

# *Sagediopsis bayozturkii* sp. nov. on the lichen *Acarospora macrocyclos* from Antarctica with a key to the known species of the genus (Ascomycota, Adelococcaceae)

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**ABSTRACT.** *Sagediopsis bayozturkii*, a lichenicolous fungus growing on Antarctic endemic species *Acarospora macrocyclos*, is described as new to science from three collections made at 65° south in the Argentine Islands (Graham Land, maritime Antarctica). The fungus has a distinct internal apical beak in the ascus and ellipsoid three-septate ascospores; therefore, it is the member of *Sagediopsis* subgenus *Hawksworthiella*. Morphologically and anatomically *S. bayozturkii* is most similar to *S. campsteriana* and *S. pertusariicola*, which are confined to the lichen hosts *Ochrolechia* spp. and *Pertusaria* spp., respectively. In addition to having different hosts, *S. bayozturkii* differs from these two species by having smaller ascomata and shorter ascospores. Its similarities to other species of the genus are discussed, and an artificial key based on the published descriptions of the ten species now known in the genus *Sagediopsis* is presented.

## Introduction

The generic name *Sagediopsis* was re-introduced by Triebel (1989), and Alstrup and Hawksworth (1990) discussed the nomenclature and typification of the genus. Triebel (1993) later recognised five species in the genus, all restricted in host range, confined to one species or one genus. The five species were all easily distinguished by ascospore size. Four further species also differing in this respect have been added subsequently (Hoffmann and Hafellner 2000; Orange 2002; Zhurbenko 2009; Zhurbenko and Yakovchenko 2014).

Therefore, the genus *Sagediopsis* comprises nine species (<http://www.indexfungorum.org> last accessed 25th December 2016). It seems that all species of this genus, except *S. bayozturkii* and *S. dissimilis*, have a distribution in the northern hemisphere (for example, Alstrup & Hawksworth 1990; Triebel 1993; Zhurbenko 2009).

While examining collections of lichenicolous fungi from Antarctica, we discovered an undescribed *Sagediopsis* species that infects *Acarospora macrocyclos* Vain., a lichen endemic to Antarctica (Øvstedal and Lewis Smith 2001). As there was no key published for all known species of *Sagediopsis*, the discovery of the new species also prompted us to prepare an artificial key for the now ten known *Sagediopsis* species.

## Materials and methods

The specimens of the new records are deposited in Erciyes University Herbarium (EUH) Kayseri, Turkey. They were

examined by standard microscopic techniques. Hand cut sections were studied in water, potassium hydroxide (KOH) and Lugol's solution (I). Measurements were made in water. When measuring the ascospores, numbers of ascospores from five different ascoma were measured. The measurements are given as lower–upper mean. 'n' is the number of measurements. The identification key prepared for the genus *Sagediopsis* is artificial and the data are provided from the relevant literature.

## The species

*Sagediopsis bayozturkii* Halıcı, Güllü & Parnikoza, sp. nov.

Figs 1 and 2

MycoBank No.: MB 820414

## Etymology

Named in honour of Prof Dr Bayram Öztürk (University of Istanbul, Turkey), who was the leader of first Turkish Antarctic Research Expedition.

## Diagnosis

Fungus lichenicola supra thallum lichenis *Acarospora macrocyclos* immersis. Ascomata perithecioidea, globosa, 90–150 µm in diameter. Asci eight-spore, 38–50 × 8–12 µm. Ascospores (10–)11–12.5–14(–15) × 4–5 µm, three-septate.

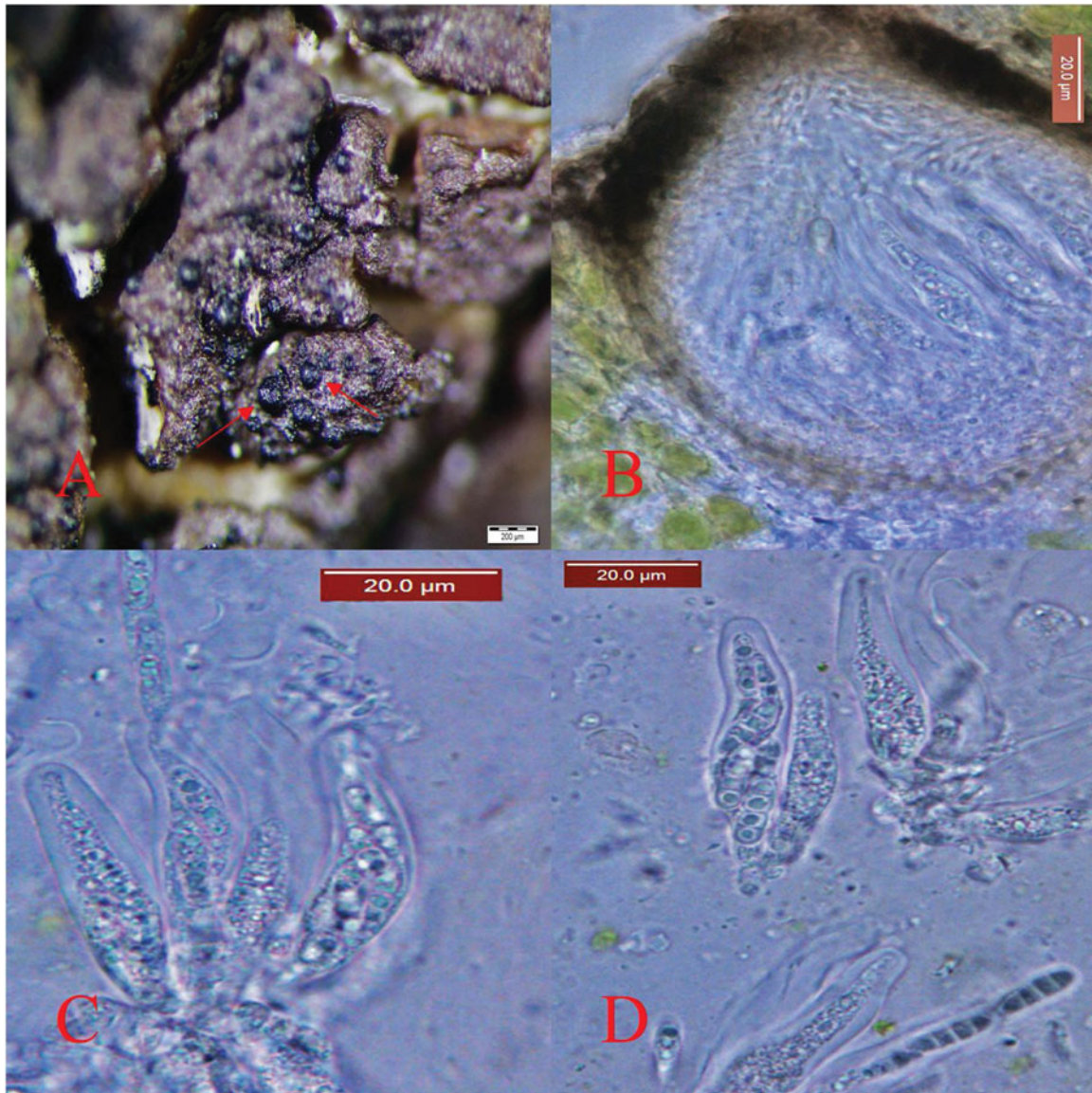


Fig. 1. *Sagediopsis bayozturkii* (holotype). A. Habitus immersed in the host areoles. B. Perithecium in section. C. and D. Asci with an internal apical beak, eight-spored.

#### Typus

Antarctica: Graham Coast: Argentine Islands: Galindez Island, Carpathians Ridge, on *A. macrocyclos* on andesite rocks, 65.246090°S, 64.2248560°W, altitude 9 m, 5 April 2016, M.G. Halıcı & I. Parnikoza (EUH-ANT 0.010 – holotypus).

#### Description

Non-lichenised, lichenicolous, evidently commensalistic as not affecting the appearance of the host. Ascomata perithecia, arising singly, first mostly immersed then usually semi-immersed to superficial, collapsed, black,  $\pm$  shiny, 90–150  $\mu\text{m}$  diameter; ostiolate, the ostiole not papilliform or raised, 15–25  $\mu\text{m}$  in diameter. Ascoma wall dark brown to almost black, 20–25  $\mu\text{m}$  thick,

composed of 8–10(–12) cell layers, paler at the base. Cells 3.5–5  $\mu\text{m}$  in diameter, with irregularly thickened walls and small lumina, pseudoparenchymatous. Hymenial gel  $I_{\text{Lugol}}$  + blue. Hamathecium of paraphysoids, rarely branched and septate, ca. 1–1.5  $\mu\text{m}$  thick; periphysoids not observed. Asci elongate-clavate, bitunicate, with an apical beak, 38–50  $\times$  8–12  $\mu\text{m}$  (n=24), eight-spored. Ascospores overlapping and distichously arranged in the ascus, ellipsoid, apices generally somewhat attenuated but occasionally more rounded, hyaline but rarely pale brown, three-septate, rarely constricted at the septa, the cells often with conspicuous rounded vacuoles, smooth-walled, with a gelatinous sheath, (10–) 11–12.5–14(–15)  $\times$  4–5  $\mu\text{m}$  (n=40), l/b ratio (2.2–) 2.5–2.9–3.3(–3.7)  $\mu\text{m}$ .

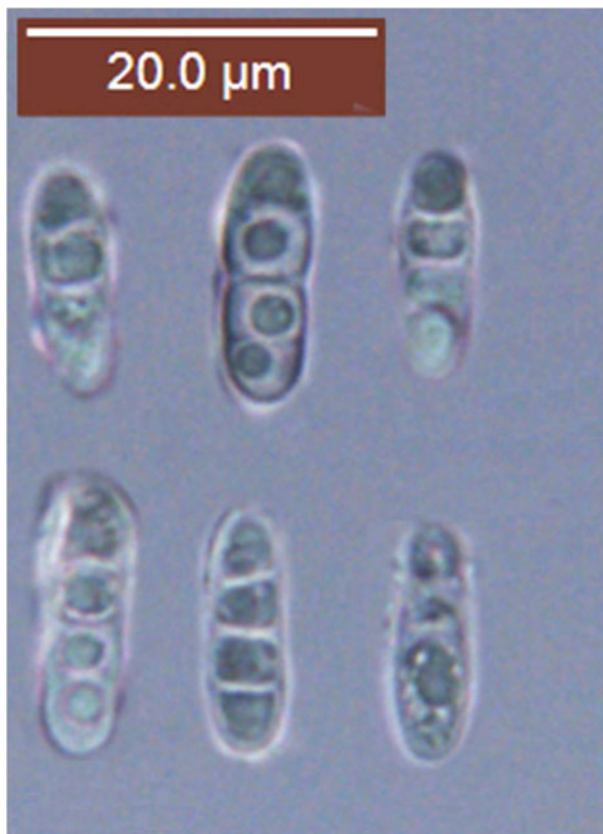


Fig. 2. *Sagediopsis bayozturkii* (holotype). Ascospores.

### Host

Growing immersed on the thalli of *A. macrocyclos*, a lichen which is endemic to Antarctica. It seems that there is no pathogenic effect of this lichenicolous fungi to the host, apparently commensalistic.

### Distribution

The host lichen *Acarospora macrocyclos* is a common component of crustose lichens community, as well as invading stones within the community of the lichens *Usnea antarctica*, *Umbilicaria antarctica* and the moss *Andreaea regularis* in Antarctica. It can grow on different types of rocks on relatively low islands and on the tops of the rocky plateaus on higher islands, as well as on artificial structures of the Ukrainian Vernadsky Base. Sometimes it covers large areas of rock. It seems that *S. bayozturkii* is very common on *A. macrocyclos* and it is probably also endemic to Antarctica. All *A. macrocyclos* specimens should be searched for the new species *S. bayozturkii*.

### Additional specimens examined

Antarctica: Graham Coast: Argentine Islands: Forge Islands, Rudnicki Island (margin eastern island), on *A. mac-*

*rocyclus* on andesite rocks, 65.232660°S, 64.287020°W, altitude 9 m, 6 April 2016, M.G. Halıcı & I. Parnikoza (EUH-ANT 0.061). Andesitic Island (margin eastern island), on *A. macrocyclos* on andesite rocks, 65.237240°S, 64.272900°W, altitude 11 m, 6 April 2016, M.G. Halıcı & I. Parnikoza (EUH-ANT 0.062).

### Discussion

The lichenicolous genus *Sagediopsis* has two subgenera: *Hawksworthiella* with asci that have more or less distinct apical beak and ellipsoid ascospores and *Sagediopsis* with asci without an internal apical beak and narrowly ellipsoid to fusiform ascospores. Therefore, *S. bayozturkii* is a member of *Hawksworthiella* (Hafellner 1993).

Ascospore septation is an important characteristic for the taxonomy of the genus *Sagediopsis* as some species have simple or one-septate ascospores (*S. aspicilliae*, *S. dissimilis*) (Triebel 1989; Hoffmann and Hafellner 2000; Orange 2002) and some have three or more septate ascospores (*S. aquatica*, *S. barbara*, *S. bayozturkii*, *S. campsteriana*, *S. fissuridensis*, *S. pertusariicola* and *S. vasilyevae*) (Triebel 1989, 1993; Hafellner 1993; Zhurbenko 2009; Zhurbenko and Yakovchenko 2014; present paper). There are four species in the subgenus *Hawksworthiella* with three-septate ascospores (*S. campsteriana* on *Ochrolechia* spp., *S. fissurisedens* on *Aspicilia myrinii*, *S. pertusariicola* on *Pertusaria* spp. and *S. vasilyevae* on *Rhizocarpon* spp.). Although there are few lichenicolous genera that have some species with quite wide host ranges and others restricted to single lichen hosts; it is known that all *Sagediopsis* species are confined to a particular host genus (Zhurbenko 2009). There have been no previous reports of *Sagediopsis* species on the lichen genus *Acarospora*. In addition to different hosts, *S. bayozturkii* differs from *S. vasilyevae* by having much shorter ascospores ((37.5–)42–50(–53) μm versus (10–)11–14(–15) μm) (Zhurbenko & Yakovchenko 2014) and from *S. fissurisedens* by having much smaller ascospores (400–700 μm versus 90–150 μm) (Hafellner 1993). It seems that *S. bayozturkii* is most similar to *S. campsteriana* and *S. pertusariicola* but it has smaller ascospores than both these species (Zhurbenko 2009).

If this species is restricted to *Acarospora macrocyclos*, which is endemic to Antarctica, we can easily predict that *S. bayozturkii* is also endemic to Antarctica.

### Key to the described species of *Sagediopsis*

This artificial key is based on data from original descriptions and other publications. Selected references to the literature on their morphology, distribution and ecology are also included.

1. Ascus with a more or less distinct internal apical beak; ascospores ellipsoid (subgenus *Hawksworthiella*).....2
- Ascus without an internal apical beak; ascospores narrowly ellipsoid to fusiform (subgenus *Sagediopsis*).....9
2. Interascal filaments absent to sparse; asci wall thickened above, with ocular chamber; ascospores one-septate, (9.5–)11–18×5–7(–8) µm, on the thalli and in the hymenia of *Ionaspis odora* and *I. lacustris*; UK, Norway, Czech Republic, Poland; see Orange (2002)..... *S. lomnitzensis* (Stein) Orange
- Interascal filaments present.....3
3. Ascospores simple or one-septate.....4
- Ascospores with more than one-septate.....5
4. Ascospores 0 (-1) septate, (10–)10.5–14(15) × 5–7(–8) µm; on thalli of *Aspicilia myrinii* and *A. myrinii* var. *subadunans*; Europe, Asian, Russia; see Hoffmann & Hafellner (2000)..... *S. aspiciliae* (Vainio) Nik. Hoffm. & Hafellner
- Ascospores 0-1-septate, thick-walled, (7.5–)8–10.5(–12) × (4–)4.5–6(–6.5) µm, on thalli of *Paraporphidia leptocarpa*; Australia, New Zealand; see Triebel (1993)..... *S. dissimilis* Triebel
5. Ascomata (60–)100–200 µm diameter; ascospores 3(–4)-septate, not constricted at the septa, (37.5–)42–50(–53) × (2.5–)3–3.5(–4) µm; on thalli of *Rhizocarpon* spp.; Russia; see Zhurbenko and Yakovchenko (2014)..... *Sagediopsis vasilyevae* Zhurb
- Ascospores up to 35 µm.....6
6. Ascomata 400–700 µm diam, reddish brown; asci 60–80 × 13–17 µm; ascospores (1–2–)3–septate, 12–17 × 5–8 µm, not constricted at the septa; on thalli of *Aspicilia myrinii*; Norway; see Hafellner (1993)..... *Sagediopsis fissurisedens* Hafellner
- Ascomata smaller than 400 µm diam.....7
7. Ascomata 90–150 µm diam; ascospores three septate, ellipsoid, (10–)11–12.5–14(–15) × 4–5 µm, on the areoles of *Acarospora macrocyclos*; endemic to Antarctica; see present paper..... *S. bayozturkii* Halici & Parnikoza
- Ascospores in general longer than 15 µm.....8
8. Ascomata (200–)250–400(–500) µm diameter, black; ascospores (0–)3(–5)-septate, not or rarely constricted at the septa, (11–)17.5–20.5–24(–31) × (3–)4–4.5–5(–6) µm; on thalli and apothecia of *Pertusaria* spp.; Russia; see Zhurbenko (2009)..... *S. pertusariicola* Zhurb
- Ascomata 150–250(–400) µm diameter, black; asci (60–)63–71(–73) × 10–12(–13) µm; ascospores three-septate, not constricted at the septa, (9–)15–19.5(–27) × (3–)4.5–5.5(–7) µm; on thalli and hymenia of several *Ochrolechia* spp.; Europe, Greenland, Russia; see Vezda (1970, as *Metasphaeria tartarina*), Hawksworth (1975, as *Metasphaeria tartarina*), Alstrup & Hawksworth (1990), Triebel (1993) and Zhurbenko (2009)..... *S. campsteriana* (Lindsay) D.Hawksw. & R.Sant
9. Ascomata 125–150(–225) µm diam.; ascospores (22–)27–36(–45) × (2.5–)3–3.5(–4) µm, narrowly fusiform to acicular, partly curved to sigmoid, (0–)3(–6)-septate, acuminate at the basal end, often containing oil drops, thin-walled, with smooth epispore, on the areoles and apothecia of *Koerberiella wimmeriana*; Czech Republic, France, Germany, Poland, Sweden, UK; see Rambold and others (1990) and Kocourková (2000)..... *S. aquatica* (Stein) Triebel
- Ascomata (200–)250–400(–450) µm; ascospores (20–)27–39.5(–46) × (3–)3.5–4.5 µm, (0–)3(–7) septate, crescent shaped to S-like; on thalli of *Porpidia glaucophaea*; Austria, France, Germany, Greenland, Norway, Poland, Slovak Republic, Slovenia, Sweden, UK, Ukraine, USA; see Triebel (1989), Rambold and others (1990) and Kocourková (2000)..... *S. barbara* (Th.Fr.) R.Sant. & Triebel

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