



Three new records of *Helotiales* for the mycobiota of Türkiye

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Türkiye mikobiyotası için üç yeni *Helotiales* kaydı

Abstract: *Hymenoscyphus imberbis* (Bull.) Dennis, *H. vitigenus* (De Not.) Dennis (*Helotiaceae*) and *Gemmina gemmarum* (Boud.) Raitv. (*Pezizellaceae*) species, collected from Bingöl and Van provinces, are given as new records for Türkiye. The identified samples are given with macroscopic and microscopic characters, photographs, collection localities and collector numbers.

Key words: *Discomycetes*, lignicolous fungi, sac fungi, Türkiye

Özet: Bingöl ve Van illerinden toplanan *Hymenoscyphus imberbis* (Bull.) Dennis, *H. vitigenus* (De Not.) Dennis (*Helotiaceae*) ve *Gemmina gemmarum* (Boud.) Raitv. (*Pezizellaceae*) türleri Türkiye için yeni kayıt olarak sunulmuştur. Tanımlanan örnekler makroskopik ve mikroskopik karakterleri, fotoğrafları, toplama yerleri ve toplayıcı numaraları ile birlikte verilmiştir.

Anahtar Kelimeler: *Discomycetes*, lignikol mantarlar, askuslu mantarlar, Türkiye

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1. Introduction

The order *Helotiales*, within the class *Leotiomycetes* (*Ascomycota*) is the largest order containing the non-stromatic *Discomycetes*. It is known to include 11 families, approximately 500 genera, and almost 4000 species (Kirk et al., 2008; Baral, 2015). Members of this order usually produce brightly colored or, in some species, dark-colored apothecia, which may be stipitate or sessile. The overall shape of the apothecia is cupulate-discoid, turbinate funnel-shaped, or clavate (Korf, 1973). Most members of the *Helotiales* have minute apothecia, usually less than 2 mm in diameter. Although most of the species live as decomposers on dead plant remains, there are also a few parasitic or symbiotic species (Hosoya, 2021).

According to the latest check-lists, listing the species determined in Türkiye (Sesli et al., 2020; Solak & Türkoğlu, 2022), and the recent studies carried out on ascomycetous fungi in our country (Akçay et al., 2022; Acar & Quijada, 2022; Uzun and Kaya, 2022a; 2022b; Uzun, 2023), the order *Helotiales* is represented by the 16 families, 37 genera and 90 species in Türkiye. The most populous families are *Dermataceae* and *Helotiaceae* families (Sesli et al., 2020; Solak & Türkoğlu, 2022).

The genus *Hymenoscyphus* Gray (*Helotiaceae*), comprising more than 150 species worldwide, has attracted attention especially in Europe due to the damage they cause on various trees, especially ash, and many studies have been carried out on it (Kirk et al., 2008, Baral et al., 2014, George et al., 2022). In Türkiye, only 15 species of this genus have been reported so far without any study related to the damage they cause on trees. The genus *Gemmina* Raitv. comprises two species, and none of them has been presented from Türkiye before (Işık and Türkekul, 2018;

Keleş, 2019; Sesli et al., 2020; Çetinkaya and Uzun 2021; Solak and Türkoğlu, 2021).

2. Materials and Method

Fungal specimens were collected from Bingöl and Van provinces of Türkiye in 2019 and 2020. Morphological and ecological characteristics of the samples were recorded during field studies, and they were photographed in their natural habitats. Then, they were taken to the laboratory and microscopic investigations were carried out on the samples. Observations of apothecia were made under a Leica EZ4 stereomicroscope with the magnifications up to 35×. Microscopic investigation of the samples was carried out under a Leica DM500 light microscope mounted with a Leica ICC50 HD camera. Drawings of some micro characters were prepared using the CorelDRAW Standard 2021 software. Reagents such as 5 % KOH and Iodine (IKI) and Melzer's reagent were used as investigation media. Identification was performed with the aid of the relevant literature (Dennis, 1956; Raitviir and Faizova, 1983; Blank, 1988). Macrofungal samples are kept in the Fungarium of the Biology Department of Van Yüzüncü Yıl University Herbarium (VANF).

3. Results

The determined species are presented with their macroscopic and microscopic features, habitats, substrates, collection dates and voucher numbers (eg. Acar 1155). Colour photographs of ascocarps and some microscopic features were also provided.

Ascomycota Caval.-Sm.

Leotiomycetes O.E. Erikss. & Winka

Helotiaceae Rehm

Hymenoscyphus imberbis (Bull.) Dennis (Figs. 1-2)

Macroscopic and microscopic features: Apothecia 1-4 mm, cup-shaped or flat, white when fresh, drying reddish-brown or pale yellowish brown, smooth or minutely downy with a short sturdy stipe of about 1 mm, slightly tomentose at the base. Ascospores $7-11.5 \times 3-4.2 \mu\text{m}$, elliptical or slightly inequilateral, sometimes a septate, spores size based on $n = 25$ spores. Asci $55-85 \times 6-9.4 \mu\text{m}$, 8 spored, cylindrical-claviform, asci size based on $n = 15$ asci, pore blue in Melzer's reagent and croziers at the base. Paraphyses up to $2.4 \mu\text{m}$, slightly widened apex, cylindrical, hyaline, septate in its lower part. Ectal excipulum $10-30 \times 5-15 \mu\text{m}$, polygonal, sharply defined, with a widening texture, with some VBs (persistent in dead state) in the outermost cells.

Specimen examined: Bingöl, Ormanardı village, on branch of *Quercus* sp., $38^{\circ}49'46''\text{N}$, $40^{\circ}30'38''\text{E}$, 1253 m, 18.04.2020, Acar 1155.

Hymenoscyphus vitigenus (De Not.) Dennis (Fig. 3-4)

Macroscopic and microscopic features: Apothecia 0.5-3.5 mm, scattered, at first flat, then slightly convex, light yellow to yellow, ochre, exterior slightly furfuraceous. Stipe $0.2-0.5 \times 1.5-3 \text{ mm}$, smooth, thin, usually ochraceous towards the base. Ascospores $15-20 \times 4.5-6 \mu\text{m}$, mainly cylindrical to ellipsoid, sometimes curved, large or small 3-5 or more guttulate, spores size based on $n = 25$ spores. Asci $100-140 \times 7-12 \mu\text{m}$, 8 spored, cylindrical-claviform, asci size based on $n = 15$ asci, pore blue in Melzer's reagent. Paraphyses up to $3 \mu\text{m}$, cylindrical, clavate or lanceolate at the apex, hyaline, multiply septate and filled with many guttulate. Ectal excipulum $12-23 \times 7-13 \mu\text{m}$, hyaline thin-walled, rectangular cells, texture widening from below to upwards.

Specimen examined: Bingöl, Kurudere village, on branch of *Vitis vinifera*, 14.10.2020, $38^{\circ}54'13''\text{N}$, $40^{\circ}25'15''\text{E}$, 1174 m, VANF Acar 1163.

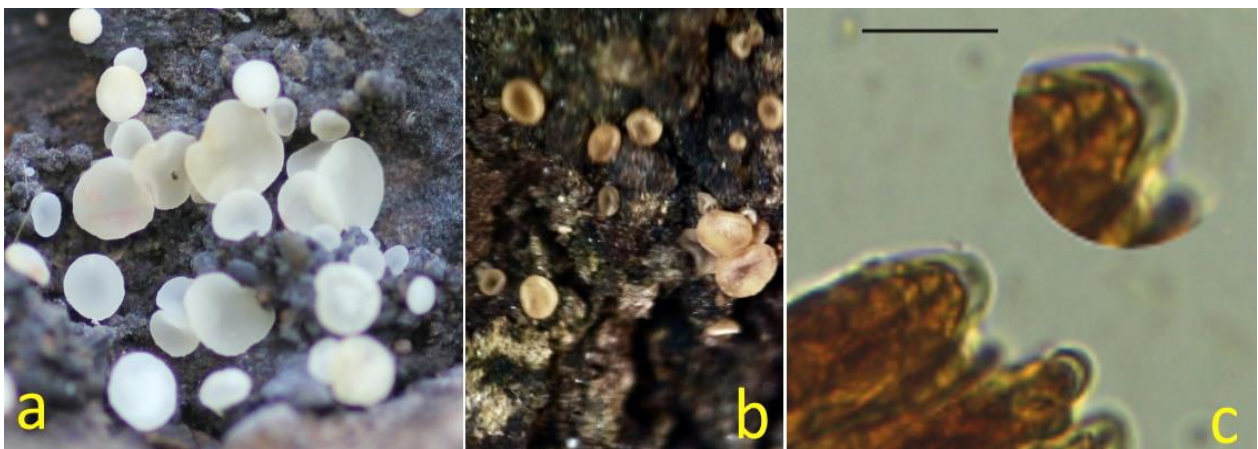


Figure 1. *Hymenoscyphus imberbis* a. fresh ascomata b. dried ascomata c. apex of an ascus in Melzer's reagent (Scale bar= 10 μm).

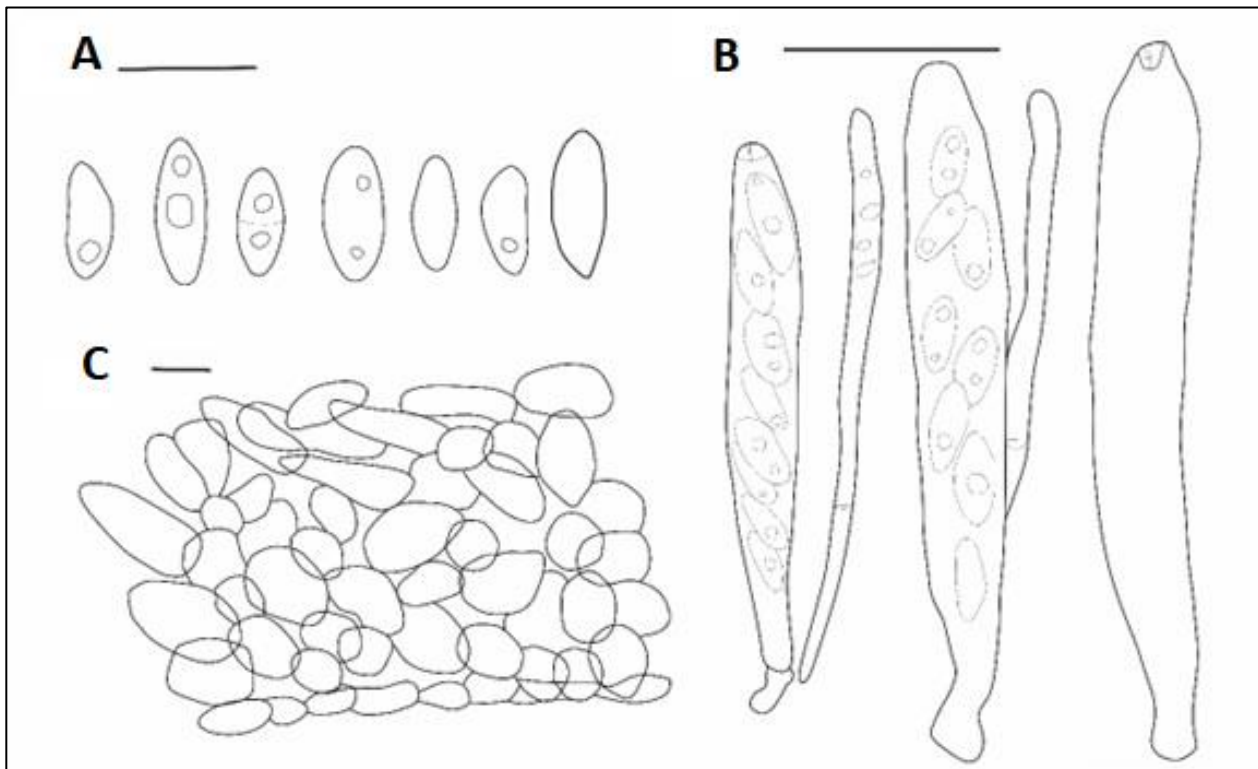


Figure 2. *Hymenoscyphus imberbis* A. spores B. asci and paraphysis C. ectal excipulum (Scale bars: a and c= 10 μm ; b= 20 μm).

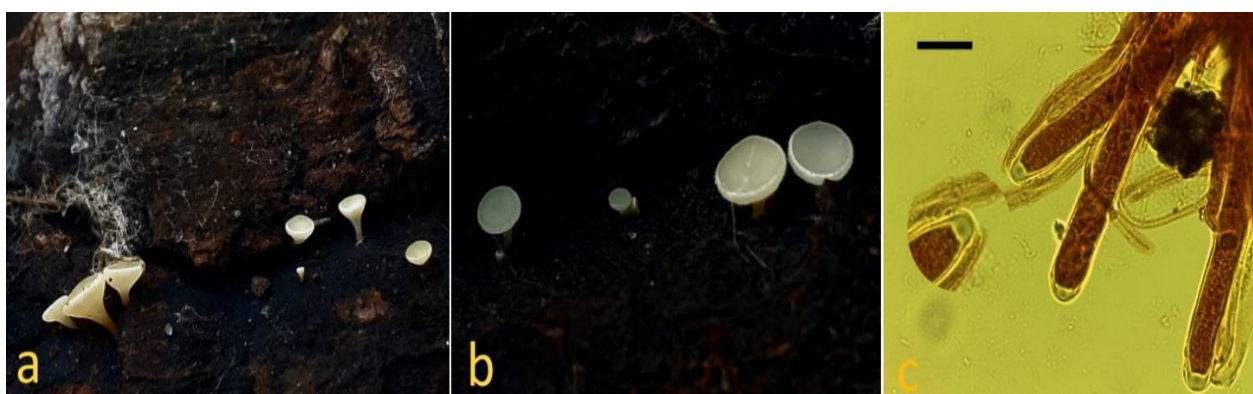


Figure 3. *Hymenoscyphus vitigenus* a-b. fresh ascomata c. apexes of ascus in Melzer's reagent (Scale bar= 10 µm)

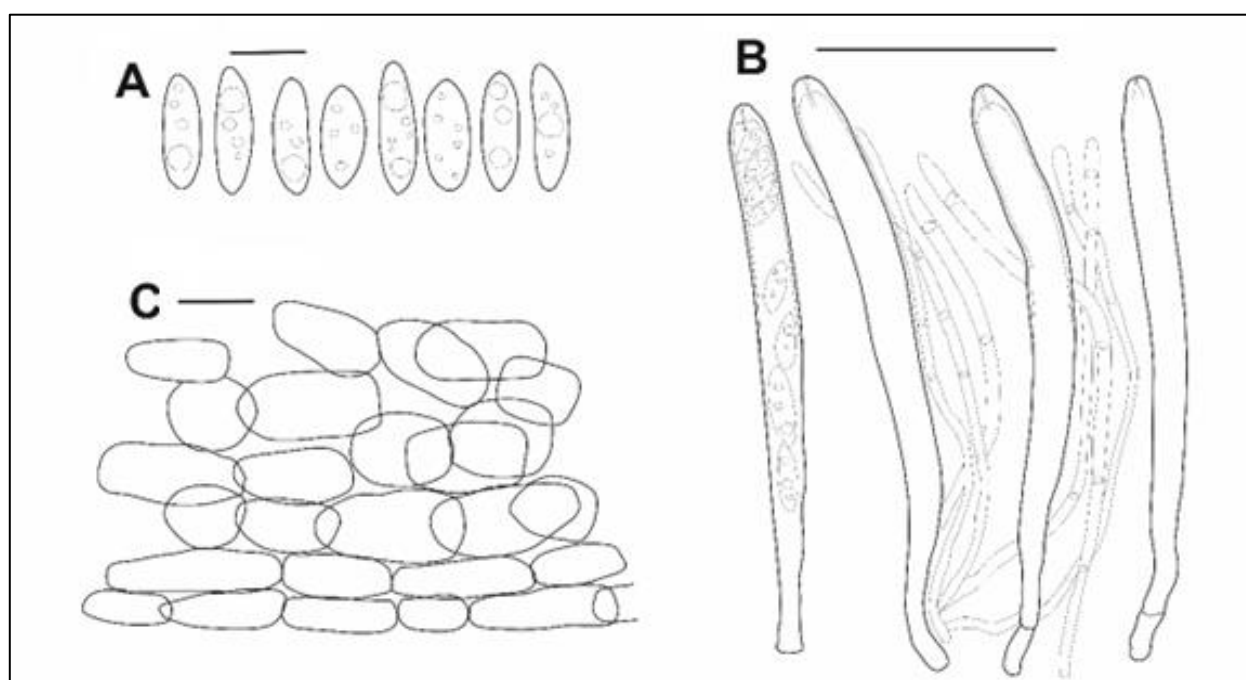


Figure 4. *Hymenoscyphus vitigenus* A. spores B. asci and paraphysis C. ectal excipulum (Scale bars: a and c= 10 µm; b= 50 µm)

Pezizellaceae Velen.

Gemmina gemmarum (Boud.) Raitv. (Fig. 5-6)

Macroscopic and microscopic features: Apothecia 0.3-1 mm, cup-shaped or infundibuliform when young, then broad saucer-shaped, whitish, yellowish-cream when dried. Stipe slightly longer than diameter of the disc, whitish to pale ochraceous towards to base. Ascospores $6-9.7 \times 2-3$ µm, elliptical, smooth, hyaline, sometimes small droplet, spores size based on $n = 25$ spores. Asci $35-60 \times 3.3-6.5$ µm, 8-spored, cylindrical, with croziers at the base, asci size based on $n = 15$ asci, pore blue in Melzer's reagent. Paraphyses up to 2–3.5 µm, sparse, filiform, usually even and cylindrical on all sides, sometimes clavate or tapering towards the apex, large oil droplets at the base, which oil drops make the paraphyses appear to be septate. Hair $20-50 \times 3-4.6$ µm curved at the apex and extended, cylindrical, 2 or 3 septate, glabrous towards the base. Ectal excipulum up to 8.5 µm, hyaline thin-walled, oblong or globose cells, texture widening from below to upwards.

Specimen examined: Türkiye, Van, Tuşba, MTA lodgings garden, fallen bud (poplar) scale, 04.05.2019, $38^{\circ}33'31''N$, $43^{\circ}17'59''E$, 1649 m, VANF Acar 1126.

4. Discussions

Three species from the order *Helotiales* were identified for the first time from Türkiye and presented as a contribution to the fungal diversity of our country. The total number of species belonging to the *Helotiales* increased from 90 to 93. *Hymenoscyphus imberbis* and *H. vitigenus* were added as the sixteenth and the seventeenth member of the genus *Hymenoscyphus* in Türkiye.

Hymenoscyphus imberbis is a saprotrophic species with more or less flat to slightly convex, sessile to short-stalked apothecia, like *Hymenoscyphus fagineus* (Pers.) Dennis and *Hymenoscyphus epiphyllus* (Pers.) Rehm ex Kauffman. *H. imberbis* can be distinguished from similar species by its relatively shorter and wider spores, apothecial color ranging pink to reddish-brown as it dries, and slightly downy stipe, which tapering towards the base. It can be differentiated from other *Hymenoscyphus* of the same color and habitat, such as *Hymenoscyphus vernus* (Boud.) Dennis, by the presence of croziers at the base of the asci, which do not appear in *H. vernus*, and from *Hymenoscyphus kathiae* (Korf) Baral, because it has much

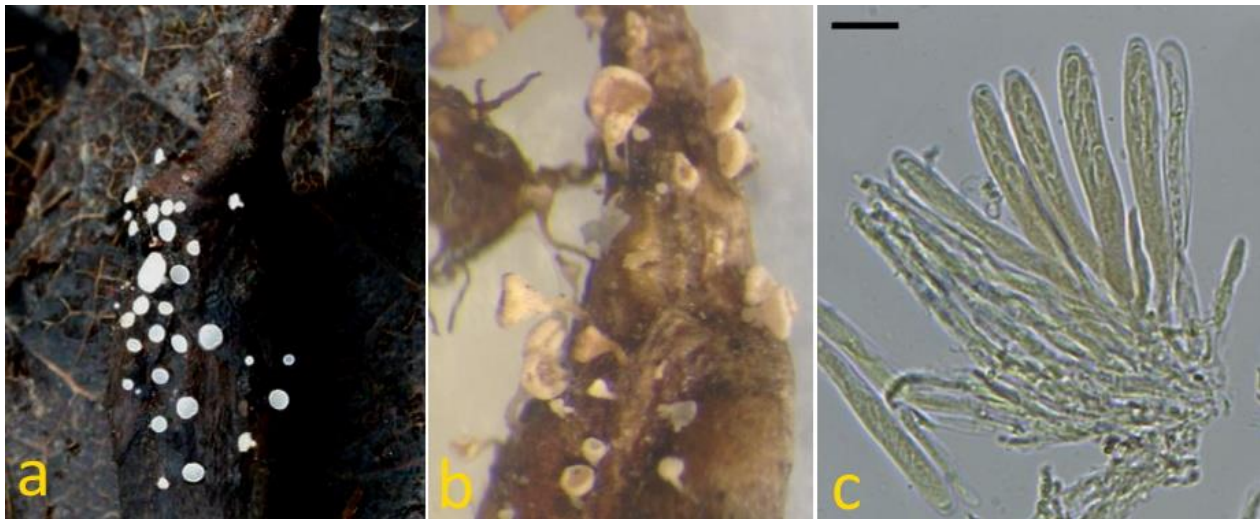


Figure 5. *Gemmina gemmarum* a. fresh ascomata b. dried ascomata c. asci and paraphysis in Melzer's reagent (Scale bar= 10 µm)

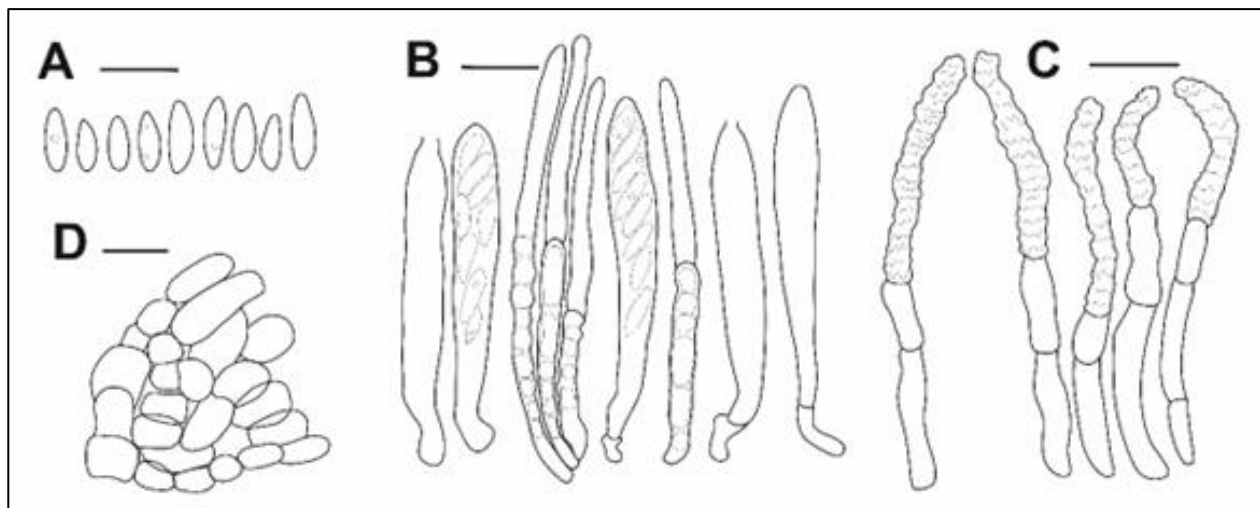


Figure 6. *Gemmina gemmarum* A. ascospores B. asci and paraphysis C. hairs D. ectal excipulum (Scale bars= 10 µm)

longer spores (Lizonbreve, 1992; Hengstmengel, 2009; Thompson, 2013).

Hymenoscyphus vitigenus grows on the rotting stems of the *Vitis vinifera* and is closely related to *Hymenoscyphus scutula* (Pers.) W. Phillips, *Hymenoscyphus caudatus* (P. Karst.) Dennis and *Helotium hyalopes* Fuckel, which grow on the bark or leaf remnants of this plant (Dennis, 1964; Baral, 2015). However, *H. scutula* has much longer spores, and *H. caudatus* grows on the remains of fallen leaves of *Vitis vinifera* or different trees (Breitenbach & Kränzlin, 1984; Uzun et al., 2010). In addition, while the length of the asci of *H. vitigenus* is 100-140 µm, the ascus lengths of *Helotium hyalopes* are between 80-120 µm, and its spores have two droplets (Fuckel, 1870; Baral, 2015).

Gemmina gemmarum is the first member of genus *Gemmina* in Türkiye (Işık & Türkekul, 2018; Keleş, 2019; Sesli et al., 2020; Çetinkaya & Uzun 2021; Solak & Türkoğlu, 2022).

Of the two *Gemmina* species determined on the Earth, *G. gemmarum* grows on rotting residues of *Populus* sp., while *G. juniperi* grows on wood remains of *Juniperus* sp. (Raitviir, 2004; Thompson, 2013). Turkish collection of *G. gemmarum* was made on fallen bud scale of *Populus* sp.

Conflict of Interest

Authors have declared no conflict of interest.

Authors' Contributions

The authors contributed equally.

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