

New lichens and lichen records from Papua New Guinea, with the description of *Crustospathula*, a new genus in the Bacidiaceae

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ABSTRACT: Several lichen species are reported from the first time from New Guinea, based on material collected by the author in 1995. The following new taxa are described: *Crustospathula cartilaginea* gen. et spec. nov., *Pseudopyrenula serusiauxii* spec. nov. and *Trypethelium galligenum* spec. nov. *Psoroma papuana* Aptroot & Diederich nom. nov. is proposed as new name for *Psoroma pannarioides* Aptroot & Diederich.

INTRODUCTION

The lichen flora of tropical areas is still much underworked. Papua New Guinea is no exception, although recently many additional species have been reported or described (e.g. Aptroot et al. 1997) and over 1000 species are now known. From 14 October until 3 November 1995 the author made a collecting trip to Papua New Guinea, the third in a series, this time together with Dr. E. Sérusiaux, Mr. P. Lambley and Dr. H.J.M. Sipman. The most important aim of this trip was to collect ascomycetes from undisturbed tropical forests at various altitudinal zones.

Among the collected material, two pyrenocarpous

collections seem to represent new species and are described below. Although only one or few collections are available, there is little doubt that they represent new species. They are widely different from all hitherto known species, even when applying wide species concepts. It is noticeable that the more than 100 collections of the genus *Pyrenula* from the 1995 expedition could all be identified with the key in Aptroot et al. (1997), except for two lowland specimens. They seem close to the upland species *P. pileata* Vainio but differ in some important respects.

Another most unusual discovery concerned a crustose lichen with very unusual, stalked soredia. It was found in an undisturbed rain forest area. It does not fit in any known genus and is therefore

described here in a new genus in the Bacidiaceae.

In addition to the new genus and species, several lichen species not previously recorded from New Guinea were discovered. These are reported below as well.

MATERIAL AND METHODS

All material has been investigated with an Olympus BH microscope with Nomarski interference contrast. Slides have been mounted in tap water, from which drawings have been made using a camera lucida, or in IKI (Lugol) in order to observe iodine reactions. The specimens are preserved in Herb. Aptroot, except for the types, which are deposited in B.

List of collecting localities:

- 1 14-19 October 1995 Northern Province, Owen Stanley Range, Myola, surroundings of guesthouse. 9° 09' S, 147° 46' E. 2100 m. Scattered trees in grassland, fences, margin of forest.
- 2 14 October 1995 Northern Province, Owen Stanley Range, Myola, near guesthouse, along Iora river. 9° 09' S, 147° 46' E. 2100 m. In primary montane forest in valley.
- 3 14-19 October 1995 Northern Province, Owen Stanley Range, Myola, near guesthouse. 9° 09' S, 147° 46' E. 2100 m. Open grass vegetation with scattered shrubs and boulders on gravel deposits along Iora river.
- 4 15 October 1995 Northern Province, Owen Stanley Range, Myola, 0-1 km along trail from guesthouse towards NE, on the right bank of Iora river. 9° 09' S, 147° 46' E. 2100-2400 m. In primary montane forest on mountain slope.
- 5 16 October 1995 Northern Province, Owen Stanley Range, Myola, c. 2 km along trail from guesthouse towards NE, on the right bank of Iora river. 9° 08' S, 147° 47' E. 2400-2800 m. In primary montane forest with *Phyllocladus* sp. and *Podocarpus* sp. on mountain ridge.
- 6 16 October 1995 Northern Province, Owen Stanley Range, Myola, c. 3 km NE of guesthouse. 9° 08' S, 147° 47' E. 2700 m. In treefern grassland in deep valley (frost hollow).
- 7 17 October 1995 Northern Province, Owen Stanley Range, Myola, c. 0.5 km along trail from guesthouse to Naduri. 9° 09' S, 147° 46' E. 2100 m. In primary montane forest.
- 8 18 October 1995 Northern Province, Owen Stanley Range, Myola, near guesthouse. 9° 09' S, 147° 46' E. 2100 m. In open grassland on bare rock and soil on bank of Iora creek.
- 9 19 October 1995 Central Province, Owen Stanley Range, trail from Myola to Naduri. 9° 08' S, 147° 41' E. 2300 m. In primary montane forest on the Gap.
- 10 19, 20 October 1995 Central Province, Owen Stanley Range, trail from Myola to Naduri. 9° 08' S, 147° 41' E. 1800 m. In montane forest remnants along trail from the Gap downwards.
- 11 19, 20 October 1995 Central Province, Owen Stanley Range, surroundings of Naduri village. 9° 08' S, 147° 41' E. 1600 m. Secondary vegetation and gardens.
- 12 20, 21 October 1995 Central Province, Owen Stanley Range, Kagi village. 9° 08' S, 147° 40' E. 1400 m. Secondary vegetation and gardens.
- 13 20, 21 October 1995 Central Province, Owen Stanley Range, Kagi village, along Kokoda Trail towards Gap. 9° 08' S, 147° 40' E. 1700 m. *Lithocarpus* forest on mountain ridge.
- 14 23 October 1995 Central Province, c. 22 km E of Port Moresby, Varirata National Park, along entrance road. 9° 26' S, 147° 21' E. c. 700 m. Regularly burnt *Eucalyptus* forest.
- 15 23 October 1995 Central Province, c. 22 km E of Port Moresby, Varirata National Park, near headquarters. 9° 26' S, 147° 21' E. c. 800 m. Forest remnants and conglomerate rock outcrops in clearing along stream.
- 16 23 October 1995 Central Province, c. 22 km E of Port Moresby, Varirata National

- Park, near Varirata Lookout. 9° 26' S, 147° 21' E. c. 800 m. Dry secondary forest with *Casuarina* and *Eucalyptus* and conglomerate rock outcrops.
- 17 24 October 1995 -14 November 1995 Madang Province, Jais Aben Resort c 10 km NW of Madang. 5° 09.4' S, 145° 48.2' E. 1 m. Cocos plantation at the coast.
- 18 25-27 October 1995 Madang Province, c 10 km W of Bogia, Laing island in Hansa Bay. 4° 10.4' S, 144° 52.5' E. 1 m. Coastal primary forest.
- 19 28 October 1995 Madang Province, S side of Ramu valley, Brahman Mission, along road to Bundi. 5° 45' S, 145° 17' E. 500 m. Forest remnants and rock outcrops near stream in deep valley.
- 20 29 October 1995 Madang Province, S side of Ramu valley, 8-10 km W of Brahman Mission. 5° 44.9' S, 145° 19.7' E. 100 m. Logging site in lowland forest remnant.
- 21 29 October 1995 Madang Province, S side of Ramu valley, c. 3 km W of Brahman Mission. 5° 45.0' S, 145° 20.9' E. 150 m. Lowland forest regrowth after selective logging.
- 22 29 October 1995 Madang Province, S side of Ramu valley, c. 2 km W of Brahman Mission. 5° 45.0' S, 145° 20.9' E. 150 m. Lowland forest regrowth after selective logging.
- 23 30 October 1995 Madang Province, S side of Ramu valley, 11 km W of Brahman Mission. 5° 44.9' S, 145° 19.7' E. 100 m. Logging site in lowland forest remnant.
- 24 30 October 1995 Madang Province, Ramu valley, 10 km W of Ramu Sugar factory. c. 6° S, 146° E. 100 m. On conglomerate boulders in grassland.
- 25 31 October & 2 November 1995 Madang Province, foothills of Finisterre range, 40.8 km along road Madang-Lae. 5° 26' S, 145° 34' E. 200 m. Primary forest.
- 26 1 November 1995 Madang Province, Baitata logging site, c. 30 km NW of Madang. 5° 00.5' S, 145° 45.9' E. 50 m. On thin trunks in undergrowth of disturbed forest.
- 27 1 November 1995 Madang Province, Budub village, Ari logging site, c. 20 km NW of Madang. 5° 02.6' S, 145° 44.5' E. 150 m. On tree trunks in primary forest.
- 28 3 November 1995 Madang Province, Balek Wildlife Sanctuary, c. 15 km S of Madang along road to Lae. 5° 18' S, 145° 43' E. c. 20 m. On tree trunks in gardens and forest relics on top of former reef and in primary forest behind it.

NEW SPECIES AND GENERA

Crustospathula cartilaginea Aptroot gen. et sp. nov. (Bacidiaceae)

Figs 1, 5, 6.

Diagnosis: Ascomycetes lichenisati Bacidiacearum, thallo crustaceo, algis chlorococcoideis, sorediis labriformibus, stipitatis, stipibus cartilagineis, apotheciis pallidis, ascis typo Bacidia, ascosporis acicularibus, curvatis, 0-3-septatis, 20-25 x 0.8-1.5 μ m, atranorinum continentis.

Typus: Papua New Guinea, Madang Province, foothills of Finisterre range, 40.8 km along road Madang-Lae. 5° 26' S, 145° 34' E. 200 m. In undisturbed tropical lowland rain forest, growing at a height of 3-5 m on branches and stem of a c. 3 cm thick, aromatic, sapling. Aptroot 36411, 2 November 1995 (B, holotype; LG, Herb. Aptroot, isotypes).

Thallus crustose, indeterminate, covering areas of up to 10 cm diam., somewhat greyish green, continuous, minutely verruculose with warts up to 0.1 mm diam., delimited by a thin, whitish hypothallus. Soredia copiously present, stalked, starting as pinkish, cartilaginous warts of c. 0.3 mm diam. and up to 0.3 mm high, soon forming simple or 1-2 times branched, spatuliform cartilaginous, up to 3 mm high, branches which are up to 0.5 mm wide at the basis. These expand at the tips and dissolve at the lower side of the tips into whitish to pale greenish, labriform or crenately lobed, up to 2 mm wide, powdery soralia. Soredia 8-16 μ m diam., containing only

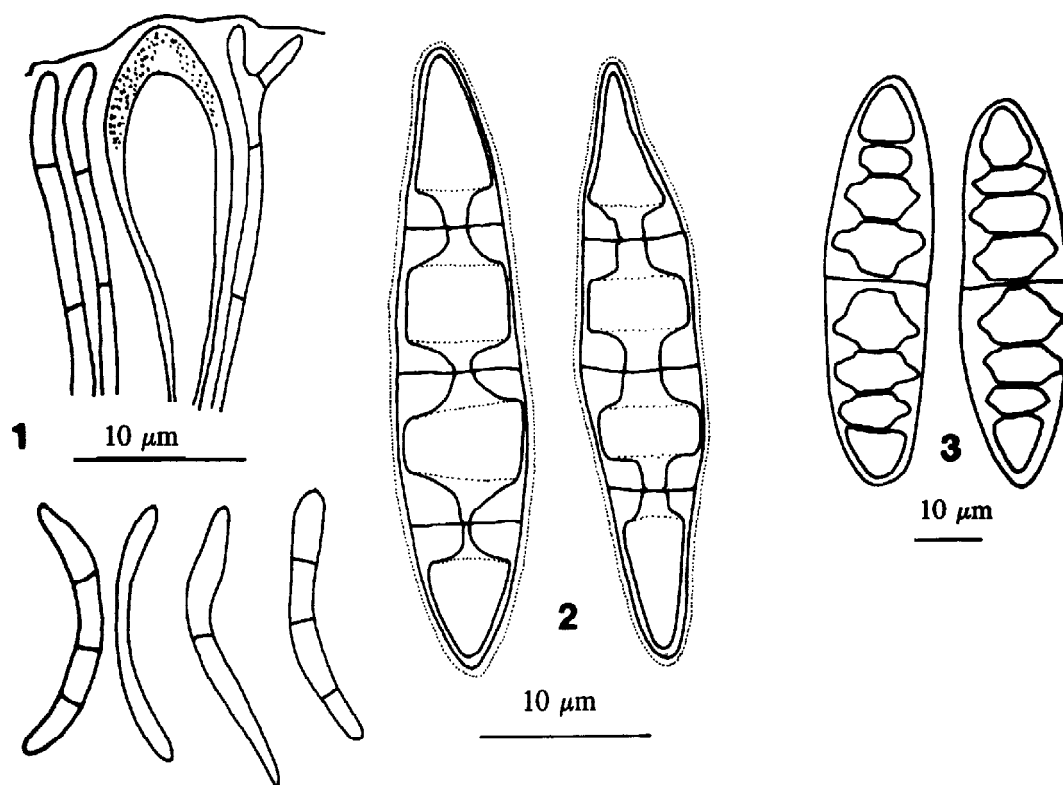


Fig. 1. Ascus, paraphyses and ascospores of *Crustospathula cartilaginea* (type).

Fig. 2. Ascospores of *Pseudopyrenula senusiauxii* (type).

Fig. 3. Ascospores of *Trypethelium galligerum* (type).

one or few algal cells. The cartilaginous tissue consists of dense, thin (up to 1 μm wide) hyphae that are strongly refractive and show up in polarised light, suggesting the presence of crystals; it is not corticate and does not contain algae, but the bases of the branched soralia may be covered by the thallus. Algae chlorococcoid, cells c. 6-12 μm diam. Apothecia sparse, lecideine, whitish to pale pinkish, flat, up to 0.5 mm diam., excipulum present, of the same colour as the disc, up to 0.1 mm wide. All internal structures hyaline. Asci clavate, 27-25 x 6-9 μm . Ascus tips with cap-like blue coloration with IKI after pre-treatment with KOH (*Bacidia*-type). Hamathecium consisting of mostly unbranched, up to 2 μm wide paraphyses without apical thickenings in copious gelatinous matrix. Ascospores 8/ascus, needle-like, upper end rounded, lower end pointed, 0-3-septate, often

strongly curved or bent, 20-25 x 0.8-1.5 μm . Conidia not observed. Chemistry: all reactions negative, atranorin detected with TLC.

This is the first crustose lichen known with stalked, cartilaginous, labriform soralia. It could not be classified in any known genus. Therefore a new genus is erected for this new species. It is assigned to the Bacidiaceae, because the generative structures are reminiscent of certain species of *Bacidia* De Not.

It could be argued that it is in fact a fruticose lichen, being somewhat comparable to the monospecific genus *Polystroma* Clemente (= *Polystroma* Fée). This species has also a very restricted distribution (it is only known from Cuba, French Guiana and Surinam) and is also growing on branches in the understory of tropical lowland forest.

Pseudopyrenula serusiauxii Aptroot sp. nov.

Fig. 2.

Diagnosis: *Pseudopyrenula* thallo immerso, hymenio puro, hyalino, ascosporis triseptatis, fusiformibus, 30-39 x 6-8 μm latis, luminibus angularibus.

Typus: Papua New Guinea, Madang Province, Balek Wildlife Sanctuary, c. 15 km S of Madang along road to Lae. 5° 18' S, 145° 43' E. c. 20 m. On *Macaranga* (Euphorbiaceae) tree trunks in forest relics in secondary forest. Aptroot 36864, 3 November 1995 (B, holotype; LG, Herb. Aptroot, isotypes).

Thallus immersed in the bark, visible as a pale greenish discoloration of the bark, covering areas up to 5 cm diam., not delimited, not corticate, with sparse *Trentepohlia* algae. Ascomata immersed in the bark, sphaeroid, 200-400 μm diam., wall black, c. 50 μm thick, near the ostiole up to c. 100 μm thick, incorporating remnants of a clypeus, ostiole central, flat (not conical), black, c. 0.2 mm diam. All internal structures hyaline. Hamathecium consisting of anastomosing trabeculate pseudoparaphyses, not inspersed, filaments c. 1.5 μm wide. Ascospores 8/ascus, fusiform, 3-septate, 30-39 x 6-8 μm , with angular, diamond-shaped lumina and up to 4 μm thickened distosepta. Chemistry: all reactions negative, no substances detected with TLC.

This is a species of *Pseudopyrenula* Müll. Arg., as is shown by the trabeculate hamathecium, the non-stromatic ascomata and the hyaline, distoseptate ascospores with diamond-shaped lumina. It differs from all other known species by the large, fusiform ascospores, the non-inspersed, hyaline hamathecium, the small ascomata and the flat (not conical) ostioles.

Trypethelium galligenum Aptroot sp. nov.

Figs 3, 7.

Diagnosis: *Trypethelium* thallo crasso, incrementa gallaeformia corticis arborum

inducente, pseudostromatibus ochraceis, hamathecio guttulis oleosis flavis, anthraquinonoideis, inspersis, ascosporis octonis septemseptatis, 50-59 x 12-17 μm , thallo substantias terpenoideas varias continente.

Typus: Papua New Guinea, Central Province, Owen Stanley Range, Kagi village, along Kokoda Trail towards Gap. 9° 08' S, 147° 40' E. 1700 m, on *Lithocarpus* (Fagaceae) in *Lithocarpus* forest on mountain ridge. Aptroot 39461, 21 October 1995 (B, holotype; Herb. Aptroot, isotype).

Thallus superficial, indeterminate, continuous, bullate with warts c. 1-2 mm diam., extending over areas up to 20 cm diam., causing the bark of the host to form gall-like ridges up to 1 cm high and wide and up to 5 cm long, corticate, shiny, pale greenish grey, with *Trentepohlia* algae. Cortex dense, greenish, nearly cartilaginous, up to 200 μm high. Medulla lax, ochraceous yellow (KOH negative), up to 1 mm thick. Pseudostromata whitish to cream, indistinctly corticate, angular to linear on the thallus warts and usually somewhat higher than the thallus, internally pale yellowish (KOH negative), darker near the ascoma walls, without crystals, containing 1-20 ascomata. Ascomata sphaeroid, immersed in the pseudostromata, 300-500 μm diam., wall black, 50-100 μm thick. Ostioles a c. 50 μm wide pale canal in a flat, black, c. 100 μm wide disc, visible from above, usually surrounded by one or two concentric, brownish rims on the surface of the whitish pseudostromata. Hamathecium strongly anastomosing, in copious gel with copious, yellow, KOH+ purple oil globules. Asci large, irregular, with 8 ascospores. Ascospores long ellipsoid to broad fusiform, hyaline, 7-septate, with 1 median euseptum and 6 distosepta, lumina diamond-shaped, 50-59 x 12-17 μm . Chemistry: all reactions of thallus cortex, medulla and pseudostromata negative; five terpenoids detected in the thallus by TLC; anthraquinone present in the hamathecium, confirmed by KOH-reaction.

This species forms very distinctive galls on the bark, and can therefore be spotted high up in the trees, where it is apparently locally common. The pseudostroma formation is different from any of

those given by Makhija and Patwardhan (1993). It does not seem to be closely related to any other known *Trypethelium* species. The anthraquinone in the hamathecium is shared with *Laurera aurantiaca* Makhija & Patwardhan, which differs, e.g. by larger, solitary ascomata and muriform ascospores.

Psoroma papuana Aptroot & Diederich, nom. nov.

After the publication of *Psoroma pannarioides* Aptroot & Diederich in Aptroot et al. (1997) we came across the older homonym *Psoroma pannarioides* Hennssen (1983, Mycotaxon 18: 98). Therefore we herewith propose the following new name: *Psoroma papuana* Aptroot & Diederich non. nov. pro *Psoroma pannarioides* Aptroot & Diederich, Bibliotheca Lichenologica 64: 150 (1997).

NEW RECORDS FOR NEW GUINEA

Astrothelium subfuscum Krempelh.

Loc. 23, Aptroot 38706, on tree in tropical lowland rain forest.

New to New Guinea; so far known from the neotropics and tropical Asia (Malaya, Singapore, Borneo). For a description, see Harris (1986: 63).

Astrothelium versicolor Müll. Arg.

Loc. 16, Aptroot 39772, on *Casuarina* in dry forest at 800 m.

New to New Guinea; so far known from the neotropics and tropical Asia (the Philippines). For a description, see Harris (1986: 64).

Cladonia polycarpoides Nyl.

Loc. 15, Aptroot 39560, on conglomerate rock at 800 m.

New to tropical Asia; almost cosmopolitan, so far unknown from tropical Asia but reported from New Caledonia. For a description, see Stenroos (1988: 120). TLC: norstictic and connorstictic acid.

Clathroporina eminentior (Nyl.) Müll. Arg.

Loc. 27, Aptroot 36751, on tree in tropical lowland rain forest.

New to New Guinea; probably pantropical, so

far known from Brazil, Tanzania, Australia, Thailand and New Caledonia. For a description, see McCarthy (1995b: 325).

Cryptothele sp.

Loc. 24, Aptroot 38825, on conglomerate rock in lowland grassland.

This represents the first record of this genus for New Guinea. The material is immature, but probably represents a new species with very neat, minute, closely appressed lobes.

Dibaeis holstii (Müll. Arg.) Kalb & Gierl

Loc. 8, Aptroot 38049, 38050, on soil along creek in open grassland at 2100 m.

New to tropical Asia; probably pantropical, so far known from Central America, South Africa, East Africa and Hawaii. For a description, see Gierl and Kalb (1993: 625).

Euopsis pulvinata (Schaerer) Vainio

Loc. 15, Aptroot 39567, 39592, 395955, on conglomerate rock (partly temporarily wet) along stream in forest clearing.

New to the Southern Hemisphere; probably almost cosmopolitan, but so far known from only from North America and Europe. For a description, see Purvis et al. (1992: 247). The related species *E. granatina* (Sommerf.) Nyl. was reported with some doubt from Papua New Guinea (Aptroot et al. 1997).

Haematomma solediatum R.W. Rogers

Loc. 4, Aptroot 37560, on tree in primary mountain forest at 2300 m.

New to tropical Asia; probably widely pantropical, so far known from Central and South America, Europe, Macaronesia, India and Australia. For a description, see Staiger and Kalb (1995: 164).

Homothecium sp.

Loc. 8, Aptroot 38062, 38063, on wet rock along creek in grassland at 2100 m.

This represents the first record of this genus for New Guinea. The material is slightly overmature, but probably represents a new species, resembling a tiny *Collema*, but with simple ascospores of 11-13 x 7-8 μ m.

Lithothelium cf. *submuriforme* R.C. Harris &

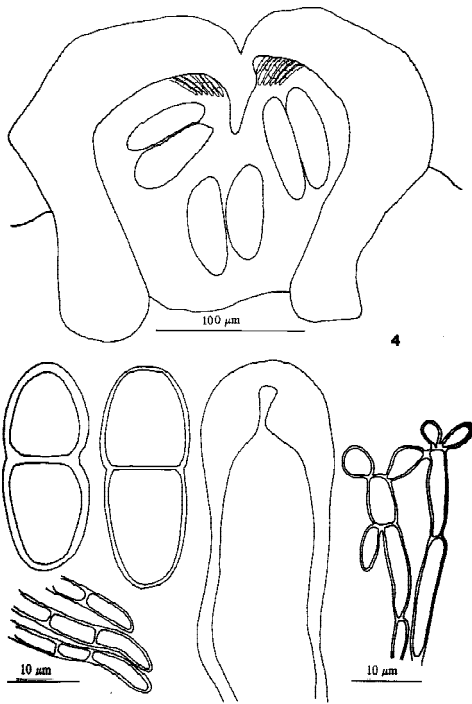


Fig. 4. Transverse section through ascocarp, ascospores, periphyses, ascus and pseudoparaphyses of *Melaspilea diplasiospora* (Aptroot 31381).

Aptroot

Loc. 18, Aptroot 38353, on wood in coastal primary forest.

This species is so far only known from the type, from South Africa. For a description, see Aptroot (1991a: 69). The present specimen differs in the ascospores, which are very variable in dimension and colour, starting as hyaline, becoming medium brown and eventually reddish brown. Medium brown ascospores reach up to 36 x 15 µm, whereas the hyaline and red-brown stages are smaller and fall into the range of the ascospores of the type.

Melaspilea diplasiospora (Nyl.) Müll. Arg.

Loc. 7, Aptroot 37979; Mount Wilhelm, Aptroot 31381, on twigs, e.g. of *Elaeocarpus*, in open mountain forests at 2100-3600 m.

New to tropical Asia; probably pantropical, so far known only from South America (Colombia). The reports from Europe (Great Britain) are

erroneous, although the description is accurate, see Purvis et al. (1992: 369), who erroneously state the species to be endemic to the British Isles. Compare also Nylander (1863: 377). Since an illustration of this species has never been published, the material from Mount Wilhelm is illustrated in Fig. 4, which may serve to evaluate its correct generic disposition when the very heterogeneous genus *Melaspilea* is revised.

Musaespora gigas (Zahlbr.) R.C. Harris

Loc. 7, Aptroot 38042, on twigs of *Elaeocarpus* in primary mountain forest at 2100 m.

New to New Guinea; probably confined to tropical Asia, so far known only from Indonesia (Java). For a description, see Aptroot and Sipman (1993b: 127, sub *M. corticola* Aptroot & Sipman).

Ochrolechia africana Vainio

Loc. 1, Aptroot 37039; 11, Aptroot 38135; 16, Aptroot 39768 (cf.), on *Casuarina* and other trees in primary and secondary forests at 800-2100 m. New to tropical Asia; probably pantropical, so far known from Central and South America and South Africa. For a description, see Brodo (1991: 739).

Ochrolechia szatalaensis Versegly

Loc. 2, Aptroot 37318, on tree in primary mountain forest at 2100 m.

New to the Southern Hemisphere; probably almost cosmopolitan, so far known from North America and Europe. For a description, see Brodo (1991: 761).

Peltula bolanderi (Tuck.) Wetmore

Loc. 24, Aptroot 38821, on conglomerate rock in lowland grassland.

New to tropical Asia; probably pantropical, so far known from North and South America and South Africa. For a description, see Büdel (1987: 46).

Physcia alba (Fée) Müll. Arg.

Loc. 11, Aptroot 38160, on tree in secondary vegetation at 1600 m.

New to tropical Asia; probably pantropical, so far known from North and South America. For a description, see Moberg (1990: 323).

Porina chlorotica (Ach.) Müll. Arg. s.s.
 Loc. 19, Aptroot 38401, on rock along stream in deep valley in forest remnants at 500 m.
 New to tropical Asia; almost cosmopolitan, so far known from North America, Europe, temperate Asia, South Africa, Australia, New Zealand and two subantarctic islands (Juan Fernández and Macquarie Island). For a description, see Purvis et al. (1992: 490).

Porina exasperatula Vainio
 Loc. 26, Aptroot 38858, on thin tree in undergrowth of primary lowland rain forest.
 New to tropical Asia; probably pantropical, so far known from Central and South America. For a description, see Aptroot and Sipman (1993a: 23).

Ramonia microspora V zda
 Loc. 21, Aptroot 38651, on liana in lowland forest regrowth after logging.

Extralimital records: **KENYA:** Nyanza Prov., Kisumu-Londiani Distr., Tinderet Forest Reserve, Maas Geesteranus 5135, VI 1949, on *Juniperus procera* in clearing of tall forest at 2420 m (Herb. Aptroot, L); **INDONESIA:** Java, Yogyakarta, Gadjah Madaa University Garden, Gandjar, VI 1995; Jakarta, Taman Radio Walam, on *Eugenia aquaeva*, Gandjar, IX 1995; Jakarta, Kebayoram Baru, on *Muraya paniculata*, Gandjar, IX 1995.

This species, which was hitherto only known from the type from Argentina, is apparently pantropical, as is shown by the collections mentioned above. It has especially been found frequently by Prof. Dr. T. Gandjar in Java. Dr. A. Vezda has confirmed the identification of one collection. For a description, see Vezda (1966: 162).

Thelella brasiliensis (Müll. Arg.) Vainio
 Loc. 8, Aptroot 38070, on bare rock along creek in open grassland at 2100 m.
 New to tropical Asia; probably pantropical, so far known from Central and South America, West Africa (Ile Principe), China and Australia. For a description, see Mayrhofer (1987: 28).

Trapelia placodioides Coppins & P. James
 Loc. 8, Aptroot 37189; 16, Aptroot 39696, 39697, on rock in open areas at 800-2100 m.

New to the Southern Hemisphere; probably almost cosmopolitan, so far known from North America and Europe. For a description, see Purvis et al. (1992: 611).

Verrucaria hydrela Ach.
 Loc. 2, Aptroot 37473 (cf.); 15, Aptroot 39561, on wet rock along creeks at 800-2100 m.
 New to tropical Asia; probably almost cosmopolitan, so far known from Europe, North America and Australia. Determination after McCarthy (1995a: 108).

Verrucaria inconstans P.M. McCarthy
 Loc. 15, Aptroot 39593, on wet conglomerate rock along creeks at 800 m.
 New to tropical Asia; so far known only from Tasmania. Determination after McCarthy (1995a: 109).

Verrucaria margacea (Wahlenb.) Wahlenb.
 Loc. 2, Aptroot 37474, on wet rock along creeks at 2100 m.
 New to tropical Asia; probably almost cosmopolitan, so far known from Europe, North America, temperate Asia, India and Australia. Determination after McCarthy (1995a: 113).

Verrucaria praetermissa (Trevisan) Anzi
 Loc. 19, Aptroot 38427, on wet rock along creeks in forest remnants in deep valley at 500 m.
 New to tropical Asia; possibly almost cosmopolitan, so far known from Europe and Australia. Determination after McCarthy (1995a: 118).

Xanthoparmelia mougeotina (Nyl.) D. Galloway
 Loc. 24, Aptroot 38819, on conglomerate rock in lowland grassland.
 New to tropical Asia; probably pantropical, so far known from South America, South Africa, Uganda, India, Hong Kong, New Zealand and Australia. For a description, see Elix et al. (1986: 290). TLC: usnic and stictic acids.

Acknowledgements

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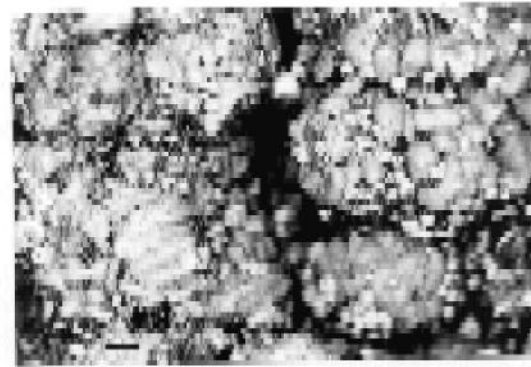
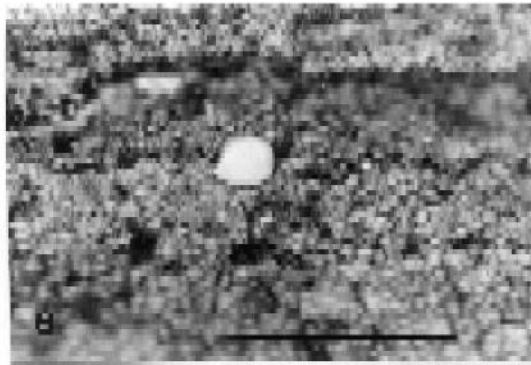


Fig. 5. Thallus with stalked soralia of *Crustospathula cartilaginea* (type).

Fig. 6. Thallus with apothecia of *Crustospathula cartilaginea* (type).

Fig. 7. Gall-forming thallus with pseudostrumata and acornata of *Trypethelium galligenum* (type).

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