

## *Synaptospora olandica*, a new species from Sweden

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A new species, *Synaptospora olandica*, was collected in relict spots of *Corylus avellana* on alvares in Öland, Sweden. It is a lignicolous saprobe characterized by minute, setose perithecia, unitunicate, cylindrical to clavate asci and pale brown to pale olivaceous-brown, 1-septate ascospores becoming fused obliquely in pairs. *Synaptospora olandica* and other three hitherto known species of *Synaptospora* differ sufficiently in ascospore morphology to warrant their specific distinction. The systematic position of *Synaptospora* in the Sordariales is discussed.

Keywords: ascospore morphology, *Collematospora*, Coniochaetaceae, *Dactylaria*-like, key, *Roselliniopsis*, Sordariales, systematics, Trichosphaeriaceae.

*Synaptospora* Cain encompasses lignicolous, saprobic, perithecial ascomycetes characterized by superficial, setose or glabrous perithecia that may be surrounded by a circular basal stroma, unitunicate asci and 1-celled, pigmented ascospores usually tending to fuse in groups of two to eight, becoming flattened along the area of contact (Cain, 1957; Huhndorf & al., 1999). The genus comprises three species, all with temperate distribution. These species are differentiated mainly on ascospore morphology, though some differences occur in perithecial vestiture, presence of a basal stromatic tissue and variation in ascus apex. The temperate species, *S. olandica*, has pale brown to pale olivaceous-brown, 1-septate ascospores that fuse obliquely in pairs; in all other features it fits well in the genus. *Synaptospora olandica* is described and illustrated and compared to other *Synaptospora* species. A *Dactylaria*-like hyphomycete was found growing on the perithecial wall of some perithecia in the type collection of *S. olandica*. Several attempts to cultivate this fungus on cornmeal (CMA, Difco), potato-carrot (PCA, Gams & al., 1998) and oatmeal agar (OA, Gams & al., 1998) were unsuccessful.

### Materials and methods

Perithecia were rehydrated in distilled water and subsequently studied in water, Melzer's reagent, cotton blue in lactic acid and

Congo red. Measurements were made from preparations mounted in water. A minimum of 20 ascospores and asci were measured. Images were captured in Melzer's reagent using differential interference microscopy (DIC) and processed using Adobe Photoshop 6.0 CE.

### Taxonomy

*Synaptospora olandica* Réblová, **sp. nov.** – Figs. 1–10.

Ascomata superficialia, subglobosa usque ad conica, papilla minuta praedita, ostiolata, 175–190  $\mu\text{m}$  diam, 190–230  $\mu\text{m}$  alta, setosa. Setae acutae, simplices, obscure fuscae vel opacae, 25–65  $\mu\text{m}$  longae. Pariet perithecii bistratosus, 17.5–27.5  $\mu\text{m}$  crassus. Asci cylindrici vel clavati, (35–)40–48(–50)  $\times$  (5.5–)6–7  $\mu\text{m}$ , breviter pedunculati, apice non amyloideo. Ascosporae ellipsoideae, 5–6  $\times$  (3.5–)4–4.5  $\mu\text{m}$ , juvenes amerosporae, hyalinae, maturitate bicellulares, olivaceo-brunnescentes, connataescenter binatae, oblique compressae.

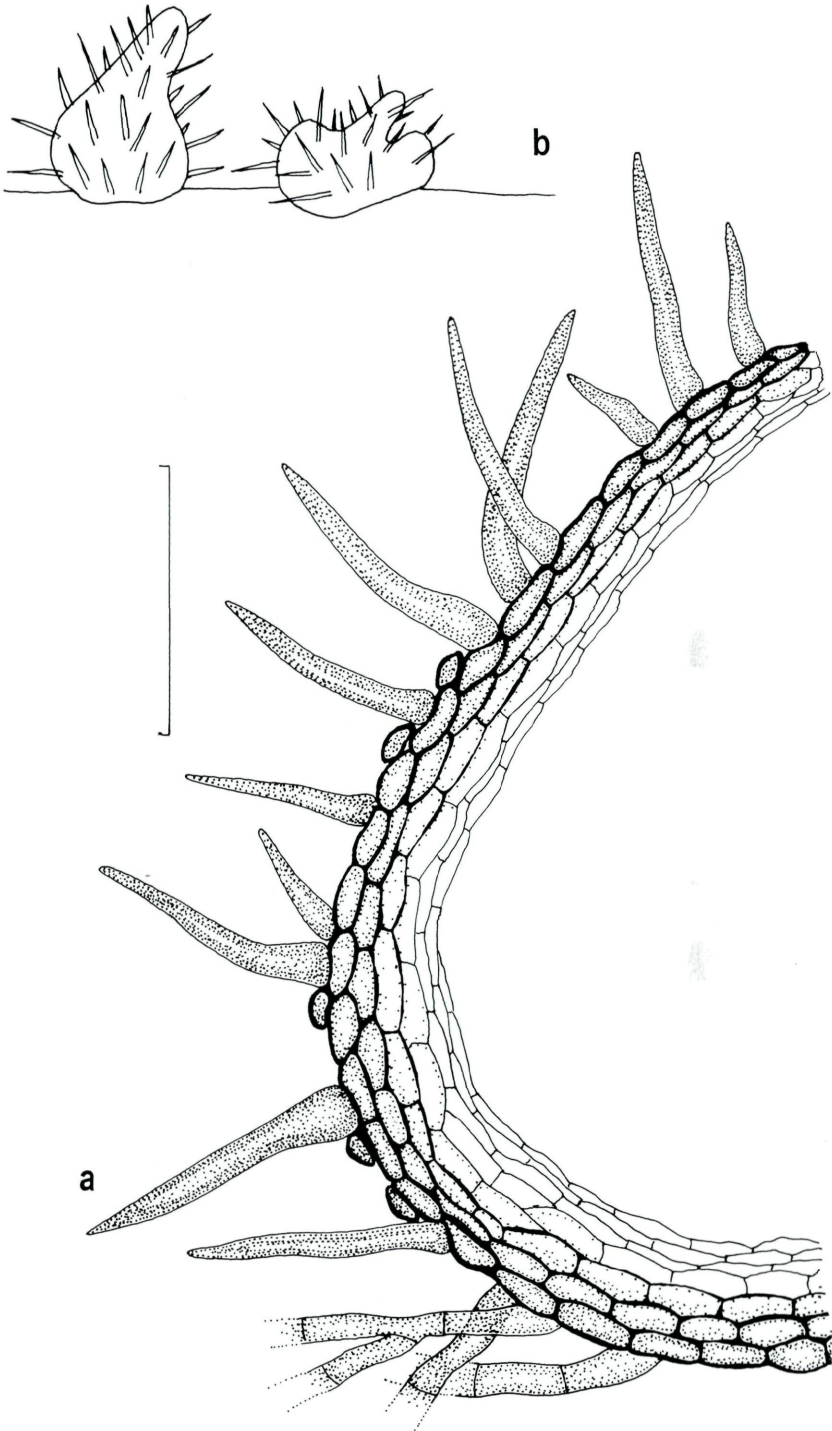
Anamorph. – Unknown.

Holotype. – SWEDEN. Öland: Gardby parish, Tornrör 5 km SW of Gardby, decayed wood and bark of a branch of *Corylus avellana* buried in litter, 4 Jun. 2001, M. Réblová, MR 1884/01 (PRM 896153).

Perithecia superficial to semi-immersed, solitary, non-stromatic, subglobose to conical, minutely papillate, 175–190  $\mu\text{m}$  diam, 190–230  $\mu\text{m}$  high, collapsing laterally upon drying, densely setose, externally with dark brown, opaque oval to globose, protruding cells dispersed among setae. Perithecia attached to the substratum with sparse, long, branched, septate, slightly flexuous, mid-brown ca. 2.5  $\mu\text{m}$  wide hyphae. Basal stromatic tissue not observed. – Setae pointed, thick-walled, mid-brown, non-septate, unbranched, straight to slightly flexuous, base broad to bulbous, 25–65  $\mu\text{m}$  long, 2.5–3.5  $\mu\text{m}$  wide near the base. – Perithecial wall leathery, 2-layered, 17.5–27.5  $\mu\text{m}$  thick; outer wall of 3–4 rows of mid brown, polyhedral, thick-walled cells; inner layer of rows of thin-walled, hyaline, compressed cells. – Ostiolar canal periphysate. – Paraphyses sparse, hyaline, broadly cellular, septate, constricted at the septa, branching in the lower part, 6–8(–9)  $\mu\text{m}$  wide, longer than asci. – Asci unitunicate, thin-walled, cylindrical to clavate (35–)40–48(–50)  $\times$  (5.5–)6–7  $\mu\text{m}$ , short stipitate, persistent, apex truncate to broadly rounded, slightly thickened, apical ring shallow, indistinct, 8-spored. – Ascospores ellipsoidal, 5–6  $\times$  (3.5–)4–4.5  $\mu\text{m}$ , when young 1-celled, hyaline, at maturity developing a median septum, pale brown to pale olivaceous-brown, slightly constricted at the septum. Young ascospores fusing obliquely in pairs, becoming flattened in shape along the area of contact, pairs of ascospores uniseriate in the ascus.



Figs. 1–8. *Synaptospora olandica*. – 1, 2. Mature ascospores. – 3. Paraphyses. – 4, 7. Asci containing mature ascospores. – 5, 6, 8. Asci containing young ascospores. – Scale bar = 5  $\mu$ m. – Figs. 1–8 from PRM 896153 (HOLOTYPE).



Figs. 9. *Synaptospora olandica*. – a. Median, longitudinal section of the perithecial wall. – b. Habit sketch of perithecia. – Scale bar = 50  $\mu$ m. – From PRM 896153 (HOLOTYPE).

**Etymology.** – Öland, referring to the place of origin.

**Habitat.** – Saprobe on soft, decorticated wood and bark of *Corylus avellana*.

**Distribution.** – Sweden: Öland.

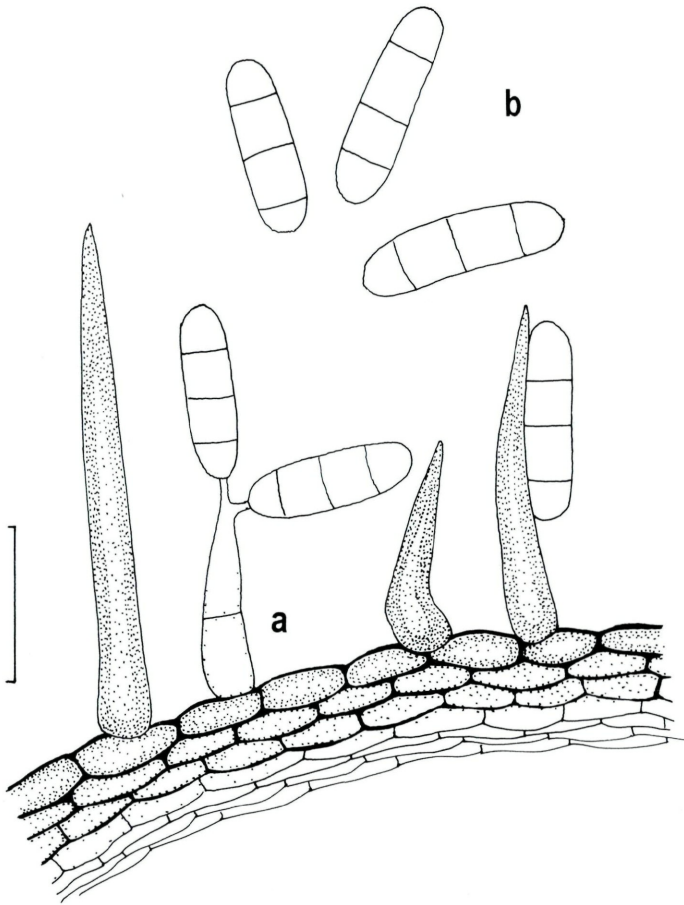
**Other material examined.** – SWEDEN. Öland: Gardby parish, Tornrör 5 km SW of Gardby, decayed wood of a twig of *Corylus avellana* buried in litter, 4 Jun. 2001, M. Réblová, MR 1824/01.

### Key to *Synaptospora* species

1. Ascospores 1-celled . . . . . 2
- 1.\* Ascospores 2-celled, becoming fused obliquely in pairs, 5–6 × (3.5–)4–4.5 µm, perithecia setose, basal stroma lacking . . . . . *S. olandica*
2. Ascospores becoming fused in groups of two to eight . . . . . 3
- 2.\* Ascospores not becoming fused in groups, 8–11 × 4.5–5.5 µm, perithecia glabrous, circular basal stroma present . . . *S. plumbea*
3. Perithecia setose, surrounded with a circular basal stroma, ascospores 7.5–9 × 5–6 µm . . . . . *S. setosa*
- 3.\* Perithecia glabrous, coarsely roughened with elevated areas, lacking basal stroma, ascospores 6–11 × 5–6 µm . . . . . *S. petrakii*

### Discussion

*Synaptospora olandica* is characterized by pale brown to pale olivaceous-brown, 1-septate ascospores that become fused in pairs in the earliest stages of development, setose perithecia and absence of a circular basal stroma. All cultivation attempts were unsuccessful. A *Dactylaria*-like hyphomycete was found growing among setae on the perithecial wall of several perithecia in the type collection of *S. olandica*. It fits to *Dactylaria* sect. *Dactylaria* that is delimited for species with hyaline, little-differentiated conidiophores (de Hoog, 1985). The associated hyphomycete formed conidiophores upright, hyaline, slightly differentiated, 0–1-septate, 16–17 µm long and 3–3.5 µm wide in the middle, apically with 2–3 denticles, ca. 2.5 µm long and 0.5 µm wide. Conidia hyaline, smooth, thin-walled, cylindrical, broadly rounded at the ends, 3-septate, 13–15 × 4 µm, not constricted at the septa. However, I hesitate to propose *Dactylaria* as an anamorph of *Synaptospora* based on the occasional occurrence in the single collection. Carmichael & al. (1980) mentioned the occurrence of a *Dactylaria* Sacc. teleomorph in *Acrospermum* Tode (Acrospermaceae Fuckel, family inc. sed., Eriksson & Hawksworth, 1998). This was based on an unnamed cultural isolate of *A. compressum*



Figs. 10. *Dactylaria*-like hyphomycete. – a. Conidiophores of *Dactylaria*-like hyphomycete growing among setae on the perithecial wall of *S. olandica*. – b. Conidia of *Dactylaria*-like hyphomycete. – Fig. 10 a, b from the natural substratum. – Scale bar = 10  $\mu$ m. – From PRM 896153 (HOLOTYPE of *S. olandica*).

Tode described by Webster (1956), which produced a fungus similar to *Dactylaria*. No other teleomorph has been associated with *Dactylaria*.

*Synaptospora petrakii* Cain and *S. setosa* Huhndorf & al. possess 1-celled, brown ascospores that fuse in groups of two to eight. Ascospores of *S. plumbea* Huhndorf & al. do not fuse, although they show a slight tendency to segregate in groups of four within the ascus. Perithecia of *S. petrakii* and *S. plumbea* are glabrous, having a thick perithecial wall with elevated areas on the surface. Despite the differences in ascospore morphology and absence of a basal stroma, *S. olandica* resembles *S. setosa* in having setose perithecia,

dark, pointed and unbranched setae and the presence of an indistinct apical ring.

The presence of a basal stroma may vary among *Synaptospora* species; distinctly delimited circular stromatic area surrounding perithecia was observed only in *S. plumbea* and *S. setosa* (Huhndorf & al., 1999). I found a similar case in *Chaetosphaeria* Tul. & C. Tul., *Chaetosphaeria myriocarpa* C. Booth, which formed a typical circular basal stroma of variable thickness in the wood. In other *Chaetosphaeria* species the stromatic tissue was lacking.

The ascial apex is not uniform in all *Synaptospora* species. *Synaptospora petrakii*, the type species, possesses a thickened annular structure just below the truncated apex; *S. plumbea* has a small distinct ring, and *S. setosa* has an indistinct ring and asci without any visible apical thickening. The ascial apex of *S. olandica* is slightly thickened and has an indistinct ring; the empty asci show two minute refractive bodies.

Ascospores fusing in groups within the ascus are also typical of *Roselliniopsis* Matzer & Hafellner (Hughes, 1953; Matzer, 1993) and *Collematospora venezuelensis* Jeng & Cain (Jeng & Cain, 1976). *Collematospora venezuelensis* (Trichosphaeriaceae G. Winter, Trichosphaeriales, Jeng & Cain, 1976) is separated from *Synaptospora* by a formation of a dextrinoid, membrane-like structure enclosing a group of four fused ascospores, filiform paraphyses, presence of a diaphragm-like apical annulus and coprophilous habitat.

*Roselliniopsis* (Sordariales, Eriksson & Hawksworth, 1998), where *Synaptospora tartaricola* (Nyl.) Cain was transferred (Matzer, 1993), is a genus of non-ostiolate, lichen-inhabiting species resembling *Synaptospora* in aspects of peridium, ascus and partly in ascospore morphology. Ascospores in *Roselliniopsis* become fused irregularly in groups or remain separate, at maturity develop one or two transverse septa that divide an ascospore unequally or the spores become muriform; ascospores of some species possess germ pores. Matzer (1993) distinguished *Synaptospora* from *Roselliniopsis* on the structure of the ascial apex, which is thickened in *Synaptospora* while in *Roselliniopsis* it does not show any thickening, and on the absence of germ pores in ascospores in *Synaptospora* and habitat, lignicolous vs. lichenicolous, respectively. Except for the habitat, there is considerable overlapping of characters of *Synaptospora* and *Roselliniopsis* and in some species genus-diagnostic characters may be missing.

Both the Trichosphaeriaceae and Coniochaetaceae Malloch & Cain (Sordariales), as delimited by Barr (1990), represent possible homes for *Synaptospora*, *Collematospora* and *Roselliniopsis*. Because life histories of all three genera are unknown and no DNA data could be obtained, it is difficult to discern their relationships. Morpholo-

gical characteristics of the perithecia alone do not support unambiguous placement in either family. Preliminary phylogenies inferred from the large subunit nuclear ribosomal DNA gene showed clearly the Trichosphaeriaceae to fall outside of the Sordariales (Réblová & Winka, 2001).

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