

**BRYOSCYPHUS ATROMARGINATUS SPEC. NOV. (LEOTIACEAE),  
A NEW ASCOMYCETE PARASITIZING THE THALLUS OF  
MARCHANTIA POLYMORPHA**

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*Bryoscyphus atromarginatus* spec. nov. from dying thalli of *Marchantia polymorpha* is described *in vivo* and *in vitro*. Differences with *B. marchantiae* and other representatives of the genus are discussed. A key to the species of *Bryoscyphus* is given.

The genus *Bryoscyphus* was erected by Spooner to accommodate four species of inoperculate discomycetes occurring on thalli of Bryophyta (Kirk & Spooner, 1984). The structure of the excipulum, the truncate apices of the asci and fusoid and frequently rhomboidal ascospores are characteristic of the genus. Most species are known from few collections. Recently, a fungus rapidly killing thalli of *Marchantia polymorpha* L. was collected in the Netherlands. The anatomy of its excipulum is typical of *Bryoscyphus*, but it differs from all known species of the genus, including *B. marchantiae* (Berk.) Spooner. The type collection of *B. marchantiae* was in fact on *Reboulia haemisphaerica* (L.) Raddi (Kirk & Spooner, 1984). The description given by Naumov (1964) of the collection he reported as *Hymenoscyphus marchantiae* (Berk.) Dennis on *M. polymorpha* agrees well with the new species proposed in this paper.

The new species is described *in vivo* and *in vitro* and a key to the species of *Bryoscyphus* is given.

***Bryoscyphus atromarginatus* Verkley, van der Aa & G. de Cock, spec. nov. — Figs. 1–3**

Apothecia superficialia, solitaria vel gregaria, cupulata, stipitibus brevibus crassis centralibus. Discus initio concavus, postea quasi planus, 0.5–4.0 mm diametro, pallide ochraceus. Margo initio plerumque albidus, deinde ad atroviolaceum fuscenscens. Receptaculum concolor, apprime margine minute tomentellum.

Excipulum ectale (corticale) e duobus stratis compositum. Cellulae strati interioris globosae vel angulares, isodiametricae, tenuitunicatae, plerumque 10–17 µm diametro, marginem versus gradatim in cellulas prismaticas transeuntes. Cellulae strati exterioris isodiametricae usque prismaticae, plerumque 5.0–7.5 µm diametro, modice crassitunicatae, contentu viridi-brunneo, in series undulatas adpressas dispositae, marginem versus gradatim in cellulas minus adpressas graciles transeuntes, parallele radiantes, saepe in processus liberos trichoideos terminantes.

Excipulum medullosum ex hyphis tenuibus et leviter intertextis, plerumque 2.0–3.5 µm diametro, prope excipulum ectale plus minusve parallelis.

Asci cylindrico-clavati, apice truncato-rotundato et intus iodo caerulescente, deorsum in stipitem attenuati, octospori, 100–125 × 5.5–7.0 µm. Ascosporae inaequilaterales, elliptae, clavato-obovoideae, hya-

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linae, continuae (post dehiscenciam rarissime uniseptatae),  $(10.2-11.0-13.2(-15.5) \times (3.4-3.6-4.2(-4.8) \mu\text{m}$ . Paraphyses simplices, filiformes, obtusae, apicem versus plerumque  $3.0 \mu\text{m}$  latae, contentu granulati brunneo-flavo.

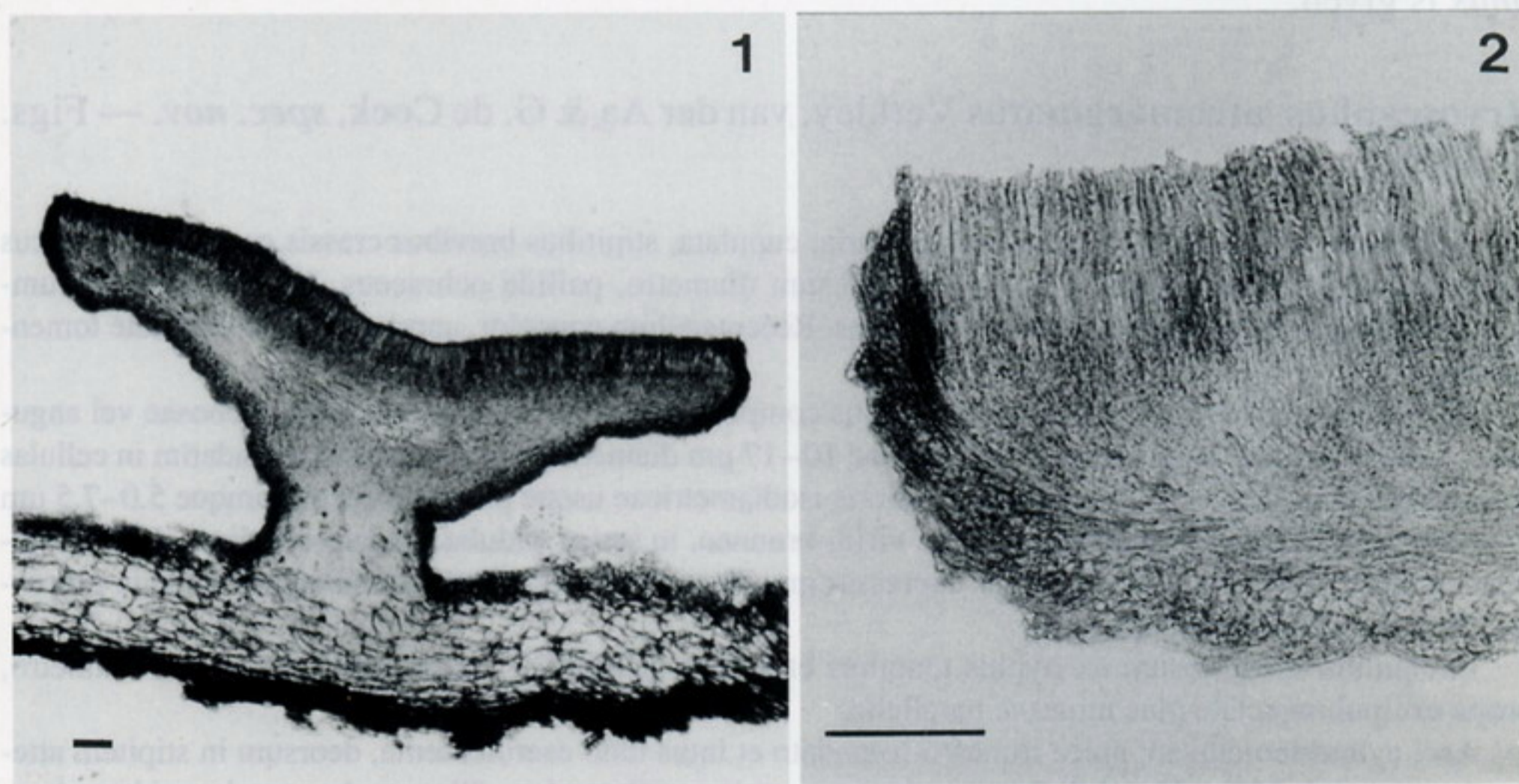
In thallo emoriente *Marchantiae polymorphae*.

*Apothecia* superficial, solitary or gregarious, cupulate, with a short and stout central stalk. *Disc* at first concave, becoming almost flattened, 0.5–4.0 mm in diameter, pale ochreous, smooth (dark vinaceous-brown when dry). *Receptacle* at first concolorous, later with a shade of yellow-green, more intense towards the stalk, minutely downy especially near the slightly elevated margin (powdery on a dark brown background when dry). Margin at first often whitish, but soon darkening to dark violaceous.

*Ectal excipulum* differentiated into two layers. Cells of the inner layer thin-walled, globose to angular, isodiametric, mostly  $10-17 \mu\text{m}$  in diameter, towards the margin of the disc gradually transformed into prismatic elements lying at a low angle to the surface. Cells of the outer layer isodiametric to brick-shaped, mostly  $5.0-7.5 \mu\text{m}$  in diameter, with somewhat thickened walls and greenish brown cytoplasmic inclusions, lying in meandering, adpressed rows, towards the margin gradually replaced by less adpressed slender cells, running parallel and often terminating in free hair-like processes, with two to several septa.

*Medullary excipulum* consisting of slender, thin-walled, hyphal elements,  $2.0-3.5 \mu\text{m}$  in diameter, running closely parallel near the ectal excipulum and slightly interwoven more inwards. Subhymenium scarcely differentiated from medullary excipulum.

*Asci* narrowly cylindrical-clavate, with a truncate to rounded apex, the narrow ring blueing most intensely with IKI in the lower part which may protrude into the epiplasm; asci attenuating into a long, stalk-like base with crozier, 8-spored, biseriate when fresh, uniseriate or partly biseriate in rehydrated material,  $100-125 \times 5.5-7.0 \mu\text{m}$  (rehydrated state, with mature spores). *Ascospores* inequilateral, ellipsoidal to clavate-obovoid, with



Figs. 1, 2. *Bryoscyphus atromarginatus*, holotype. — Fig. 1. Cryosection of mature apothecium on thallus of *Marchantia polymorpha*, cotton blue (scale bar =  $100 \mu\text{m}$ ). — Fig. 2. Detail of hymenium and excipulum (scale bar =  $10 \mu\text{m}$ ).

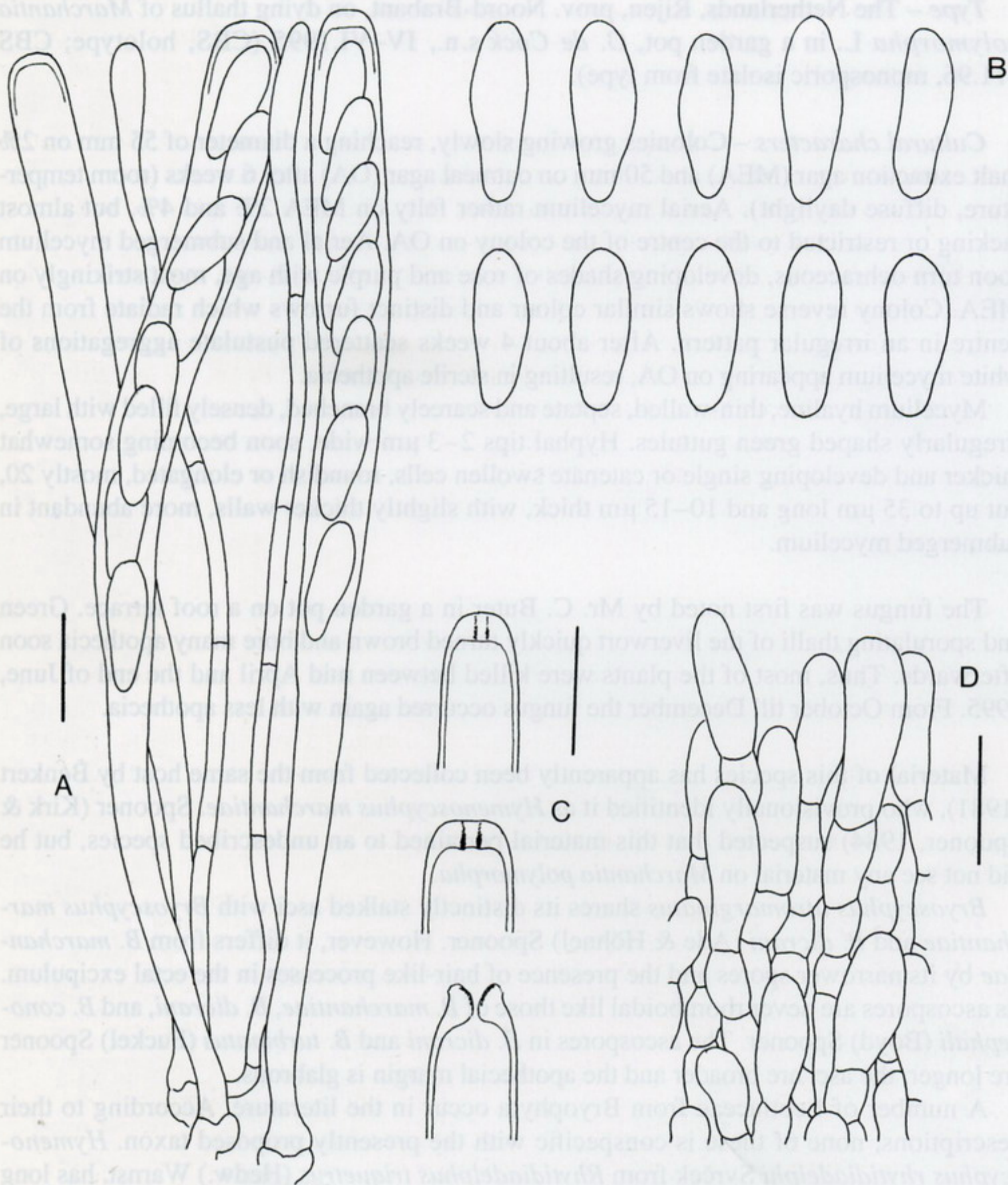


Fig. 3. *Bryoscyphus atromarginatus*, holotype. A. Asci with ascospores; B. ascospores in water; C. detail of ascus apical apparatus in IKI; D. surface view of marginal hyphae (all scale bars = 10  $\mu$ m).

rounded ends, hyaline, one-celled (two-celled ones occasionally observed after liberation), with one or two large and often several smaller greenish oil-droplets, (10.2–)11.0–13.2(–15.5)  $\times$  (3.4–)3.6–4.2(–4.8)  $\mu$ m. *Paraphyses* simple, filiform, obtuse, apical cells often slightly broadening to up to 3.0  $\mu$ m near the tip, contents granular, brownish yellow.

*Type* – The Netherlands, Rijen, prov. Noord-Brabant, on dying thallus of *Marchantia polymorpha* L. in a garden pot, G. de Cock s.n., IV–VI.1995 (CBS, holotype; CBS 211.96, monosporic isolate from type).

*Cultural characters* – Colonies growing slowly, reaching a diameter of 55 mm on 2% malt extraction agar (MEA) and 50 mm on oatmeal agar (OA) after 6 weeks (room temperature, diffuse daylight). Aerial mycelium rather felty on MEA 2% and 4%, but almost lacking or restricted to the centre of the colony on OA. Aerial and submerged mycelium soon turn ochraceous, developing shades of rose and purple with age, most strikingly on MEA. Colony reverse shows similar colour and distinct furrows which radiate from the centre in an irregular pattern. After about 4 weeks scattered pustulate aggregations of white mycelium appearing on OA, resulting in sterile apothecia.

Mycelium hyaline, thin-walled, septate and scarcely branched, densely filled with large, irregularly shaped green guttules. Hyphal tips 2–3  $\mu\text{m}$  wide, soon becoming somewhat thicker and developing single or catenate swollen cells, roundish or elongated, mostly 20, but up to 35  $\mu\text{m}$  long and 10–15  $\mu\text{m}$  thick, with slightly thicker walls, more abundant in submerged mycelium.

The fungus was first noted by Mr. C. Buter in a garden pot on a roof terrace. Green and sporulating thalli of the liverwort quickly turned brown and bore many apothecia soon afterwards. Thus, most of the plants were killed between mid April and the end of June, 1995. From October till December the fungus occurred again with less apothecia.

Material of this species has apparently been collected from the same host by Benkert (1981), who provisionally identified it as *Hymenoscyphus marchantiae*. Spooner (Kirk & Spooner, 1984) suspected that this material pertained to an undescribed species, but he did not see any material on *Marchantia polymorpha*.

*Bryoscyphus atromarginatus* shares its distinctly stalked asci with *Bryoscyphus marchantiae* and *B. dicrani* (Ade & Höhnel) Spooner. However, it differs from *B. marchantiae* by its narrower spores and the presence of hair-like processes in the ectal excipulum. Its ascospores are never rhomboidal like those of *B. marchantiae*, *B. dicrani*, and *B. conocephali* (Boyd) Spooner. The ascospores in *B. dicrani* and *B. turbinatus* (Fuckel) Spooner are longer, the asci are broader and the apothecial margin is glabrous.

A number of Leotiaceae from Bryophyta occur in the literature. According to their descriptions, none of these is conspecific with the presently proposed taxon. *Hymenoscyphus rhytidadelphus* Svrček from *Rhytidadelphus triquetrus* (Hedw.) Warnst. has long stalked asci measuring 90–110  $\times$  8–10  $\mu\text{m}$ , ascospores 15.5–17  $\times$  5–6 and a denticulate margin without hair-like processes (Svrček, 1978). *Hymenoscyphus atlanticus* Candoussseau from *Bryum capillare* Hedw. has longer 1-septate ascospores (15–18  $\times$  3.5–4  $\mu\text{m}$ ) and only elongated excipular elements (Candoussseau, 1976). *Hymenoscyphus erythropus* Döbb. has much smaller asci and ascospores (Döbbeler, 1981). The sphagnicolous species also differ from *B. atromarginatus* in several characters. *Hymenoscyphus vasaënsis* (P.A. Karst.) Dennis has narrower spores (10–14  $\times$  3  $\mu\text{m}$ ) and only elongated elements in the ectal excipulum (Dennis, 1964), *H. sphagnisedus* (Velen.) Svrček has translucent apothecia and shorter, broader and short-stalked asci and narrower ascospores (Svrček, 1979). *Hymenoscyphus schimperi* (Nawaschin) Eckblad (= *Discinella schimperi* (Nawa-

schin) Redhead & Spicer, 1981) has a smooth excipulum, longer and broader ascospores and is only known from *Sphagnum squarrosum* Crome. Study of type material may warrant a transfer of some of these species to *Bryoscyphus* in due course.

#### KEY TO THE SPECIES OF BRYOSCYPHUS

- 1a. Asci distinctly stalked (at least lower one-third part very narrow) . . . . . 2
- b. Asci without such a distinct stalk . . . . . 4
- 2a. Asci mostly shorter than 125  $\mu\text{m}$ , ascospores 3.6–4.2  $\mu\text{m}$  in width, never rhomboidal, on *Marchantia* . . . . . *B. atromarginatus*
- b. Asci mostly longer than 140  $\mu\text{m}$ , ascospores wider than 6.0  $\mu\text{m}$ , at least some rhomboidal, on other hosts . . . . . 3
- 3a. Ascospores 16–24  $\times$  6.5–10  $\mu\text{m}$ , with hair-like processes on ectal excipulum, on *Ceratodon* and *Dicranium* . . . . . *B. dicrani*
- b. Ascospores 12–15.5  $\times$  6–7  $\mu\text{m}$ , no hair-like processes on ectal excipulum, on *Reboulia* . . . . . *B. marchantiae*
- 4a. Ascospores wider than 4.0, asci 112–130  $\times$  9–11  $\mu\text{m}$ , excipulum with multiseptate hairs at the margin, 30–70  $\times$  4–9  $\mu\text{m}$ , on *Conocephalum* . . . . . *B. conocephali*
- b. Ascospores 3.5–4.0 in width, asci 95–102  $\times$  11–12  $\mu\text{m}$ , excipulum without such long hairs at the margin, on *Dicranum*, *Hypnum* and *Polytrichum* (?) . *B. turbinatus*

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