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Research note/Araştırma notu

Notes on Turkish *Hypocrea*

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Abstract

Four members of *Hypocrea* Fr. (*Hypocrea alni* Jaklitsch, *Hypocrea gelatinosa* (Tode) Fr., *Hypocrea lixii* Pat., *Hypocrea nybergiana* T. Ulvinen & H.L. Chamb), are given for the first time from Turkey. Including the previously recorded *Hypocrea leucopus* (P. Karst.) H.L. Chamb, an identification key was prepared for Turkish *Hypocrea*. Short descriptions of the newly recorded taxa are given together with the photographs related to their macro and micromorphologies.

Key words: new record, *Hypocrea*, Turkey.

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Türkiye *Hypocrea*'ları üzerine notlar

Özet

Dört *Hypocrea* Fr. (*Hypocrea alni* Jaklitsch, *Hypocrea gelatinosa* (Tode) Fr., *Hypocrea lixii* Pat., *Hypocrea nybergiana* T. Ulvinen & H.L. Chamb) üyesi Türkiye'den ilk kez verilmiştir. Daha önceden kaydedilen *Hypocrea leucopus* (P. Karst.) H.L. Chamb'u da dahil ederek, Türkiye *Hypocrea*'ları için bir teşhis anahtarı oluşturulmuştur. Yeni kayıt olarak verilen taksonlara ait kısa betimleme, taksonların makro ve mikro morfolojilerine ait fotoğraflarıyla birlikte verilmiştir.

Anahtar kelimeler: yeni kayıt, *Hypocrea*, Türkiye

1. Introduction

Hypocrea Fr. is a genus of the family *Hypocreaceae* within the order *Hypocreales* and its asexual forms are mainly classified in the genus *Trichoderma*, while a few members belong to the other genera, such as *Gliocladium* Corda or *Stilbella* Lindau (Jaklitsch, 2009).

Genus *Hypocrea* produce perithecia embedded in fleshy stromata forming by pseudoparenchymatous tissue or highly compacted hyphae, two celled ascospores disarticulating at the septum within the asci of young samples, forming 16 ascospores in each ascus when mature (Jaklitsch et al., 2008; Jaclitsch, 2009).

The members of the genus usually occur on woody or herbaceous substrata, commonly in tropical or subtropical regions and less frequently in arid, temperate or boreal zone (Chaverri and Samuels, 2003).

According to literature on Turkish macromycota (Sesli and Denchev, 2008, Solak et al., 2007; Akata, 2012), only one member of *Hypocrea* (*Hypocrea leucopus* (P. Karst.) H.L. Chamb) has previously been reported from Turkey.

The aim of the present study is to make a contribution to Turkish mycobiota.

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2. Materials and methods

Fungal samples were collected from Dernekpazarı (Trabzon) district and Zigana Mountain (Gümüşhane) between 2013 and 2014 during periodical field trips. Necessary morphological and ecological characteristics of the samples were recorded and they were photographed in their natural habitats. Then the samples were taken to the laboratory for further investigations. Identification was performed according to Chaverri and Samuels (2003), Jaklitsch et al. (2008) and Jaklitsch (2009; 2011). The identified samples were deposited at Karamanoğlu Mehmetbey University, Kamil Özdağ Science Faculty, Department of Biology.

3. Results

The systematic of the newly recorded species is presented in accordance with Jaklitsch, (2009, 2011), Kirk et al. (2008) and Index fungorum (www.indexfungorum.org: accessed 15 February 2015).

Ascomycota R.H. Whittaker
Hypocreales Lindau
Hypocreaceae De Not.
Hypocrea Fr.

3.1. Key to species of Turkish *Hypocrea*

1. Stromata stipitate and ascospores hyaline 2
1*. Stromata non stipitate and ascospores green 3
2. Stromata < 50 mm long, fertile part yellow to golden brown ..... *H. leucopus*
2*. Stromata > 50 mm long, fertile part reddish brown to brownish orange ..... *H. nybergiana*
3. Stromata translucent, waxy to gelatinous ..... *H. gelatinosa*
3*. Stromata not translucent, waxy to gelatinous 4
4. Stromata dark reddish brown ..... *H. alni*
4*. Stromata olive to dark green ..... *H. lixii*

3.2. *Hypocrea alni* Jaklitsch (2008).

Anamorph: *Trichoderma alni* Jaklitsch

Stromata 7-10 mm diam., pulvinate to semiglobose, perithecia embedded, surface smooth, tubercular to rugose, reddish brown to grayish brown (Figure 1a). Ostiolar dots brownish when young, turning green to blackish when mature because of spore mass. Asci 70-85 × 4.5-5 µm, 16 spored, cylindrical to clavate (Figure 1b). Spores uniseriate, 4-4.5 × 3.5-4 µm, oblong to subglobose and green (Figure 1c).

Ecology: On damp wood and bark of alder (*Alnus glutinosa*), more rarely on silver birch (*Betula pendula*) (Jaklitsch, 2009).

Distribution: Austria, Netherlands, Ukraine and United Kingdom (Jaklitsch, 2009).

Specimen examined: TURKEY—Trabzon: Dernekpazarı, Zincirlitaş village, on dead branch and bark of alder (*Alnus glutinosa*), 40º51′K- 39º17′D, 890 m, 16.07.2014, Yuzun 1603.

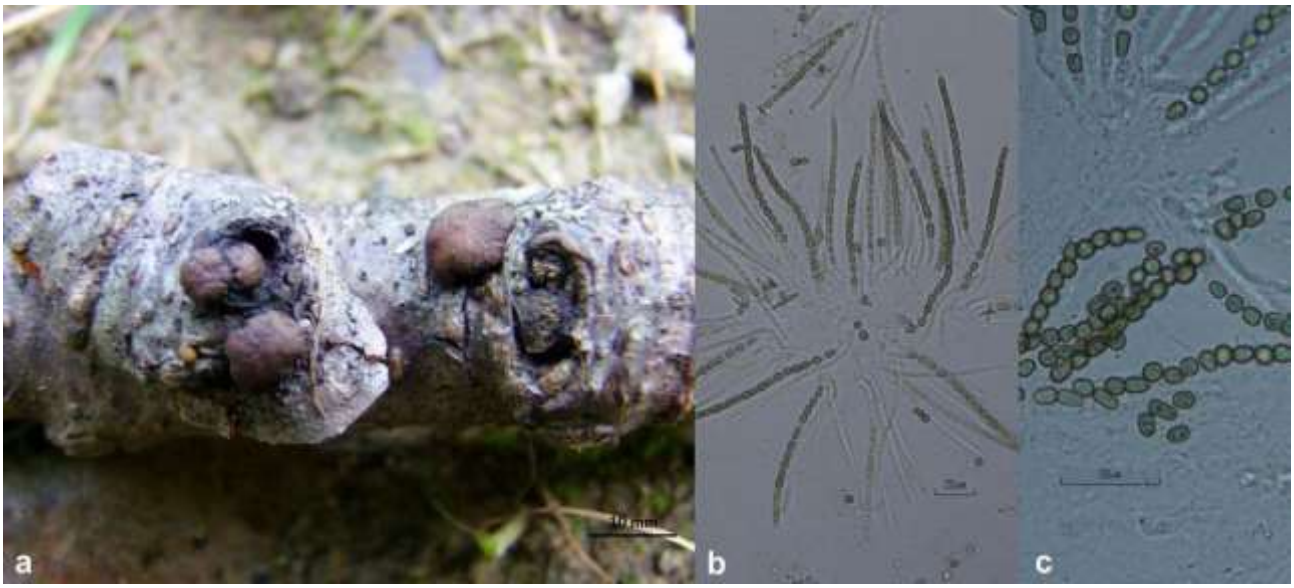

Figure 1. *Hypocrea alni*: a. ascocarps, b. asci, c. ascospores in portions of asci

3.3. *Hypocrea gelatinosa* (Tode) Fr. (1849).

Anamorph: *Trichoderma gelatinosum* P. Chaverri & Samuels

Syn: *Chromocrea gelatinosa* (Tode) Seaver, *Creopus gelatinosus* (Tode) Link, *Hypocrea gelatinosa* (Tode) Fr., subsp. *gelatinosa*, *Hypocrea gelatinosa* subsp. *oligotheca* Penz. & Sacc., *Hypocrea gelatinosa* var. *aequalis* Henn., *Hypocrea gelatinosa* var. *oligotheca* (Penz. & Sacc.) Sacc., *Hypocrea gelatinosa* var. *viridis* (Tode) Sacc., *Hypocrea moriformis* Cooke & Massee, *Hypocrea oligotheca* (Penz. & Sacc.) Sacc., *Sphaeria gelatinosa* Tode, *Sphaeria gelatinosa* var. *viridis* Tode, *Sphaeria pallida* Pers., *Sphaeria pallida* Pers., var. *pallida*, *Sphaeria pallida* var. *viridis* (Tode) Pers.

Stromata 1-2 mm diam., pulvinate, circular to angular, soft, gelatinous and translucent, numerous perithecia in per stroma, surface smooth, colourless, pale grayish to pale yellowish when young, turning green to yellowish green when mature (Figure 2a-b). Ostioles invisible. Asci 90-100 × 5-5.5 µm, 16 spored, cylindrical to clavate (Figure 2c). Spores uniseriate, 4-4.5 × 3.5-4.5 µm, verrucose, oblong to subglobose and green (Figure 2d).

Ecology: On rotten wood and bark also on various fungi (Jaklitsch, 2009).

Distribution: Austria, France, Germany, Netherlands, Slovenia, Ukraine and United Kingdom (Jaklitsch, 2009).

Specimen examined: TURKEY—Trabzon: Dernekpazarı, Günebakan village, on dead wood of alder, 40º46′K- 40º11′D, 570 m, 05.09.2014, Yuzun 1494.

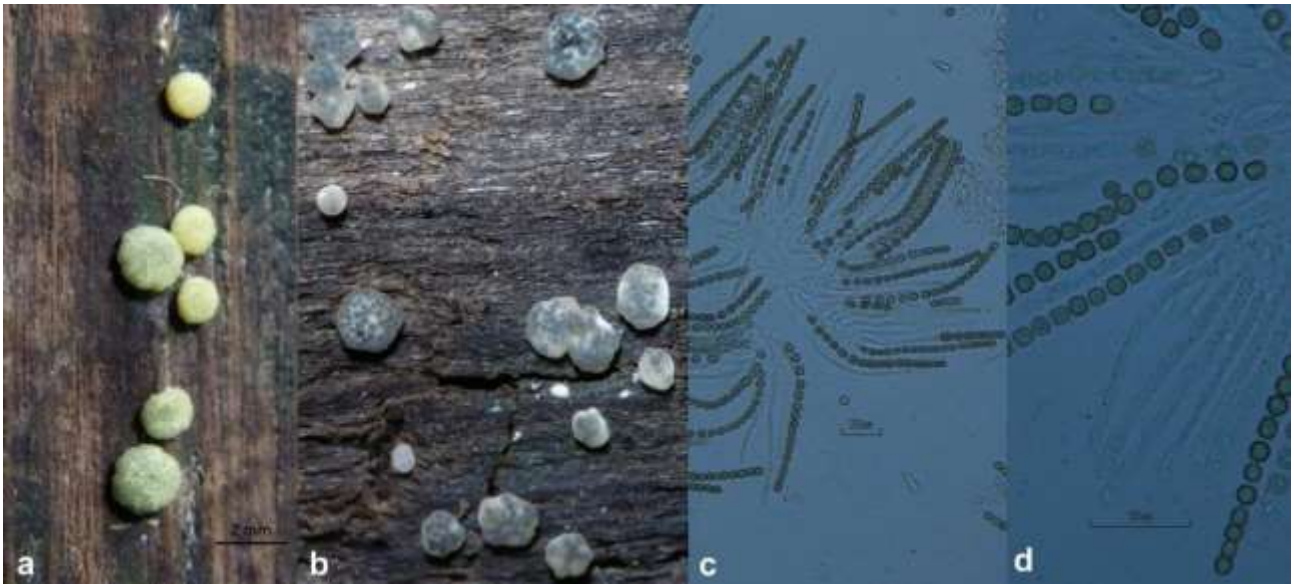

Figure 2. *Hypocrea gelatinosa*: a & b. ascocarps, c. asci, d. ascospores in portions of asci

3.4. *Hypocrea lixii* Pat. (1891).

Anamorph: *Trichoderma harzianum* Rifai

Stromata 1-4 mm diam., turbinate to pulvinate, circular, surface smooth when young granulose when mature, olive, dark green to black (Figure 3a). Ostiolar dots greenish brown to black. Asci 80-90 × 5-5.5 µm, 16 spored, cylindrical to clavate (Figure 3b). Spores uniseriate, 4-4.5 × 3.5-4 µm, elipsoid, oblong to subglobose and green (Figure 3c).

Ecology: On dead wood and bark also on some macrofungi particularly polypores (Jaklitsch, 2009).

Distribution: Austria, Denmark, Germany, France, Papua New Guinea, Thailand, United Kingdom (Jaklitsch, 2009).

Specimen examined: TURKEY—Trabzon: Dernekpazarı, Günebakan village, on dead wood of alder, 40º46′K- 40º11′D, 570 m, 05.09.2014, Yuzun 1495.

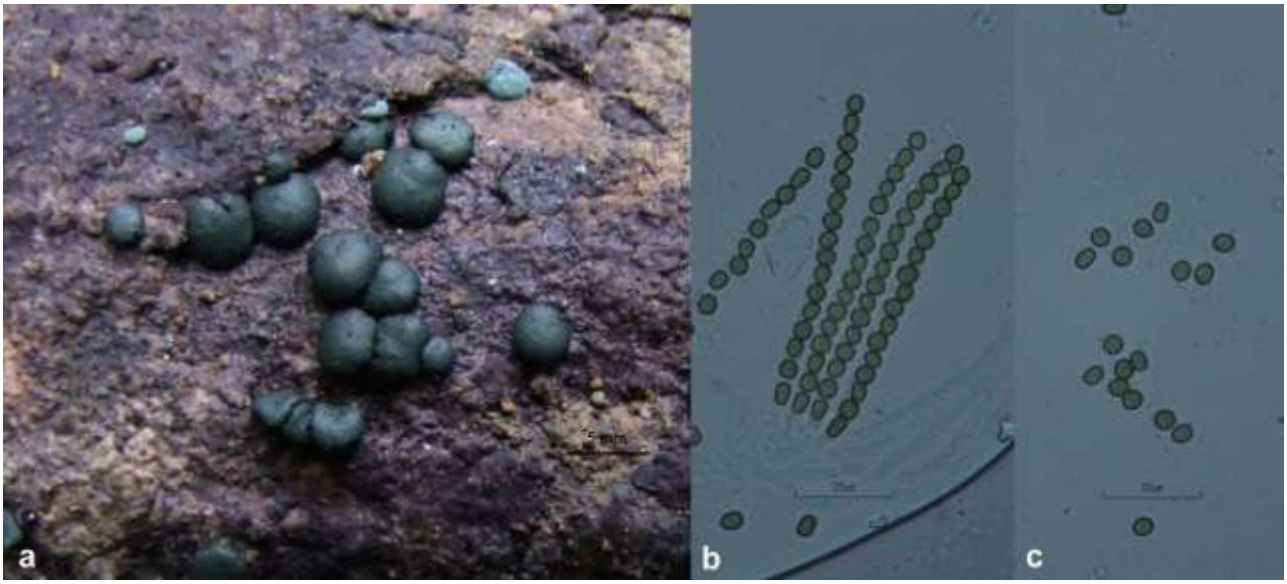

Figure 3. *Hypocrea lixii*: a. ascocarps, b. asci, c. ascospores

3.5. *Hypocrea nybergiana* T. Ulvinen & H.L. Chamb (2004).

Anamorph: *Trichoderma nybergianum* (T. Ulvinen & H.L. Chamb.) Jaklitsch & Voglmayr

Stromata separated into fertile and sterile parts. Total stroma 60-100 × 20-40 mm, narrowly clavate (Figure 4a). Fertile part 40-60 mm long, reddish brown to brownish orange. Surface smooth, glabrous, slightly tuberculate. Stipe whitish to beige ((Figure 4a). Ostiolar dots bright ochre to brown. Asci 80-100 × 5-6 µm, 16 spored, cylindrical to clavate (Figure 4b). Spores uniseriate, 4-4.5 × 3.5-4 µm, globose to subglobose and hyaline (Figure 4c).

Ecology: In conifer and mixed forests, on forest litter (Jaklitsch, 2011).

Distribution: Finland and Sweden (Jaklitsch, 2011).

Specimen examined: TURKEY—Trabzon: Gümüşhane, Zigana mountain, beech and spruce mixed forest, on spruce needles, 40º37′K- 39º22′D, 1630 m, 13.10.2013, Kaya, Akata & Yuzun 833.

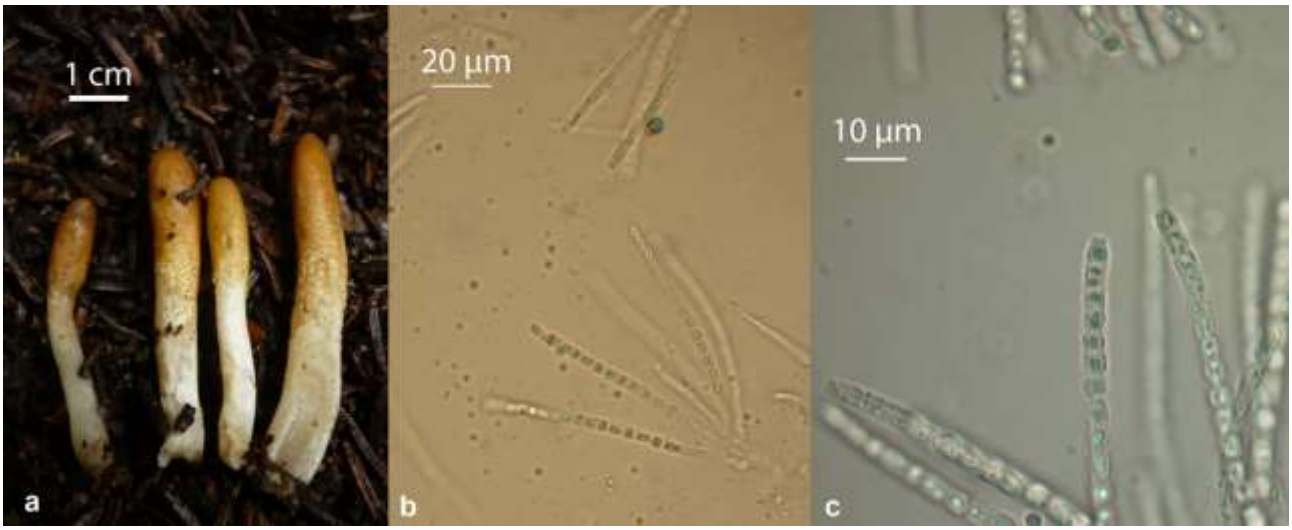

Figure 4. *Hypocrea nybergiana*: a. ascocarps, b. asci, c. ascospores in portions of asci..

4. Conclusions

Hypocrea alni is macroscopically very close to *H. brunneoviridis* Jaklitsch due to their thickly pulvinate, reddish brown stromata and green spores. It can be seperated from the latter species by its darker stromata with inconspicuous ostiolar dots and occurrence in damp, grassy or boggy habitats of *Alnus glutinosa*, often along brooks (Jaklitsch et al., 2008).

Hypocrea gelatinosa can be distinguished from other green-spored *Hypocrea* members by its glassy, waxy to gelatinous stromata (Jaklitsch, 2009).

Hypocrea lixii is characterized by olive or dark green to black, lenticular, turbinate to pulvinate stromata and greenish brown to black ostiolar dots. *H. epimyces* Sacc. and *H. parepimyces* Jaklitsch may resemble the lenticular form of the *Hypocrea lixii* but both former species have reddish to orange-brown and conspicuous ostiolar dots (Jaklitsch, 2009).

Hypocrea nybergiana differs from other stipitate *Hypocrea* species by its larger, darker stromata and rusty pigmented scales between the fertile and sterile parts on the stipe (Chamberlain et al., 2004; Jaklitsch, 2011).

Though 75 species were reported from Europe (Jaklitsch, 2009) only one member of *Hypocrea* (*Hypocrea leucopus* (P. Karst.) H.L. Chamb) has so far been reported from Turkey till now. With the addition of *Hypocrea alni*, *H. gelatinosa*, *H. lixii*, *H. nybergiana* current number of the genus increased to five.

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