

## *Bryoperdon*, A New Gasteromycete Genus Record for Turkey

Abdullah KAYA<sup>1\*</sup>, Yasin UZUN<sup>2</sup>

<sup>1</sup>Gazi University, Science Faculty, Dept. of Biology, Ankara <sup>2</sup>Karamanoğlu Mehmetbey University, Science Faculty, Dept. of Biology, Karaman, Turkey

<sup>1</sup><https://orcid.org/0000-0002-4654-1406>, <sup>2</sup><https://orcid.org/0000-0002-6423-6085>

✉: [kayaabd@hotmail.com](mailto:kayaabd@hotmail.com)

### ABSTRACT

The gasteromycete genus, *Bryoperdon* is given as new record for the Turkish mycobiota by the collection and identification of *B. acuminatum* specimens from Ardeşen district of Rize province. The new recorded taxon is described briefly, and the distribution locality, voucher number and photographs related to its micro and macro morphologies are provided.

### Research Article

#### Article History

Received : 25.10.2019  
Accepted : 23.01.2020

#### Keywords

Biodiversity  
Bryophilous fungi  
Puffballs

## *Bryoperdon*, Türkiye İçin Yeni Bir Gasteromiset Cins Kaydı

### ÖZET

Bir gasteromiset cinsi olan *Bryoperdon*, Rize'nin Ardeşen ilçesinden *B. acuminatum* örneklerinin toplanıp teşhis edilmesiyle Türkiye mikrobiyotası için yeni kayıt olarak verilmiştir. Yeni olarak kaydedilen takson kısaca betimlenmiş ve yayılış lokalitesi, toplayıcı numarası, ve makro ve mikro morfolojilerine ilişkin fotoğrafları verilmiştir.

### Araştırma Makalesi

#### Makale Tarihi

Geliş Tarihi : 25.10.2019  
Kabul Tarihi : 23.01.2020

#### Anahtar Kelimeler

Biyçeşitlilik  
Bryofilik mantarlar  
Puf mantarları

**To Cite** : Kaya A, Uzun Y 2020. *Bryoperdon*, A New Gasteromycete Genus Record for Turkey. KSU J. Agric Nat 23 (3): 596-599. DOI: 10.18016/ksutarimdog.vi.638135.

### INTRODUCTION

*Bryoperdon* Vizzini, is a gasteromycete genus within the family *Agaricaceae*. This monotypic genus was recently erected with the member *B. acuminatum* (Bosc) Vizzini, and is characterized by small, ovoid gasteroid basidiome with mycelial cords and lacking a true stipe, lycoperdon type capillitium, smooth to minutely pustulose-verrucose spores, on bryophilous growth on rocks and tree trunks (Vizzini and Ercole, 2017).

*Bryoperdon acuminatum* had been known as *Bovista acuminata* (Bosc) Kreisel, *Lycoperdon acuminatum* Bosc or *Lycoperdon pyriforme* var. *acuminatum* (Bosc) F. Šmarda. Depending on the molecular analysis and morphological and ecological characteristics such as basidiome shape, absence of a subgleba, exoperidium consisting of chained, inflated elements, and bryophilous association, this species raised to the new genus *Bryoperdon* (Vizzini and Ercole, 2017).

As a result of a care review of the current checklists (Sesli and Denchev, 2014; Solak et al., 2015) and the latest contributions (Kaya, 2015; Doğan and Kurt, 2016; Elliot et al., 2016; Türkekul, 2017; Akata and

Gürkanlı, 2018; Doğan, 2018; Uzun et al., 2018; Yakar et al., 2019), hundred and twenty eight gasteromycete taxa have so far been presented from Turkey, and 34 of them belong to the genera *Bovista* Pers. (5), *Bovistella* Morgan (1), *Calbovista* Morse ex M.T. Seidl (1), *Calvatia* Fr. (3), *Chlorophyllum* Marsee (1), *Disciseda* Czern. (1), *Lycoperdon* Pers. (21) and *Mycenastrum* Desv. (1). These genera are also known as puffballs due to emission of brown dust-like spore clouds when the mature fruit body is impacted or bursts.

In this present study, a new genus and subsequently a new species is introduced to the Turkish mycobiota.

### MATERIALS and METHODS

Specimens of *B. acuminatum* were collected during a field trip to Ardeşen district of Rize province on 5th August 2016. The basidiomata were photographed with a Sony DSC HX-400V digital compact camera, at their natural habitats and the required morphological and ecological characteristics were noted. Microscopic investigations were carried out in the laboratory on dried specimens, through a Nikon Eclipse Ci-S

trinocular light microscope, mounting in water and Melzer's reagent. Photographs related to micromorphology was taken through a Nikon DS-Fi2 camera. SEM images were obtained with a Hitachi SU5000 scanning electron microscope. Identification was performed referring to Coker and Couch (1928), Swartz (1936), Bessette et al. (2007), Vizzini and Ercole (2017). The sample is kept at the fungarium of Karamanoğlu Mehmetbey University, Kamil Özdağ Science Faculty Department of Biology.

## RESULTS

*Basidiomycota* R.T. Moore

*Agaricales* Underw.

*Agaricaceae* Chevall.

*Bryoperdon acuminatum* (Bosc) Vizzini, in Vizzini & Ercole, Phytotaxa 299(1): 80 (2017)

**Syn:** [*Lycoperdon acuminatum* Bosc, *Bovista acuminata* (Bosc) Kreisel, *Lycoperdon pyriforme* var. *acuminatum* (Bosc) F. Šmarda]

**Macroscopic and microscopic features:** Basidiomata 9-14 × 6-9 mm, ovoid to somewhat egg-shaped with a pointed apex and rounded base, whitish to cream when young, pale ochraceous, yellowish brown to brownish at maturity. Exoperidium consists of 0.1-0.2 mm tall pyramidal structures which are usually composed of apically connected 2-4 spines (Figure 1). Endoperidium thin, whitish when young, then light to dark brown. Gleba at first whitish then yellowish green to pale brown. Basidiospores 3.6-4.0 µm in diam., globose to spherical, yellowish brown and almost smooth under light microscope (Figure 2a,b), moderately warty with broken pedicels under SEM (Figure 2c-e).



Figure 1. Basidiocarps of *Bryoperdon acuminatum*  
Şekil 1. *Bryoperdon acuminatum*'ün bazidiyokarpları

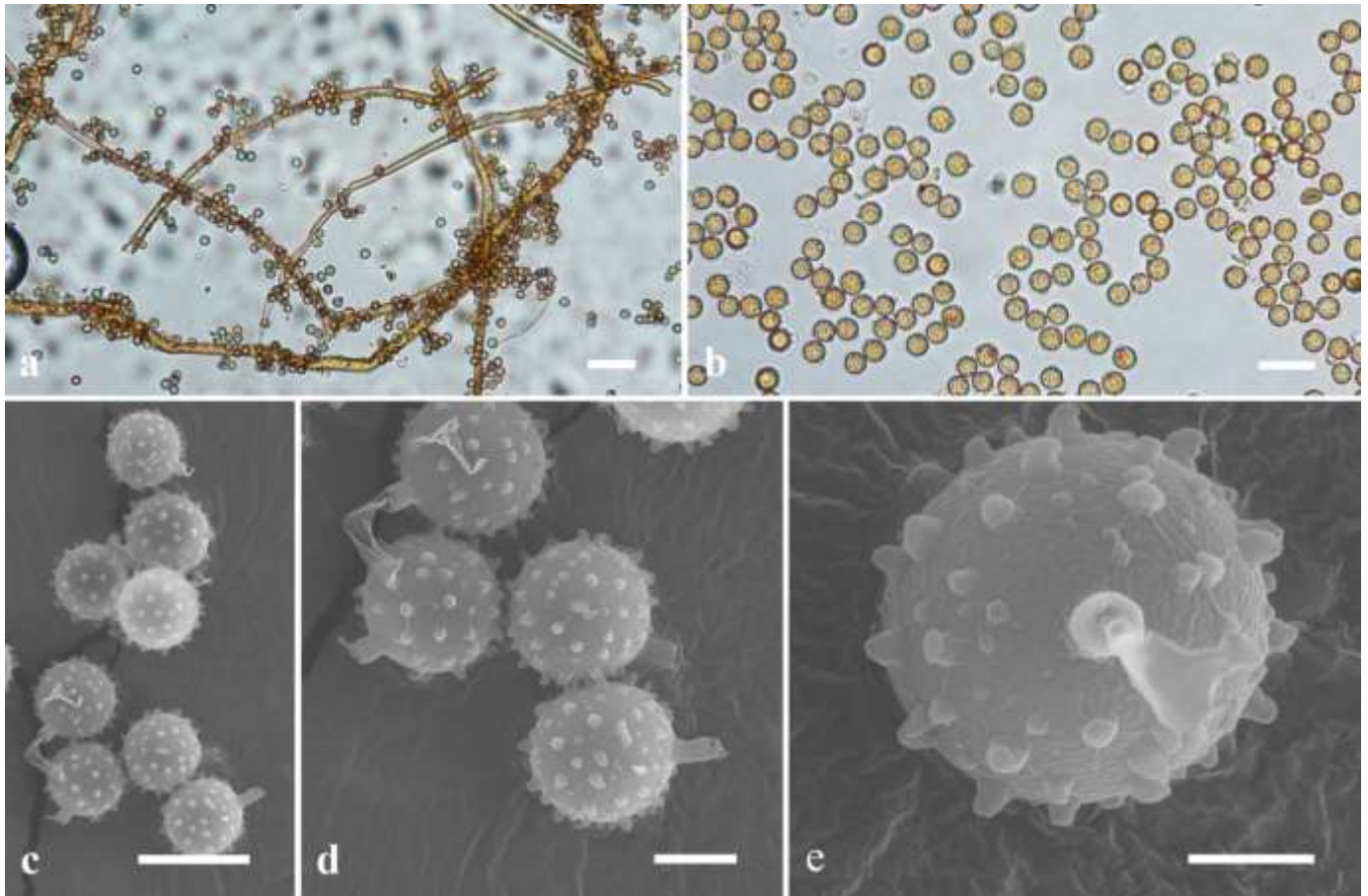


Figure 2. Capillitial hypha and basidiospores (a) and basidiospores (b-e) of *Bryoperdon acuminatum*. (a, b: light microscope, c-e: scanning electron microscope) (bars – a: 50  $\mu$ m, b:10  $\mu$ m, c: 5  $\mu$ m, d: 2  $\mu$ m, e: 1  $\mu$ m) (a, b: in Melzer)

Şekil 2. *Bryoperdon acuminatum*'un kapillitiyal hifleri ve bazidiyosporları (a) ve bazidiyosporları (b-e), (a, b: ışık mikroskobu, c-e: taramalı elektron mikroskobu) (barlar – a: 50  $\mu$ m, b:10  $\mu$ m, c: 5  $\mu$ m, d: 2  $\mu$ m, e: 1  $\mu$ m) (a, b: Melzer)

**Ecology:** *Bryoperdon acuminatum* grows on mossy stumps or stones in deciduous, coniferous and mixed forests (Bessette et al., 2007; Gorbunova, 2017; Gorbunova and Rebriev, 2017; Vizzini and Ercole, 2017).

**Specimen examined:** Rize, Ardeşen, Eskiarmutluk Village, among mosses on rock, 41°07'N-41°08'E, 610 m, 05.viii.2016, Yuzun 5185.

## DISCUSSION

*Bryoperdon acuminatum* is reported here as the first record to Turkey. General characteristics of Turkish specimens are in agreement with those given in the literature (Coker and Couch, 1928; Swartz, 1936; Bessette et al. 2007; Vizzini and Ercole, 2017). Though Vizzini and Ercole (2017) have placed it in the family *Lycoperdaceae* during the first establishment of the genus, we regarded *Bryoperdon* in *Agaricaceae* since we follow Index Fungorum (accessed 22 October 2019).

*Bryoperdon acuminatum* has been widely reported from Central and North America, but it has a rare distribution in Europe (Vizzini and Ercole, 2017), and

according to the The Global Fungal Red List Initiative (accessed 22 October 2019) it was also suggested for Fungal Red List because of its narrow ecological preferences and habitat loss due to deforestation.

Although *B. acuminatum* is a remarkable species with its rather small, oblong, conical fruit bodies with the tip towards the top, and its unique habitat, it may be confused with *Bovista ochrotricha* Kreisel in terms of morphology and ecology. But the exoperidium made up of non-enlarged elements with lanceolate apex, mixed with setiform ones, and more verrucose spores of the latter species differs it from *B. acuminatum*. *Lycoperdon rupicola* Jeppson, E. Larss. & M.P. Martín was also reported to grow mainly among moss carpets, and has morphological similarities with *B. acuminatum* but it is distinguished from *B. acuminatum* by a well-developed subgleba, a prominent, stellately-lobed, protruding apical pore and some phylogenetic properties (Vizzini and Ercole, 2017).

## ACKNOWLEDGEMENTS

The authors would like to thank Karamanoğlu Mehmetbey University Research Fund for supporting the Project 16-M-16 financially.

## Statement of Conflict of Interest

Authors have declared no conflict of interest.

## Author's Contributions

The contribution of the authors is equal.

## REFERENCES

- Akata I, Gürkanlı CT. 2018. A New Genus Record For Turkish Clathroid Fungi. *The Journal of Fungus*, 9(1): 36-38.
- Bessette AE, Roody WC, Bessette AR, Dunaway DL. 2007. *Mushrooms of the Southeastern United States*. New York: Syracuse University Press.
- Coker WC, Couch JN. 1928. *The Gasteromycetes of the eastern United States and Canada*. Baltimore. Chapel Hill: The University of North Carolina Press.
- Doğan HH, Kurt F, 2016. New macrofungi records from Turkey and macrofungal diversity of Pozantı-Adana. *Turkish Journal of Botany*, 40(2): 209-217.
- Doğan HH. 2018. A new Genus, *Schenella*, Addition to Turkish Mycota from Geastraceae. *The Journal of Fungus*, 9(2): 92-94.
- Elliot TF, Türkoğlu A, Trappe JM, Yaratanakul Güngör M. 2016. Turkish truffles 2: eight new records from Anatolia. *Mycotaxon*, 131(2): 439-453.
- Gorburnova IA. 2017. New information about the agaricoid mushrooms of the Katunsky reserve and rare mushrooms of the Republic of Altai (Russia). *Nature Conservation Research* 2(suppl.2): 43-55.
- Gorburnova IA, Rebriev YA. 2017. Rare species of Gasteromycetes of Russia. *Flora of Asian Russia*, 2(26): 3-9.
- Index Fungorum. 2019: <http://www.indexfungorum.org/Names/Names.asp>. Accessed 22 October 2019.
- Kaya A. 2015. Contributions to the macrofungal diversity of Atatürk Dam Lake basin. *Turkish Journal of Botany*, 39(1): 162-172.
- Sesli E, Denchev CM. 2014. Checklists of the myxomycetes, larger ascomycetes, and larger basidiomycetes in Turkey. 6th ed. *Mycotaxon Checklists Online*. 136 p. (<http://www.mycotaxon.com/resources/checklists/sesli-v106-checklist.pdf>).
- Solak MH, Işıloğlu M, Kalmış E, Allı H. 2015. *Macrofungi of Turkey, Checklist, Vol. 2*. Turkey: Üniversiteler Ofset, İzmir, 280p.
- Swartz D. 1936. The Development of *Lycoperdon acuminatum*. *Mycologia*, 28(3): 278-283.
- The Global Fungal Red List Initiative. 2019. [http://iucn.ekoo.se/iucn/species\\_view/327150/](http://iucn.ekoo.se/iucn/species_view/327150/). Accessed 22 October 2019.
- Türkecul İ. 2017. New *Calbovista*, *Mycena*, *Rhizopogon*, *Stictis*, and *Symphyosirinia* records from Turkey. *Mycotaxon*, 132(3): 503-512.
- Uzun Y, Kaya A, Yakar S. 2018. A new record and new localities for the genus *Sclerogaster* R.Hesse in Turkey. *Süleyman Demirel Üniversitesi Fen Bilimleri Enstitüsü Dergisi*, 23 (Özel Sayı): 9-12.
- Vizzini A, Ercole E. 2017. Detecting the phylogenetic position of *Bovista acuminata* (Agaricales, Basidiomycota) by an ITS-LSU combined analysis: the new genus *Bryoperdon* and revisitation of *Lycoperdon* subgen. *Apioperdon*. *Phytotaxa*, 299(1): 77-86.
- Yakar S, Uzun Y, Çevik FT 2019. New locality records for two hypogeous basidiomycete species in Turkey. *Anatolian Journal of Botany*, 3(1): 28-33.