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ASPIDOTHELIUM GEMMIFERUM SP. NOV., FROM PAPUA NEW GUINEA (LICHENIZED ASCOMYCETES)

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Abstract: The foliicolous lichen *Aspidothelium gemmiferum* is described from lowland rainforest along the northern coast of Papua New Guinea; it is easily distinguished by the production of disc-like isidia on the prothallus. A key to all known species of *Aspidothelium* is provided.

Key Words: Foliicolous lichens — Thelenellaceae — disc-like isidia — Australasia

Foliicolous lichens are very diverse in Papua New Guinea and include several fascinating genera and species, such as *Byssoloma gahavisukanum* with sporodochia, *Hippocrepidea nigra* with horseshoe-shaped hyphophores, *Musaespora coccinea* with bright orange perithecia and campylidia, *Phyllocratera papuana* with large flattened perithecia and muriform ascospores, and *Sporopodiopsis mortimeriana* with complex conidiomata (APTROOT et al. 1997, SÉRUSIAUX 1997). Amongst the large collections gathered by the first author in that country during two expeditions in 1992 and 1995, a new foliicolous species of *Aspidothelium* has been found and is described in this paper.

The genus *Aspidothelium* Vain. is characterized by the following features: ascomata perithecioid, usually with disc-like or verruciform protuberances, asci clavate, fissitunicate, with very thick walls and a small but distinct ocular chamber, paraphyses simple, occurrence of periphyses, ascospores fusiform to ellipsoid, transversely septate or muriform, and a chlorococcoid photobiont.

Eleven species (incl. the one described in this paper) occur on living leaves but only two [*A. fugiens* (Müll. Arg.) R. Sant. and the recently segregated *A. scutellicarpum* Lücking] are rather common and pantropical. Since the outstanding monograph of SANTESSON (1952), new foliicolous species of *Aspidothelium* have been described in SÉRUSIAUX (1978) and LÜCKING (1999a), or mentioned as 'ined.' in LÜCKING (1999b) and LÜCKING & KALB (2000).

In his most remarkable taxonomical survey of the pyrenolichens, HARRIS (1995: 160-167) suggested that *Aspidothelium* belongs to the Thelenellaceae and should be reduced into synonymy with *Thelenella* Nyl. LÜCKING (1998) discussed this concept and reached the conclusion that *Aspidothelium* and *Thelenella* feature a number of differences that support their separation at generic level: perithecia exposed vs immersed in thalline verrucae, structure of asci and paraphyses (see contradictory findings by ERIKSSON, 1981 and HARRIS, 1995) and different ascospore types, those of *Aspidothelium* being unmistakable. This view was confirmed by H. Mayrhofer (pers. comm. 1997).

Aspidothelium gemmiferum Sérus. & Lücking sp. nov.

Species foliicola ab omnibus aliis generis *Aspidothelii* valde distincta scutellis discoideis umbilicatisque, 0.15-0.2 mm diam., in prothallo copiose instructo. Perithecia c. 0.6 mm diam., basi distincte constricta, pallide aurantiaca. Ascosporae fusiformes, 13-15-septatae, 61-70 x 14-16 µm.

Type: Papua New Guinea, Madang prov., S side of Ramu river, Brahman Mission, c. 8-10 km W of Brahman Mission, 5°45'S 145°20'E, 100 m, logging site in forest remnant, 29 X 1995, E. Sérusiaux 15704 (LG, holotype).

Description: Thallus foliicolous, rounded or irregular, up to 1.5 cm in diam., made of scattered algiferous patches with a rather wrinkled surface, and a distinct, albeit pale grey and almost translucent, rather shiny prothallus. **Disc-like isidia** rather abundant (max. 40-45/cm^2), present only on the prothallus, rarely contiguous, 0.15-0.2 mm in diam., translucent to pale greyish, at first adnate on the thallus surface and when mature typically discoid and umbilicate, with a slightly dissected margin, containing no algal cells or very few near its centre, made of long, transversely septate hyphae radiating from the central part of the disc and with a fringe of individual hyphae protruding out of the disc and usually with a hooked tip (easily seen under SEM). **Perithecia** few, at first seen as hemispherical, pale orange verrucae; when mature sessile, c. 0.6 mm in diam. and c. 0.45 mm high, distinctly constricted at the base, pale orange, with a few dark orange spots, especially near the ostiole, with the outer surface rather irregular; ostiole central, in a slight depression. Outer perithecial wall 150-200 µm thick, typically paraplectenchymatous, with rounded cells 6-12 µm in diam. and some up to 16 µm in diam., many dead and empty and thus forming a lacunose plectenchyma; inner perithecial wall thin, prosoplectenchymatous; paraphyses abundant, long and simple, c. 1.5 µm thick; periphyses abundant, simple, c. 1.5

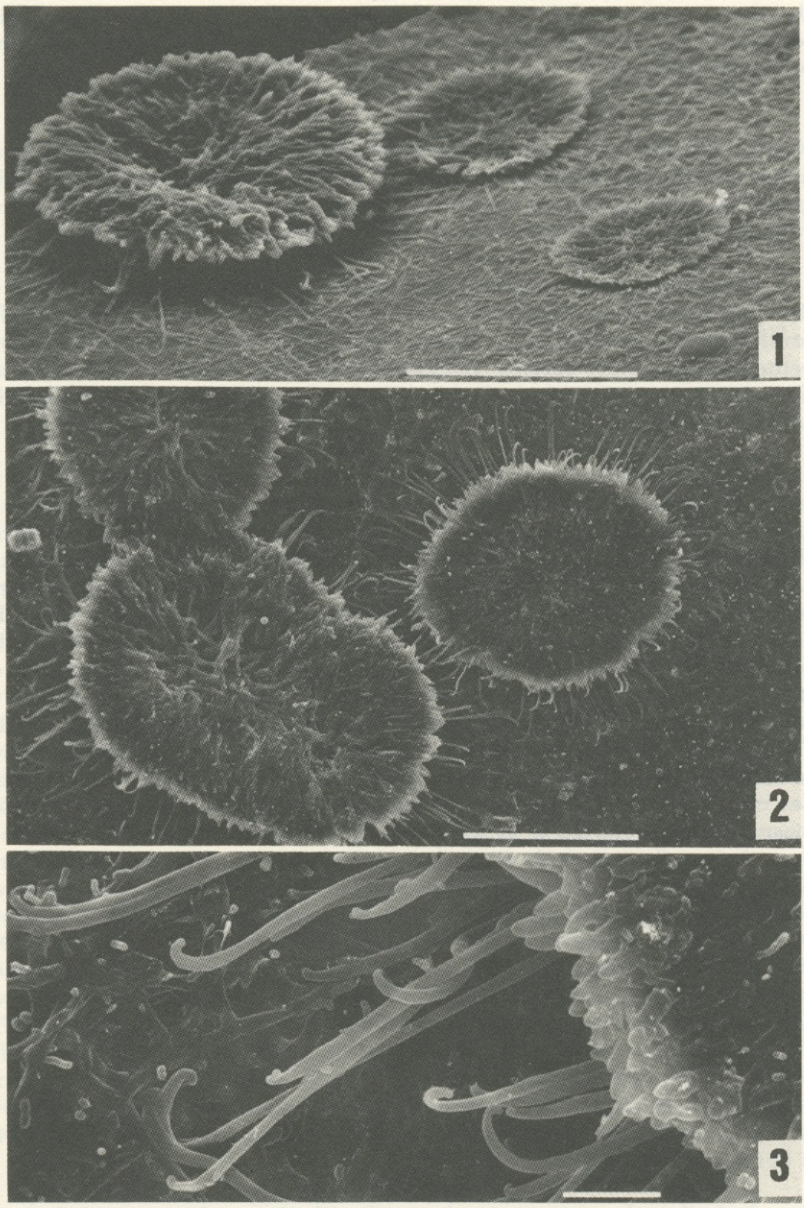

Fig. 1-3. *Aspidothelium gemmiferum* (holotype): SEM views of the disc-like isidia. Scale bars: 100 µm for 1-2 and 10 µm for 3.

µm thick; asci clavate, with very thick walls and a small but distinct ocular chamber; ascospores 2-4 per ascus, fusiform, with rather acute ends, 13-15-septate, 61-70 x 14-16 µm. **Photobiont** a species of the Chlorococcaceae, most probably *Trebouxia*.

Notes: *Aspidothelium gemmiferum* can easily be distinguished by the typical and numerous disc-like isidia occuring on its prothallus. No other species in the genus has such an asexual mean of dispersal. The other species with transversely septate ascospores can be identified with the key provided below.

The perithecia of *Aspidothelium gemmiferum* somewhat resemble those of the type material of *Phylloporina macrospora* Müll. Arg. from Brazil, so far considered a synonym of *A. fugiens* (SANTESSON 1952) but most probably belonging to another species (LÜCKING 1999a). This material lacks any disc-like isidia and is otherwise well-developed: its genuine identity remains to be established.

Disc-like, and sometimes umbilicate, asexual diaspores can be found in several species of foliicolous lichens belonging to completely different groups: *Phylloblastia dolichospora* Vain. (incertae sedis), *Chroodiscus mirificus* (Krempelh.) R. Sant. (Thelotremataceae), *Coenogonium isidiiferum* (Lücking) Lücking (Gyalectaceae), *Echinoplaca gemmifera* Lücking (Gomphillaceae), and several species of *Porina*, e.g. the species producing the *Phyllophiale* disc-like 'isidia' (Trichotheliaceae). The total number of species involved in the production of such diaspores is quite low when referred to the number of strictly foliicolous species but is nevertheless important when compared to corticolous or saxicolous species known to produce them. Indeed, in the Tropics and to our knowledge, only a few, poorly known, corticolous representatives of the Thelotremataceae also form such diaspores. The recently described *Myriotrema parvidiscum* Sipman (SIPMAN 1994: 167) produces disc-like diaspores (here referred to as schizidia), as well as the monotypic and sterile *Byssophytym album* Groenh. (recorded from Indonesia/Java and Papua New Guinea) which most probably also belongs to the Thelotremataceae. In Papua New Guinea, three different chemistries are associated with thalli producing such diaspores, and their taxonomy is currently under study by H. J. M. Sipman (pers. comm.). A corticolous collection so far identified as *Bacidina scutellifera* (Vezda) Vezda is known from the Philippines (Luzon, Laguna prov., Los Baños, Mt Makiling Forest reserve, 370 m, 31 VII 1994, P. Diederich 13174, hb. Diederich): it produces the disc-like isidia typical of *B. scutellifera* but the absence of apothecia precludes any final decision on its identity. The selection pressure to produce such diaspores in foliicolous species is thus quite important and is otherwise also observed in foliicolous liverworts (LÜCKING & LÜCKING 1998).

A similar phenomenon is observed with the production of a byssoid thallus in tropical corticolous species and genera. Indeed, the thallus of the following taxa appears to be very similar although they belong to completely

different groups: *Sagenidiopsis merrotsii* R. W. Rogers & Hafellner (Opegraphales), *Dimerella chiodectonoides* Kalb (Gyalectaceae), *Thelopsis byssoidea* Diederich (Ostropales, ? Stictidaceae), *Tania lanosa* Egea et al. (Arthoniales), *Tibellia dimerelloides* Hafellner & Vezda (Bacidiaceae), etc. (see further examples in HAFELLNER & VEZDA 1992).

Distribution and ecology: *Aspidothelium gemmiferum* is so far known only from the type locality, a little-disturbed area of lowland rainforest along the northern coast of Papua New Guinea, where it grows on living leaves of an unidentified dicotyledon in the understory. The locality is extremely rich in foliicolous lichens and several further new species have been discovered in the large collections gathered.

Key to the known foliicolous species of *Aspidothelium*

1a Ascospores transversely septate 2
1b Ascospores muriform 8

2a Thallus with abundant disc-like isidia on the prothallus (Papua New Guinea) ..... *A. gemmiferum* Sérus. & Lücking
2b Thallus without such isidia 3

3a Perithecial wall paraplectenchymatous, externally with a fine spongioid cover (Tropical America) ..... *A. ornatum* Lücking
3b Perithecial wall formed by densely intricate hyphae, smooth or with irregular appendages, setae or a disc-like expansion on apical parts 4

4a Perithecia smooth 5
4b Perithecia with irregular appendages, setae or a disc-like expansion on apical parts 6

5a Perithecia egg-shaped or papilliform, pale yellowish; ascospores 80-140 µm long (Tropical America) ..... *A. papillicarpum* Lücking ined.
5b Perithecia hemispherical to wart-shaped or subglobose, dark grey; ascospores 50-100 µm long (Tropical America) ..... *A. geminicarpum* (Malme) R. Sant.

6a Perithecia with a disc-like expansion with smooth or minutely dentate margins, whitish to pinkish or pale grey (pantropical) ..... *A. scutellicarpum* Lücking
6b Perithecia with short appendages or setae, pale yellowish to brownish white 7

7a Perithecia with up to 0.3 mm long setae; ascospores with the two median cells often slightly enlarged (Tropical America) ..... *A. arachnoideum* Lücking ined.

7b Perithecia with short, up to 0.1 mm long, irregular appendages; ascospores with the two median cells not enlarged (pantropical) ..... *A. fugiens* (Malme) R. Sant.

8a Ascospores with the median cell large and simple (Tropical America/Ecuador) ..... *A. mirabile* Lücking
8b Ascospores regularly muriform 9

9a Perithecia with up to 0.2 mm long setae (Tropical America and Africa) ..... *A. trichothelioides* Sérus. & Vezda
9b Perithecia with a disc-like expansion 10

10a Thallus verrucose; ascospores 35-65 x 13-20 µm (Tropical Asia and Australia) ..... *A. verruculosum* R. Sant.
10b Thallus smooth; ascospores 40-80 x 15-25 µm (pantropical) ..... *A. cinerascens* Vain.

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