

***Sphaerellothecium gallowayi* sp. nov., a new lichenicolous ascomycete on *Heterodermia* from Australia and Papua New Guinea**

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Abstract: *Sphaerellothecium gallowayi* sp. nov., confined to *Heterodermia* species in Australia and Papua New Guinea, is distinguished from related species and from *Stigmatidium heterodermiae* by the relatively small ascomata, asci and ascospores.

Species of the lichenicolous genus *Sphaerellothecium* have minuscule, black perithecia developing over a frequently superficial, dark mycelium. The type species, *S. araneosum* (Arnold) Zopf, develops on the thallus of *Ochrolechia*, *Pertusaria* and *Varicellaria* (ROUX & TRIEBEL 1994). During the past twenty years, a dozen new species have been described, and they all appear to be host-specific, confined to a genus or to part of a genus. Many more undescribed species obviously exist, and the aim of this paper is to describe a new species growing on *Heterodermia* in Australia and Papua New Guinea. It is a pleasure for me to dedicate the new species to David J. Galloway on the occasion of his 65th birthday.

All microscopical examinations and measurements refer to material studied in water, unless otherwise stated.

***Sphaerellothecium gallowayi* Diederich, sp. nov.**

Sphaerellothecium species insignis hyphis brunneis laevisque leviter immersis, ascomatibus 30–45(–60) µm, ascis 17–27 × 9–13 µm et ascosporis hyalinis 7.5–10 × (2.5–)3–4 µm.

Typus: Australia, New South Wales, Buckenbowia River, 7.5 km WNW of Batemans Bay, 35°32' S, 150°07' E, alt. 2 m, Avicennia-Aegiceras dominated river bed, on *Heterodermia* cf. *japonica*, 15 March 1992, R. Moberg & B. Owe-Larsson A71:18 (UPS [L-124438] – holotypus; CANB, hb Diederich – isotypi).

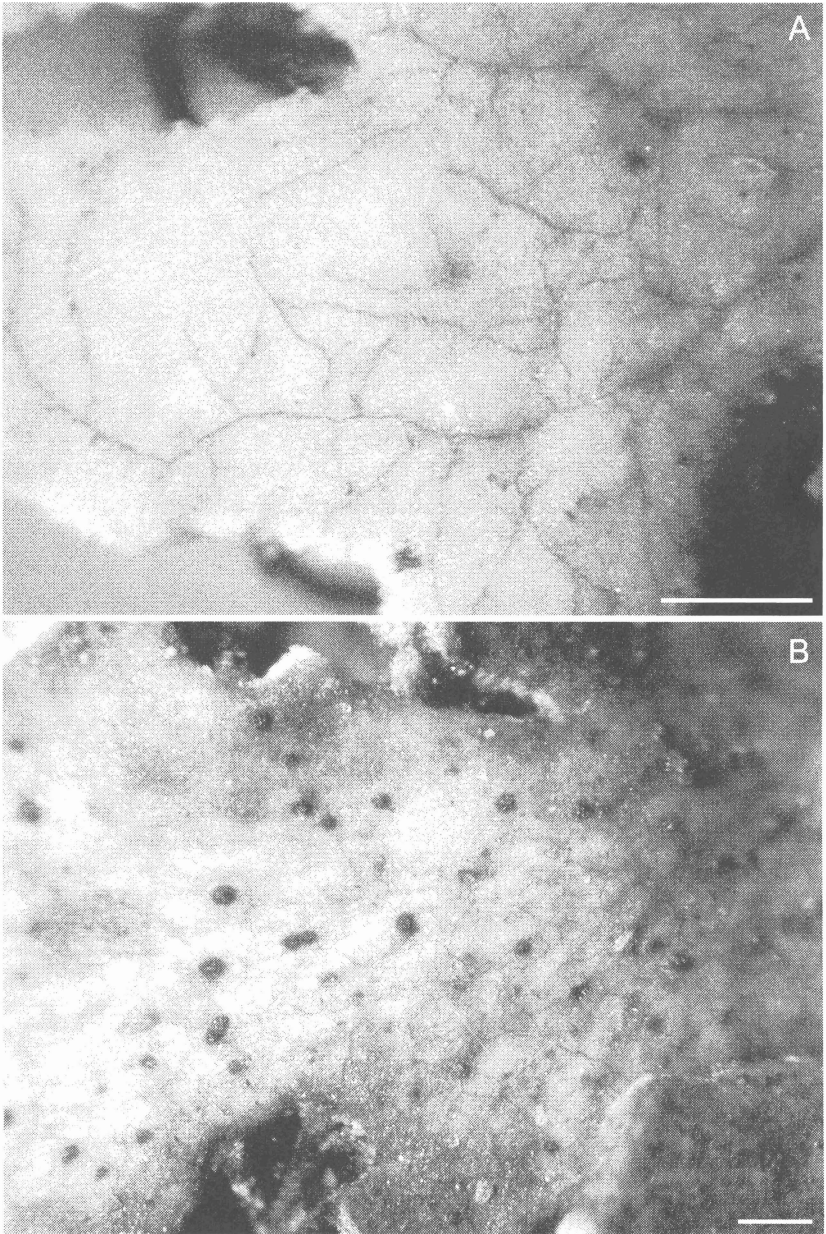


Fig. 1. *Sphaerellothecium gallowayi* (holotypus). A, thallus of *Heterodermia* cf. *japonica* with sterile mycelium. B, thallus with mycelium and mature ascomata. Scale bars = 200 μ m.

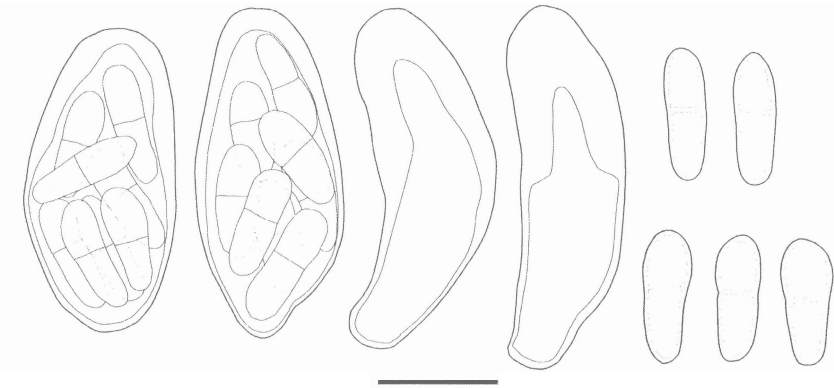


Fig. 2. *Sphaerellothecium gallowayi* (holotypus), asci and ascospores. Scale bar = 10 μ m.

Vegetative hyphae slightly immersed, 3–4.5 mm thick; cell wall dark brown in exposed parts, brownish below, smooth. *Ascomata* perithecioid, blackish, superficial or slightly immersed, 30–45(–60) mm diam. *Perithecial wall* 8–15 mm thick, in the upper part dark reddish brown, K+ dark greyish or olivaceous brown, in the lower part pale to medium brown; cells in surface view of irregular shape, 5–10 mm diam., wall irregularly thickened. *Periphyses* present; external periphyses brownish; internal periphyses hyaline, 1–2-septate, 5–7 mm long, c. 1 mm thick. *Centrum* K/I-, without any visible paraphysoids or pseudoparaphyses. *Asci* shortly ellipsoid to obpyriform, wall apically thickened, with a distinct ocular chamber, K/I- (but epiplasma K/I+ orange to red), 17–27 \times 9–13 mm, 8-spored. *Ascospores* hyaline, 1-septate, smooth-walled, without a visible perispore, with 1–2 guttules per cell (dead herbarium material observed in KOH), 7.5–10 \times (2.5–)3–4 mm; upper cell slightly broader and often shorter. *Conidiomata* not observed.

Distribution and hosts: The species is known from the type locality in Australia (New South Wales, at sea level) on *Heterodermia* cf. *japonica*, and from Papua New Guinea (Mount Wilhelm, at 3500–3700 m alt.), where it was collected several times on *Heterodermia hypoleuca*, *H. microphylla* and *H. obscurata*. The host thallus is sometimes darkened by the abundant development of vegetative hyphae just under the upper surface, and old infected thalli are occasionally bleached. The species seems to be rare, as it is not present in the many other *Heterodermia* specimens from hb Aptroot and hb Diederich, but relatively abundant in the two known localities.

Discussion: *Sphaerellothecium heterodermiae* is distinguished from most other known *Sphaerellothecium* species by the smaller and hyaline ascospores, and the smaller asci and ascomata. *Sphaerellothecium parmeliae* Diederich & Etayo, with ascospores of 8.5–10 \times 3–4 mm, is a much more aggressive parasite, as the infected thalli become entirely black (ETAYO & DIEDERICH 1998); *S. gowardii* Alstrup & M. S. Cole, with

ascospores of 7×4 μm , has larger ascomata (40–60 μm) and slightly larger asci (22–26 \times 13–15 μm) (ALSTRUP & COLE 1998); *S. subtile* Triebel & Rambold has brown ascospores of $7.5\text{--}8 \times 3\text{--}3.5$ μm and slightly smaller ascomata (25–35 μm) (TRIEBEL et al. 1991); *S. cladoniae* (Alstrup & Zhurb.) Hafellner [syn. *S. araneosum* var. *cladoniae* Alstrup & Zhurb.] has larger ascomata (45–60 μm) and larger ascospores ($9\text{--}12.5 \times 3\text{--}4.5$ μm) (ZHURBENKO & ALSTRUP 2004); and *S. cladoniicola* E. S. Hansen & Alstrup has a superficial (not immersed) network of vegetative hyphae, slightly larger ascospores ($8\text{--}12 \times 5$ μm) and slightly larger ascomata (30–60 μm) (HANSEN & ALSTRUP 1995). All these species are furthermore confined to other host genera.

The new species should not be mistaken for *Stigmatidium heterodermae* Etayo, described from Colombia on *Heterodermia boryi* (ETAYO 2002). However, that species has much larger ascomata (50–80 μm) and asci (28–44 \times 9–12 μm), longer and narrower ascospores ($10.5\text{--}13 \times 2.5\text{--}3$ μm), and thinner vegetative hyphae (1.5–3 μm). Two *Lichenopeltella* species described from *Heterodermia* differ in having catathecioid ascomata and so can hardly be confused with the new *Sphaerellothecium*. Further in *L. heterodermae* Diederich, described from Papua New Guinea on several *Heterodermia* species, the ascospores are much larger (24–28 \times 7.5–8.5 μm), and ascomata are larger (150–250 μm diam.) (APTROOT et al. 1997); and in *L. heterodermiicola* M.S. Cole & D. Hawksw. described from *H. speciosa* in the USA the ascospores are also larger, $13\text{--}14.5 \times 14.5$ μm and as are the ascomata which were reported as 80–130 μm diam (COLE & HAWKSWORTH 2002). A specimen of *Sphaerellothecium* on *Heterodermia albicans* (Canary Islands, La Palma, 3.5 km NNE of Santa Cruz, Tenagua, 0.3 km NE of crossing with main road, $28^{\circ}42.8' \text{ N}$, $17^{\circ}44.7' \text{ W}$, 1999, *van den Boom 22485*, herb. ??) could not be identified with certainty. A sparse superficial or slightly immersed net of vegetative hyphae, blackish perithecia of 35–45 μm , 8-spored, K/I– asci of 22–23 \times 11–14 μm , and hyaline, 1-septate ascospores of $7\text{--}9 \times 3.5\text{--}4$ μm suggest *S. gallowayi*. However, the specimen differs by initially completely immersed perithecia breaking through the cortex of the host, and also by a much larger number of ascomata on each infect thallus lobe. The single specimen examined does not allow it to be ascertained if this is a reaction to a different host species, or a further distinct but, yet undescribed species. However, the latter alternative is supported by a macroscopical appearance that is quite distinct from that of *S. gallowayi*.

Additional specimens examined: Papua New Guinea: Chimbu prov.: Mount Wilhelm area, near lake Piunde (= Pindaunde), $5^{\circ}47' \text{ S}$, $145^{\circ}03' \text{ E}$, 3500 m, on tree in forest remnants, on *Heterodermia hypoleuca*, 1987, *Aptroot 18588* (hb Aptroot); *ibid.*, on *H. microphylla*, *Aptroot 18341a* (hb Aptroot); *ibid.*, on *H. obscurata*, *Aptroot 18316* (hb Aptroot); *ibid.*, on *H. obscurata*, 1992, *Diederich 10251b* (hb Diederich); *ibid.*, valley W of lake Piunde, 3700 m, on *H. microphylla*, 1966, *McVean 66193* (hb Aptroot).

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