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Research Article

New locality records for two truffle taxa in Turkey

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Abstract

Hymenogaster luteus and *Leucogaster nudus*, two new specimens of previously reported truffle taxa, were collected and itentified from habitats within the boundaries of the Eastern Black Sea and the Marmara Regions of Turkey. *Hymenogaster luteus* was reported previously only once from the localities within Isparta, Osmaniye, Tekirdağ and Yalova Provinces in Turkey. The first Turkish record of *Leucogaster nudus* was reported by Pilát from Ilgaz Mountain (Kastamonu Province). Brief descriptions and new distribution localities of the species were provided together with the photographs related to their macro and micromorphologies.

Keywords: Basidiomycetes, biodiversity, chorology, hypogeous fungi, Turkey

İki trüf taksonu için Türkiye'de yeni lokalite kayıtları

Özet

Daha önceden rapor edilmiş olan iki trüf taksonu, *Hymenogaster luteus* ve *Leucogaster nudus*, Türkiye'nin Doğu Karadeniz Bölgesi ve Marmara Bölgesi'ndeki habitatlardan toplanarak teşhis edilmiştir. *Hymenogaster luteus*, Türkiye'de Isparta, Osmaniye, Tekirdağ ve Yalova illerindeki yerleşim yerlerinde daha önce yalnızca bir kez rapor edilmişti. *Leucogaster nudus*'un ise ilk Türkiye kaydı Pilát tarafından Ilgaz Dağı'ndan (Kastamonu İli) yapılmıştı. Türlerin kısa betimlemeleri ve yeni yayılış lokaliteleri, makro ve mikromorfolojilerine ait fotoğrafları ile birlikte verilmiştir.

Anahtar kelimeler: Bazidiyomisetler, biyoçeşitlilik, koroloji, toprakaltı mantarlar, Türkiye

INTRODUCTION

Two checklists were presented by Sesli and Denchev (2014) and Solak et al. (2015) related to the macromycetes of Turkey. Following the checklists, many contributions were also made to the increasing knowledge of Turkish higher fungi during the last five to six years (Kaşık et al. 2017; Allı et al. 2019; Keleş 2019; Şelem et al. 2019; Türkekul & Işık 2019; Yıldız et al. 2019; Acar et al. 2020; Akçay 2020; Çağli & Öztürk 2020; İleri et al. 2020; Sadullahoğlu et al. 2020; Sesli 2020).

A closer look at the checklists and most of the latest contributions indicates that epigeous macrofungi have received more attention than hypogeous species until the last decade. After the 2010s, Castellano & Türkoğlu (2012), Türkoğlu & Castellano (2014), Türkoğlu et al. (2015) and Elliot et al. (2016) have presented in a concentrated manner new records and new localities of Turkish hypogeous macromycetes. Meanwhile, Doğan & Akata (2015), Alkan et al. (2018), Doğan (2018), Doğan et al. (2018), Uzun & Kaya (2018), Uzun & Yakar (2018), Uzun et al. (2018), Berber et al. (2019), Uzun & Kaya, (2019a,b,c,d), Uzun et al. (2019a,b), Yakar et al. (2019) and Uzun & Kaya (2020a,b) also presented reports about the hypogeous macromycetes of Turkey.

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Currently, more than 90 taxa of hypogeous macrofungi, 43 belonging to Ascomycota and 56 to Basidiomycota, are known to exist in Turkey. The truffle species, *Hymenogaster luteus* Vittad. and *Leucogaster nudus* (Hazsl.) Hollós, are also among the known taxa of hypogeous macromycetes in Turkey. Here we present new localities for these two taxa within the boundaries of the East Black Sea and Marmara Regions.

The study aims to make a contribution to the mycobiota of Turkey by presenting new distributions of two hypogeous macromycete species.

MATERIAL AND METHOD

Specimens of *Hymenogaster luteus* were collected from İstanbul and Trabzon Provinces between 2016 and 2018, and *Leucogaster nudus* samples were collected from Rize and Trabzon Provinces between 2015 and 2017. The fruit bodies were photographed and the characteristics required for the identification of the samples were noted during field studies. Next, the samples were transferred to the fungarium in paper boxes and dried in an air-conditioned room. Micromorphological investigations were performed on the dry specimens. A Nikon eclipse Ci-S trinocular light microscope was used for microscopic investigations. Spore photographs were taken with a DS-Fi2 digital camera aided by a Nikon DS-L3 displaying apparatus. The specimens were identified by comparing the obtained data with Vittadini (1831), Zeller & Dodge (1924), Dodge & Zeller (1934), Hawker (1954), Pegler et al. (1993), Montecchi & Sarasini (2000), Arroyo et al. (2005) and Türkoğlu et al. (2015). The samples are being kept at the Karamanoğlu Mehmetbey University, Kamil Özdağ Faculty of Science, Department of Biology.

RESULTS AND DISCUSSION

Basidiomycota R.T.Moore
Agaricomycetes Doweld
Agaricales Underw.
Hymenogastraceae Vittad.
Hymenogaster Vittad.

Hymenogaster luteus Vittad., Monographia Tuberacearum: 22, t. 3: 9 (1831) (Vittadini 1831).
Synonyms. *Hymenogaster luteus* f. *trigonosporus* Vaček, *Hymenogaster luteus* var. *berkeleyanus* (Corda) Stielow, Bratek, A.K.I.Orczán, S.Rudnoy, Hensel, P.Hoffm., Klenk & Göker, *Hymenogaster luteus* var. *fulvus* Soehner, *Hymenogaster luteus* var. *fulvus* Soehner, *Hymenogaster luteus* var. *subfuscus* Soehner, *Hysterogaster luteus* (Vittad.) C.W.Dodge, *Oogaster berkeleyanus* Corda, *Tuber berkeleyanum* Tul. & C.Tul.
Description. Basidiomata 5−17 mm broad, subglobose to globose, some irregularly lobed, usually with a depressed base, white to dirty white when young, greyish or yellowish-grey to yellowish-brown at maturity (Figure 1). Peridium 100-160 µm thick, smooth, silky. Gleba soft, at first white, then yellowish to pale yellow. Odor pleasant. Basidia 22−25 × 4−6 µm, clavate. Basidiospores 18−2 × 7.5−9.5(−10) µm, ellipsoid to fusiform, some not symmetrical, smooth and thick walled (Figure 2). *Hymenogaster luteus* grows under deciduous trees, coniferous trees or mixed forest as embedded in soil or leaf or needle litter (Hawker 1954; Montecchi & Sarasini 2000; Türkoğlu et al. 2015).

Taxonomic notes

Hymenogaster luteus was reported previously only once by Türkoğlu et al. (2015) from the localities within Isparta, Osmaniye, Tekirdağ and Yalova Provinces in Turkey based on the collections between 2013 and 2014. The samples were collected under *Quercus vulcanica* Boiss. & Heldr. ex Kotschy, or under mixed stands with the members of *Carpinus* L., *Fagus* L., *Pinus* L., and *Rhododendron* L. species, especially of *Carpinus betulus* L., *Fagus orientalis* Lipsky, *Pinus brutia* Ten., *Pinus nigra* Aiton, *Quercus cerris* L. and *Q. petraea* (Matt.) Liebl. Our sample was collected under broad-leaved trees, such as *Laurus nobilis* L., *Fagus orientalis, Castanea sativa* Mill., *Rhododendron ponticum* (Boiss. & Reut.) Hand.-Mazz., *Alnus* Mill. and *Quercus* L. species.

Dodge & Zeller (1934), Hawker (1954), Pegler et al (1993), Montecchi & Sarasini (2000) and Türkoğlu et al. (2015) give the basidiocarp dimensions as 10−20 mm, 10(−17) mm, 5−15 mm, 5−20 mm and 10 mm, respectively. The same authors measured the basidiospore size as 18−22 × (7−)9−11(−12) µm except Türkoğlu et al. (2015) who gives it as 12−20 × 9−12 µm. Peridium thickness was given as 40−50 µm by Dodge & Zeller (1934) and Hawker (1954), while it was given as 90−180 µm by Türkoğlu et al. (2015). Though the basidiocarp and basidiospore dimensions of the samples investigated are generally in agreement with all of the reported data, they fit well with Hawker (1954) and Montecchi & Sarasini (2000). On the other hand, peridium thickness of our samples fit well with previously recorded Turkish collections (Türkoğlu et al. 2015).

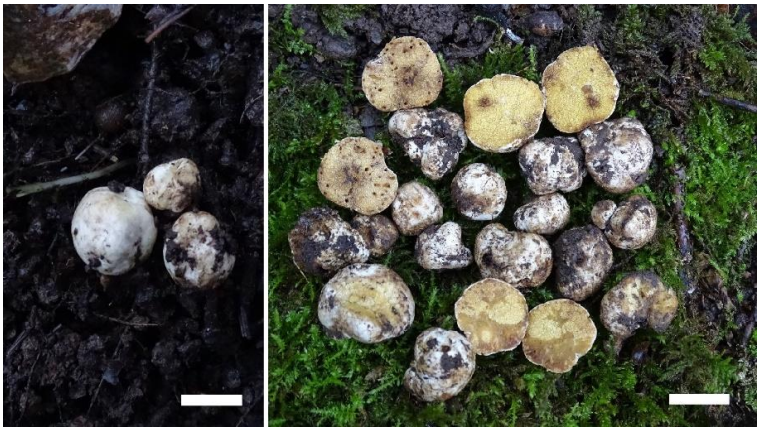

Figure 1. Basidiocarps of *Hymenogaster luteus* (Bars: 10 mm).

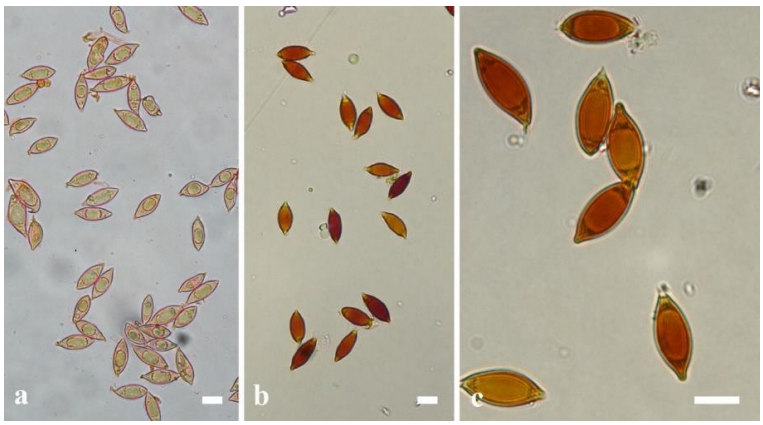

Figure 2. Basidiospores (a-c) of *Hymenogaster luteus* (Bars: 10 µm).

Basidiomycota R.T.Moore
Agaricomycetes Doweld
Russulales Kreisel ex P.M.Kirk, P.F.Cannon & J.C.David
Albatrellaceae Nuss
Leucogaster R.Hesse

Leucogaster nudus (Hazsl.) Hollós, Annales Historico-Natureles Musei Nationalis Hungarici 6: 319 (1908). **Synonyms.** *Hydnangium nudum* Hazsl., *Leucogaster floccosus* R.Hesse.
Description. Basidiocarps 20−45 mm in diameter, subglobose, some irregularly lobed, at first whitish to yellowish white, later ochraceous to yellowish brown, developing red-brown stains (Figure 3). Peridium 200−400 µm thick, finely tomentose when young, soon become glabrescent, fragile and not separable. Gleba white, then pale ocher to pale olive brown, with small, angular cells, from the beginning filled with a gelatinous matrix, secreting latex when cut. Basidiospores 11−14 µm, subglobose to spherical, surface with a reticulate ornamentation, enclosed in a gelatinous transparent, thin walled and smooth episporal membrane (Figure 4). *Leucogaster nudus* was reported to grow under deciduous trees, coniferous trees or mixed forest (Zeller & Dodge 1924; Pegler 1993; Montecchi & Sarasini 2000; Türkoğlu et al. 2015).

Figure 3. Basidiocarps of *Leucogaster nudus* (Bars: 15 mm).

Taxonomic notes
The first Turkish record of *Leucogaster nudus* was reported by Pilát (1937) from Ilgaz Mountain, and the existence of it in Turkey was also noted by Türkoğlu et al. (2015) based on the samples collected from Kastamonu Province under *Abies nordmanniana* (Steven) Spach var. *bornmulleriana* (Mattf.) Silba and *Fagus orientalis*. We found it under different mixed stands of *Fagus orientalis, Castanea sativa, Rhododendron ponticum, Picea orientalis* (L.) Peterm. and *Alnus* species.

Basidiocarp dimensions of *Leucogaster nudus* were reported as 10−15 mm, 15−50 mm, 10−30 mm and 15−30 mm by Zeller & Dodge (1924), Pegler et al. (1993), Montecchi & Sarasini

(2000) and Türkoğlu et al. (2015), respectively. Spore dimensions were also reported as 16−18 µm, 11−18 µm, 10−14 µm and 13.2−17.5 µm by the same authors.

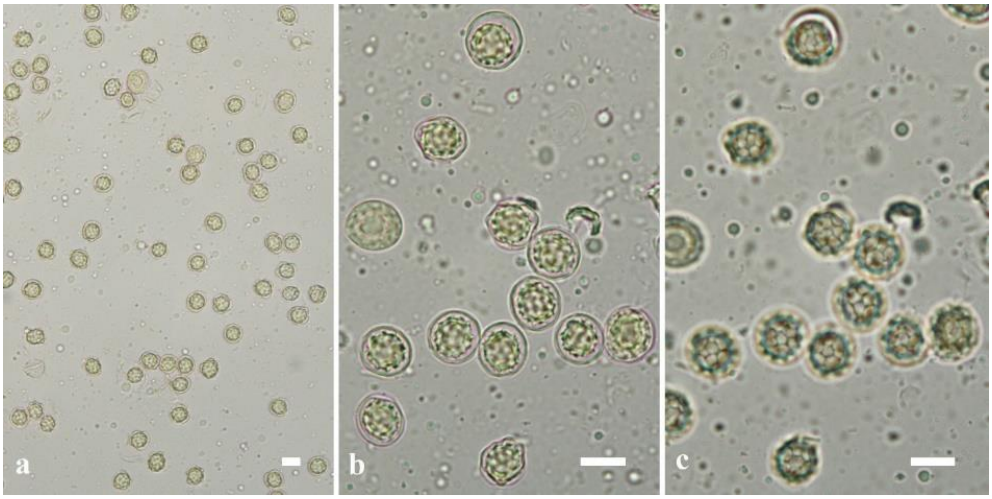

Figure 4. Basidiospores (a-c) of *Leucogaster nudus* (Bars: 10 µm).

The basidiocarps of the newly collected samples, reaching up to 45 mm, seem to exceed the size (15−30 mm) given by Montecchi & Sarasini (2000) and Türkoğlu et al. (2015). However, it is in agreement with those reported by Dodge & Zeller (1934) and Pegler et al. (1993) who had reported it as 10−50 mm and 15−50 mm, respectively. Basidiospore size of the samples investigated is also within the range given by Pegler et al. (1993), Montecchi & Sarasini (2000) and Türkoğlu et al. (2015). Though the peridium thickness of our samples does not reach up to 500 µm or 520 µm, which was given by Montecchi & Sarasini (2000) and Türkoğlu et al. (2015) respectively, it is within the range reported by the above authors.

Specimens examined

Hymenogaster luteus. İstanbul, Beykoz, Çavuşbaşı, under soil and rotting plant residues, mixed forest of *Quercus* sp. and *Laurus nobilis*, 41˚03′N−29˚08′E, 150 m, 27.12.2018, Y.Uzun 7145; Trabzon, Tonya, Sağrı village, under soil and rotting plant residues, mixed forest of *Fagus orientalis, Castanea sativa, Rhododendron ponticum* and *Alnus* sp., 40˚57′N−39˚18′E, 780 m, 17.05.2016, Y.Uzun 5085.

Leucogaster nudus. Rize, Ardeşen, Kirazlık village, under soil and rotting plant residues, mixed forest of *Fagus orientalis, Castanea sativa, Rhododendron ponticum* and *Alnus* sp. 41˚07′N−41˚05′E, 600 m, Y.Uzun 5206; Yeşiltepe village, under soil and rotting plant residues, mixed forest of *Fagus orientalis, Castanea sativa* and *Rhododendron ponticum*, 41˚09′N−41˚09′E, 510 m, 26.11.2017, Y.Uzun 5946.; Trabzon, Tonya, Erikbeli village, under soil and rotting plant residues, mixed forest of *Fagus orientalis, Picea orientalis* and *Rhododendron ponticum*, 40˚46′N−39˚14′E, 1400 m, 28.10.2015, Y.Uzun 4620; Kösecik village, under rotting plant residues and mosses, mixed forest of *Fagus orientalis, Castanea sativa* and *Rhododendron ponticum*, 40˚57′N−39˚16′E, 800 m, 07.11.2016, Y.Uzun 5384; Kozluca village, Kösecik village, under rotting plant residues and mosses, mixed forest of *Fagus orientalis, Castanea sativa* and *Rhododendron ponticum*, 40˚56′N−39˚13′E, 1000 m, 13.11.2016, Y.Uzun 5478; Çaykara, Uzungöl

Nature Park, under soil and rotting plant residues, mixed forest of *Fagus orientalis*, *Picea orientalis* and *Rhododendron ponticum*, 40˚37′N−40˚16′E, 1370 m, 14.11.2016, Y.Uzun 5486.

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