



Two new Myxomycetes (*Physarum albescens* Ellis ex T.Macbr. and *Physarum tropicale* T.Macbr.) record from Turkey

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Abstract

In this study myxobiota of Hatay investigated and identified two new *Physarum* records for Turkey. These species are *Physarum albescens* Ellis ex T.Macbr. and *Physarum tropicale* T.Macbr. In addition, the fruiting bodies and microscopic structures photographs belonging to samples were taken with light microscopy and scanning electron microscope (SEM).

Key words: *Myxomycetes*, *Physarum*, new records, Hatay, Turkey

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Türkiye için iki yeni Miksomiset (*Physarum albescens* Ellis ex T.Macbr. ve *Physarum tropicale* T.Macbr.) kaydı

Özet

Bu çalışmada Hatay mikrobiyotası araştırıldı ve 2 yeni *Physarum* türü Türkiye’de ilk defa tespit edildi. Bu türler *Physarum albescens* Ellis ex T.Macbr. ve *Physarum tropicale* T.Macbr. Ayrıca bu türlere ait fruktifikasyon yapıları ve mikroskopik özelliklerine ait fotoğrafları ışık mikroskobu ve Elektron mikroskobu (SEM) yardımıyla elde edildi.

Anahtar kelimeler: Miksomiset, *Physarum*, yeni kayıtlar, Hatay, Türkiye

1. Introduction

The most important characteristics of *Physarales* and *Physarum* is the presence of lime (calcium carbonate) deposits which may occur in the peridium, capillitium or stalk of the fruiting body (Stephenson and Stempen, 1994). The presence of lime is usually an obvious feature, but under certain environmental conditions fruiting bodies are sometimes produced that have very little lime. Fruiting bodies types of *Physarales* are most often sporangia, but some species produce plasmodiocarp or aethalia. Fruiting body of *Physarum* is stalked or sessile, sporangium or plasmodiocarp rarely almost aethaloid. Stalk when present ranging from short and stout to slender and relatively long grooved or smooth, calcareous or limeless and translucent. Peridium consisting of one or two layers, the outermost layer calcareous (Ing, 1999). Columella present or absent, with or without calcareous deposits. Capillitium usually consisting of calcareous nodes connected by hyaline threads, these attached to the base and to the peridium, the nodes sometimes forming a pseudocolumella. Spores in mass black or dark brown (Stephenson, 2003).

Physarum is the most widely known genus among the *Physarales* and *Myxomycetes*, due to the fact that the species *Physarum polycephalum* serves as a model organism for cell research. Now 142 *Physarum* species are known all over the world (Lado, 2014) and up to now 27 species have been described in Turkey (Baba, 2008; Baba et al., 2012; Baba et al., 2013; Sesli and Denchev, 2014).

2. Materials and methods

Materials collected from different types of habitats in Hatay (Figure 1). Natural mature fructifications collected on natural plants material barks, woods, debris and other materials from different stations and placed in cardboard herbarium boxes. In addition, the fructifications of myxomycetes were as obtained from the moist chamber culture in the laboratory. Plants materials were moistened with distilled water. The moist chambers were examined every day under a dissecting microscope.

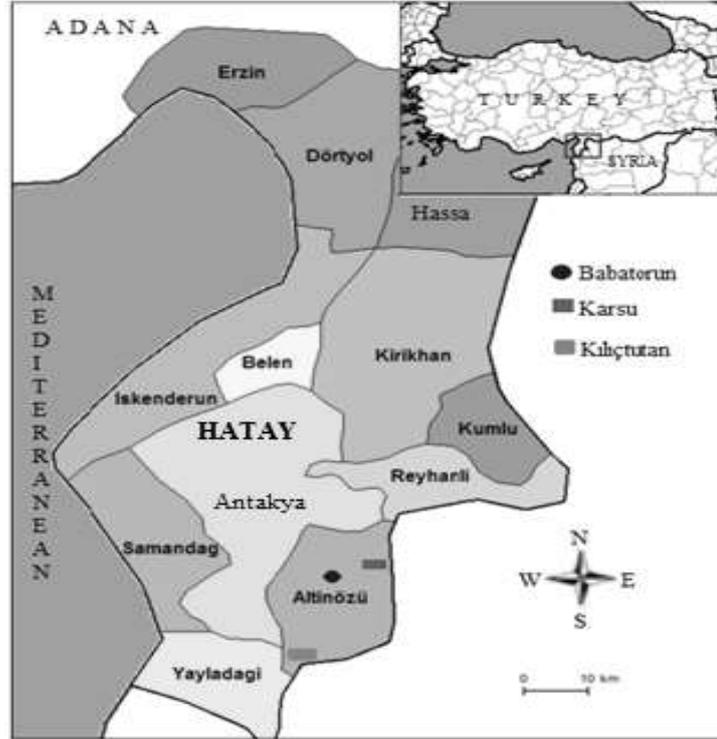


Figure 1. Map of research area

When developing myxomycetes were found, the moist chamber was allowed to dry slowly and the myxomycetes were then dried. The same chambers were then rewetted for another 4 week period and examined as before. The Myxomycetes specimen was identified according to the relevant references (Ing, 1999; Farr, 1981; Martin et al., 1983; Neubert et al., 1995). The samples were prepared as fungarium material and stored in the laboratory of Department of Biology, Faculty of Arts and Science, Mustafa Kemal University.

3. Results

With this study 2 *Physarum* species are identified for the first time from Turkey and recorded in Turkey myxobiota as new record.

3.1. Description of Species:

Protista
 Myxomycota
 Myxomycetes
 Myxogastromycetidae
 Physarales
 Physaraceae
 Physarum

3.1.1. *Physarum albescens* Ellis ex T.Macbr.,

The North American Slime Moulds, ed.2: 86, (1922).

Syn: *Leocarpus fulvus* T. Macbr., N. Amer. Slime-moulds, ed.1: 82 (1899), *Physarum fulvum* (T. Macbr.) G.Lister, in Lister, Monogr. mycetozoa, ed.2: 60 (1911), *Physarum rubronodum* G.W.Martin, J.Wash. Acad. Sci.38, (7): 238 (1948).

Sporocarps subglobose to shortly plasmodiocarpous or more commonly obovoid, sometimes sessile, 0.6-1.4 mm high, white, pale to brilliant yellow to dark orange or when lime is lacking dark blue or iridescent. Dehiscence by small flakes above leaving a persistent base. Peridium single but when the limy crust is thick, appearing double as the lime flakes away, when lime is lacking membranous and iridescent. Columella absent. Capillitium white, yellow, orange or red brown, rigid, intricate reticulum, attached to the peridium, threads flattened, lime knots, sparse to numerous, minute to large, round, elongated or branched. Spore-mass black to dark purple-brown, in transmitted light purple to violet-brown, 11-12 μm diameter, spinulose, often paler on one side. Hypothallus massive, veined, creamy, yellow to pale orange. Plasmodium yellow to scarlet or orange-red (Figure 2).

Hatay: Altınözü Babatorun, on dead *Cupressus sempervirens* L. wood, 459 m, 36° 04' 38" N; 36° 17' 48" E, 20.02.2012, *Gelen* 435. Karsu on dead *Cupressus sempervirens* L. wood, natural, 304 m, 36° 07' 49" N; 36° 16' 30" E, 21.01.2012, *Gelen* 395.

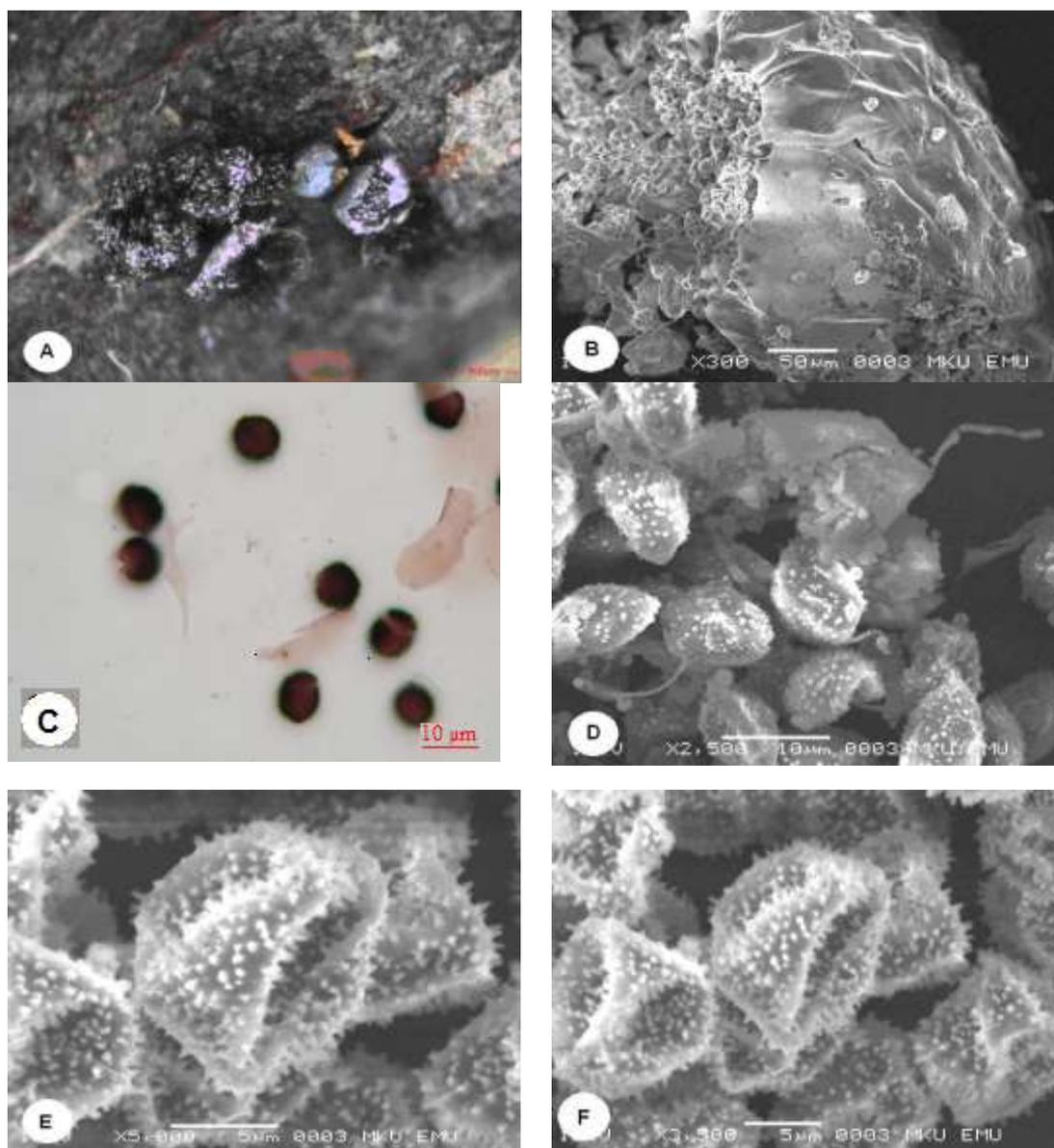


Figure 2. *Physarum albescens*: A, B: plasmodiocarps, C,D: capillitium and spores, E,F: spores. (A and C in light microscope, B,D,E,F in SEM)

3.1.2. *Physarum tropicale* T.Macbr., The North American Slime Moulds 45 (1899).

Sporangia scattered, gregarious, up to 1-1.5 mm total height, subglobose or turbinate, stalked on a narrowed base, 0.6-1 mm diameter, iridescent and above bluish green, sprinkled with flakes of White or pink lime, brown below, nearly limeless. Peridium delicate, membranous, iridescent above, the lower portion sharply delimited, thicker, tending to persist as a cup-like base. Stalk thick, stout, dark Brown or black, cylindrical, not calcareous, less than 40-50% of the

total height or sometimes absent. Columella absent. Capillitium dense, the nodes small, white, angular, uniformly distributed. Spore-mass black, in light dark violaceous-brown, distinctly verruculose, 10-13 μm diam (Figure 3).

Hatay: Altınözü, Kılıçtutan on dead *Quercus* sp. bark, 652 m, 35° 58' 01" N; 36° 17' 48" E, 23.03.2012, *Gelen* 608.

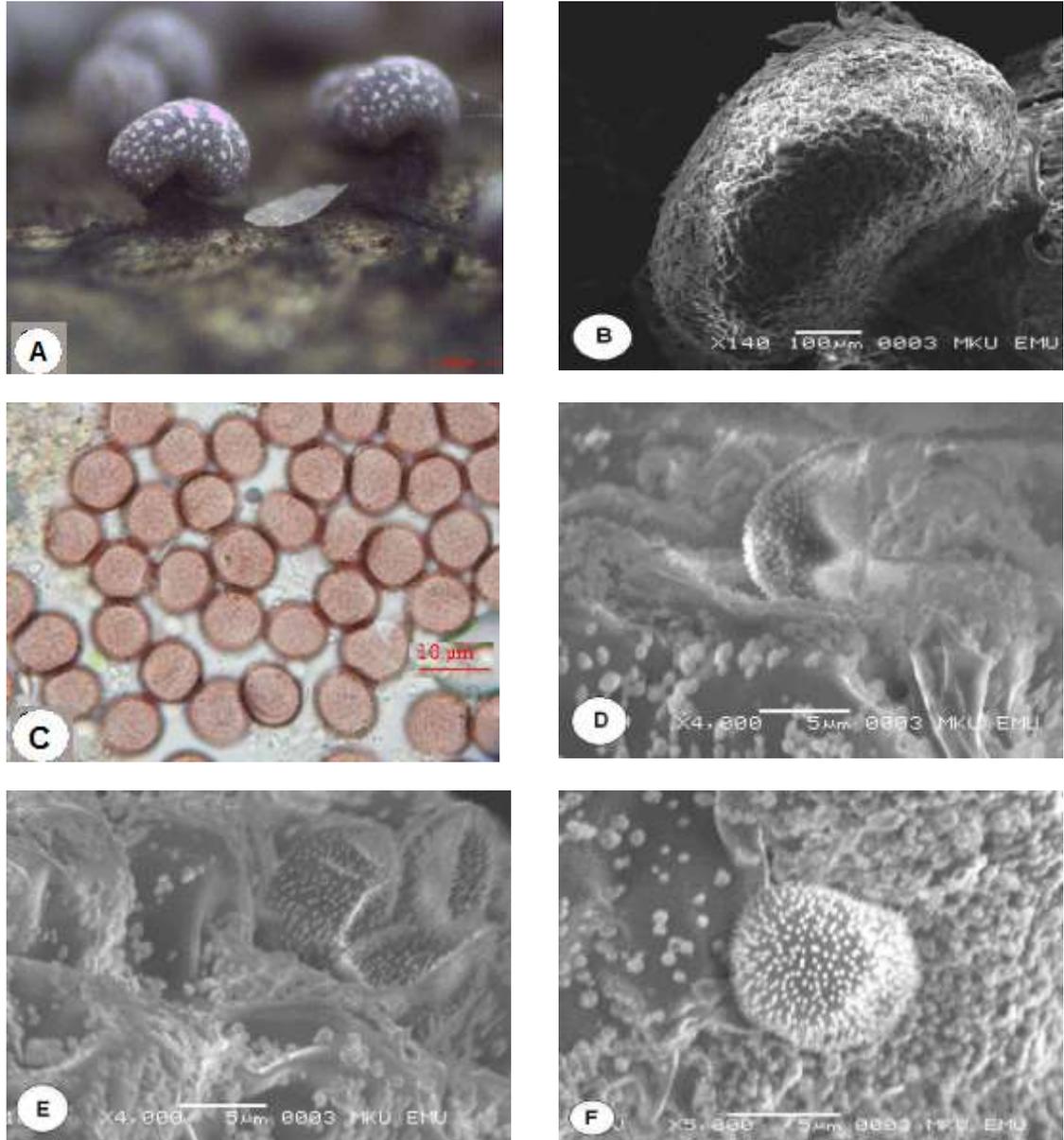


Figure 3. *Physarum tropicale* A,B: sporangium C,D,E,F: spores and lime granules, (A and C in light microscope, B,D,E,F in SEM)

4. Conclusions

Members of the *Physarum* genus are widely distributed throughout different ecosystems (Ing, 1999). Species of *Physarum* genus found different substrates in Turkey, such as *Abies*, *Alnus*, *Cedrus*, *Fagus*, *Fraxinus*, *Juglans*, *Juniperus*, *Liquidambar*, *Pinus*, *Platanus*, *Populus*, *Prunus*, *Picea*, *Salix*, *Quercus*, *Ulmus* spp. and *Malus* sp. (Yağız and Afyon, 2007; Demirel and Kaşık, 2012). In our study we collected the species from *Quercus* sp., and *Cupressus sempervirens* L. In general temperature and moisture appear to be the primary factors affecting the seasonal distribution of myxomycetes.

Physarum albescens is very distinctive with colour, capillitium and habitat features that characterize the species (Ing, 1999). As noted in Martin and Alexopoulos (1969) pale and firm peridium of *Physarum albescens* is similar to *Diderma* (Stephenson and Stempen, 1994). The upper part, in breaking away, often leaves a sharply defined cup, with the pale, closely knit capillitium retaining its form. This species is more prevalent in mountain region and it is easily identified by its sporangial characteristics Discriminative feature of this species is dense, tightly reticulate pale capillitium and it retains its compact shape after dehiscence (Neubert et al., 1995). Habitat types include various plant

debris or (more rarely) living plants usually near the edges of melting snowbanks in alpine regions or fallen leaves and woody debris (Stephenson, 2003)

A description for *Physarum tropicale* was made at the first time in 1944 by Hagelstein, but it is a possible synonym of *P. notabile* previously defined by Lister. There may be considerable similarity between *P. tropicale* and certain forms of *P. notabile*, the former appears to be distinct, as judged from the type specimen. Its distinguishing features are the robust, somewhat turbinate to depressed-subglobose sporangia with iridescent peridium, limeless and somewhat thickened below. The stout dark brown stipes and the abundant uniformly distributed angular to branching capillitial lime nodes, distinctly warted and purplish spores are quite different from any specimen of *P. notabile* examined (Stephenson, 2003).

There were 27 known *Physarum* taxa in Turkey, by newly discovered 2 species *Physarum* taxa number has been increased to 29. Two new *Physarum* were added to the myxobiota of Turkey.

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References

- Baba, H. 2008. A New Myxomycetes genus and three species record for Turkey. *International Journal of Botany*. 4: 336-339.
- Baba, H., Gelen M., Zümre, M. 2012. A new *Physarum* (Myxomycetes) record from Hatay-Turkey. *Ot sistematik botanik dergisi*. 19/2: 125-131.
- Baba, H., Gelen, M., Zümre, M. 2013. A new Myxomycetes record for *Physarum* genus from Turkey. *Biological Diversity and Conservation (Biodicon)*. 6(3): 49-51.
- Demirel, G., Kaşık, G. 2012. Four new records for *Physarales* from Turkey. *Turkish Journal of Botany*. 36: 95-100.
- Eroğlu, G., Kaşık, G. 2013. Myxomycete of Hadim and Taşkent districts (Konya/Turkey) and their ecology. *Biological Diversity and Conservation (Biodicon)*. 6/3: 120-127
- Farr, M.L. 1981. *How to know the true slime molds*. IA: William C. Brown Publishers, Dubuque Iowa, USA.
- Ing, B. 1999. *The Myxomycetes of Britain and Ireland*, The Richmond Publishing Co. Slough, England.
- Lado, C. 2014. An on-line nomenclatural information system of Eumycetozoa (Last updated October 7, 2014) Real Jardín Botánico, Madrid, CSIC.
- Martin, G.W., Alexopoulos, C.J. 1969. *The Myxomycetes*, University of Iowa pres. Iowa, USA.
- Martin, G.W., Alexopoulos, C.J., Farr, M.L. 1983. *The Genera of Myxomycetes*, Univ. Iowa Pres. Iowa, USA.
- Neubert, H., Nowotny, W., Baumann, K. 1995. *Die Myxomyceten (Band II)*. Karlheinz Baumann Verlag Gomaringen Germany.
- Sesli, E., Denchev, C.M. 2014. Checklists of the myxomycetes, larger ascomycetes, and larger basidiomycetes in Turkey. 6th edn. Mycotaxon Checklists Online (<http://www.mycotaxon.com/resources/checklists/sesli-v106-checklist.pdf>): 1–136. [Updated and uploaded in February 2014]
- Stephenson, S.L., Stempen, H. 1994. *Myxomycetes: A Handbook of Slime Molds*. Timber Press. Portland, Oregon, USA.
- Stephenson, S.L. 2003. *Myxomycetes of New Zealand*. Fungal diversity Press, Hong Kong.
- Yağız, D., Afyon, A. 2007. The ecology and chorology of *Myxomycetes* in Turkey. *Mycotaxon*. 101: 279-282.

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