



## ***Geopora clausa*, A New Hypogeous Ascomycete Record for Turkey**

Yasin UZUN<sup>1</sup>, Abdullah KAYA<sup>\*1</sup>  
ORCID: 0000-0002-6423-6085; 0000-0002-4654-1406

<sup>1</sup> Karamanoğlu Mehmetbey University, Kamil Özdağ Science Faculty, Department of Biology, Karaman, Turkey

### **Abstract**

*Geopora clausa* (Tul. & C. Tul.) Burds. (Pyronemataceae) is reported as new record for the first time from Turkey, based on the samples collected from Araklı district of Trabzon province. The taxon is described briefly and the photographs related to its macro and micromorphology are provided.

**Key words:** biodiversity, false truffle, new record, macrofungi, taxonomy

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## ***Geopora clausa*, Türkiye İçin Yeni Bir Toprak Altı Askomiset Kaydı**

### **Özet**

*Geopora clausa* (Tul. & C. Tul.) Burds. (Pyronemataceae), Trabzon'un Araklı ilçesinden toplanan örneğe bağlı olarak, Türkiye'den ilk kez yeni kayıt olarak rapor edilmiştir. Takson kısaca betimlenmiş ve makro ve mikromorfolojisine ilişkin fotoğrafları verilmiştir.

**Anahtar kelimeler:** Biyoçeşitlilik, yalancı trüf, yeni kayıt, makromantar, taksonomi

### **1. Introduction**

*Geopora* Harkn. is a genus in the family Pyronemataceae. It was first proposed by [1] for the truffle like fungus, *G. cooperi* Harkn. Later on the boundaries of the genus were expanded including some hypogeous, semihypogeous and epigeous species, with closed or cup-shaped ascocarps [2, 3]. The genus is characterised by entirely or partially hypogeous, globular, semiglobular or cup-shaped ascocarps, whitish, greyish or yellowish grey hymenium, cylindrical, eight spored and operculate asci, generally bifurcate, septate and hyaline paraphyses, ellipsoid, smooth ascospores mostly with one or two larger oil drops and more smaller oil drops [2,3].

Though [4] mentions about the existence of 13 species of the genus, 22 conformed *Geopora* species have been listed in Index Fungorum (accessed 3 May 2019). So far five members of the genus, *G. arenicola* (Lév.) Kers, *G. arenosa* (Fuckel) S. Ahmad, *G. cooperi* Harkn., *G. sepulta* (Fr.) Korf & Burds. and *G. sumneriana* (Cooke) M. Torre, have been recorded from Turkey [5, 6, 7, 8, 9, 10].

Here we present *Geopora clausa* (Tul. & C. Tul.) Burds. as new record for the mycobiota of Turkey. Current checklists [11, 12] and the contributions presented after the checklists [13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24] indicate that *G. clausa* hasn't been reported from Turkey before. The study aims to make a contribution to the mycobiota of Turkey.

### **2. Materials and methods**

Fruit bodies of *G. clausa* were collected in Araklı district of Trabzon province in 2018. During field study, the fruit bodies were photographed and notes were taken related to their ecological and morphological characteristics. Microscopical investigations are based on dried samples and performed under a Nikon Eclipse Ci-S trinocular light

\* Corresponding author / Haberleşmeden sorumlu yazar: Tel.: +903362262156; Fax.: +903362262150; E-mail: kayaabd@hotmail.com

microscope. Congo red was also used as a mounting medium. More than 30 spores were measured from several slides to obtain the spore size. Photographs related to micromorphology were taken with the help of a DS-Fi2 digital camera. The samples were identified by comparing the accumulated data with [25, 26, 27, 28, 29]. Index Fungorum (accessed 3 May 2019) was followed for the systematics of the taxon. The samples are kept at Karamanoğlu Mehmetbey University, Kamil Özdağ Science Faculty, Department of Biology.

### 3. Results

*Geopora clausa* (Tul. & C. Tul.) Burds.

**Synonyms:** *Genea clausa* Tul. & C. Tul., *Geopora clausa* f. *ellipospora* Burds., *Geopora clausa* subsp. *californica* (Gilkey) Burds., *Hydnocystis californica* Gilkey, *Hydnocystis clausa* (Tul. & C. Tul.) Ceruti.

**Macroscopic and microscopic features:** Ascomata 8–22 mm in diameter, hypogeous or semi-hypogeous, subglobose or irregular due to lobed or wrinkled structure. Peridium pseudoparenchymatous with dark brown cracked surface forming pyramidal warts. Odour fruity. Gleba white to greyish white (Figure 1a). Asci 170–240 × 16–21 µm, cylindrical, eight spored (Figure 1b). Paraphyses cylindrical, septate, enlarged at the apex up to 5–9 µm. Ascospores 21–26(29) × 16–18 µm, ellipsoid to ovoid, smooth, hyaline, generally with a large central guttule and numerous small guttules at polar ends (Figure 1cd).

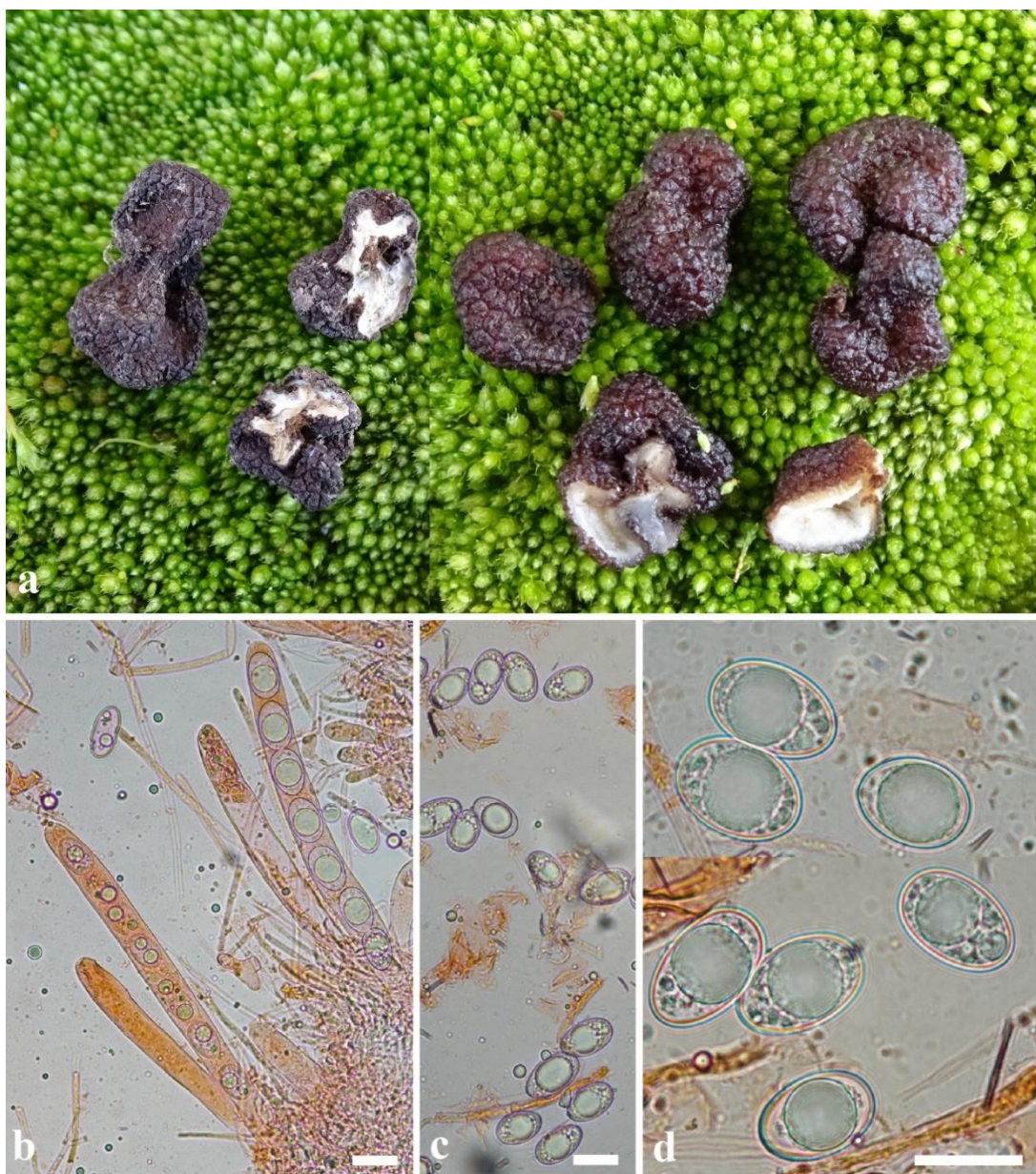


Figure 1. Ascocarps (a), asci and paraphyses (b) and ascospores (c, d) of *Geopora clausa*

**Ecology:** *Genea clausa* was reported to grow as hypogeous or as semi-hypogeous in sandy and light soils in wooded maquis, clear forests and coastal pine forest under cork-oaks (*Quercus suber* L.), holm-oaks (*Q. ilex* L. subsp. *ballota* (Desf.) Bonafè), pines (*Pinus halepensis* Miller, *P. pinea* L.) and *Helianthemum* Mill. sp., during spring and autumn [24, 25, 26, 28].

**Specimen examined:** Trabzon, Araklı, Atışalamı place, in soil, under *Pinus pinaster* Aiton, 40°56'N-40°02'E, 215 m, 27.11.2018, Yuzun 6926.

#### 4. Conclusions and discussion

*Geopora clausa* is mainly characterized by its hollow and brown warty outer surface. Though [30] refers it to be a widespread species in Europe, it seems to be an uncommon or a rare species [27, 29]. Except a record from California [25], it was generally recorded from Mediterranean countries [25, 26, 27, 29]. There is no earlier reference for the occurrence of this species in Turkey.

In general, the macro and micromorphological characteristics of the studied Turkish collection *G. clausa* are in agreement with [25, 26, 27, 28, 29]. Enlargement size of paraphyses at the apex well fits with [28]. Ascospore size measured by [27] seem to be comparatively larger than our samples, as it is also the case for [25, 26, 28, 29].

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#### References

- [2] Author, A. (year). Title of article: *Title of Journal*, volume(issue), page range. Doi:xx xxxxxxxxxxxx.
- [1] Harkness, H.W. (1885). Fungi of the Pacific Coast. *Bulletin of the California Academy of Science*, 1, 159-176.
- [2] Tamm, H., Pöldmaa, K., & Kullman, B. (2010). Phylogenetic relationships in genus *Geopora* (Pyronemataceae, Pezizales). *Mycological Progress*, 9, 509-522. <https://doi.org/10.1007/s11557-010-0659-4>
- [3] Perić, B., & Perić, O. (2011). Notes on Mantenegrin species of *Geopora*. *Mycologia Montenegrina*, 14, 117-150.
- [4] Kirk, P.M., Cannon, P.F., Minter, D.W., & Stalpers, J.A. (2008). *Dictionary of the Fungi, 10th ed.* Wallingford, UK: CAB International.
- [5] Gücin, F., & Öner, M. (1982). Macrofungus flora of Manisa Province in Turkey. *Doğa Bilim Dergisi*, 6(3), 91-96.
- [6] Sesli, E., & Türkekul, İ. (2000). *Sepultaria sumneriana* (Cooke) Massee – taxonomy, illustration and distribution. *Energy Education Science & Technology*, 6(1), 43-46.
- [7] Kaşık, G., Öztürk, S., Türkoğlu, A., & Doğan, H.H. (2002). Macrofungi flora of Yeşilhisar District (Kayseri). *The Herb Journal of Systematic Botany*, 9(2), 123-134.
- [8] Solak, M.H., Gücin, F., Işıloğlu, M., & Pacioni, G. (2003). A new record of *Geopora cooperi* f. *cooperi* from West Asia. *Pakistan Journal of Botany*, 35(4): 473-475.
- [9] Demirel, K., Uzun, Y., Akçay, M.E., Keleş, A., Acar, İ., & Efe, V. (2015). Van Yöresi Makromantarlarına Katkıları. *Mantar Dergisi*, 6(2), 13-23. <https://doi.org/10.15318/Fungus.2015214060>
- [10] Türkoğlu, A., Castellano, M.A., Trappe, J.M., & Güngör Yaratanakul. M. (2015). Turkish truffles I: 18 new records for Turkey. *Turkish Journal of Botany*, 39(2), 359-376. <https://doi.org/10.3906/bot-1406-42>
- [11] Sesli, E., & Denchev, C.M. (2014). Checklists of the myxomycetes, larger ascomycetes, and larger basidiomycetes in Turkey. 6<sup>th</sup> edn. *Mycotaxon Checklists Online*. (<http://www.mycotaxon.com/resources/checklists/sesli-v106-checklist.pdf>), 1-136.
- [12] Solak, M.H., Işıloğlu, M., Kalmış, E., & Allı, H. (2015). *Macrofungi of Turkey Checklist Vol II*. İzmir: Üniversiteler ofset.
- [13] Kaşık, G., Aktaş, S., Alkan, S., & Öztürk, C. (2017). Selçuk Üniversitesi Alaeddin Keykubat Kampüsü (Konya) Mantarlarına İlaveler. *Mantar Dergisi*, 8(2), 129-136. <https://doi.org/10.15318/Fungus.2017.43>
- [14] Işık, H. & Türkekul, İ. (2018). *Leucopaxillus lepidoides*: Yozgat Yöresinden Türkiye Mikotası için Bir Yeni Kayıt. *Süleyman Demirel University Journal of Natural and Applied Sciences*, 22(2), 402-405. <https://doi.org/10.19113/sdufbed.04130>
- [15] Kaygusuz, O., Çolak, Ö.F., Matočec, N., & Kušan, I. (2018). New data on Turkish hypogeous fungi. *Natura Croatica*, 27 (2), 257-269. <https://doi.org/10.20302/NC.2018.27.16>
- [16] Tırpan, E., Çöl, B., Şen, İ., & Allı, H. (2018). Macrofungi of Dağçay Peninsula (Turkey). *Biological Diversity and Conservation*, 11 (3), 90-98.
- [17] Acar, İ., Uzun, Y., Keleş, A., & Dizkırıcı Tekpınar, A. (2019). *Suillellus amygdalinus*, a new species record for Turkey from Hakkari Province. *Anatolian Journal of Botany*, 3(1), 25-27. <https://doi.org/10.30616/ajb.514778>
- [18] Allı, H., & Doğan, H.H. (2019). A new genus (*Balsamia*) addition for Turkish mycota. *Mantar Dergisi*, 10(1), 23-25.

- [19] Keleş, A. (2019). New records of macrofungi from Trabzon province (Turkey). *Applied Ecology and Environmental Research*, 17(1), 1061-1069. [https://doi.org/10.15666/aeer/1701\\_10611069](https://doi.org/10.15666/aeer/1701_10611069)
- [20] Özkazanç, N.K., & Yeşilbaş Keleş, Y. (2019). Macrofungi of Küre Mountains National Park in Bartın region of Turkey. *Turkish Journal of Forestry*, 20(1), 8-14. <https://doi.org/10.18182/tjf.501489>
- [21] Sesli, E., & Bandini, D. (2019). *Inocybe sphagnophila* Bandini & B. Oertel (Agaricales, Inocybaceae): A new record for the Turkish mycota. *Mantar Dergisi*, 10(1), 44-47.
- [22] Şelem, E., Keleş, A., Acar, İ., & Demirel, K. (2019). Edible macrofungi determined in Gürpınar (Van) district. *Anatolian Journal of Botany*, 3(1), 7-12. <https://doi.org/10.30616/ajb.498433>
- [23] Türkekul, İ., & Işık, H. (2019). Macrofungal Biodiversity of Reşadiye (Tokat) District. *Acta Biologica Turcica*, 32(2), 95-101.
- [24] Uzun, Y., Karacan, İ.H., Yakar, S., & Kaya, A. (2018). New additions to Turkish *Tricholomataceae*. *Anatolian Journal of Botany*, 2(2), 65-69. <https://doi.org/10.30616/ajb.350067>
- [25] Burdsall, H.H. (1968). A revision of the genus *Hydnocystis* (*Tuberales*) and of the Hypogeous species of *Geopora* (*Pezizales*). *Mycologia*, 60(3), 496-523. <https://doi.org/10.1080/00275514.1968.12018600>
- [26] Malençon, G. (1973). Champignons hypogés du nord de L’afrique-I Ascomycetes. *Persoonia*, 7(2), 261-288.
- [27] Moreno-Arroyo, B., Gómez, J. & Pulido, E. (2005). *Tesoros de nuestro montes. Trufas de Andalucía*. Córdoba: Consejería de Medio Ambiente, Junta de Andalucía.
- [28] Agnello, C. (2011). Ritrovamenti nel Salento di *Hydnocystis piligera* Tul. e *Hydnocystis clausa* (Tul. & C. Tul.) Ceruti. *Ascomycete.org*, 2(4), 9-17.
- [29] Kaounas, V., Assyov, B., & Alvarado, P. (2011). New data on hypogeous fungi from Greece with special reference to *Wakefieldia macrospora* (*Hymenogastraceae*, *Agaricales*) and *Geopora clausa* (*Pyronemataceae*, *Pezizales*). *Mycologia Balcanica*, 8, 105-113.
- [30] Beug, M.W., Bessette, A.E., & Bessette, A.R. (2014). *Ascomycete fungi of North America, a mushroom reference guide*. Austin: University of Texas press.

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