

## A New Record for Asia: *Abrothallus tulasnei* M. Cole & D. Hawksw. (Dothideomycetes, Ascomycota) from Turkey

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**Abstract:** *Abrothallus tulasnei* M. Cole & D. Hawksw. 2001, a species which is only known from North America and Austria in Europe, is recorded for the first time from North Anatolia in Asia. Notes on the Turkish specimen are presented and the differences between it and the other *Abrothallus* De Not. species which are lichenicolous on *Xanthoparmelia* species are discussed

**Key Words:** Ascomycota, lichenicolous fungi, Vouauxiomyces

### Asya için yeni bir kayıt, Türkiye'den: *Abrothallus tulasnei* M. Cole & D. Hawksw. (Dothideomycetes, Ascomycota)

**Özet:** Sadece Kuzey Amerika ve Avrupa'da Avusturya'dan bilinen *Abrothallus tulasnei* M. Cole & D. Hawksw. 2001 Asya'da Kuzey Anadolu'da ilk defa rapor edilmiştir. Türkiye'den toplanan bu türe ait örnek hakkında notlar sunulmuş ve *Xanthoparmelia* türleri üzerinde likenikol olan diğer *Abrothallus* türleri ile farklılıkları tartışılmıştır.

**Anahtar Sözcükler:** Ascomycota, likenikol fungus, Vouauxiomyces

### Introduction

The genus *Abrothallus* De Not. 1845 comprises 38 species that have a lichenicolous, commensalistic, and non-lichenised life habit. Members of this genus are especially found as lichenicolous on parmelioid lichens. It is unknown if one species can grow on several hosts, or if each host genus has its own *Abrothallus* species (Diederich, 2004; Sujja, 2006). Moreover, the taxonomic value of some characters, especially the iodine reaction of the mycelium has been considered controversial by different authors (Kotte, 1909; Keissler, 1930; Hawksworth, 1981, 1983; Clauzade et al., 1989; Diederich, 2004; Sujja, 2006). Recently, the narrow species concept proposed by Kotte (1909) was accepted by some authors (Clauzade et al., 1989; Diederich,

2004); however, some additional characters used by Keissler (1930), such as pruinosity of ascomata and hymenium reaction with K, were also consulted. Sujja (2006), in her study about the variation in morphological characters in *Abrothallus*, rejected the hymenium reaction with K because of a rather constant positive greenish reaction shown on most of her studied specimens.

The genus has no clear similarities with any other genera. For this reason, the position of *Abrothallus* remains uncertain in modern classification systems of Ascomycota (Kirk et al., 2001). Generally, pycnidia of *Vouauxiomyces* type have been found mixed with ascomata. This situation was proposed by Tulasne (1852) as the pycnidia represent an imperfect stage of *Abrothallus*.

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After compilation of 63 taxa of lichenicolous fungi known from Turkey by Hafellner and John (2006), in the course of determining the lichenicolous fungal biota of Turkey, a new genus (Halıcı & Hawksworth, 2007) and numbers of new species (Halıcı & Hawksworth, 2007, 2008; Halıcı et al., 2005, 2007a, 2007b) were described from Turkey, besides numbers of new records for Turkey in a series of papers (Halıcı et al., 2006; 2007c, 2007d, 2007e, 2007f; Halıcı & Candan, 2007). The number of lichenicolous fungi in Turkey reached about 120. In this study, notes on *Abrothallus tulasnei* on *Xanthoparmelia stenophylla* with a typical *Vouauxiomyces* anamorph collected from Bolu province are given and the differences between the other *Abrothallus* species reported on *Xanthoparmelia* are given.

### Materials and Methods

The specimen is stored in ANK (Herbarium of Ankara University, Science Faculty, Ankara, Turkey). The specimen was examined with an Olympus BH-2 research microscope fitted with Nomarski differential interference contrast optics and a drawing tube. Photomicrograph was prepared using a Nikon Eclipse 80i. Sections were prepared by hand and examined in I (Lugol's iodine and Metzler's iodine [KI], with and without pre-treatment with 10% KOH), 10% KOH alone, and water. Ascospore measurements were obtained in water.

#### The species

*Abrothallus tulasnei* M. Cole & D. Hawksw. 2001

Host lichen: *Xanthoparmelia stenophylla* (thallus)

Anamorph: *Vouauxiomyces* type

Specimen studied: Turkey, Bolu, Mengen, Keçikıran Hill, alt. 425 m, on thallus of *Xanthoparmelia stenophylla* on siliceous rocks, 12 July 2003, leg. D. Cansaran-Duman, det. D.L.Hawksworth & M.G.Halıcı (ANK 520).

Notes on Turkish collection of the species: Lichenicolous on thallus of *Xanthoparmelia stenophylla*, not associated with galls, commensalistic as no discolouration was observed in the host thallus. The same host thallus is also heavily infected by *Lichenostigma elongata* (Halıcı & Cansaran-Duman, 2007). Apothecia arising singly (only 4 apothecia were observed), not stipitate, ~0.1-0.2 mm; epruinose, vegetative hyphae immersed in the host tissues, not turning blue in iodine (Lugol's and Metzler's). Hymenium olivaceous green in K,

hypothecium well developed, dark brown, asci ~ subcylindrical; 47-51 × 14-15 μm, 8-spored (Figure 1). Ascospores overlapping in the ascus, 1-septate, dark brown, 13-15 × 6.5-7.5 μm. Pycnidia arising singly, scattered, very common on the host thallus, conidia narrowly obpyriform, truncated at the base, simple, colourless, 12.5-17 × (4-)4.5-5(5.5-) μm (Figure 2).

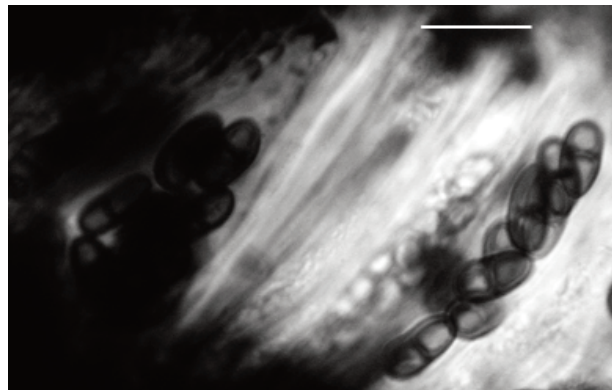


Figure 1. *Abrothallus tulasnei*. A vertical section from ascomata showing ascospores and 8-spored asci. Scale = 25 μm.

### Discussion

The species was described by Cole and Hawksworth (2001) on the thallus and apothecial discs of *Xanthoparmelia somloënsis* from Quebec, Canada. The Turkish specimen of this species differs from the holotype collection by little shorter and narrower ascospores (15-17 × 7-11 μm in holotype collection). We suppose the ascospores in the Turkish specimen are immature.

There are 2 more *Abrothallus* species that have been recorded on *Xanthoparmelia* species: *A. caerulescens*, which was described by Kotte (1909) on *Xanthoparmelia conspersa*, differs by I + blue vegetative hyphae. In the original description of this species by Kotte (1909), the ascospore size is given as 13-15.60 × 4.94-5.98 μm and no information on the anamorph stage was given. Although Sujja (2006) concluded that the I reaction of the vegetative hyphae is an effective character for separating the *Abrothallus* species, Diederich (2004) preferred to treat all the *Abrothallus* species on *Xanthoparmelia* as a single species for which *A. caerulescens* is the oldest name. However, we do not have any hesitation to publish this species under *A. tulasnei*, because of the I reaction as

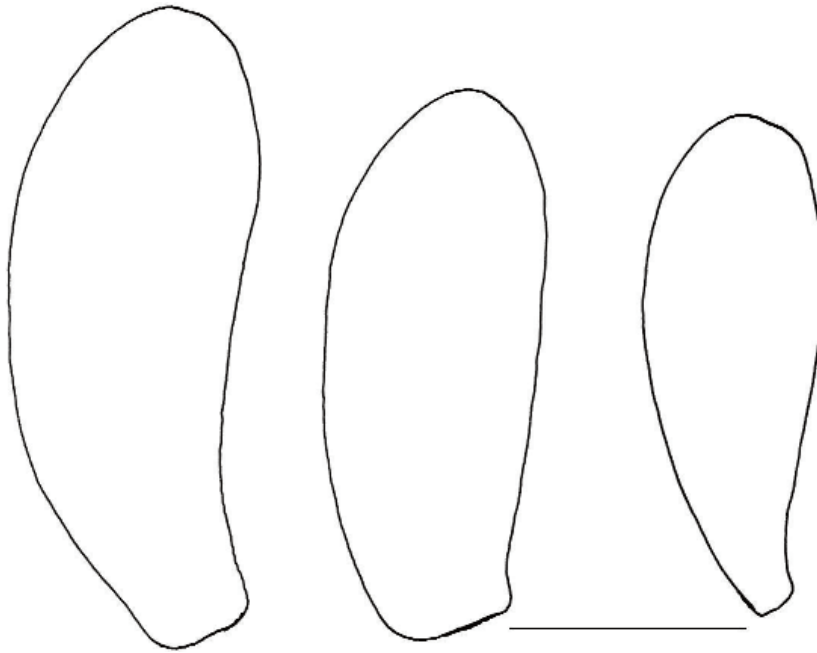


Figure 2. *Abrothallus tulasnei*. Outline of 3 *Vouauxiomyces* type conidia. Scale = 10  $\mu$ m.

well as the conidia size and shape well fit to the information and figures given in Cole and Hawksworth (2001) as conidia size: (9.5-)11-14.5(-19)  $\times$  (3.5-)4-5(-6.5). In addition, conidia size in the Sonoran description of *A. caerulescens* from the Sonoran Desert in Diederich (2004) is 7-14  $\times$  5.5-6.5  $\mu$ m, which is obviously shorter than the conidia size in the Turkish specimen. The other species, *Abrothallus bertianus*, which primarily occurs on *Parmelia* subgen. *Melanoparmelia* (Hawksworth, 1980), was reported on *Xanthoparmelia somloënsis* from Arizona, USA, by Triebel et al. (1991), and is also distinctive by I + blue reaction of vegetative hyphae but as the specimen studied by Triebel et al. (1991) did not show this reaction it was also treated by Diederich (2004) under the name *A. caerulescens*. This species has shorter ascospores (9-13  $\times$  5-7  $\mu$ m; Hawksworth, 1980) than the Turkish specimen.

Three *Abrothallus* species have been recorded to date from Turkey: *A. bertianus* on *Melanelixia fuliginosa* from Trabzon by John and Breuss (2004), *A. parmeliarum* on *Parmelia saxatilis* from İzmir by John (1996), and *A. prodiens* on *Hypogymnia physodes* from Bayburt by Yazıcı and Aslan (2007). In these studies, no information on anamorph stages was given. *A. tulasnei* is the first species of the genus reported from Turkey on *Xanthoparmelia* with an anamorph stage. This species is

also new to Asia as it has only been reported to date from America (Cole & Hawksworth, 2001) and Austria (Hafellner & Obermayer, 2007).

We think that molecular studies should be carried on this genus as the morphological characters can sometimes be unreliable, like the iodine reaction of vegetative hyphae as proposed by Diederich (2004). Another problematic character in this genus is the pruinosity of the apothecia as greenish pruina tends to be best developed in younger ascomata but may not be always observed on older ones (Suija, 2006). We also think that conidia sizes may be the best characters to separate the species of this genus and in the collections of members of this genus anamorph stage must be examined more carefully.

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## References

- Clauzade G, Diederich P & Roux C (1989). Nelikenigintaj fungoj likenlogaj. Illustrita determinlibro. *Bull Soc Lin Provence, Numéro Special 1*: 1-42.
- Cole MS & Hawksworth DL (2001). Lichenicolous fungi, mainly from the USA, including *Patriciomyces* gen. nov. *Mycotaxon* 77: 305-338.
- Diederich P (2004). *Abrothallus*. In: Nash TH III, Ryan BD, Diederich P, Gries C & Bungartz F (eds.), *Lichen flora of the Greater Sonoran Desert Region*, vol 2: 626-630. Lichens Unlimited, Arizona State Univ., Tempe.
- Hafellner J & John V (2006). Über Funde lichenicoler nicht-lichenisierter Pilze in der Türkei, mit einer Synopsis der bisher im Land nachgewiesenen Taxa. *Herzogia* 19: 155-176.
- Hafellner J & Obermayer W (2007). Flechten und lichenicole Pilze im Gebiet der Stubalpe (Österreich: Steiermark und Kärnten). *Mitt Naturwiss. Ver Steiermark* 136: 5-59.
- Halıcı MG & Candan M (2007). Notes on some lichenicolous fungi from Turkey. *Turk J Bot* 31: 353-356.
- Halıcı MG & Cansaran Duman D (2007). Lichenized and lichenicolous fungi of Yaylacık (Bolu) and Yenice (Karabük) Research Forests in Turkey. *Mycologica Balcanica* 4: 97-103.
- Halıcı MG & Hawksworth DL (2007). Two new species of lichenicolous fungi from Turkey. *Lichenologist* 39: 439-443.
- Halıcı MG & Hawksworth DL (2008). Two new species of *Dacampia* (Ascomycota, *Dacampiaceae*), with a key to and synopsis of the known species of the genus. *Fungal Diversity* 28: 49-54.
- Halıcı MG, Orange A & Aksoy A (2005). *Weddellomyces turcicus*, a new species on a grey *Acarospora* from Turkey. *Mycotaxon* 94: 249-252.
- Halıcı MG, Kocakaya M & Aksoy A (2006). Additional and interesting lichenized and lichenicolous fungi from Turkey. *Mycotaxon* 96: 13-19.
- Halıcı MG, Kocourková J, Diederich P & Aksoy A (2007a). *Endococcus variabilis*, a new species on *Staurothele areolata*. *Mycotaxon* 100: 337-342.
- Halıcı MG, Atienza V & Hawksworth DL (2007b). Two new *Polycoccum* species from Turkey. *Mycotaxon* 101: 157-163.
- Halıcı MG, Özdemir Türk A & Candan M (2007c). New records of pyrenocarpous lichenicolous fungi from Turkey. *Mycotaxon* 99: 201-206.
- Halıcı MG, Candan M & Özdemir Türk A (2007d). New records of lichenicolous and lichenized fungi from Turkey. *Mycotaxon* 100: 255-260.
- Halıcı MG, Hawksworth DL & Aksoy A (2007e). New and interesting lichenicolous fungi records from Turkey. *Nova Hedwigia* 85: 393-401.
- Halıcı MG, Hawksworth DL & Aksoy A (2007f). Contributions to the lichenized and lichenicolous fungal biota of Turkey. *Mycotaxon* 102: 403-414.
- Hawksworth DL (1981). The Lichenicolous Coelomycetes. *Bull Br Mus Nat Hist* 9: 1-98.
- Hawksworth DL (1983). A key to the lichen-forming, parasitic, parasymbiotic and saprophytic fungi occurring on lichens in the British Isles. *Lichenologist* 15: 1-144.
- John V (1996). Preliminary catalogue of lichenized and lichenicolous fungi of Mediterranean Turkey. *Bocconea* 6: 173-216.
- John V & Breuss O (2004). Flechten der östlichen Schwarzmeer-Region in der Türkei (BLAM-Exkursion 1997). *Herzogia* 17: 137-155.
- Keissler K (1930). *Die Flechtenparasiten*. In: Rabenhorst L (ed.), *Kryptogamen-Flora von Deutschland, Österreich und der Schweiz* 8: 1-712. Leipzig: Geest & Portig.
- Kirk PM, Cannon PF, David JC & Stalpers JA (eds.) (2001). *Ainsworth and Bisby's Dictionary of the Fungi*. 9th ed. CABI Publishing, Wallingford.
- Kotte I (1909). Einige neue Fälle von Nebensymbiose (Parasymbiose). *Zentralbl. Bakteriol., Parasitenkd.* II 24: 74-93.
- Sujja A (2006). Variation of morphological characters in the lichenicolous ascomycete genus *Abrothallus*. *Ann Bot Fennici* 43: 193-204.
- Triebel D, Rambold G & Nash III, TH (1991). On lichenicolous fungi from continental North America. *Mycotaxon* 42: 263-296.
- Tulasne LR (1852). Mémoire pour servir à l'histoire organographique et physiologique des lichens. *Ann Sci Nat* 17: 5-128.
- Yazıcı K & Aslan A (2007). Lichens and lichenicolous fungi from Bayburt province. *Acta Botanica Hungarica* 49: 199-213.