova et al. 2003, Bodensteiner et al. 2004, Binder et al. 2005, Larsson 2007, Gorjón 2020). *Dendrothele* species are developing exclusively as saprobes mainly on bark of living trees, shrubs and on decayed wood. Some species are restricted to a specific plant host (Nakasone et Burdsall 2011). The presence of host specificity is a good indication that further research of the species is needed to provide insight into its distribution and ecology in the study area.

Dendrothele nivosa (Berk. et M.A. Curtis ex Höhn. et Litsch.) P.A. Lemke is characterised by effused basidiomata with a smooth white hymenial surface, thick, abrupt, adnate margin, monomitic hyphal system, richly branched dendrophyses, covered by crystals, and echinulate ellipsoid to ovoid basidiospores, being the only species within the European *Dendrothele* with ornamented spores. According to the available literature, this fungus prefers juniper species (Bernicchia et Gorjón 2010). It is a rare species previously only known from a few localities in Italy (Bernicchia 1986) and France (Boidin et Gilles 1990).

In Bulgaria, Savin juniper is a species of high conservation value and therefore included in the Red Data Book of the Republic of Bulgaria, vol. 1 (Stoeva 2015) and in the Red List of Bulgarian vascular plants (Petrova et Vladimirov 2009) as Endangered. Shrub communities with Savin juniper are a rare and endangered habitat of Europe (4060 Alpine and Boreal heaths) included in the national list of protected habitats in the Biological Diversity Act (2002), the Red Data Book of the Republic of Bulgaria, vol. 3, as Critically Endangered (Roussakova 2015) and the Directive of the European Union (Habitats) 92/43/EEC (Council of the EC 1992).

In a study of the state of the Savin juniper population in the Rila Mts. in 2019, the species *D. nivosa* was found on living branches of *Juniperus sabina*, above the village of Beli Iskar, situated in the southwestern part of Bulgaria. Here we report it on Savin juniper for the first time. This host had not previously been published for the species in the literature.

The aim of the present work is to report the first find of *D. nivosa* in the Balkans on a new substrate, and to evaluate the effect of this lignicolous fungus on the state of the Savin juniper population in the Rila Mts. The paper provides taxonomic, ecological and distributional data, as well as a species distribution map.

MATERIAL AND METHODS

The field study on lignicolous fungi in the Rila Mts. was carried out in July 2019 using the transect method. Only two localities of *J. sabina* are known in the Rila Mts. – above the village of Beli Iskar (very small and highly fragmented population) and along the Cherni Iskar River (large population, in good condition). *Dendrothele nivosa* was only found on some shrubs of Savin juniper in the Beli Iskar population.

The monitoring and assessment of the state of the *J. sabina* population was carried out in accordance with approved methodologies of the National Biodiversity Monitoring System of the Executive Environment Agency of Bulgaria (<http://eea.government.bg/bg/bio/nsmbr/praktichsko-rakovodstvo-metodiki-za-monitoring-i-otsenka/visshi-rasteniya>).

Species identification was carried out following Eriksson et Ryvarden (1975) and Bernicchia et Gorjón (2010) applying standard methods, including microscopy and application of reagents (Melzer's reagent and 5% KOH).

The nomenclature of fungi follows Index Fungorum (www.indexfungorum.org), while the nomenclature of vascular plants follows the Euro+Med PlantBase – an information resource for Euro-Mediterranean plant diversity (<http://ww2.bgbm.org/EuroPlusMed>, last accessed 5 October 2021). The studied specimens have been deposited in the Mycological Collection of the Institute of Biodiversity and Ecosystem Research (SOMF), Bulgarian Academy of Sciences.

RESULTS

Dendrothele nivosa (Berk. et M.A. Curtis ex Höhn. et Litsch.) P.A. Lemke, *Persoonia* 3(3): 367, 1965

≡ *Aleurodiscus nivosus* Berk. et M.A. Curtis ex Höhn. et Litsch., *Sber. Akad. Wiss. Wien, Math.-naturw. Kl., Abt. 1*, 116: 808, 1907

Morphological features. Basidiomata effused, hymenophore smooth, with a chalky colour, margin adnate (Fig. 1). Hyphal system monomitic, hyphae with simple septa or with occasional clamps, thin-walled, 2–5 µm wide. Dendrophyses richly branched, covered by crystals. Cystidia cylindrical to clavate, 30–40 × 8–15 µm, with yellowish granular content in KOH. Basidia clavate to cylindrical, 80–100 × 15–20 µm, with four sterigmata. Basidiospores broadly ellipsoid to ovoid, 18–22 × 14–16 µm, thin-walled, finely echinulate, apiculus not very pronounced, inamyloid (Fig. 2).

Ecological remarks. In Europe, the species is considered a white rot saprobe with a restricted range following the distribution of the juniper host. This species is reported as good example of adaptation to exposed dry conditions. *Dendrothele nivosa* is known from different juniper species (Gorjón et Bernicchia 2010). In Bulgaria it was collected on living branches of Savin juniper, a substrate which had previously not been noted for this lignicolous fungus.

According to the classical syntaxonomic classification, the *Juniperus sabina* communities in the Rila Mts. belong to the *Vaccinio-Piceetea* class (Roussakova



Fig. 1. Macroscopic view of basidiome of *Dendrothele nivosa* (SOMF 30 289). Photo Aneta Lambevská-Hristova.

2015, <https://www.synbiosys.alterra.nl/evc/>). They represent very rare, relict communities. According to Mazur et al. (2021), the monophyletic *Sabina* section most probably emerged in the Tertiary, in the present-day Mediterranean region, and the distribution of its species was further influenced by late Tertiary and Quaternary climatic changes.

In the Rila Mts., communities with Savin juniper are very small in size and have a limited distribution. The potential of the species to spread to other localities or to acquire new territories is extremely low. Adjacent to the dense tufts of *J. sabina*, various fungus and plant species were found. Plant species include e.g. *Festuca dalmatica*, *Juniperus sibirica*, *Pinus sylvestris*, *Poa nemoralis*, *Populus tremula*, *Rubus idaeus* and *Thymus* spp. In addition, eight records of aphylloroid fungi were found in the studied area: *Fomitopsis pinicola* (Sw.) P. Karst., *Gloeophyllum abietinum* (Bull.) P. Karst., *G. sepiarium* (Wulfen) P. Karst., *G. tra-beum* (Pers.) Murrill, *Gloeoporus taxicola* (Pers.) Gilb. et Ryvarden, *Irpex lacteus* (Fr.) Fr., *Phellinopsis conchata* (Pers.) Y.C. Dai and *Stereum sanguinolentum*

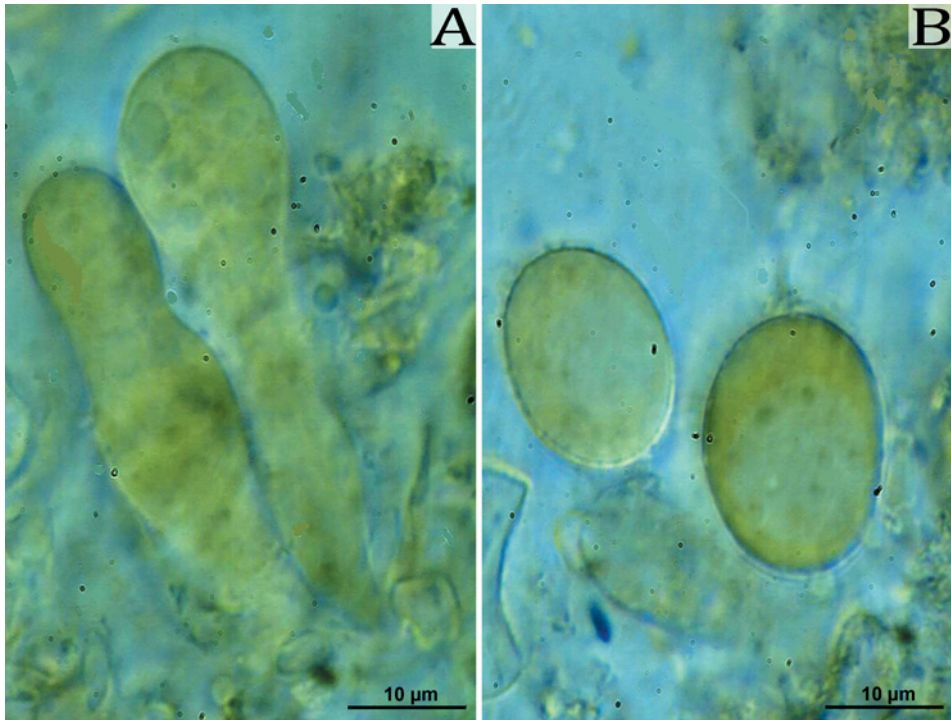


Fig. 2. Microscopic features of *Dendrothele nivosa* (SOMF 30 289): **A** – cystidia; **B** – basidiospores. Scale bars = 10 µm. Photos Aneta Lambevsk-Hristova.

(Alb. et Schwein.) Fr. These species were found as saprobes on deciduous and coniferous wood of different trees in the habitat of the Savin juniper.

General distribution. According to the published data by Bernicchia et Gorjón (2010), *Dendrothele nivosa* is a very rare species in Europe and is only known from a few localities in Italy and France. The species appears to prefer habitats with a Mediterranean climate. The new find from the Rila Mts. expands the distribution range of this interesting species. It is also a new species for the Bulgarian mycota (Fig. 3).

Specimen examined

Bulgaria. Rila Mts., 1.3 km south of the village of Beli Iskar, 42°15'48.7" N, 23°32'25.8" E, 1157 m a.s.l., pasture with *Juniperus sabina*, on living branches of *J. sabina*, 14 July 2019, leg. A. Lambevsk-Hristova et G. Hristov, det. A. Lambevsk-Hristova et M. Karadelev (SOMF 30 289).

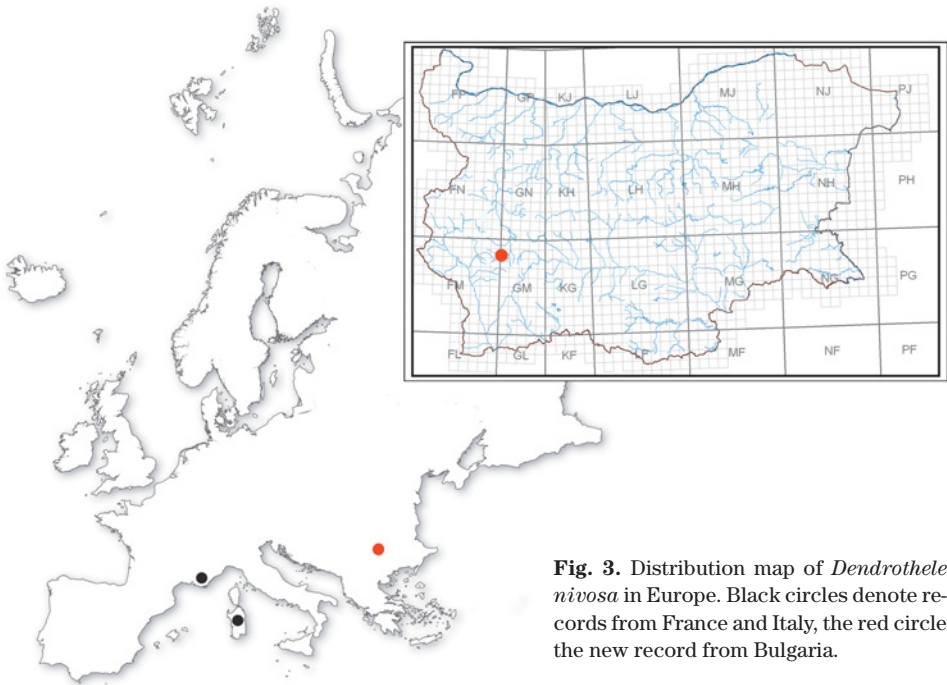


Fig. 3. Distribution map of *Dendrothele nivosa* in Europe. Black circles denote records from France and Italy, the red circle the new record from Bulgaria.

DISCUSSION

The original description of *D. nivosa* is based on a specimen growing saprotrophically on *Juniperus oxycedrus* and *J. phoenicea* in Italy. It is a very rare species, recorded only a few times in this country from Sardegna (Oliena and Orgosolo; Bernicchia 1986, Gorjón et Bernicchia 2010). Other European records are known from France (Signes), where the species was found growing as a saprobe on *Juniperus* (Gorjón et Bernicchia 2010). According to Boidin et Gilles (1990), this fruitbody was collected on a living tree of *J. virginiana* (a species introduced in Europe), although they are not very certain of the identity of the substrate. The same area has been visited a number of times and the species has been recollected on the same substrate.

The distribution of Savin juniper is restricted to several localities in Bulgaria [Rila Mts., Stara Planina Mts. (Central Balkan National Park) and East Rhodopi Mts.]. The only known habitat of shrub communities with *J. sabina* in the Rila Mts. to date is located in the area of Beli Iskar and along the Cherni Iskar River, at elevations of 1000–1200 m.

Our research indicates that *D. nivosa* follows the distribution of different juniper trees in Europe, such as *Juniperus sabina*, *J. oxycedrus*, *J. phoenicea* and *J. virginiana* (unconfirmed). In all cases the material has been collected as a saprobe on dead parts of living trees of different juniper species.

In conclusion, the find of a new species for the Bulgarian mycota is a positive feature because it increases the knowledge of the diversity of lignicolous fungi in the country and the Balkan Peninsula. As a result of our research, we found that there is no negative effect of *D. nivosa* on the status of the *J. sabina* population at present. Given the high conservation status of Savin juniper and the only location of the rare lignicolous species *D. nivosa* in the Balkans, periodic monitoring of the condition of both species is recommended so that adequate protection measures can be implemented in case of need. The results of this study may provide support for better management and the conservation of biodiversity in the Rila Mts.

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