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A New Genus Record for the *Phleogenaceae* Family from Türkiye

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Abstract: This study focuses on macrofungus specimens collected during a comprehensive field survey in 2023 in the Çukurca district of Hakkâri. Each specimen was photographed in situ and analysed using well-known mycological techniques. Detailed morphological analysis is crucial for the correct identification of the collected samples. All microcharacters of the species are meticulously drawn in the manuscript for clarity. In particular, this study represents the first description of *Helicogloea lagerheimii* Pat. at the genus level in Türkiye. Furthermore, the discovery of *H. lagerheimii* in the Çukurca region highlights the ecological diversity and richness of the region's mycobiota. It underlines the need for continued mycological research in under-explored areas of the country.

Keywords: Basidiomycota, Biodiversity, Hakkâri, *Helicogloea lagerheimii*, Türkiye.

Türkiye'den *Phleogenaceae* Familyası için Yeni Bir Cins Kaydı

Öz: Bu çalışma, 2023 yılında Hakkâri'nin Çukurca ilçesinde gerçekleştirilen kapsamlı bir saha araştırması sırasında toplanan makrofungus örneklerine odaklanmaktadır. Her bir örnek yerinde fotoğraflanmış ve iyi bilinen mikolojik teknikler kullanılarak analiz edilmiştir. Ayrıntılı morfolojik analiz, toplanan örneklerin doğru tanımlanması için çok önemlidir. Çalışmada mikrokarakterlerin daha anlaşılır olması için türün tüm mikrokarakterleri titizlikle çizilmiştir. Bu araştırma *Helicogloea lagerheimii* Pat. türünün Türkiye'de cins düzeyinde ilk tanımlanmasını içermektedir. Ayrıca, Çukurca yöresinden *H. lagerheimii*'nin keşfi, bölgenin mikobiyotasının ekolojik çeşitliliğini ve zenginliğini vurgulamakta ve ülkenin az keşfedilmiş bölgelerinde mikolojik araştırmaların devam etmesi gerektiğinin altını çizmektedir.

Anahtar kelimeler: Bazidyomikota, Biyoçeşitlilik, Hakkâri, *Helicogloea lagerheimii*, Türkiye.

Introduction

More than 8,400 species (215 genera) of *Pucciniomycotina* have been described to date,

representing approximately 8% of all fungi described to date (Kirk et al., 2008; Akata et al., 2016). *Pucciniomycotina*, a close relative of *Ustilaginomycotina*



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and *Agaricomycotina*, is one of the subphylums forming the basal lineage of *Basidiomycota*. All examined members of the *Pucciniomycotina* have simple septal pores devoid of septal pore valves and dolipores (septal pore swellings), which together with their predominant cell wall sugars and disc-like spindle pole bodies distinguish them from most other members of *Basidiomycota* (McLaughlin et al., 1995; Wells, 1994). Although some members of the *Ustilaginomycotina* appear to have simple septal pores, these are associated with membranous plates that are continuous with the plasma membrane (Lutzoni et al., 2004). The detailed phylogeny of *Pucciniomycotina*, which includes nine classes (*Agaricostilbomycetes*, *Mixiomycetes*, *Tritirachiomycetes*, *Cystobasidiomycetes*, *Microbotryomycetes*, *Classiculomycetes*, *Cryptomycocolacomycetes*, *Atractiellomycetes* and *Pucciniomycetes*), has not yet been fully resolved (Aime et al., 2014).

The single-order *Atractiellales* of the *Atractiellomycetes*, one of the nine classes of the *Pucciniomycotina*, includes two families (*Hoehnelomycetaceae* Jülich and *Phleogenaceae* Weese). Members of the order *Atractiellales* are saprotrophic. They are characterised by having simpleosomes and phragmobacidia. *Phleogenaceae* is the largest family of the order and is represented by 50 species in 7 genera (Akata et al., 2016; Aime et al., 2018; Wijayawardene et al., 2020).

The genus *Helicogloea* Pat in the family *Phleogenaceae* Weese is represented by 25 resupinate species living mainly in decaying wood and other plant remains. The genus is typically characterized by translucent, gelatinous or waxy basidiocarps as well as non-septate hyphae. The basidium is usually four-celled with transversal septa and a probacidial sac. Basidiospores vary in size and shape from medium to large (Malysheva et al., 2020). The most important morphological feature that distinguishes the species in the genus *Helicogloea* from *Bourdotigloea* Aime, named in 2018, is the absence of cystidia (Aime et al., 2018). In addition, several species with non-gelatinized basidiocarps, floccose structures, and clamped hyphae were transferred from *Helicogloea* to *Saccosoma* Spirin in 2018 (Spirin et al., 2018). The majority of species belonging to the genus *Helicogloea* exhibit host specificity; seven species are found only on angiosperms, while two are restricted to conifers (Malysheva et al., 2020).

According to Sesli et al. (2020) and Solak and Türkoğlu (2022) checklists and recent studies (Acar and Quijada, 2022; Acar and Uzun, 2022; Allı, 2022; Dizkirici and Acar, 2022; Acar, 2023; Akata et al., 2023; Akçay et al., 2023; Şahin et al., 2023; Kesici et al., 2023; Uzun and

Kaya, 2023; Acar et al., 2024; Acar and Karabıyık, 2024a, b; Akata et al., 2024a, b, c; Aslan et al., 2024; Keleş et al., 2024; Şengül et al., 2024; Terman et al., 2024; Yeşilyurt et al., 2024) *Helicogloea lagerheimii* is a new genus record. This study aims not only to record the presence of *Helicogloea lagerheimii* in Türkiye, but also to contribute to the mycobiota of the country and the world.

Material and Metod

Fresh specimens of *Helicogloea lagerheimii*, the subject of this study, were collected within the borders of Gündeş Village (Çukurca/Hakkâri) in 2020. The morphological characters of the specimen were noted in the field notes. In addition, it was photographed and documented in its natural environment with a Canon 60D digital camera. Afterward, it was meticulously transported to Van Fungarium in Van Yüzüncü Yıl University, Faculty of Science, Department of Biology. It was dried in an area out of the sun and turned into fungarium material for later use. For the determination of microscopic data, preparations were made from the dried sample and examined and photographed with a Leica DM500 (Germany) research microscope. Microscopic characters were measured at least 20 times using Leica Application Suite (version 3.4.0). Macro- and micromorphological analyses were carried out following the methods of studies by (Möller, 1895; Rogers, 1932; Rick, 1933; Baker, 1936). CoreIDRAW (64-bit) (Canada) drawing programme was used to make the observed micro characters more understandable. The specimens of the study are kept in Van Yüzüncü Yıl University Fungarium (VANF).

Results

Systematisation of the study sample

Basidiomycota R.T. Moore

Pucciniomycotina R. Bauer, Begerow, J.P. Samp., M. Weiss & Oberw.

Atractiellomycetes R. Bauer, Begerow, J.P. Samp., M. Weiss & Oberw.

Atractiellales Oberw. & Bandoni

Phleogenaceae Weese

Helicogloea Pat.

Proposed Turkish scientific name:
"Lagerheim'in Mantarı"

Helicogloea lagerheimii Pat. (Figure 1-2)

Fruit bodies, soft and gelatinous and have no definite shape. When fresh, appear greyish and translucent. When dry, develop a coating like a matt varnish and can cover large areas up to 120 mm. The surface may be bumpy or wrinkled. Internal structure

consists of hyphae segmented by septa, often showing constrictions in these segments. The hyphae walls are slightly thickened and can be up to 6.3 μm in diameter. **Clamp connections** not present. **Probasidia** develop laterally from terminal primordial cells; thin-walled, sac-like and oblong to oval in shape, 20–38 \times 7–10 μm . **Metabasidia** develops at the ends of the primordial cells, narrowing at the beginning and widening towards the end. They are transversely divided into three segments and

measure 60–95 \times 6–8 μm . Sterigmata (spore-bearing structures) can be up to 10 μm long. **Basidiospores** curved-cylindrical to egg-shaped to ellipsoid, transparent, with a blunt tip, 9–16 \times 6–8.5 μm ; germinate by a process of repetition.

Specimen examined: Hakkâri, Çukurca, Gündeş village, 37° 18'N, 43° 28'E, 1072 m, on stump of *Juglans* sp, 24.11.2020, Kesici 0316.

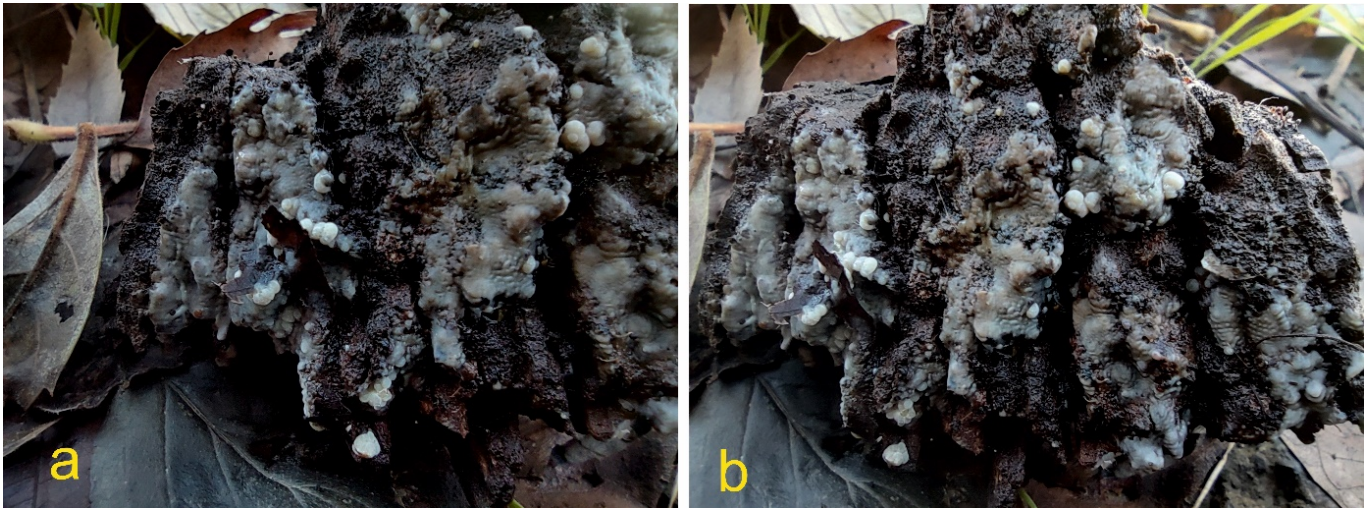


Figure 1. a-b. Fruit bodies of *Helicogloea lagerheimii*

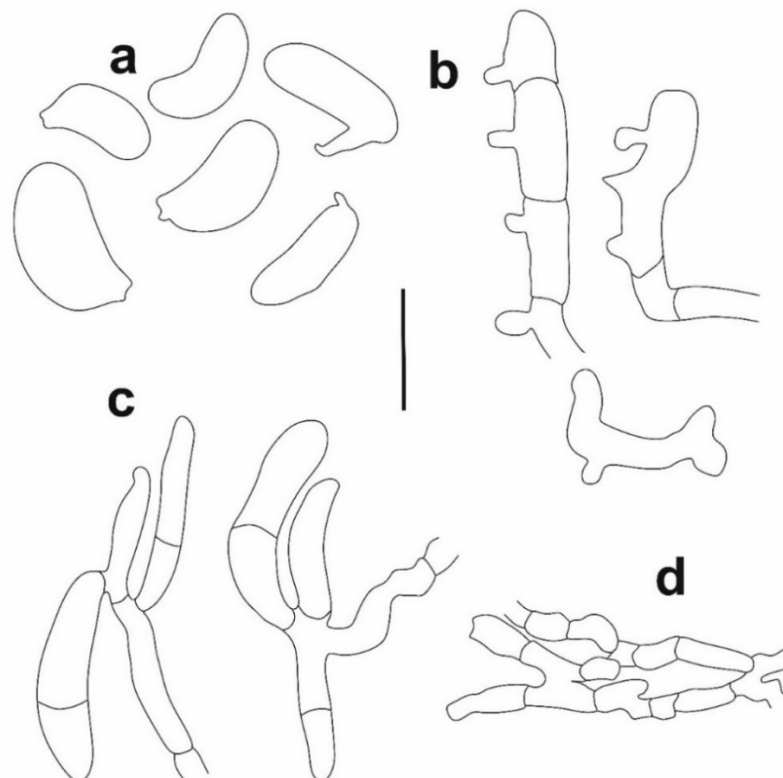


Figure 2. *Helicogloea lagerheimii* a. Basidiospores, b. Probasidia, c. Metabasidia, d. Subicular hyphae
Scale bar: 10 μm

Discussions

Helicogloea lagerheimii is morphologically very similar to *H. ovispora* (Möller) Spirin. The fructification is a particularly well-developed gelatinous fructification. It is also slightly similar concerning the size of the basidium. However, some differences are quite clear. In particular,

the probacidia of the type collection is sometimes narrowed and often located more anteriorly than usual concerning the basal wall of the primordium. The microcharacters of *H. ovispora* are generally larger and coarser (Baker, 1936; Spirin et al., 2018).

Table 1: Comparison of the present sample with other studies

<i>H. lagerheimii</i>	Hyphae	Probasidium	Metabasidium	Spores
Current study	2–6.3 µm	20–38 × 7–10 µm	60–95 × 6–8 µm	9–16 × 6–8.5 µm
Möller, 1895	2–6 µm	30 × 8 µm	100 µm	13 × 7–9 µm
Rogers, 1932	3–4.5–6 µm	16–32 × 7–10 µm	75–100 × 4.5–7.5 µm	11–14.5 × 5–7.5 µm
Rick, 1933	2–6 µm	18–33 × 6–7.5 µm	65 × 4.5 µm	15–18 × 6–7.5 µm
Baker, 1936	2–6 µm	18–38 × 5.5–10 µm	69–100 × 5–7.5 µm	13–15–18 × 6.5–8 µm

As indicated in Table 1, the microscopic characters of this study are very close to the reference ranges in the studies by (Möller, 1895; Rogers, 1932; Rick, 1933 and Baker, 1936). This is evidence that our sample was analysed correctly. In light of all these data, *Helicogloea lagerheimii* is a new record at the genus level for the mycobiota of our country.

Author contributions

All authors contribute equally.

Conflicts of interest

The authors declare that there is no conflict of interest.

Ethical Statement:

It is declared that scientific and ethical principles have been followed while carrying out and writing this study and that all the sources used have been properly cited (Yusuf UZUN, Sedat KESİCİ, İsmail ACAR)

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