
New and interesting lichens and lichenicolous fungi in Brazil

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New and interesting lichens and lichenicolous fungi are reported from two regions in Brazil, mainly from the Serra do Caraça (Minas Gerais), but also from the Serra da Mantiqueira (São Paulo). These are some of the results of an international field meeting aimed at collecting topotype material from taxa described from the region by Vainio a century earlier. The following species are described as new: *Acarospora oligyrophorica* Aptroot, *Fellhanera antennophora* Aptroot, *Graphina coccospora* Aptroot, *Lepraria multiacida* Aptroot, *Placidiopsis hypothallina* Aptroot, *Pyrenula fusoluminata* Aptroot, *Pyrenula quarzítica* Aptroot, *Sulcopyrenula cruciata* Aptroot & *Topeliopsis globosa* Aptroot. The following new combinations are proposed: *Bacidiopsis tenuisecta* (Vainio) Aptroot comb. nov., *Brigantiaea subobscurata* (Vainio) Aptroot comb. nov., *Caloplaca subrubelliana* (Vainio) Aptroot comb. nov., *Campylothelium megalostomum* (Vainio) Aptroot comb. nov., *Graphina subvestita* (Vainio) Aptroot comb. nov., *Micarea poliocheila* (Vainio) Aptroot comb. nov., *Micarea subgranulans* (Vainio) Aptroot comb. nov., *Micarea subternaria* (Vainio) Aptroot comb. nov., *Ocellularia piperis* (Vainio) Aptroot comb. nov., *Ocellularia stylothecium* (Vainio) Aptroot comb. nov., *Pyrenula crassiuscula* (Malme) Aptroot comb. nov., *Rinodina atrofusca* (Vainio) Aptroot comb. nov. and *Scoliciosporum camptosporum* (Vainio) Aptroot comb. nov. For many other species the first records from the Southern hemisphere or from (South) America are given.

Key words: *Acarospora*, ascomycetes, Brazil, *Fellhanera*, *Graphina*, *Lepraria*, lichens, lichenicolous, *Placidiopsis*, *Pyrenula*, *Sulcopyrenula*, taxonomy, *Topeliopsis*.

Introduction

In September 1997, an international lichen collecting trip was organized to the Serra do Caraça in Brazil. This is the region where, more than a century earlier, Vainio collected many of his Brazilian lichens. The area consists of low mountains with exposed granitic rock outcrops and gullies with forest remnants and has been relatively unchanged since Vainio's time, no question a result of the unchanged management by the landowner, a monastery, where we (and Vainio) also stayed.

The main aim of the trip was to see what remained of the lichen flora from a century earlier, and especially to collect topotypes of taxa Vainio (and others)

described from the area. These are to be kept in Brazil, so that representative materials become readily available to researchers in the country of origin.

The recollecting of Vainio's taxa was indeed very successful, and many topotypes were collected and deposited in Brazil in the SP herbarium. Other collections were identified with taxa not currently known to occur in Brazil, or even in (South) America or the Southern hemisphere, and are therefore published. Several species were also found that prove to be new species. These are therefore described. Several of the topotypes proved that the taxa described by Vainio are valid, but should be placed in different genera according to current practice. Therefore, some new combinations are also proposed.

Materials and Methods

All material was collected in duplicate, with one specimen in ABL and one in SP. Holotypes of the newly described taxa are in SP, isotypes in ABL. The numbers starting with 4 are the running collecting numbers of the author; the numbers starting with a letter denote the collecting locality as explained below and the collecting-number of that site. Example: 41014 c37 means: collected by A. Aptroot no. 41014 at site c, where it is the 37th collection made.

Collecting localities

a-n: Brazil, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, 20°06'S, 43°29'W.

- a: Near monastery Santuário do Caraça, altitude *ca.* 1300 m, 15-21 September 1997.
- b: Near football field near monastery Santuário do Caraça, altitude 1250 m, 16 September 1997.
- c: Along track towards Varginha chapel, altitude *ca.* 1250 m, 16 September 1997.
- d: Near Banho do Belchior, altitude *ca.* 1250 m, 17 September 1997.
- g: 0.5-1 km NW of monastery Santuário do Caraça, altitude *ca.* 1250 m, 18 September 1997.
- h: Near Funil, 1 km NW of monastery Santuário do Caraça, altitude *ca.* 1250 m, 18 September 1997.
- j: Near Funil, 1 km NW of monastery Santuário do Caraça, altitude *ca.* 1350 m, 18 September 1997.
- k: Near Funil, 1.5 km NW of monastery Santuário do Caraça, altitude 1300 m, 18-21 September 1997.
- l: Near Tanque Grande, altitude *ca.* 1270 m, 19-20 September 1997.
- m: Near rapids Cachoeira da Canjerana near Tanque Grande, altitude 1300 m, 20 September 1997.
- n: Near Gruta de Lourdes, altitude *ca.* 1450 m, 19 September 1997.
- r-v: Brazil, São Paulo, Serra da Mantiqueira, Campos do Jordão, 22°40'S, 45°30'W.
- r: Near Oratour Hotel, altitude *ca.* 1400 m, 23-27 September 1997.
- t: Mirante de São José dos Alpes, altitude *ca.* 1750 m, 25 September 1997.
- v: Parque Estadual de Campos do Jordão, altitude *ca.* 1500 m, 25-26 September 1997.
- x: Brazil, São Paulo, Botanical Garden, 23°39'S, 46°30'W, 27 September 1997.

Species new to science

Acarospora oligyrophorica Aptroot sp. nov. (Fig. 1)

Thallus saxicola, areolata, pallida, acido gyrophorico continens. *Apothecia* perithecioidea, ascis circa 40-sporis.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near monastery Santuário do Caraça, altitude ca. 1300 m, 15-21 September 1997, A. Aptroot no. 40758 a158 (SP, **holotype**; ABL, **isotype**). Additional material: 40745 a145.

The species grows on siliceous rock along mountain streams, but is not regularly submerged. It is accompanied by *Usnea* and *Xanthoparmelia* species.

Thallus crustose, 1-3 cm diam., sandy brown, partly with a pale hue, areolate, surrounded by a ca. 0.5 mm wide brown hypothallus, in which a few isolated areoles are often visible. *Algae* chlorococcoid, ca. 5-10 µm diam. *Areoles* 0.3-0.6 mm diam., ca. 100-200 µm thick, flat, with usually 1, but occasionally 2-4 (in that case usually immature) ascomata and/or 2-5 pycnidia (especially towards the margin of the thallus). *Ascomata* cupulate but nearly perithecioid with a narrow disc, 0.2-0.5 mm diam., chocolate-brown to nearly black, hemispherically protruding above the areole. *Epihymenium* brownish. *Hymenium* clear, hyaline, ca. 50-55 µm high. *Hypothecium* hyaline. *Asci* cylindrical, ca. 35-50 × 10-17 µm, wall relatively thick (1-1.5 µm). *Paraphyses* anastomosing, up to 1 µm wide, tips not clavate. *Ascospores* ca. 40 in one ascus, hyaline, simple, ovoid to long-ellipsoid, very variable in shape, but constant within one ascus, 10-15 × 3-5 µm, surrounded by a 1 µm wide gelatinous sheath. *Pycnidia* mostly immersed, hyaline, ca. 60-100 µm diam., protruding with a dark brown, ca. 30-50 µm wide ostiole. *Conidia* hyaline, bacillar, 3.5-5.5 × 1 µm. *Chemistry*: K-, C+ red (gyrophoric acid).

This is the only species of the *Acarospora oligospora*-group (with fewer than 50 spores/ascus) with gyrophoric acid, and is furthermore characterized by the pale areoles and protruding perithecioid apothecia, together giving it the appearance of a *Staurothele* of the *S. fissa*-group.

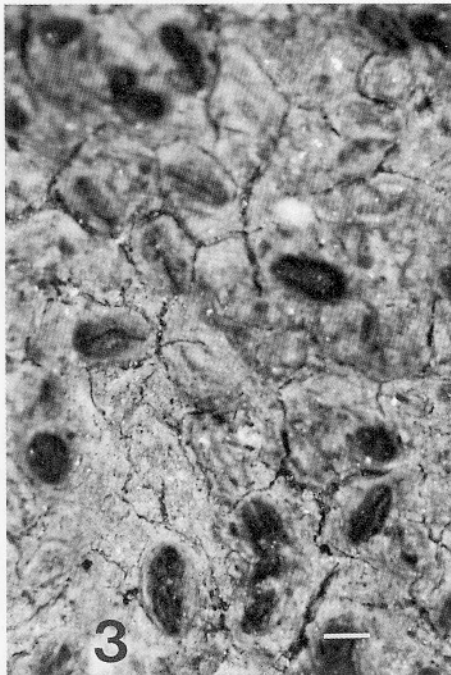
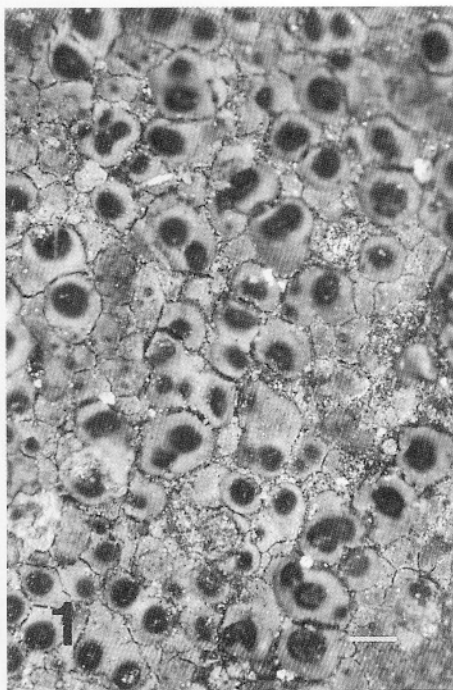
Fellhanera antennophora Aptroot sp. nov. (Fig. 2)

Thallus corticola, granulosa, Lecidea hypomela similis. *Campylidia* corniformes, saepe arcuata, ad 1 mm alta. *Apothecia* ad 1 mm lata, hypothecio fusco, ascosporis fusiformibus triseptatis.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near Banho do Belchior, altitude ca. 1250 m, 17 September 1997, A. Aptroot no. 41186 d143 (SP, **holotype**; ABL, **isotype**).

The species was found on an upright liana in one of the richest forest remnants in the area, together with *Bulbothrix* and *Dimerella* species.

Thallus crustose, up to 13 cm diam., sandy-brown, partly with a pale hue, finely granular so as to be nearly continuous, surrounded by an inconspicuous



Figs. 1-4. Brazilian lichens. 1. *Acarospora oligyrophorica* Aptroot (from holotype). 2. *Fellhanera antennophora* Aptroot (from holotype). 3-4. *Graphina coccospora* Aptroot (from holotype). Bars: 1-3 = 1 mm; 4 = 10 μ m.

brown hypothallus, on which a few isolated granules are often visible. *Algae* chlorococcoid, mostly ellipsoid, *ca.* 3-7 μm diam. *Granules* 20-50 μm diam., globose. *Apothecia* sitting on the thallus, flat to slightly convex, 0.5-1 mm diam., 0.2-0.4 mm high, disc chocolate-brown, often with some nearly black spots, margin greyish-white, disappearing at maturity. *Epihymenium* pale brown. *Hymenium* clear, hyaline, *ca.* 50-55 μm high. *Hypothecium* cellular, dark brown, *ca.* 30-50 μm high. *Excipulum* paraplectenchymatous, *ca.* 50-55 μm wide, hyaline outside, with hyaline, KOH-soluble crystals, with isolated dark brown hypothecium cells inside. *Asci* cylindrical, *ca.* 45-50 \times 10-13 μm , tholus *Pilocarpaceae*-type. *Paraphyses* simple or branched at the tips, up to 1 μm wide, tips medium brown and slightly clavate. *Ascospores* 8 in one ascus, hyaline, 3-septate, fusiform to long-ellipsoid, 19-22 \times 3-5 μm , without gelatinous sheath. *Pycnidia* stalked, on top of simple or rarely branched, dark brown to black, conical, often bent campylidia of 0.4-1 mm high and 0.2-0.3 mm diam. at the base, mostly covered by a thallus-coloured pruina. *Ostiole* 50-100 μm wide, not much differentiated, black, not pruinose. *Conidia* hyaline, pyriform to clavate, 4-6.5 \times 2-3 μm . *Chemistry*: K-, C- (no substances detected in thallus and pruina).

This is the *Fellhanera* species with the longest campylidia reported so far, and is furthermore characterised by the large and stout apothecia with dark brown hypothecium, giving it the appearance of a species of the *Lecidea piperis*-group. Most of the long campylidia were curved upward in nature, suggesting that the pycnidia were exposed for propagation by way of rainwater dripping in the pycnidia.

***Graphina coccospora* Aptroot sp. nov.**

(Figs. 3-4)

Thallus saxicola, nitida. *Apothecia* lirelliformia, immersa, excipulo carbonisato, ascosporis globosis vel ellipsoideis, 4-6-loculatis.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near Banho do Belchior, altitude *ca.* 1250 m, 17 September 1997, A. Aptroot no. 41071 d28 (SP, **holotype**; ABL, **isotype**).

The species grows on damp siliceous rock with e.g. *Heterodermia speciosa*.

Thallus crustose, up to 5 cm diam., metallic-greyish, superficial, up to 0.5 mm thick, surrounded by a *ca.* 1 mm wide hypothallus of thallus colour but glossy. *Algae* *Trentepohlia*-like, sparse. *Apothecia* mostly immersed in the thallus, lirelline, simple, 0.5-1.5 mm long, 0.3-0.6 mm wide, 0.2-0.3 mm high. *Opening* slit-like, black, 50-80 μm wide. *Hymenium* clear, hyaline, IKI-negative. *Exciple* entire, fully carbonised, extending below the hymenium. *Asci* cylindrical, *ca.* 75-110 \times 9-13 μm , tholus IKI-negative (content IKI+ dextrinoid red-brown), without ocular chamber. *Paraphyses* simple, up to 1 μm wide, at the tips up to 1.5 μm . *Ascospores* 8 in one ascus, uniseriate, hyaline, IKI-negative, distoseptate with 4-6 rounded locules in two rows, globose to ellipsoid, (6-)9-12 \times 7-10 μm ,

without gelatinous sheath. *Pycnidia* not observed. *Chemistry*: K-, C-, UV- (no substances detected).

This is the only species of *Graphina* with globose to ellipsoid 4-6-loculate ascospores and a carbonised hymenium. The only species in the genus with similar ascospores is *G. cinereoalba* (Vainio) Zahlbr. (for which several older epithets are available), which has no carbonisation at all. The saxicolous habitat is remarkable, but not a character per se as many usually corticolous *Graphidaceae* have been found on sandstone rock in the study area.

***Lepraria multiacida* Aptroot sp. nov.** (Fig. 5)

Thallus saxicola vel terricola, ochraceoalba, acida norsticticum, sticticum, consticticum, salazinicum, connorsticticum, consalazinicum, atranorinum, zeorinum et cetera continens.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near monastery Santuário do Caraça, altitude ca. 1300 m, 15-21 September 1997, A. Aptroot no. 40640 a40 (SP, **holotype**; ABL, **isotype**). Additional material: 40604 a4; 40666 a66; 40683 a83.

This species is locally common on natural sandstone rock outcrops as well as on walls and soil between boulders, growing together with e.g. *Heterodermia speciosa*, *Cladonia* and *Parmotrema* species.

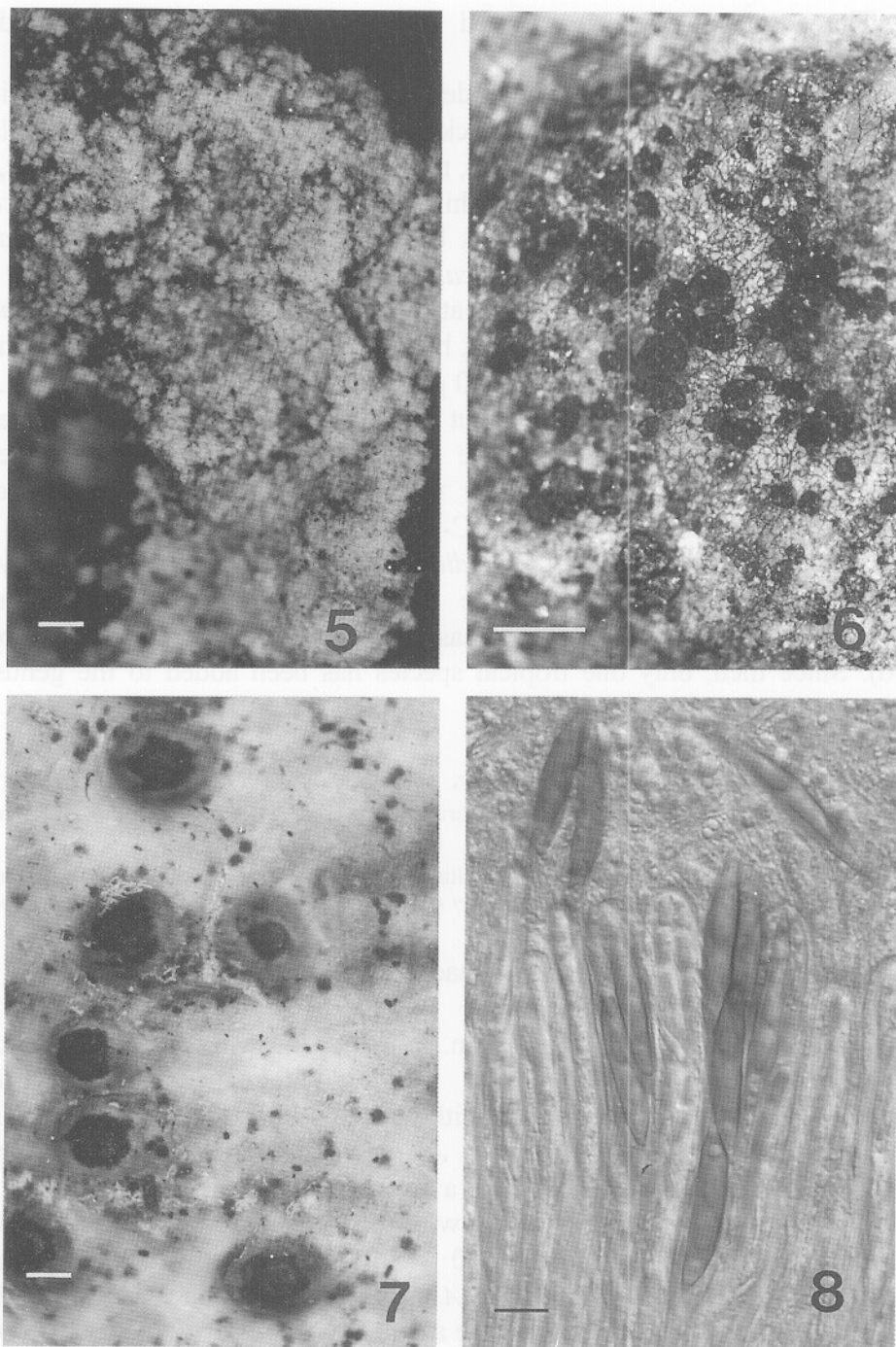
Thallus crustose, occupying areas of up to several decimeters, up to 2 mm thick, crème-whitish, consisting of irregular granules on an often whiter (or occasionally blackened) medulla that sometimes mainly consists of hyphae so as to form a hypothallus; margins often slightly effigured with up to 0.5 mm wide lobes which are considerably thinner (up to 0.2 mm thick). *Granules* ca. 0.1-0.2 mm diam., with up to 100 µm long, protruding hyphae above. *Algae* chlorococcoid. *Chemistry*: K+ yellow-orange, KC-, C-, UV- (atranorin, zeorin, 2 unidentified terpenoids, norstictic acid, stictic acid and 2 minor accessory substances, constictic acid, salazinic acid, connorstictic acid and consalazinic acid).

The species is characterized by the thick thallus of a (for a *Lepraria*) coarse texture, but above all by the numerous secondary metabolites present at the same time. It resembles *L. nivalis* J.R. Laundon and especially the sometimes synonymised *L. crassissima* (Hue) Lettau *sensu* e.g. Diederich and Sérusiaux (2000), but differs by the cream colour and the chemistry, visible e.g. by the negative KC and C reactions.

***Placidiopsis hypothallina* Aptroot sp. nov.** (Fig. 6)

Thallus squamulosa, brunnea, ad hypothallo hyphoideo sessilis. *Perithecia* hyalina, immersa, pyriformia, ascis pyriformibus, ascosporis elongato-ellipsoideis vel clavatis.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near monastery Santuário do Caraça, altitude ca. 1300 m, 15-21 September 1997, A. Aptroot no. 40720 a120 (SP, **holotype**; ABL, **isotype**).



Figs. 5-8. Brazilian lichens. **5.** *Lepraria multiacida* Aptroot (from holotype). **6.** *Placidiopsis hypothallina* Aptroot (from holotype). **7-8.** *Pyrenula fusoluminata* Aptroot (from holotype). Bars: 5-7 = 1 mm; 8 = 10 μ m.

The species grows on exposed siliceous rock. It is accompanied by *Xanthoparmelia* species.

Thallus crustose, covering rounded areas of up to 0.5 cm diam. with a hypothallus consisting of loose, blackish hyphae, with numerous, isolated squamules. *Squamules* dark brown, flat, rounded to lobate, 50-200 μm diam., 50-100 μm thick, each surrounded by a thin black margin. *Algae Verrucariaceae*-type, 5-8 μm diam. *Upper cortex* dark brown, 3-5 μm thick, cellular. *Medulla* paraplectenchymatous, hyaline, cells ca. 2 μm diam. *Margin* black, 8-12 μm thick, extending into the lower cortex at the sides of the squamules. *Perithecia* fully immersed in the thallus, pyriform, hyaline, 50-80 μm diam. *Ostiole* central, visible as a black dot from above, 30-50 μm wide. *Hymenium* clear, hyaline. *Asci* pyriform, ca. 25-35 \times 8-13 μm , without ocular chamber. *Paraphyses* simple, up to 0.8 μm wide. *Ascospores* 8 in one ascus, irregularly arranged, hyaline, 1-septate, long-ellipsoid to clavate, 8-10 \times 2.5-3 μm , without gelatinous sheath. *Pycnidia* not observed. *Chemistry*: K-, C-, UV- (no substances detected).

This is the only species of *Placidiopsis* with the thallus dominated by the hyphae of the hypothallus, just like a subiculum in some non-lichenised ascomycetes. The genus *Placidiopsis* has been monographed recently by Breuss (1996). Since then, only one tropical species has been added to the genus by Aptroot and Seaward (1999).

***Pyrenula fusoluminata* Aptroot sp. nov.**

(Figs. 7-8)

Thallus corticola, corticata. *Asci* 4-sporis, ascosporis fusiformibus, apicibus attenuatis, luminibus fusiformibus.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near Banho do Belchior, altitude ca. 1250 m, 17 September 1997, A. Aptroot no. 41102 d59 (SP, **holotype**; ABL, **isotype**).

The species was found on a shaded tree in a forest remnant and was accompanied by *Phyllopsora* species.

Thallus crustose, up to 10 cm diam., yellowish-brown, superficial, corticate, without pseudocyphellae, somewhat glossy, without hypothallus. *Algae Trentepohlia*-like, sparse. *Perithecia* with the basal half covered by the thallus, hemispherical, black, 0.7-1.2 mm diam. *Ascomal wall* entire, 100-250 μm thick, without crystals, IKI-negative. *Ostiole* a central depression, black, 0.1-0.2 mm wide. *Hymenium* heavily interspersed with oil globules, hyaline, IKI-negative. *Asci* cylindrical to clavate, ca. 95-110 \times 8-11 μm , without ocular chamber. *Paraphyses* simple, up to 0.8 μm wide. *Ascospores* 4(-5) in one ascus, irregularly arranged, mostly towards the tips of the asci, chocolate brown, distoseptate with consistently 4 fusiform, lumina in one row (the middle two about twice as long as the end ones, up to 10 μm long, the end ones up to 5 μm long), fusiform, often the

lower end attenuated, (25-)35-45(-50) \times 4-6(-7.5) μm , without gelatinous sheath. *Pycnidia* not observed. *Chemistry*: K-, C-, UV- (no substances).

This is the only species of *Pyrenula* with consistently four fusiform ascospores in the ascus and fusiform lumina. The only species of *Pyrenula* that has ascospores of a somewhat similar shape, *P. flagellata* H. Harada (1993), has 7-septate ascospores.

***Pyrenula quarzítica* Aptroot sp. nov.**

(Figs. 9-10)

Thallus saxicola, corticata. *Ascomata* fusca, ostiolis rufescentibus, ascosporis distoseptatis, *Pyrgillo* similaribus.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near Funil, 1.5 km NW of monastery Santuário do Caraça, altitude 1300 m, 18-21 September 1997, A. Aptroot no. 41320 k12 (SP, **holotype**; ABL, **isotype**). Additional material: 41324 k16; 41441a k134; 41329 k21.

The species grows on shaded to somewhat exposed sandstone and quartzitic rock in forest remnants.

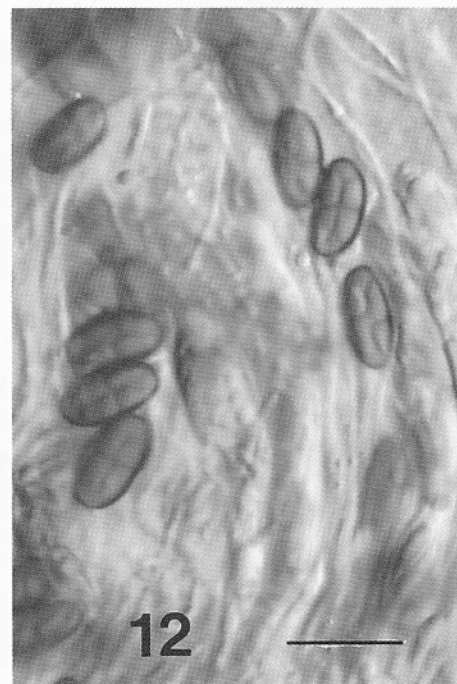
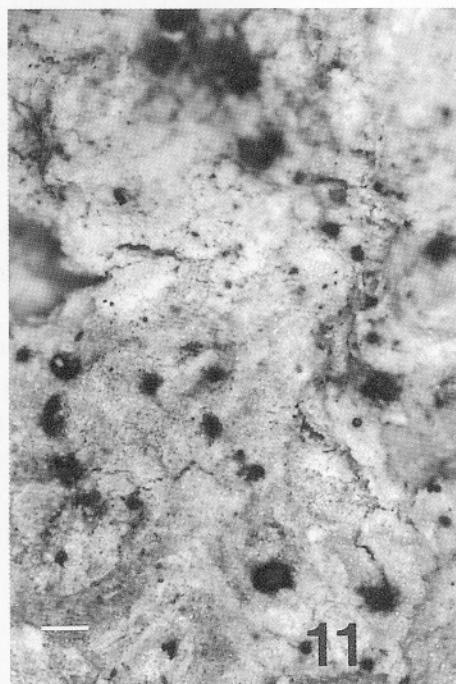
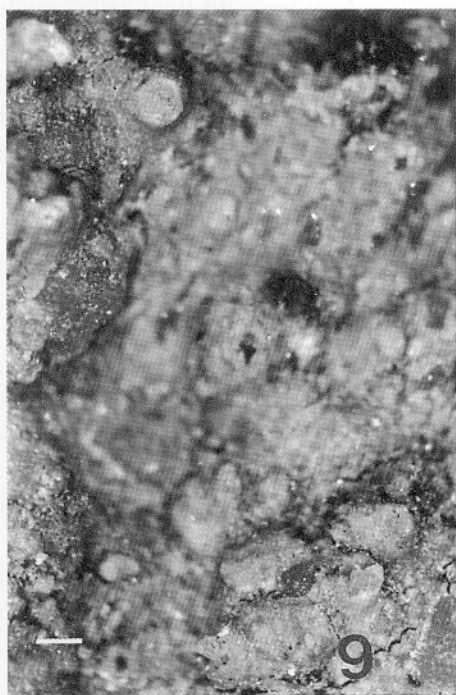
Thallus crustose, up to 10 cm diam., yellowish-brown, superficial, corticate, without pseudocyphellae, somewhat glossy, without hypothallus. *Algae Trentepohlia*-like, sparse. Perithecia mostly half covered by the thallus, hemispherical, brown, 0.6-1 mm diam. *Ascomal wall* entire, 100-250 μm thick, with angular, 30-80 μm wide hyaline crystals, IKI-negative, KOH+ reddish. *Ostiole* conical, reddish-brown, 0.1-0.2 mm wide. *Hymenium* not interspersed, hyaline, IKI-negative. *Asci* cylindrical to clavate, ca. 100-150 \times 15-20 μm , without ocular chamber. *Paraphyses* simple, a few anastomosing above the asci, up to 0.8 μm wide. *Ascospores* 8 in one ascus, uniseriate, very dark chocolate-brown, distoseptate only, with darker pigmentation in bands around the septa, with 4 lumina (the middle ones about twice as broad as the end ones), ellipsoid, often the ends pointed, (22-)25-30 \times (12-)14-17 μm , without gelatinous sheath. *Pycnidia* not observed. *Chemistry*: K-, C-, UV- (no substances).

This is the only really saxicolous species of *Pyrenula*, furthermore characterized by the reddish brown ostioles and the *Pyrgillus*-like ascospores with dark pigmentation around the distosepta. There are only two species of *Pyrenula* that have ascospores of a somewhat similar type, viz. *P. pyrgillospora* Aptroot (Aptroot *et al.*, 1997) and *P. obvoluta* (Nyl.) R.C. Harris & Aptroot (Aptroot, 1991); both are corticolous and have black ascoma walls; the former has eusepta; the latter contains lichexanthone.

***Sulcopyrenula cruciata* Aptroot sp. nov.**

(Figs. 11-12)

Thallus lichexanthonum continens. *Ascomata* immersa, ascosporis distoseptatis, cruciatis, 4-loculatis, luminibus acutatis.



Figs. 9-12. Brazilian lichens. **9-10.** *Pyrenula quarzitica* Aptroot (from holotype). **11-12.** *Sulcopyrenula cruciata* Aptroot (from holotype). Bars: 9, 11 = 1 mm; 10, 12 = 10 μ m.

Type: BRAZIL, Minas Gerais, Catas Altas, Serra do Caraça, Parque Natural do Caraça, Near rapids Cachoeira da Canjerana near Tanque Grande, altitude 1300 m, 20 September 1997, A. Aptroot no. 41633 m27 (SP, **holotype**; ABL, **isotype**).

The species grows on an exposed tree with soft bark without accompanying species.

Thallus crustose, up to 5 cm diam., whitish, nearly immersed in the bark, without pseudocyphellae, without hypothallus. *Algae Trentepohlia*-like, sparse. *Perithecia* mostly immersed in the thallus, globose, black, 0.3-0.6 mm diam. *Ostiole* central, conical, black, 30-50 μm wide. *Ascomal wall* entire, 50-100 μm thick, without crystals (but bark full of hyaline crystals), IKI-negative. *Hymenium* clear, hyaline, IKI-negative. *Asci* cylindrical, ca. 45-70 \times 8-11 μm , IKI-negative, without ocular chamber. *Paraphyses* simple or branched at the tips, up to 0.8 μm wide. *Ascospores* 8 in one ascus, uniseriate, chocolate-brown, sulcate, distoseptate with consistently 4 fusiform locules in two rows, long-ellipsoid, (6-) 9-12 \times 4-6 μm , without gelatinous sheath. *Pycnidia* not observed. *Chemistry:* K-, C-, UV+ yellow (lichexanthone).

This is the only species of *Sulcopyrenula* with lichexanthone, and also the only one with consistently 4-loculate ascospores. The genus *Sulcopyrenula* has been introduced recently by Harada (1999) to accommodate the species of *Anthracothecium* with sulcate ascospores with distoseptate locules in two rows. One of the species not (yet) combined into the genus, *Anthracothecium subglobosum* Riddle, comes close in having consistently 4 locules and containing lichexanthone, but differs by the wider, subglobose ascospores that are not sulcate, and by the interspersed hamathecium.

***Topeliopsis globosa* Aptroot sp. nov.**

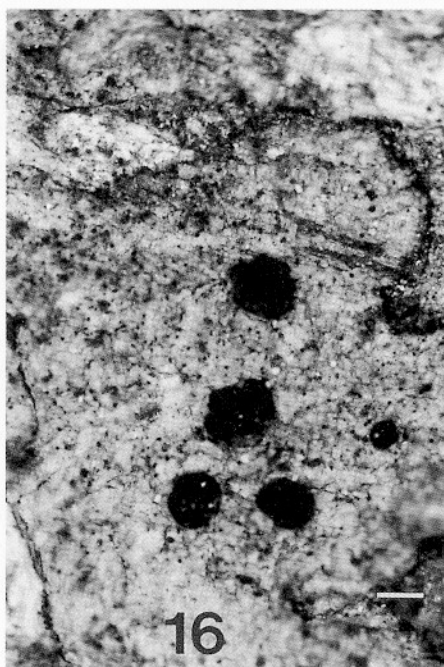
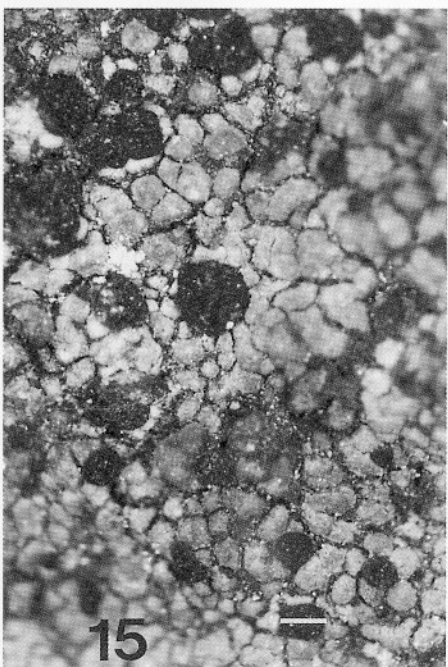
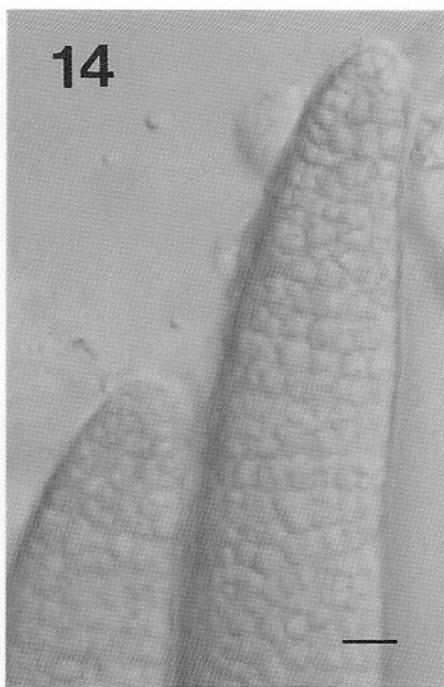
(Figs. 13-14)

Thallus muscicola. *Apothecia* globosa, ostiolis bilobatis vel furcatis, periphysis nullis, ascosporis multiloculatis, iodino violaceis.

Type: BRAZIL, São Paulo, Serra da Mantiqueira, Campos do Jordão, Mirante de São José dos Alpes, altitude ca. 1750 m, 25 September 1997, A. Aptroot no. 41709 t42 (SP, **holotype**; ABL, **isotype**).

The species overgrows mosses on trees in cloud forest and is accompanied by *Cladonia* and *Cryptothecia* species.

Thallus crustose, up to 5 cm diam., whitish metallic-grey, without hypothallus. *Algae Trentepohlia*-like, sparse. *Ascomata* closed apothecia, superficial on the thallus, globose, wall black, but fully covered by a corticate thallus layer, 0.4-0.6 mm diam. and high. *Ostiole* an unbranched or furcate central slit resulting in a bilobate or trilobate opening, black, 30-50 μm wide. *Hymenium* clear, hyaline, IKI-negative. *Asci* cylindrical, tholus IKI-negative (content IKI+ dextrinoid red-brown), ca. 200-300 \times 35-50 μm , with a thickened tholus. *Paraphyses* simple, sparingly anastomosing towards the tips, 1-1.5 μm wide. *Periphyses* not observed. *Ascospores* single in the ascus, hyaline, IKI+ strongly



Figs. 13-16. Brazilian lichens. **13-14.** *Topeliopsis globosa* Aptroot (from holotype). **15.** *Fuscidea kochiana*, Aptroot 40710. **16.** *Fuscidea lightfootii*, Aptroot 40801. Bars: 13, 15-16 = 1 mm; 14 = 10 μ m.

violet, densely muriform with in surface view *ca.* 15 locules across and *ca.* 90 locules in length, without any discernable primary septa, fusiform, 160-260 × 30-40 μm, with 1-3 μm wide, hyaline, IKI+ dextrinoid (red-brown), gelatinous sheath; locules cubical and *ca.* 2.5-3.5 μm diam. *Pycnidia* not observed. *Chemistry*: K-, C-, UV- (no substances detected).

This is the only species of *Topeliopsis* without periphyses, and also the only one with consistently bi- to trilobate ascospores. The genus *Topeliopsis* has been introduced recently by Kantvilas and Vezda (2000) to accommodate the species of the *Thelotrema* family with nearly perithecioid ascospores opening with lobes and with densely muriform ascospores. The new species fits the generic concept perfectly except for the absence of periphyses. It resembles members of the *Graphidaceae* by its slit-like ostiole, but the ascospores remain globose.

New records for Brazil, South America, America or the Southern hemisphere

Several species are reported here for the first time from Brazil, South America, America or the Southern hemisphere. Most are relatively well known, but often overlooked, species widespread in the Northern hemisphere or in the Palearctic. Surprisingly, several others have only recently been described from, e.g., Papua New Guinea. The distribution range of the respective species might in most cases be nearly cosmopolitan.

Agonimia octospora Coppins & P. James. New to the Southern hemisphere and to America. So far known from Europe and Macaronesia. Collection examined: 40685 a85.

Agonimia opuntiella (Poelt & Buschardt) Vezda. New to the Southern hemisphere and to America. So far known from Europe and Macaronesia. Collections examined: 41768 v30; 40642 a42; 40869 a269; 41014 c37.

Agonimia pacifica (Harada) Diederich. New to America. So far known from East Asia. Collection examined: 41795 x2.

Amygdalaria pelobotryon (Wahlenb.) Norman. New to the Southern hemisphere. So far known from Europe, North America and Asia. Collection examined: 40786 a186.

Arthonia tavaresii Grube & Hafellner. New to the Southern hemisphere and to America. So far known only from Europe. Lichenicolous on an unidentifiable *Pyrenula* on *Brunfelsia*. Identified by P. Diederich. Collection examined: 40606 a6.

Arthrorhaphis grisea Th. Fr. New to S. America. So far known from Europe and North America. Collection examined: 41064 d21.

Aspicilia cinerea (L.) Koerber. New to S. America. Cosmopolitan. Collections examined: 40901c a302; 40771 a171; 40790 a190.

Byssoloma tricholomum (Mont.) Zahlbr. Found repeatedly on unusual substrates: on plastic: 41539 n4; on glass: 41540 n5; on sandstone: 41541 n6.

Caloplaca citrina (Hoffm.) Th. Fr. New to Brazil. Cosmopolitan. Collection examined: 41530 l89.

Caloplaca coronata (Krempelh.) Steiner. New to the Southern hemisphere and to America. So far known from Europe and Asia. Collection examined: 40769 a169.

Candelariella reflexa (Nyl.) Lettau. New to S. America. So far known from Europe, North America and Asia (including tropical mountains in East Asia). Collection examined: 40770 a170.

Chaenothecopsis rubina Tibell. New to the Southern hemisphere. So far only known from Costa Rica and Mexico. Collection examined: 41663a r29. Identification confirmed by L. Tibell.

Cliostomum griffithii (Sm.) Coppins. New to S. America. So far known from Europe, North America and Australasia. Collection examined: 41644 r10.

Enterographa praepallens (Nyl.) Redinger. New to America. So far known from Asia and Australasia. Collections examined: 41574 n39; 41073 d30.

Fuscidea kochiana (Hepp) V. Wirth & Vezda. New to the Southern hemisphere. So far known from Europe and North America. Collections examined: 40710 a110; 40739 a139 (Fig. 15).

Fuscidea lightfootii (Sm.) Coppins & P. James. Well-developed material; thallus with divaricatic acid, soredia and apothecia with the characteristic obtuse, medianly constricted ascospores. New to the Southern hemisphere. So far known from Europe and North America. Collection examined: 40801 a201 (Fig. 16).

Heterodermia appendiculata (Kurok.) Swinscow & Krog. New to S. America. So far known from Africa and Australasia. Collection examined: 40688 a88.

Hyperphyscia granulata (Poelt) Moberg. New to S. America. So far known from Africa. Collection examined: 40648 a48.

Lecanactis abietina (Ach.) Koerber. New to Brazil. In temperate regions of both hemispheres. Collection examined: 41769 v31.

Lecanora oreinoides (Koerber) Hertel & Rambold. New to S. America. So far known from Australasia. Collections examined: 41607 m1; 40982 c5.

Lecidea variegatula Nyl. New to Brazil. In the Southern hemisphere only known from Tierra del Fuego; furthermore frequent in Europe, but not known from North America or Asia (Hertel 1997). Collection examined: 41291 j58.

Leptogium californicum Tuck. New to S. America. So far known from North and Central America and Africa. Collection examined: 40671 a71.

Leptogium decipiens P.M. Joerg. New to Brazil. So far known to be restricted to South America. Collection examined: 41785a v0.

Leptogium javanicum Mont. New to America. So far known from Africa, Asia and Australasia. Collection examined: 41698 t31.

Melaspilea diplasiospora (Nyl.) Müll. Arg. New to Brazil. So far known only from Colombia and Australasia, incorrectly reported from Europe. Collection examined: 41440 k132.

Micarea prasina Fr. New to S. America. Cosmopolitan. Collection examined: 41050 d7.

Micarea sylvicola (Flotow) Vezda & V. Wirth. New to the Southern hemisphere. So far known from Europe and North America. Collection examined: 40787 a187.

Mycoporum acervatum R.C. Harris. New to the Southern hemisphere. So far only known from North America. Collection examined: 40973 b72.

Myeloconis fecunda P. McCarthy & Elix. New to Brazil. So far known from South America and East Asia. Collection examined: 41407 k99.

Phaeopyxis punctum (A. Massal.) Rambold, Triebel & Coppins. New to S. America. So far known only from Europe. Lichenicolous on *Cladonia subradiata*. Identified by P. Diederich. Collection examined: 41205 g14.

Physcia lobulata Moberg. New to Brazil. A South American species so far known from Costa Rica and Venezuela. Collection examined: 41729 t62.

Physcia lopezii Moberg. New to Brazil. A South American species so far known from Ecuador, West Indies, Juan Fernandez and Venezuela. Collection examined: 41733 t66.

Placynthiella icmalea (Ach.) Coppins & P. James. New to S. America. Apparently cosmopolitan, as this was the last continent it was not yet reported from. Collection examined: 41625 m19.

Porpidia platycarpoides (Bagl.) Hertel. New to the Southern hemisphere. So far known from Europe, Asia and North America. Collection examined: 40782 a182.

Protoparmelia isidiata Diederich, Aptroot & Sérusiaux. New to America. A surprising record of a species so far known only from high mountains in Papua New Guinea (Aptroot *et al.*, 1997). Collections examined: 41282 j49; 41308a j76; 40621 a21.

Pyrenocollema saxicola (A. Massal.) Coppins. New to the Southern hemisphere and to America. So far known only from Europe. The specimens are associated with cyanobacteria, as fits a *Pyrenocollema*. Collections examined; 40713 a113, 41582 n47.

Pyrenula gahavisukana Aptroot. New to America. A surprising record of a species so far known only from mountains in Papua New Guinea (Aptroot *et al.*, 1997). Collection examined: 41340 k32.

Ramonia microspora Vezda. New to Brazil. So far known from Argentina, Kenya, Papua New Guinea and Indonesia (Aptroot 1998). Collection examined: 41778a v40a.

Verrucaria dolosa Hepp. New to S. America. Apparently cosmopolitan, as this was the last continent it was not yet reported from (Aptroot and Seaward 1999). Collection examined: 40937 b36.

Woessia arvidssonii Sérusiaux. New to Brazil. Previously known only from Ecuador. Collection examined: 41534 l93.

New combinations for some taxa described by Vainio (1890) from the same area

Examination of topotype material in addition to the protologue revealed the systematic position of some taxa described by Vainio (1890) from the area, which were not yet combined in the genera they belong to in the current classification. Most are sufficiently described in the protologue as to be recognizable as valid species, but most were assigned to collective genera now heavily split. For some species, illustrations are made of the habitus. The following new combinations are proposed here:

Bacidiopsis tenuisecta (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea tenuisecta* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 19 (1890). **Topotype:** e.g. 41086 d43.

Brigantiaea subobscurata (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea subobscurata* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 26 (1890). **Topotype:** e.g. 40812 a212.

Caloplaca subrubelliana (Vainio) Aptroot, **comb. nov.**, basionym: *Placodium subrubellianum* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(1): 120 (1890). **Topotype:** 41608 m2.

Campylothelium megalostomum (Vainio) Aptroot, **comb. nov.**, basionym: *Heufleria megalostoma* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 193 (1890). **Topotype:** 41334 k26.

Graphina subvestita (Vainio) Aptroot, **comb. nov.**, basionym: *Graphis subvestita* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 103 (1890). Representative collection examined: 41077 d34.

Micarea poliocheila (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea poliocheila* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 21 (1890). **Topotype**: e.g. 40898 a296 (Fig. 17).

Micarea subgranulans (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea subgranulans* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 39 (1890). **Topotype**: 41273 j40 (Fig. 18).

Micarea subternaria (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea subternaria* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 18 (1890). **Topotype**: 40777 a177.

Ocellularia piperis (Vainio) Aptroot, **comb. nov.**, basionym: *Thelotrema piperis* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 78 (1890). **Topotype**: e.g. 40853 a253 (Fig. 19).

Ocellularia stylothecium (Vainio) Aptroot, **comb. nov.**, basionym: *Thelotrema stylothecium* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 80 (1890). Representative collection examined: 41651 r17 (Fig. 20).

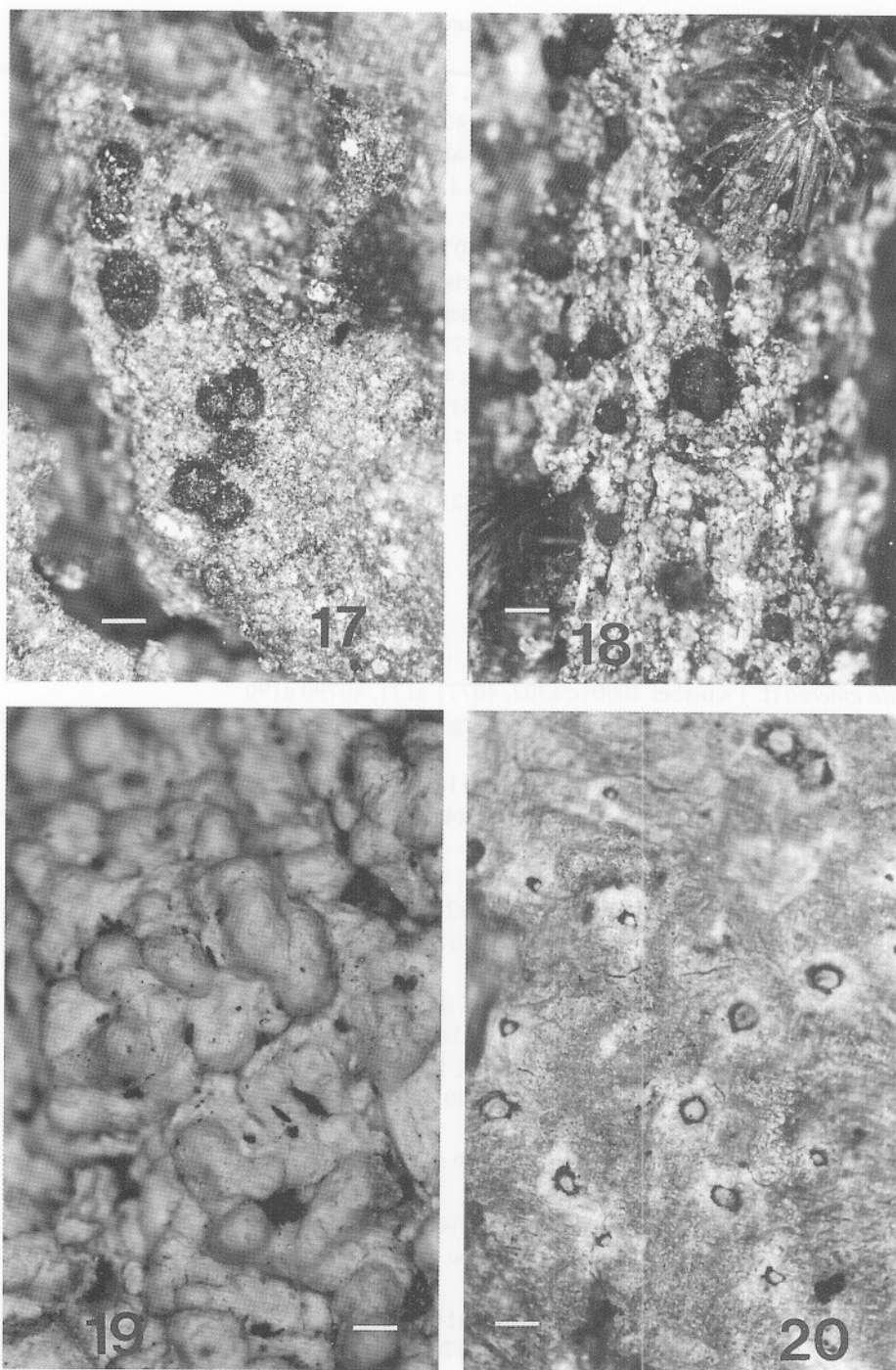
Pyrenula crassiuscula (Malme) Aptroot, **comb. nov.**, basionym: *Parthelium crassiusculum* Malme, Arkiv för Botanik 19(1): 20 (1924). **Isotype** seen: Matto Grosso, Guia, Malme 2673 (UPS). The paratypes Malme 2673 (LD) and 2092 (G) were also studied and found to be identical. Additional collection examined: 41727 t60. In addition to the original description it should be noted that the thallus contains lichexanthone (UV+ yellow).

Rinodina atrofusca (Vainio) Aptroot, **comb. nov.**, basionym: *Buellia atrofusca* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(1): 169 (1890). **Topotype**: e.g. 40914 b13. the transfer is necessary because of the distoseptate ascospores characteristic of the genus *Rinodina*.

Scoliciosporum camptosporum (Vainio) Aptroot, **comb. nov.**, basionym: *Lecidea camptospora* Vainio, Acta Societatis pro Fauna et Flora Fennica 7(2): 59 (1890). Representative collection examined: 40766 a166.

The flora

An alphabetic list of all species identified so far is given in table 1. It is a relatively long list of species, showing the enormous variation in some groups like *Cladonia* (for which it is the area with the highest biodiversity worldwide, see Ahti, 2000), *Lecanora* (see Guderley, 1999 for more details), the *Parmeliaceae* and *Graphidaceae* and the corticolous pyrenocarps, and much smaller representation in some other groups, like the cyanophilic lichens and the saxicolous pyrenocarps. Follicolous lichens were deliberately not collected (they will be treated by other specialists) and species mostly known as foliicolous are reported below only when they were collected from other substrata, e.g. bamboo. The list is presented here *in extenso*, as it gives a fair idea about the diversity of the lichen flora in the region. It is tempting to estimate how much of the lichen flora in the area is now known. In any case, dozens of recognisable species (including for instance an undescribed, strictly saxicolous red-fruited *Cladonia*) had to be left unnamed and undescribed, e.g. because the taxonomy of the respective groups is unsettled or because the species is already in study elsewhere.



Figs. 17-20. Brazilian lichens. 17. *Micarea poliocheila*, Aptroot 41065 (from topotype). 18. *Micarea subgranulans*, Aptroot 41723 (from topotype). 19. *Ocellularia piperis*, Aptroot 41637 (from topotype). 20. *Ocellularia stylothecium*, Aptroot 41651. Bars = 1 mm.

Table 1. Alphabetic list of the identified collections, with indication of topotypes.

<i>Acarospora oligyrophorica</i> Aptroot 40745 a145, 40758 a158 holotype+topotype
<i>Acarospora</i> cf. <i>smaragdula</i> (Wahlenb.) Massal. 40784 a184, 40761 a161, 40743 a143
<i>Agonimia octospora</i> Coppins & P. James 40685 a85
<i>Agonimia opuntiella</i> (Poelt & Buschardt) Vezda 41768 v30, 40642 a42, 40869 a269, 41014 c37
<i>Agonimia pacifica</i> (Harada) Diederich 41795 x2
<i>Amygdalaria pelobotryon</i> (Wahlenb.) Norman 40786 a186
<i>Anisomeridium americanum</i> (Massal.) R.C. Harris 40970 b69
<i>Anisomeridium</i> sp. indet. (ostioles lateral; not americanum) 40902 b1
<i>Anthracotheceum duplicans</i> (Nyl.) Müll. Arg. 41719 t52, 41760 v22, 41686 t19, 41200 g9
<i>Anthracotheceum prasinum</i> (Eschw.) R.C. Harris 40809 a209
<i>Architrypethelium seminudum</i> (Mont.) Aptroot 41147 d104, 41697 t30, 41182 d139
<i>Architrypethelium uberinum</i> (Fée) Aptroot 41277 j44
<i>Arthonia</i> cf. <i>antillarum</i> (Fée) Nyl. 40972 b71
<i>Arthonia cinnabarina</i> (DC.) Wallr. s.l. 41433 k125, 40619 a19, 40966 b65, 41144 d101
<i>Arthonia complanata</i> Fée 41476 l35, 41391 k83
<i>Arthonia ferruginea</i> Vainio 41195 g4
<i>Arthonia submiserula</i> Vainio 40861 a261
<i>Arthonia tavaresii</i> Grube & Hafellner 40606 a6
<i>Arthrorhaphis grisea</i> Th. Fr. 41064 d21
<i>Aspicilia cinerea</i> (L.) Koerber 40901c a302, 40771 a171, 40790 a190
<i>Astrothelium cinnamomeum</i> (Eschw.) Müll. Arg. 41501 l60, 41018 c41, 41192 g1, 41029 c52 (cf.), 40793 a193 (cf.)
<i>Astrothelium confusum</i> Müll. Arg. 41458 l17, 41143 d100
<i>Astrothelium versicolor</i> Müll. Arg. 41348 k40, 41477 l36 topotypes of <i>Pseudopyrenula aureomaculata</i> Vainio
<i>Auriculara byssomorpha</i> (Nyl.) Kalb 41226 h13, 41219 h6, 41712 t45, 41630 m24
<i>Bacidia brasiliensis</i> (Müll. Arg.) Zahlbr. 41657 r23
<i>Bacidia imundata</i> (Fr.) Koerber 41533 l92, 40780 a180, 41614 m8 (cf.)
<i>Bacidia sitiana</i> (Vainio) Zahlbr. 41145 d102
<i>Bacidiospora tenuisecta</i> (Vainio) Aptroot 41086 d43, 41586 n51, 41576 n41 topotypes
<i>Bathelium endochryseum</i> (Vainio) R.C. Harris 41405a topotype
<i>Brigantiaea leucoxantha</i> (Sprengel) Swinscow & Krog 41371 k63
<i>Brigantiaea subobscurata</i> (Vainio) Aptroot 41401 k93, 41543 n8, 41220 h7, 41022 c45, 41289 j56, 41019 c42, 40812 a212 topotypes
<i>Buellia aethalea</i> (Ach.) Th. Fr. 41286 j53, 40749 a149, 40762 a162
<i>Buellia americana</i> Müll. Arg. 40859 a259
<i>Buellia coccinea</i> (Fée) Aptroot 41448 l7, 41275 j42
<i>Buellia endococcinea</i> Vainio 41580 n45 topotype
<i>Buellia lucens</i> Vainio 41256 j23 topotype
<i>Buellia mamillana</i> (Tuck.) W.A. Weber 40748 a148, 40704 a104
<i>Buellia melanochlora</i> (Krempelh.) Müll. Arg. 41702 t35
<i>Buellia microscopica</i> Vainio 41609 m3 topotype
<i>Buellia punctata</i> (Hoffm.) Massal. 41598 n63, 41034 c57

Table 1. (continued).

<i>Buellia recipienda</i> Vainio 41257 j24, 40901b a301 topotypes
<i>Bulbothrix isidiza</i> (Nyl.) Hale 40699 a99
<i>Bulbothrix semilunata</i> (Lynge) Hale 40811 a211
<i>Bulbothrix tabacina</i> (Mont. & v.d. Bosch) Hale 40834 a234
<i>Bulbothrix viridescens</i> (Lynge) Hale 40826 a226
<i>Byssoloma leucoblepharum</i> (Nyl.) Nyl. 41204 g13, 41105 d62, 40879 a279, 41678 t11
<i>Byssoloma subdiscordans</i> (Nyl.) P. James 40936 b35, 41757 v19
<i>Byssoloma tricholomum</i> (Mont.) Zahlbr. 41539 n4, 41540 n5, 41541 n6
<i>Calicium hyperelloides</i> Nyl. 41522 l81, 41546 n11, 41038 c61
<i>Calicium salicinum</i> Pers. 40899 a297, 41044 d1 topotypes of <i>Calicium trachelinum</i> var. <i>rufescens</i> Vainio
<i>Caloplaca citrina</i> (Hoffm.) Th. Fr. 41530 l89
<i>Caloplaca</i> cf. <i>conversa</i> (Krempelh.) Jatta 41008 c31, 40999 c22, 40986 c9, 41010 c33
<i>Caloplaca coronata</i> (Krempelh.) Steiner 40769 a169
<i>Caloplaca crocea</i> (Krempelh.) Hafellner & Poelt 41732 t65
<i>Caloplaca subrubelliana</i> (Vainio) Aptroot 41608 m2 topotype
<i>Caloplaca xanthobola</i> (Krempelh.) Zahlbr. 40901 a299
<i>Campylothelium megalostomum</i> (Vainio) Aptroot 41334 k26 topotype
<i>Candelaria concolor</i> (Dickson) Vainio 40624 a24, 40795 a195, 41296 j63
<i>Candelariella reflexa</i> (Nyl.) Lettau 40770 a170
<i>Canomaculina subsumpta</i> (Nyl.) Elix 41684 t17, 40669 a69
<i>Canoparmelia crozalsiana</i> (B. de Lesd.) Elix & Hale 40660 a60, 40607 a7, 40828 a228
<i>Catillaria endochroma</i> (Fée) Zahlbr. 41191 d148
<i>Catillaria picila</i> (Massal.) Coppins 41535 l94
<i>Celothelium dominicanum</i> (Müll. Arg.) Aguirre 41337 k29, 41434 k126, 41191a d149, 41464 l23
<i>Chaenotheca chlorella</i> (Ach.) Müll. Arg. 41558 n23, 41550 n15 (cf.), 41571 n36 (cf.), 41557 n22 (cf.)
<i>Chaenotheca confusa</i> Tibell 41663 r29
<i>Chaenothecopsis pilosa</i> Tibell & Kalb 41251 j18
<i>Chaenothecopsis rubina</i> Tibell 41663a r29
<i>Chiodecton malmei</i> Thor 41100 d57, 41736 t69, 40867 a267
<i>Chiodecton sphaerale</i> Ach. 41452 l11 topotype of <i>Chiodecton piperis</i> Vainio
<i>Chrysothrix candelaris</i> (L.) Laundon 41566 n31, 41564 n29
<i>Cladia aggregata</i> (Sw.) Nyl. 40943 b42, 41604 n69, 41599 n64
<i>Cladina confusa</i> (R. Sant.) Follm. & Ahti 41590 n55, 41579 n44
<i>Cladonia ahtii</i> Stenroos 40844 a244
<i>Cladonia albofuscescens</i> Ahti 41270 j37, 40894 a292 topotypes
<i>Cladonia anaemica</i> (Nyl.) Stenroos 41782 v44, 41269 j36
<i>Cladonia andesita</i> Vainio 41669 t2
<i>Cladonia calycanthoides</i> (Vainio) Ahti & Marcelli 41246 j13 topotype
<i>Cladonia carassensis</i> Vainio 41230 h17, 41074 d31, 41242 j9 topotypes
<i>Cladonia cartilaginea</i> Müll. Arg. 40814 a214
<i>Cladonia ceratophylla</i> (Sw.) Sprengel 41078 d35, 41249 j16, 41666 r32, 40701 a101
<i>Cladonia connexa</i> Vainio 41298 j65 topotype

Table 1. (continued).

<i>Cladonia consimilis</i> Vainio 41302 j69 topotype
<i>Cladonia corniculata</i> Ahti & Kashiw. 40949 b48, 40686 b86
<i>Cladonia crinita</i> (Delise ex Pers.) Ahti 41033 c56
<i>Cladonia dactylota</i> Tuck. 41660 r26
<i>Cladonia</i> cf. <i>didyma</i> (Fée) Vainio 41152 d109, 41573 n38, 41344 k36
<i>Cladonia dimorpha</i> Hammer 41297 j64
<i>Cladonia divaricata</i> Nyl. 41240 j7
<i>Cladonia flagellaris</i> Ahti & Marcelli 40895 a293
<i>Cladonia grayi</i> G. Merrill ex Sandstede 40672 a72
<i>Cladonia</i> cf. <i>hypoxanthoides</i> Vainio 41674 t7
<i>Cladonia ibitipocae</i> Ahti 41250 j17
<i>Cladonia itatiaiae</i> Ahti 41294 j61
<i>Cladonia lopezii</i> Stenroos 41268 j35, 41266 j33
<i>Cladonia macilenta</i> Hoffm. 41624 m18
<i>Cladonia macilentoides</i> Ahti & Fleig 41239 j6, 40858 a258
<i>Cladonia marcellii</i> Ahti 41216 h3 topotype
<i>Cladonia metaminiata</i> Stenroos 41542 n7, 41283 j50 topotypes
<i>Cladonia minarum</i> Ahti 41221 h8 topotype
<i>Cladonia miniata</i> G. Mey. 41290 j57, 41021 c44
<i>Cladonia obscurata</i> Ahti 41037 c60, 41578 n43 topotypes
<i>Cladonia ochrochlora</i> Floerke 41052 d9
<i>Cladonia parvipes</i> (Vainio) Zahlbr. 41020 c43 topotype
<i>Cladonia peltastica</i> (Nyl.) Müll. Arg. 41032 c55, 41238 j5, 41241 j8
<i>Cladonia penicillata</i> (Vainio) Ahti & Marcelli 41603 n68, 41063 d20 topotypes
<i>Cladonia peziziformis</i> (With.) Laundon 41675 t8
<i>Cladonia pityrophylla</i> Nyl. 40729 a129, 41057 d14
<i>Cladonia pleurota</i> (Floerke) Schaerer 41404 k96
<i>Cladonia pumila</i> Ahti 41214 h1 topotype
<i>Cladonia pyxidata</i> (L.) Hoffm. s.l. 40838 a238, 41153 d110, 41053 d10
<i>Cladonia ramulosa</i> (With.) Laundon 41747 v9, 40891 a289
<i>Cladonia rugicaulis</i> Ahti 41222 h9
<i>Cladonia salmonea</i> Stenroos 41004 c27, 41280 j47
<i>Cladonia signata</i> (Eschw.) Vainio 41035 c58, 41583 n48
<i>Cladonia sphacelata</i> Vainio 41272 j39, 41248 j15 topotypes
<i>Cladonia</i> cf. <i>subcariosa</i> (Nyl.) Vainio 40947 b46
<i>Cladonia subdelicatula</i> Asahina 41309 k1
<i>Cladonia subradiata</i> (Vainio) Scriba 41245 j12, 41595 n60, 41054 d11, 41537 n2 topotypes
<i>Cladonia subsquamosa</i> Krempelh. 41271 j38, 40684 a84
<i>Cladonia substellata</i> Vainio 41036 c59, 41243 j10 topotypes
<i>Cladonia turgidior</i> (Nyl.) Ahti 41244 j11
<i>Cladonia verticillaris</i> (Raddi) Fr. 41606 n71
<i>Cliostomum griffithii</i> (Sm.) Coppins 41644 r10
<i>Coccocarpia domingensis</i> Vainio 40885 a285, 41198 g7, 41793 v55
<i>Coccocarpia erythroxyli</i> (Sprengel) Swinscow & Krog 40922 b21

Table 1. (continued).

<i>Coccocarpia palmicola</i> (Sprengel) Arvidsson & Galloway 40925 b24
<i>Coccocarpia pellita</i> (Ach.) Müll. Arg. 40928 b27
<i>Coccocarpia stellata</i> Tuck. 40904 b3, 41006 c29
<i>Coenogonium linkii</i> Ehrenb. 41479 l38, 41726 t59, 40956 b55
<i>Collema</i> cf. <i>leptaleum</i> Tuck. 40664 a64
<i>Collema leptaleum</i> var. <i>bilosum</i> (Mont.) Degel. 40863 a263
<i>Corella brasiliensis</i> Vainio 41284 j51, 41301 j68 topotype
<i>Cresponea lepriurii</i> (Mont.) Egea & Torrente 41112 d69, 41499 l58, 41408 k100, 41385 k77
<i>Cryptothecia rubrocincta</i> (Ehrenb.) Thor 40819 a219
<i>Cryptothelium octosporum</i> (Vainio) Zahlbr. 41188 d145, 40821 a221
<i>Cryptothelium</i> cf. <i>sepultum</i> (Mont.) Massal. 41126 d83, 41667 r33, 41700 t33, 41720 t53
<i>Cyphellostereum pusiolum</i> (Berkeley & Curtis) Reid 41661 r27
<i>Dibaeis absoluta</i> (Tuck.) Kalb & Gierl 40944 b43, 41061 d18
<i>Dibaeis fungoides</i> (Sw.) Kalb & Gierl 41066 d23, 41068 d25
<i>Dibaeis globulifera</i> Kalb & Gierl 40778 a178, 40950 b49
<i>Dibaeis soreliata</i> Kalb & Gierl 40945 b44, 41668 t1
<i>Dichosporidium nigrocinctum</i> (Ehrenb. : Fr.) Thor 41326 k18, 40679 a79, 41575 n40, 41559 n24, 41005 c28 topotypes of <i>Chiodecton sulphureum</i> Vainio
<i>Dictyonema glabratum</i> (Sprengel) D. Hawksw. 40733 a133
<i>Dictyonema</i> cf. <i>sericeum</i> (Sw.) Berkeley 41472 l31
<i>Diploschistes muscorum</i> ssp. <i>bartlettii</i> Lumbsch 40641 a41, 40750 a150, 41206 g15
<i>Dirinaria aegialita</i> (Ach.) Moore 40803 a203
<i>Dirinaria applanata</i> (Fée) Awasthi 40652 a52
<i>Dirinaria picta</i> (Sw.) Clem. & Shear 41419 k111
<i>Endocarpon pusillum</i> Hedwig 41794 x1, 40887 a287a
<i>Enterographa praepallens</i> (Nyl.) Redinger 41574 n39, 41232 h19 (cf.), 41073 d30
<i>Ephebe brasiliensis</i> Vainio 41616 m10 topotype
<i>Erioderma verruculosum</i> (Vainio) Hue 41785 v47, 41687 t20
<i>Everniastrum cirrhatum</i> (Fr.) Hale ex Sipman 41671 t4
<i>Fellhanera antennophora</i> Aptroot 41186 d143 holotype
<i>Fellhanera bouteillei</i> (Desm.) Vezda 41662 r28 (cf.)
<i>Fellhanera stanhopeae</i> (Müll. Arg.) Luecking, Lumbsch & Elix 41416 k108
<i>Fuscidea lightfootii</i> (Sm.) Coppins & P. James 40801 a201
<i>Fuscidea kochiana</i> (Hepp) V. Wirth & Vezda 40710 a110, 40739 a139
<i>Glyphis cicatricosa</i> (Ach.) Vainio 40825 a225
<i>Gomphillus ophiosporus</i> Kalb & Vezda 41744 v6
<i>Graphina albostrigata</i> (Vainio) Zahlbr. 41516 l75, 41498 l57, 41489 l48, 41512 l71 topotypes
<i>Graphina analoga</i> (Nyl.) Zahlbr. 40832 a232, 40847 a247, 40903 b2, 41254 j21 partly topotype of <i>Graphis carassensis</i> Vainio
<i>Graphina coccospora</i> Aptroot holotype 41071 d28
<i>Graphina elongata</i> (Vainio) Zahlbr. 40961 b60, 41264 j31, 41015 c38 (cf.), 41306 j73
<i>Graphina hemisphaerica</i> (Vainio) Zahlbr. 41591 n56 topotype
<i>Graphina incrustans</i> (Fée) Müll. Arg. 41387 k79, 41488 l47, 41454 l13, 41331 k23, 41470 l29, 41400 k92, 41655 r21

Table 1. (continued).

<i>Graphina insignis</i> (Vainio) Zahlbr. 41072 d29, 41009 c32, 40991 c14, 41318 k10 topotypes
<i>Graphina marcescens</i> (Fée) Müll. Arg. 41461 l20
<i>Graphina</i> cf. <i>mendax</i> (Fée) Müll. Arg. 41119 d76, 41411 k103, 41360 k52, 41362 k54
<i>Graphina pseudosophistica</i> (Vainio) Müll. Arg. 41648 r14, 41513 l72, 41107 d64, 41212 g21, 40931 b30, 41043 c66, 41723 t56, 40890 a288, 40837 a237 topotypes
<i>Graphina streblocarpa</i> (Bel.) Müll. Arg. 41545 n10, 41763 v25, 41691 t24, 41510 l69, 41285 j52, 41520 l79
<i>Graphina subvestita</i> (Vainio) Aptroot 41174 d131, 41149 d106, 41500 l59, 41158 d115, 41141 d98, 41098 d55, 40987 c10, 41077 d34
<i>Graphis caesiella</i> Vainio 41688 t21, 41653 r19, 41450 l9, 41654 r20, 41399 k91
<i>Graphis dumastii</i> Fée 41473 l32, 41336 k28, 41511 l70, 41346 k38, 41380 k72, 41311 k3
<i>Graphis lineola</i> Ach. 40791 a191, 40689 a89, 41435 k127, 41092 d49, 41110 d67, 41095 d52, 41117 d74, 41279 j46 (cf.), 41312 k4, 41381 k73
<i>Graphis rimulosa</i> (Mont.) Trevisan 41094 d51, 41383 k75, 41139 d96, 41106 d63, 40971 b70
<i>Gyalideopsis rubrofusca</i> Kalb & Vezda 41430 k122
<i>Haematomma africanum</i> (Steiner) Dodge 40881 a281 topotype of <i>Haematomma puniceum</i> f. <i>esorediata</i> Vainio
<i>Hemigrapha asteriscus</i> (Müll. Arg.) D. Hawksw. 41752 v11
<i>Heterodermia appendiculata</i> (Kurok.) Swinscow & Krog 40688 a88
<i>Heterodermia casarettiana</i> (Massal.) Trevisan 41638 r4, 40635 a35, 41515 l74 (cf.), 40813 a213 (cf.), 40680 a80, 40633 a33, 40678 a78
<i>Heterodermia comosa</i> (Eschw.) Follm. & Redon 41364 k56, 40610 a10
<i>Heterodermia dactyliza</i> (Nyl.) Swinscow & Krog 40983 c6
<i>Heterodermia diademata</i> (Taylor) Awasthi 41611 m5
<i>Heterodermia flabellata</i> (Fée) Awasthi 40724 a124 topotype of <i>Anaptychia obscurata</i> var. <i>serpens</i> Vainio
<i>Heterodermia flabellata</i> (Fée) Awasthi 40629 a29, 41735 t68, 41227 h14, 41210 g19
<i>Heterodermia lutescens</i> (Kurok.) Follm. 40674 a74
<i>Heterodermia magellanica</i> (Zahlbr.) Swinscow & Krog 41696 t29
<i>Heterodermia obscurata</i> (Nyl.) Trevisan 40630 a30
<i>Heterodermia speciosa</i> (Wulfen) Trevisan 40663 a63, 40662 a62, 40637 a37, 40677 a77
<i>Hymenelia lacustris</i> (With.) M. Choisy 40772 a172, 41615 m9 topotypes of <i>Lecanora diamartiza</i> Vainio
<i>Hymenelia lacustris</i> (With.) M. Choisy 41612 m6, 40788 a188, 40789 a189, 40785 a185
<i>Hyperphyscia granulata</i> (Poelt) Moberg 40648 a48
<i>Hypotrachyna brasiliiana</i> (Nyl.) Hale 40705 a105, 40759 a159
<i>Hypotrachyna chlorina</i> (Müll. Arg.) Hale 41355 k47, 41724 t57, 41784 v46
<i>Hypotrachyna contradicta</i> (Hale) Hale 40756 a156, 41295 j62
<i>Hypotrachyna costaricensis</i> (Nyl.) Hale 40996 c19
<i>Hypotrachyna dactylifera</i> (Vain.) Hale 41421 k113, 41441 k133, 41711 t44, 41738 t71, 41721 t54
<i>Hypotrachyna erythrodes</i> (Zahlbr.) Hale 40760 a160
<i>Hypotrachyna flavida</i> (Zahlbr.) Hale 40645 a45, 40708 a108
<i>Hypotrachyna gracilescens</i> (Vain.) Hale 41011 c34 topotype

Table 1. (continued).

<i>Hypotrachyna imbricatula</i> (Zahlbr.) Hale 41685 t18, 41725 t58, 41717 t50
<i>Hypotrachyna immaculata</i> (Kurok.) Hale 41300 j67
<i>Hypotrachyna livida</i> (Tayl.) Hale 41737 t70
<i>Hypotrachyna subaffinis</i> (Zahlbr.) Hale 40665 a6, 540798 a198 topotypes
<i>Hypotrachyna velloziae</i> (Vain.) Hale 40820 a220, 40627 a27 topotypes
<i>Lecanactis abietina</i> (Ach.) Koerber 41769 v31
<i>Lecanactis epileuca</i> (Nyl.) Tehler 41634 m28, 41525 l84, 41521 l80, 41041 c64
<i>Lecanora achrooides</i> Vainio 40852 a252
<i>Lecanora atroviridis</i> Fée 40901a a300, 40737 a137, 40690 a90, 41617 m11, 40757 a157
<i>Lecanora atroviridis</i> f. <i>smaragdula</i> Vainio 40744 a144, 41619 m13, 40738 a138 topotypes
<i>Lecanora blanda</i> f. <i>caesiocarnea</i> Vainio 41007 c30
<i>Lecanora carassensis</i> Vainio 40719 a119 topotype
<i>Lecanora concilianda</i> Vainio 41136 d93, 40877 a277
<i>Lecanora conformata</i> Vainio 40714 a114 topotype
<i>Lecanora epichlorina</i> Vainio 41012 c35 topotype
<i>Lecanora flavovirens</i> var. <i>subvirescens</i> Vainio 41224 h11, 41148 d105 topotypes
<i>Lecanora hypopsilota</i> Vainio 40993 c16
<i>Lecanora myriocarpoides</i> Vainio 40631 a31
<i>Lecanora oreinoides</i> (Koerber) Hertel & Rambold 41607 m1, 40982 c5
<i>Lecanora pallidostraminea</i> Vainio 40799 a199, 41420 k112, 41099 d56, 40878 a278
<i>Lecanora rabdota</i> Krempelh. 40897 a295
<i>Lecanora subalbellina</i> Vainio 40855 a255, 40977 b76 (cf.)
<i>Lecanora subcarnea</i> (Liljebl.) Ach. 40755 a155, 40740 a140
<i>Lecanora subimmersa</i> (Fée) Vainio 41610 m4, 40746 a146, 40988 c11
<i>Lecanora sulphurescens</i> Fée 41618 m12, 41085 d42, 40765 a165, 40707 a107
<i>Lecanora symmictella</i> Vainio 40617 a17
<i>Lecanora tropica</i> Zahlbr. 40829 a229
<i>Lecidea hypomela</i> Nyl. s.l. 41413 k105, 41389 k81, 41349 k41, 41341 k33, 41368 k60, 41333 k25, 41180 d137, 41547 n12
<i>Lecidea piperis</i> (Sprengel) Nyl. 41386 k78, 41395 k87
<i>Lecidea variegatula</i> Nyl. 41291 j58
<i>Lecidella patavina</i> (Massal.) Krempelh. & Leuckert 40646 a46, 40703 a103 (cf.), 40716 a116, 40741 a141, 40618 a18
<i>Lepraria multiacida</i> Aptroot 40640 a40, 40604 a4, 40666 a66, 40683 a83 holotype+topotypes
<i>Lepraria neglecta</i> (Nyl.) Lettau 41551 n16
<i>Leprocaulon arbuscula</i> (Nyl.) Nyl. 41328 k20, 41327 k19, 41665 r31
<i>Leptoloma membranaceum</i> (Dickson) Vainio 41538 n3, 41605 n70, 40836 a236
<i>Leptogium autoamericanum</i> (Malme) Dodge 40753 a153, 40649 a49
<i>Leptogium azureum</i> (Ach.) Mont. 41131 d88
<i>Leptogium californicum</i> Tuck. 40671 a71
<i>Leptogium cochleatum</i> (Dickson) P.M. Joerg. & P. James 41179 d136
<i>Leptogium coralloideum</i> (Meyen & Flotow) Vainio 40754 a154, 40751 a151, 40634 a34, 40657 a57, 40654 a54, 40670 a70
<i>Leptogium cyanescens</i> (Rabenh.) Koerber 41211 g20

Table 1. (continued).

Leptogium decipiens P.M. Joerg. 41785a v0
Leptogium javanicum Mont. 41698 t31
Leptogium marginellum (Sw.) S.F. Gray 40843 a243, 40650 a50
Leptogium phyllocarpum (Pers.) Mont. 40862 a262
Leptogium sessile Vainio 41707 t40
Lobaria carassensis Vainio 41635 r1, 41776 v38 41356 k48 partly topotype
Lobaria crenulata (Hook.) Trevisan 41781 v43, 41652 r18
Lobaria erosa (Eschw.) Forssell 41783 v45, 41791 v53
Lobaria patinifera (Taylor) Hue 41775 v37 (cf.), 41792 v54, 41692 t25, 41656 r22
Lobaria patinifera (Taylor) Hue 41130 d87, 41465 l24 topotypes of *L. americana* Vainio
Lobaria peltigera (Del.) Vainio 41332 k24
Lopezaria versicolor (Fée) Kalb 41429 k121, 40927 b26, 40916 b15, 41231 h18 partly *Lecidea versicolor* var. *major* Vainio
Maronea multifera (Nyl.) Vainio 41739 v1, 40954 b53
Mazosia phyllosema (Nyl.) Zahlbr. 41677 t10
Megaloblastenia marginiflexa (Hooker & Taylor) Sipman 41710 t43
Melaspilea diplasiospora (Nyl.) Müll. Arg. 41440 k132
Micarea cf. *lignaria* (Ach.) Hedl. 41751 v13
Micarea melanococca (Vainio) comb. ined. 41299 j66, 41308 j75 topotypes
Micarea peliocarpa (Anzi) Coppins & R. Sant. 40779 a179
Micarea poliocheila (Vainio) Aptroot 41060 d17, 40948 b47, 41065 d22, 40898 a296 topotypes
Micarea prasina Fr. 41050 d7
Micarea subgranulans (Vainio) Aptroot 41273 j40 topotype
Micarea subternaria (Vainio) Aptroot 40777 a177 topotype
Micarea sylvicola (Flotow) Vezda & V. Wirth 40787 a187
Mycocalcium albonigrum (Nyl.) Tibell 41762a v24a
Mycoporum acervatum R.C. Harris 40973 b72
Myeloconis fecunda P. McCarthy & Elix 41407 k99
Myriotrema concretum (Fée) Hale 41080 d37, 41587 n52, 41481 l40, 41483 l42, 41485 l44, 41486 l45, 41444 l3
Myriotrema leiostomum (Tuck.) Hale 41469 l28, 41475 l34
Normandina pulchella (Borrer) Nyl. 40933 b32, 40992 c15, 41418 k110, 41767 v29
Ocellularia auberiana (Mont.) Hale 41388 k80
Ocellularia cavata (Ach.) Müll. Arg. 41372 k64
Ocellularia fecunda (Vainio) Hale 41101 d58, 41013 c36 (cf.), 41431 k123
Ocellularia leucomelaena (Nyl.) Hale 41252 j19
Ocellularia papillata (Leighton) Zahlbr. 41460 l19, 41373 k65 (cf.), 41398 k90 (cf.)
Ocellularia perforata (Leighton) Müll. Arg. 41453 l12, 41390 k82
Ocellularia piperis (Vainio) Aptroot 41637 r3, 41330 k22, 40853 a253 mostly topotypes
Ocellularia ripleyi Hale 41449 l8, 41361 k53, 41468 l27
Ocellularia stylothecium (Vainio) Aptroot 41651 r17
Ocellularia subwrightii Hale 41447 l6
Ochrolechia africana Vainio 41265 j32, 40880 a280
Opegrapha aperiens Vainio 41492 l51 (cf.), 41482 l41 (cf.), 41379 k71, 40851 a251, 40860 a260

Table 1. (continued).

<i>Opegrapha atra</i> Pers. 41142 d99, 41490 l49
<i>Opegrapha contracta</i> Vainio 41402 k94, 41116 d73, 41369 k61, 41159 d116, 41181 d138, 41374 k66, 41138 d95 topotypes
<i>Opegrapha filicina</i> Mont. 41505a l64
<i>Opegrapha lithyrgiza</i> Vainio 41549 n14, 41560 n25, 41572 n37, 41569 n34, 41556 n21
<i>Opegrapha puiggarii</i> Müll. Arg. 41507 l66
<i>Opegrapha trilocularis</i> Müll. Arg. 41765 v27
<i>Parmeliella brisbanensis</i> (C. Knight) P.M. Joerg. & J.D. Galloway 41774 v36, 40661 a61
<i>Parmeliella</i> cf. <i>nigrata</i> (Müll. Arg.) P.M. Joerg. & J.D. Galloway 41055 d12
<i>Parmelinopsis horrescens</i> (Taylor) Elix & Hale 40800 a200
<i>Parmelinopsis schindleri</i> (Hale) Elix & Hale 40687 a87 topotype
<i>Parmotrema crinitum</i> (Ach.) Choisy 41713 t46
<i>Parmotrema dilatatum</i> (Vainio) Hale 40644 a44
<i>Parmotrema</i> cf. <i>latissimum</i> (Fée) Hale 40742 a142
<i>Parmotrema mirandum</i> (Hale) Hale 40639 a39
<i>Parmotrema wainii</i> A.L. Smith 41693 t26, 40767 a167, 40736 a136 topotypes
<i>Peltigera austroamericana</i> Zahlbr. 41752 v14, 41750 v12, 41670 t3
<i>Peltigera austroamericana</i> Zahlbr. 41536 n1 topotype of <i>P. americana</i> Vainio
<i>Peltigera laciniata</i> (G. Merr. ex Riddle) Gyelnik 41746 v8
<i>Peltigera ulcerata</i> Müll. Arg. 40681 a81, 40730 a130, 41748 v10
<i>Pertusaria</i> cf. <i>copiosa</i> Erichsen 40840 a240, 40804 a204, 40870 a270
<i>Pertusaria cryptocarpoides</i> Vainio 41730 t63, 41690 t23
<i>Pertusaria</i> cf. <i>excludens</i> Nyl. 40981 c4, 41602 n67, 41307 j74, 40732 a132, 40984 c7, 40712 a112
<i>Pertusaria</i> cf. <i>flavicans</i> Lamy 41563 n28
<i>Pertusaria rhodostomoides</i> Vainio 40841 a241 topotype
<i>Pertusaria subventosa</i> Malme 40764 a164
<i>Pertusaria tetrathalamia</i> (Fée) Nyl. 41209 g18, 41778 v40, 41278 j45 (cf.)
<i>Pertusaria texana</i> Müll. Arg. 41527 l86
<i>Pertusaria velata</i> (Turner) Nyl. 41734 t67, 41075 d32, 41083 d40
<i>Pertusaria verruculifera</i> Vainio 40794 a194, 41636 r2 partly topotype
<i>Phaeographina caesiopruinosa</i> (Fée) Müll. Arg. 41177 d134, 40953 b52, 41424 k116, 41076 d33
<i>Phaeographina chrysentera</i> (Mont.) Müll. Arg. 41471 l30, 41682 t15, 40934 b33
<i>Phaeographina prosiliens</i> (Mont. & v.d. Bosch) Müll. Arg. 41745 v7
<i>Phaeographina sculpturata</i> (Ach.) Müll. Arg. 41353 k45, 41175 d132, 41376 k68, 41088 d45, 41023 c46, 41455 l14, 41708 t41, 41718 t51, 40876 a276, 41026 c49, 41342 k34, 41185 d142, 41432 d124, 40612 a12
<i>Phaeographis</i> cf. <i>exaltata</i> (Mont. & v.d. Bosch) Müll. Arg. 40871 a271, 41699 t32
<i>Phaeographis lobata</i> (Eschw.) Müll. Arg. 41694a t27a
<i>Phaeophyscia hispidula</i> (Ach.) Moberg 40675 a75, 40651 a51, 40668 a68
<i>Phaeopyxis punctum</i> (A. Massal.) Rambold, Triebel & Coppins. 41205 g14
<i>Phlyctella brasiliensis</i> (Nyl.) Nyl. 41140 d97, 41197 g6, 41121 d78, 41160 d117 (cf.), 41025 c48 (cf.)

Table 1. (continued).

<i>Phyllobaeis erythrella</i> (Mont.) Kalb 41067 d24, 40946 b45, 40698 a98
<i>Phyllobaeis rubescens</i> (Vainio) Kalb 41659 r25, 40776 a176
<i>Phyllopsora buettneri</i> (Müll. Arg.) Zahlbr. 41367 k59
<i>Phyllopsora confusa</i> Swinscow & Krog 41319 k11, 41394 k86 (cf.)
<i>Phyllopsora corallina</i> (Eschw.) Müll. Arg. 41771 v33, 41122 d79
<i>Phyllopsora furfuracea</i> (Pers.) Zahlbr. 41347 k39
<i>Phyllopsora isidiotyta</i> (Vainio) Riddle 41115 d72, 40849 a249, 41123 d80
<i>Phyllopsora parvifolia</i> (Pers.) Müll. Arg. 41167 d124
<i>Physcia alba</i> (Fée) Müll. Arg. 41714 t47
<i>Physcia kalbii</i> Moberg 41680 t13
<i>Physcia krogiae</i> Moberg 40864 a264
<i>Physcia lobulata</i> Moberg 41729 t62
<i>Physcia lopezii</i> Moberg 41733 t66
<i>Physcia sinuosa</i> Moberg 41093 d50
<i>Physcia solediosa</i> (Vainio) Lyngé 40727 a127, 40620 a20, 40625 a25, 40929 b28
<i>Physcidea carassensis</i> Kalb & Elix 41365 k57 topotype
<i>Physcidea squamulosa</i> Tuck. 41445 l4
<i>Piccolia conspersa</i> (Fée) Hafellner 41338 k30, 41495 l54, 41405 k97
<i>Placidiopsis hypothallina</i> Aptroot 40720 a120 holotype
<i>Placynthiella icmalea</i> (Ach.) Coppins & P. James 41625 m19
<i>Polymeridium proponens</i> (Nyl.) R.C. Harris 40818 a218, 40816 a216, 41150 d107, 41223 h10
<i>Porina</i> cf. <i>adflata</i> Müll. Arg. 40706 a106
<i>Porina</i> cf. <i>epiphylla</i> (Fée) Fée 41310 k2
<i>Porina farinosa</i> Knight 41496 l55
<i>Porina leptalea</i> (Durieu & Mont.) A.L. Sm. 40962 b61
<i>Porina limbulata</i> (Krempelh.) Vainio 41164 d121
<i>Porina mastoidea</i> (Ach.) Müll. Arg. 41146 d103, 41357 k49, 41403 k95, 41343 k35, 41129 d86, 41134 d91, 41187 d144
<i>Porina nigrofusca</i> Müll. Arg. 41613 m7, 40723 a123, 41049 d6
<i>Porina nucula</i> Ach. 41681 t14, 40960 b59, 41157 d114, 40938 b37, 40823 a223, 41427 k119
<i>Porina rufula</i> (Krempelh.) Vainio 41738a t72, 41508 l67
<i>Porina subrudiuscula</i> Malme 41676 t9
<i>Porina tetracerae</i> (Afz. in Ach.) Müll. Arg. 41351 k43, 41459 l18, 41493 l52 (cf.)
<i>Porpidia</i> cf. <i>macrocarpa</i> (DC.) Hertel & Schwab 41673 t6
<i>Porpidia platycarpoides</i> (Bagl.) Hertel 40782 a182
<i>Protoparmelia badia</i> (Hoffm.) Hafellner 40998 c21, 40709 a109
<i>Protoparmelia isidiata</i> Diederich, Aptroot & Sérusiaux 41282 j49, 41308a j76, 40621 a21
<i>Pseudocyphellaria aurata</i> (Ach.) Vainio 40802 a202, 41777 v39
<i>Pseudocyphellaria aurora</i> (De Not.) Vainio 41646 r12
<i>Pseudocyphellaria clathrata</i> (De Not.) Malme 40615 a15, 41770 v32 (cf.), 41787 v49 (cf.), 41789 v51 (cf.)
<i>Pseudoparmelia harrisiana</i> Elix & Nash 41236 j3
<i>Pseudoparmelia uleana</i> (Müll. Arg.) Elix & Nash 40806 a206, 40856 a256 topotypes of <i>Parmelia flavidoglauca</i> Vainio

Table 1. (continued).

<i>Pseudopyrenula diluta</i> (Fée) Müll. Arg. 40810 a210, 40910 b9, 40964 b63, 41040 c63, 41225 h12, 41703 t36, 41706 t39, 41027 c50, 41397 k89, 41096 d53, 41184 d141, 41135 d92, 41113 d70 mostly topotypes of <i>P. atroalba</i> Vainio
<i>Pseudopyrenula subnudata</i> Müll. Arg. 41518 l77, 41514 l73, 41519 l78 topotypes of <i>P. araucariae</i> Vainio
<i>Pseudopyrenula subnudata</i> Müll. Arg. 40959 b58, 41425 k117, 41215 h2, 41178 d135, 41208 g17, 40850 a250, 40884 a284, 41743 v5, 41090 d47, 41474 l33
<i>Punctelia stictica</i> (Del. ex Duby) Krog 40658 a58
<i>Pyrenocollema saxicola</i> (A. Massal.) Coppins 41582 n47, 40713 a113
<i>Pyrenopsis olivacea</i> Vainio 41608a m0 topotype
<i>Pyrenula anomala</i> (Ach.) Vainio 41786 v48
<i>Pyrenula aspistea</i> (Ach.) Ach. 41457 l16, 41503 l62 (cf.)
<i>Pyrenula crassiuscula</i> (Malme) Aptroot 41727 t60
<i>Pyrenula fusoluminata</i> Aptroot 41102 d59 holotype
<i>Pyrenula gahavisukana</i> Aptroot 41340 k32
<i>Pyrenula impressa</i> (Vainio) Müll. Arg. 41207 g16, 41731 t64 (cf.), 41199 g8
<i>Pyrenula minarum</i> Vainio 41504 l63
<i>Pyrenula quarzitica</i> Aptroot 41320 k12, 41324 k16, 41441a k134, 41329 k21, 41316 k8 holotype+topotypes
<i>Pyrenula quassiaecola</i> Fée 41456 l15, 41173 d130, 41645 r11, 41339 k31, 41350 k42
<i>Pyrrhospora russula</i> (Ach.) Hafellner 41620 m14, 41570 n35 (cf.), 40974 b73, 40773 a173, 40845 a245, 40726 a126, 40718 a118, 40815 a215, 41526 l85, 41276 j43, 41267 j34
<i>Pyrrhospora</i> cf. <i>russula</i> (Ach.) Hafellner (sorediate) 41058 d15, 40691 a91
<i>Pyxine albovirens</i> (G. Mey.) Aptroot 40653 a53
<i>Pyxine cocoes</i> (Sw.) Nyl. 40632 a32
<i>Pyxine coralligera</i> Malme 41293 j60, 40715 a115
<i>Pyxine eschweileri</i> (Tuck.) Vainio 41213 g22
<i>Pyxine petricola</i> Nyl. 40873 a273
<i>Pyxine subcinerea</i> Stirton 40655 a55, 40656 a56
<i>Ramalina calcarata</i> Krog & Swinscow 41639 r5
<i>Ramalina celastri</i> (Sprengel) Krog & Swinscow 41640 r6, 40602 a2
<i>Ramalina complanata</i> (Sw.) Ach. 41234 j1
<i>Ramalina peruviana</i> Ach. 41641 r7
<i>Ramalina pusiola</i> Müll. Arg. 40605 a5, 40659 a59
<i>Ramonia microspora</i> Vezda 41778a v40a
<i>Relicina abstrusa</i> (Vainio) Hale 40667 a67, 41237 j4, 40817 a217 topotypes
<i>Rimelia cetrata</i> (Ach.) Hale & Fletcher 40875 a275, 40722 a122, 40628 a28
<i>Rimelia reticulata</i> (Taylor) Hale & Fletcher 40643 a43
<i>Rinodina atrofuscata</i> (Vainio) Aptroot 40914 b13, 41274 j41 topotypes
<i>Rinodina pyxinooides</i> (Nyl.) Vainio 40989 c12
<i>Sagenidiopsis undulatum</i> (Fée) Egea, Tehler, Torrente & Sipman 41568 n33, 41442 l1, 41132 d89 (cf.), 41352 k44
<i>Sarcographa intricans</i> (Nyl.) Müll. Arg. 41097 d54, 41191b d150, 41715 t48, 40824 a224, 41103 d60, 41189 d146

Table 1. (continued).

<i>Sarcographa tricola</i> (Ach.) Müll. Arg. 41335 k27
<i>Scoliosporium camptosporum</i> (Vainio) Aptroot 41079 d36, 40783 a183, 40766 a166
<i>Siphula carassensis</i> Müll. Arg. 41588 n53 topotype
<i>Siphula decumbens</i> Nyl. 41581 n46, 41577 n42, 41596 n61
<i>Siphula fastigiata</i> (Nyl.) Nyl. 41600 n65, 41585 n50, 41548 n13
<i>Sphaerophorus australis</i> Laurer 41701 t34
<i>Sphinctrina tubaeformis</i> Massal. 40682 a82, 40622 a22, 40866 a266
<i>Squamacidia janeirensis</i> (Müll. Arg.) Brako 41392 k84
<i>Stereocaulon microcarpum</i> Müll. Arg. 41069 d26, 40700 a100 topotypes of <i>S. implexum</i> f. <i>sorediosa</i> Vainio
<i>Stereocaulon strictum</i> Th. Fr. 41672 t5
<i>Sticta ambavillaria</i> (Bory) Ach. 41647 r13
<i>Sticta fuliginosa</i> (Hoffm.) Ach. 40673 a73
<i>Sticta sinuosa</i> Pers. 41716 t49, 41780 v42, 41650 r16
<i>Sticta tomentosa</i> (Sw.) Ach. 41779 v41, 41705 t38
<i>Sticta weigelii</i> Inert in Ach. 40731 a131, 40636 a36, 40676 a76, 41118 d75
<i>Sulcopyrenula cruciata</i> Aptroot 41633 m27 holotype
<i>Tapellaria nana</i> (Fée) R. Sant. 40603 a3
<i>Teloschistes exilis</i> (Michaux) Vainio 40609 a9
<i>Teloschistes flavicans</i> (Sw.) Müll. Arg. 40839 a239
<i>Tephromela atra</i> (Hudson) Hafellner ex Kalb 40728 a128
<i>Thelotrema</i> cf. <i>aggregatum</i> (Hale) Hale 41467 l26
<i>Thelotrema brasiliensis</i> Hale 41446 l5, 41497 l56, 41436 k128
<i>Thelotrema leprocarpum</i> Tuck. 40846 a246
<i>Thelotrema</i> cf. <i>sphinctrinellum</i> Nyl. 41484 l43
<i>Thelotrema spondaicum</i> (Nyl.) Hale 40976 b75
<i>Tomasellia lactea</i> (Ach.) R.C. Harris 40616 a16
<i>Topeliopsis globosa</i> Aptroot 41709 t42 holotype
<i>Trapelia coarctata</i> (Sw.) Choisy, 41171 d128, 41304 j71, 41303 j70, 41062 d19, 41217 h4
<i>Trapelia mooreana</i> (Carroll) P. James 41070 d27
<i>Tremella lobariacearum</i> Diederich 41125 d82
<i>Trichothelium epiphyllum</i> Müll. Arg. 41505 l64
<i>Trichothelium horridulum</i> (Müll. Arg.) R. Sant. 41412 k104, 41176 d133, 40792 a192, 41363 k55, 40923 b22
<i>Trypethelium aeneum</i> (Eschw.) Zahlbr. 41229 h16, 41016 c39, 41017 c40, 41028 c51
<i>Trypethelium nitidiusculum</i> (Nyl.) R.C. Harris 41120 d77, 40920 b19, 40908 b7, 40907 b6, 40918 b17, 40796 a196, 40608 a8, 40919 b18, 41722 t55, 40911 b10, 41137 d94, 40905 b4, 40906 b5, 40909 b8, 40921 b20
<i>Trypethelium ochroleucum</i> (Eschw.) Nyl. 40888 a286, 40917 b16
<i>Tylophoron moderatum</i> Nyl. 41762 v24, 41406 k98
<i>Tylophoron protrudens</i> Nyl. 40978a c1, 41251a j0, 41523 l82 topotypes of <i>T. cupulare</i> Vainio
<i>Usnea angulata</i> Ach. 41642 r8, 41772 v34
<i>Usnea aspera</i> (Eschw.) Vainio 41247 j14, 40997 c20
<i>Usnea ceratina</i> Ach. s.l. 40985 c8

Table 1. (continued).

<i>Usnea complanata</i> (Müll. Arg.) Mot. 41202 g11
<i>Usnea madeirensis</i> Mot. 40623 a23
<i>Usnea</i> cf. <i>nashii</i> Clerc & Herrera-Campos 40734 a134
<i>Usnea rubicunda</i> Stirton 40626 a26, 40886 a286a
<i>Usnea strigosa</i> (Ach.) A. Eaton 40915 b14
<i>Usnea subflorida</i> (Zahlbr.) Mot. 41643 r9
<i>Usnea roccellina</i> Mot. 41288 j55
<i>Usnea subscabrosa</i> Mot. 41773 v35
<i>Verrucaria dolosa</i> Hepp 40937 b36
<i>Verrucaria muralis</i> Ach. 41532 l91
<i>Woessia arvidssonii</i> Sérusiaux 41534 l93
<i>Xanthoparmelia congensis</i> (B. Stein) Hale 41287 j54, 41003 c26
<i>Xanthoparmelia hypostictica</i> Nash & Elix 41002 c25
<i>Xanthoparmelia monastica</i> Nash & Elix 40735 a135 topotype
<i>Xanthoparmelia neopropaguloidea</i> Hale 41589 n54 topotype
<i>Xanthoparmelia substenophylloidea</i> Hale 40721 a121

Table 2. Comparison of numbers of taxa in some groups (in Vainio's circumscription).

	Brazil 1885	Brazil 1997	Caraça 1885	Caraça 1997
<i>Anaptychia</i> s.l.	11	10	6	9
<i>Cladonia</i> s.l.	66	51	-	47
Graphidaceae	48	26	22	24
<i>Lecanora</i> s.l.	43	25	20	25
<i>Lecidea</i> s.l.	77	54	23	48
<i>Leptogium</i>	11	11	4	8
<i>Opegrapha</i>	10	7	1	6
<i>Parmelia</i> s.l.	47	37	19	34
<i>Pertusaria</i>	12	10	6	9
<i>Physcia</i> s.l.	14	12	4	11
pyrenocarps	64	54	23	49
<i>Pyxine</i>	5	6	1	6
Thelotremaaceae	13	18	7	17
Number of species	582	453	-	395

A comparison with the lichen flora in Vainio's time is possible only in a rather general way. See Table 2 for some comparative figures, taken from Vainio's publication and from Table 1. Vainio's circumscription of the genera and families is followed, and all taxa recognized by him (also infraspecific taxa) are counted, as they often turn out to be referable to different species. The main reason for the apparent differences may be that the way of collecting has been different. Vainio spent several months in Brazil, and one month in the Caraça area, but did apparently not try to make a complete collection from Caraça.

Collecting localities, are not given for all species, by Vainio (1890). When a species is cited by Vainio to be common everywhere in Brazil, it is assumed, here to be found by him in Caraça. In Table 2, comparisons are made for the Caraça area, but also for Brazil, meaning a larger area, in Vainio's case mainly including Sitio and lowland areas towards the coast, in my case mainly including an additional mountain area near Campos do Jordão. Another source for differences is that Vainio probably collected mainly specimens that were large enough to be distributed in exsiccate series. Moreover, different collectors have different preferred habitats and species groups. Still, very many of Vainio's taxa could easily be recollected, often no doubt at the exact locality where they were collected a century earlier. This is without question a result of the virtually unchanged management by the landowner, a very lucky situation indeed. One may hope that the lichen flora of this unique area will continue to be preserved to the benefit of both researchers and lichens.

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References

- Ahti, T. (2000). Cladoniaceae. Flora Neotropica Monograph 78: 1-362.
- Aptroot, A. (1991). A Monograph of the Pyrenulaceae (excl. *Anthracothecium* and *Pyrenula*) and the Requienellaceae, with notes on the Pleomassariaceae, the Trypetheliaceae and *Mycomicrothelia* (Lichenized and Non-lichenized Ascomycetes). Bibliotheca Lichenologica 44: 1-178.
- Aptroot, A. (1998). New lichens and lichen records from Papua New Guinea, with the description of *Crustospathula*, a new genus in the Bacidiaceae. Tropical Bryology 14: 25-34.
- Aptroot, A., Diederich, P., Sérusiaux, E. and Sipman, H. (1997). Lichens and lichenicolous fungi from New Guinea. Bibliotheca Lichenologica 64: 1-220.
- Aptroot, A. and Seaward, M.R.D. (1999). Annotated checklist of Hong Kong lichens. Tropical Bryology 17: 57-101.
- Breuss, O. (1996). Revision der Flechtengattung *Placidiopsis* (Verrucariaceae). Oesterreichische Zeitschrift für Pilzkunde 5: 65-94.
- Diederich, P. and Sérusiaux, E. (2000). The lichens and lichenicolous fungi of Belgium and Luxembourg. Musée national d'histoire naturelle, Luxembourg.
- Guderley, R. (1999). Die *Lecanora subfusca*- Gruppe in Süd- und Mittelamerika. Journal of the Hattori Botanical Laboratory 87: 131-257.
- Harada, H. (1993). *Pyrenula flagellata*, sp. nov. (Lichenes, *Pyrenulaceae*) from Mariana Islands. The Bryologist 96: 635-637.
- Harada, H. (1999). *Sulcopyrenula*, a new pyrenocarpous lichen genus (*Pyrenulaceae*, lichenized ascomycota). Lichenologist 31: 567-573.
- Hertel, H. (1997). On the genus *Lecidea* (Lecanorales) in Southern Chile and Argentina. Symbolae Botanicae Upsalienses 32(1): 95-111.

- Kantvilas, G. and Vezda, A. (2000). Studies on the lichen family *Thelotremataceae* in Tasmania. The genus *Chroodiscus* and its relatives. *Lichenologist* 32: 325-357.
- Vainio, E.A. (1890). Etude sur la classification naturelle et la morphologie des lichens du Brésil. *Acta Societatis pro Fauna et Flora Fennica* 7(1-2).

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