

The lichen genus *Caprettia* Bat. & H. Maia (Monoblastiaceae)

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Abstract: The lichen genus *Caprettia* Bat. & H. Maia is reassessed, and its extraordinary mean of expelling its conidia in mucilaginous sacci through long cilia-like pycnidia is described. Such features are otherwise only known in *Anisomeridium polypori* (Ellis & Everh.) Barr and in another, undescribed species of the same genus. *Caprettia* is included in the Monoblastiaceae, and the relationships with several species currently placed in *Anisomeridium* remain to be clarified. The genus *Porinula* Vězda is reduced into synonymy. Including two new species described herein and two transferred from *Porinula*, the genus *Caprettia* now comprises five species: *C. amazonensis* Bat. & H. Maia (type species), *C. neotropica* Lücking & Sérus. sp. nova, *C. nyssaegenoides* Sérus. & Lücking sp. nova, *C. setifera* (Malcolm & Vězda) R. Sant., Lücking & Sérus. comb. nova, and *C. tanzanica* (Vězda) Lücking & Sérus. comb. nova. Based on thallus structure, presence/absence of ascomata, and anatomical details of the pycnidia, the genus is divided into subgenus *Caprettia* (including only the generic type) and subgenus *Porinula* (Vězda) Lücking & Sérus. comb. et stat. nova, typified by *Caprettia tanzanica* and including the remaining four species. The genus occurs in tropical and southern temperate rainforests, all species, except the pantropical *C. amazonensis*, being restricted to a distinctive area.

Introduction

The genus *Caprettia* Bat. & H. Maia was described in 1965 by A. C. Batista and H. da S. Maia (BATISTA & MAIA 1965) on the basis of a single collection from central Amazon in Brazil, with the single species *C. amazonensis* Bat. & H. Maia. The type collection has been examined by the authors (LÜCKING et al. 1998: 138) and found to be identical with a widespread but uncommon taxon mainly found at the margins of leaf wounds. It is characterized by black, sessile, slightly inflated pycnidia terminated by a very long beak (and thus looking like setae of Gomphillaceae) and producing small unicellular conidia aggregated and dispersed in cylindrical sacci. It does not produce any ascomata. Whether it is lichenized was said to be a matter of conjecture as its habitat is most usually colonized by species of *Strigula* or *Graphis*, but recent detailed examination showed that *Caprettia amazonensis* is a genuine lichen.

Meanwhile, a curious foliicolous species lichenized with *Phycopeltis* was found along the northern coast of Papua New Guinea. It produces irregular setae containing a pycnidium (usually at mid-height) and expelling gelatinous sacci of small conidia. Black perithecia with a crown of acute setae and rather large, 2-celled ascospores were detected in several collections. No validly published epithet was found for this species.

These observations initiated detailed examination of other species producing hair-like pycnidia, and a further species belonging to the same group was found in collections from the Neotropics. Research on the genera which might be related to *Caprettia* lead to the rare genus *Porinula* Vězda (VĚZDA 1975), which features similar thallus, perithecia, asci and ascospores. Minute tubular and hyaline pycnidia producing small sacci of conidia were discovered in a collection from Chile matching *P. setifera* Malcolm & Vězda (described from New Zealand), indicating that the genus can indeed be reduced into synonymy with *Caprettia*.

We therefore adopt the genus name *Caprettia* for all those species: the type species, *C. amazonensis*, which appears to be pantropical, the newly described *C. neotropica*, restricted to the Neotropics, *C. nyssaegenoides*, found in SE Asia, and the two species hitherto included in *Porinula*: *C. setifera* known from New Zealand, Tasmania and Southern Chile and *C. tanzanica* found in Tanzania.

Material and methods

The material was observed in tap water, in Lugol's iodine solution after KOH application (IKI), in lactophenol cotton-blue (LCB) or in brilliant cresyl blue (CRB). All measurements refer to preparation in water. Material studied with the scanning electron microscope was prepared by the critical point method.

The genus *Caprettia*

Caprettia Bat. & H. Maia, Atas do Instituto de Micologia da Universidade Federal de Pernambuco 2: 377, 1965.

Type: *Caprettia amazonensis* Bat. & H. Maia.

= *Porinula* Vězda, Folia Geobot. Phytotax. Praha 10: 399, 1975.

Type: *Porinula tanzanica* Vězda.

Thallus foliicolous, subcuticular (in *C. amazonensis*) or supracuticular (in the other species), smooth, ecorticate. Photobiont most probably *Cephaleuros* (in *C. amazonensis*) or *Phycopeltis* (in the other species). Perithecia (unknown in *C. amazonensis*) sessile, wart-shaped to subglobose, pale yellowish to reddish brown or dark brown to brownish black, glabrous or irregularly pilose or setose. Excipulum made of densely intricated hyphae with hyaline to dark brown walls. Paraphyses numerous, more or less richly branched and anastomosing, c. 1 µm thick. Periphyses present, simple, c. 10 x 1 µm. Asci fissitunicate, clavate, shortly but distinctly stalked, with thick walls which inflate considerably in K, IKI-, usually without any visible apical structure although an apical chamber can be seen in young asci. Ascospores 2-4-8 per ascus, hyaline, oblong-ellipsoid to drop-shaped, straight or curved (sometimes bean-shaped), 1-septate, slightly constricted at the septum, with the distal cell usually enlarged, hyaline. Pycnidia (unknown in *C.*

tanzanica) produced at the base of or at mid-height in a hyaline or black, hair-like, 0.5-1.7 mm long tube arising on the thallus surface. Pycnidial periphyses present at the base of the ostiolar tube, unbranched, non-septate, c. 7-10 x 1 μ m. Conidiophores absent. Conidiogenous cells unbranched, non-septate, 8-13 x 1 μ m. Conidia usually ellipsoid, non-septate, hyaline, 2-6 x 1.5-4 μ m, produced singly but, as soon as they are introduced in the ostiolar tube, aggregated into gelatinous, cylindrical sacci that are extruded from the pycnidial beak as single diaspores.

Observations: Species of *Caprettia* are easily recognized if the hair-like, tubular pycnidia are present and properly investigated. *C. amazonensis* might be mistaken for a *Tricharia* species if the hairs are not studied under the microscope, or for a non-lichenized fungus if the thallus is not well-developed. The other species are readily distinguished by their *Phycopeltis*-like thallus. If the pycnidia are absent, *Caprettia* most closely resembles species of *Porina*, in particular *P. atrocoerulea* Müll. Arg. and *P. octomera* (Müll. Arg.) F. Schill. and allies, or *Trichothelium*. A microscopic examination of the perithecia, however, immediately reveals the anatomical differences, since *Porina* and *Trichothelium* feature unbranched paraphyses and unitunicate, narrowly obclavate asci without distinct stalk.

The hamathecial structure of *Caprettia* suggests a close relationship with *Anisomeridium*, as already suggested by VĚZDA (1975) when describing the genus *Porinula*. This is confirmed by additional features, such as the occasional occurrence of beaked or setose pycnidia in *Anisomeridium* (HARRIS 1995, APTROOT & SEAWARD 1999, APTROOT & SIPMAN 2001) and the aggregation of conidia in gelatinous masses or packages, also observed in species of *Anisomeridium* and the related genus *Musaespora*. The phylogenetical relationships between all those taxa should be further studied. If we adopt the rather large genus concept of *Anisomeridium* of HARRIS (1995), all those species could be included into it. However, we choose to adopt the genus name *Caprettia* for the species dealt with in this paper as we are convinced that natural groups can be recognized within *Anisomeridium* and that *Caprettia* is one of them (see further discussion below).

Caprettia can be divided into two distinctive groups: the type species, *C. amazonensis*, has a subcuticular thallus featuring *Cephaleuros* as photobiont, perithecia are unknown, and the conidial sacci are elongate. The other four species are characterized by a supracuticular thallus with *Phycopeltis*, presence or absence of perithecia, and shorter conidial sacci. These two groups are recognized as two subgenera.

Caprettia Bat. & H. Maia subgenus *Caprettia*. – Includes the generic type, *C. amazonensis*.

Caprettia subgenus *Porinula* (Vězda) Lücking & Sérus. comb. et stat. nova
≡ *Porinula* Vězda, Folia Geobot. Phytotax., Praha 10: 399, 1975.

Type: *Caprettia tanzanica* (Vězda) Lücking & Sérus. – Includes the subgeneric type, together with *C. neotropica*, *C. nyssaegenoides*, and *C. setifera*.

Key to the species of *Caprettia*

- 1a** Thallus subcuticular, mostly at leaf margins or along wounds in the leaf, usually seen as a thin, pale greenish to whitish area but sometimes difficult to recognize; photobiont *Cephaleuros*, with rectangular to angular-rounded, non-radiate cells; perithecia unknown; pycnidia with the conidiogeneous chamber formed at the base; conidial sacci elongate (45-50 x 11-18 μm) (subgenus *Caprettia*) – Pantropical *C. amazonensis*
- 1b** Thallus supracuticular, epiphyllous, forming thin, irregular to dispersed, olive-green patches; photobiont *Phycopeltis*, with rectangular, radiate cells; perithecia present but sometimes absent; pycnidia with the conidiogeneous chamber formed at the base (then pycnidia hyaline) or produced at mid-height (then pycnidia black); conidial sacci shorter (17-25 x 10-15 μm) (subgenus *Porinula*) 2
- 2a** Perithecia dark brown to brownish black; pycnidia brownish black to black, straight or slightly bent 3
- 2b** Perithecia pale yellowish to reddish brown; pycnidia (unknown in *C. tanzanica*) hyaline, often bent towards the thallus surface 4
- 3a** Perithecia setose, setae stiff and obliquely upright; asci (4-)6-8-spored – SE Asia and Australasia *C. nyssaegenoides*
- 3b** Perithecia glabrous to irregularly and slightly setose, setae soft, often deflexed; asci 2-4(-8)-spored – Neotropics *C. neotropica*
- 4a** Perithecia glabrous – Africa (Tanzania) *C. tanzanica*
- 4b** Perithecia slightly to distinctly setose – Southern Hemisphere (Chile, New Zealand and Tasmania) *C. setifera*

The species

Caprettia amazonensis Bat. & H. Maia (Fig. 1A, 3A-B)

in BATISTA, A. C. & MAIA, H. S., Atas do Instituto de Micologia da Universidade Federal de Pernambuco 2: 377-378, 1965.

Type: Brazil: Amazonas: Manaus, v 1961, Garnier s.n. (URM 23168/Exs. 15729 – holotype!; INPA – isotype).

Thallus subcuticular, very thin or inconspicuous, forming a slightly nitidous, whitish to greenish layer. Photobiont most probably a species of *Cephaleuros* with rather irregularly arranged rows of brownish or orange, somewhat greenish, rectangular cells, 8-15 x 5-7 μm . Perithecia unknown. Pycnidia always present, mostly found at leaf wounds and projecting horizontally (see Fig. 4F in LÜCKING et al. 1998: 130), rarely on the leaf surface, with a black, sessile or rarely semi-immersed (in wounded tissue of the leaf), conidia-producing cavity c. 70-80 x 60 μm , consisting of brownish to dark brown tissue (textura intricata) prolonged by a long (0.6-1.7 mm long), straight or slightly curved, smooth, black and slightly nitidous beak with very long, dark brown, poorly defined cells (textura prorecta), and with a blunt, rather rounded apex. Conidia simple (although sometimes biguttulate and thus appearing 2-celled), ellipsoid to almost bacillar, sometimes rather

irregular or obclavate, hyaline, 4-5(-5.5) x 1.5-2 μm , aggregated into cylindrical, gelatinous sacci c. 45-50 x 11-18 μm .

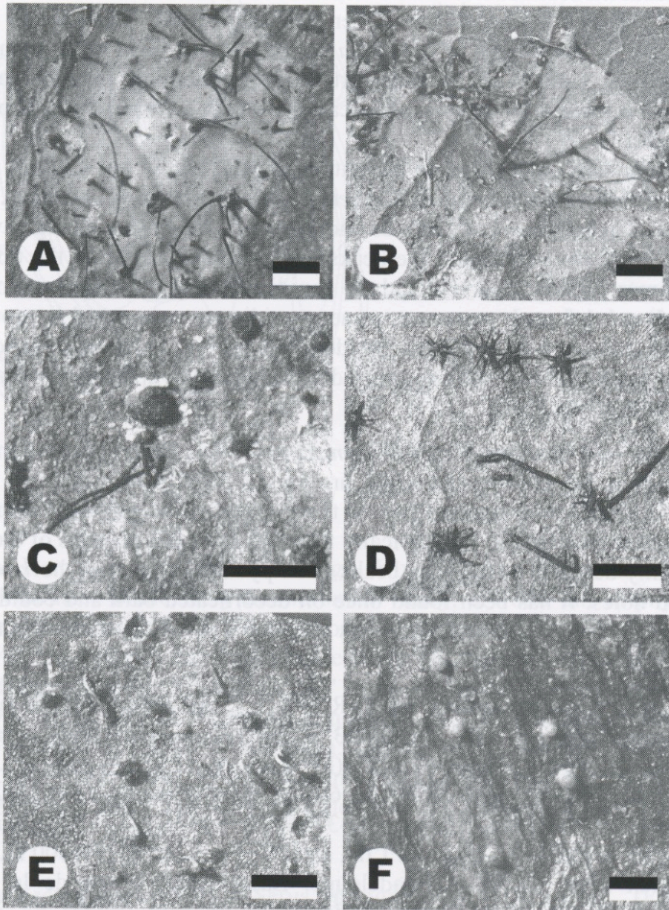


Fig. 1 A: *Caprettia amazonensis* (Guyana, Lücking 96-3016), an epiphyllous specimen with distinct thallus and numerous pycnidia. B: *C. neotropica* (Costa Rica, Lücking 97-656), rounded thallus with scattered pycnidia. C: *C. neotropica* (Costa Rica, Lücking 97-1059), perithecia of various ages and one broken pycnidium. D: *C. nysaegenoides* (Papua New Guinea, Sérusiaux s.n.), several perithecia and three pycnidia. E: *C. setifera* (Chile, Thaxter 8:1a), several curved, hyaline pycnidia. F: *C. tanzanica* (holotype), perithecia. Scale = 0.5 mm.

Observations: The biological status of this taxon, whether lichenized or not, was discussed by LÜCKING et al. (1998). Detailed study of abundant material shows that the area where the ciliate pycnidia originate is always pale greenish to whitish, and photobiont cells can be detected by microscopical examination. Cross-sections and scratch tests clearly demonstrate that the ciliate pycnidia always grow on a subcuticular lichen thallus and not a necrotic area. This subcuticular

position of the thallus also explains why *Caprettia amazonensis* almost always grows along leaf margins or wounds, where it is obviously easier to access the space beneath the leaf cuticle. A similar behaviour is known in several foliicolous species of *Strigula*, the only other lichen genus to include subcuticular species. Accordingly, the photobiont in *Caprettia amazonensis* is most probably a species of *Cephaleuros*, with its cell threads partly arranged in more than one layer, but this has to be proven by more sophisticated methods of identification presently not available.

Both collections cited from the Varirata National Park on the southern coast of Papua New Guinea are referred to *Caprettia amazonensis* with hesitation. Indeed, they produce pycnidia at leaf wounds and a sessile conidia-producing cavity, but are otherwise slightly different: the beaks taper gradually towards the tips which are sometimes slightly incurved, and the conidia are slightly longer and narrower [$5.5\text{--}6(-6.5) \times 1\text{--}1.5 \mu\text{m}$]; moreover, some pycnidia are aggregated in groups of 2 or 3. These features might indicate an additional species. Although abundant, the material is made of dying individuals, and a final decision upon their status cannot be taken for the time being.

Distribution and ecology: *Caprettia amazonensis* has been collected mainly in the Neotropics, but several gatherings are known from Australasia and a single one from central Africa (eastern part of the Democratic Republic of Congo); the species is thus pantropical. It is typically found at wounded margins of the leaves, and is readily detected by the long beaks of its pycnidia projecting horizontally in the wound holes. It has been found once on decorticated bark and could thus be overlooked on non-foliicolous substrates which are still understudied in the tropics.

Selected specimens examined: NEOTROPICS. Costa Rica: Heredia prov.: La Selva Biological Station, $10^{\circ}26' \text{ N}$, $84^{\circ}03' \text{ W}$, 50–100 m, epiphyllous in rainforest understory, vii 1997, Lücking 97-1445 (hb. Lücking). Cartago prov.: C.A.T.I.E. Agricultural Station, $9^{\circ}53' \text{ N}$, $83^{\circ}39' \text{ W}$, 600 m, epiphyllous on *Zamia* sp. in rainforest understory, iii 1991, Lücking 91-3318 (hb. Lücking). — St. Lucia: Road from Castries to Dennery, Barre de l'Île, disturbed rainforest, 250–300 m, ii 1993, E. Sérusiaux s. n. (LG). — Guadeloupe: Basse-Terre: Route de la Grande-Traversée, rivière St-Jean, forêt humide traitée en parc (arbres +/- isolés et éclairés), 260 m, iii 1996, on decorticated bark, E. Sérusiaux 17060b (LG). N-E of La Madeleine, near Grand Etang, slightly disturbed forest in humid depression, 400 m, iv 1995, epiphyllous, E. Sérusiaux s. n. (LG). — Ecuador: Pichincha prov.: Guajalito Biological Station, $0^{\circ}09' \text{ S}$, $78^{\circ}39' \text{ W}$, 1800 m, epiphyllous in montane rainforest remnant, v 1996, Lücking 96-1056 (hb. Lücking). — Guyana: see LÜCKING 1998b: 57 (all hb. Lücking). — French Guiana: Canton Sinnamary: Piste de St. Elie Field Station, $5^{\circ}20' \text{ N}$, $53^{\circ}02' \text{ W}$, 50 m, epiphyllous in rainforest understory, v 1995, Lücking 95-1413 (hb. Lücking). — Brazil: Pará: Caxiuaña Biological Station, 300 km W of Belém, $1^{\circ}46' \text{ S}$, $51^{\circ}30' \text{ W}$, lowland 'terra firme' forest, 25 m, v 1995, Lücking s. n. (hb. Lücking; LÜCKING & KALB 2000: 10). Espirito Santo: 20 km E von Linhares, $19^{\circ}22' \text{ S}$, $40^{\circ} 00' \text{ W}$, rainforest at Rio Doce, 30 m, vii 1980, K. Kalb s. n. (hb. Kalb; LÜCKING & KALB 2000: 10). Paraná: Serra Do Mar, Sapitandena (Antonina), epiphyllous, 1997, A. Shinini 34237 (LG).

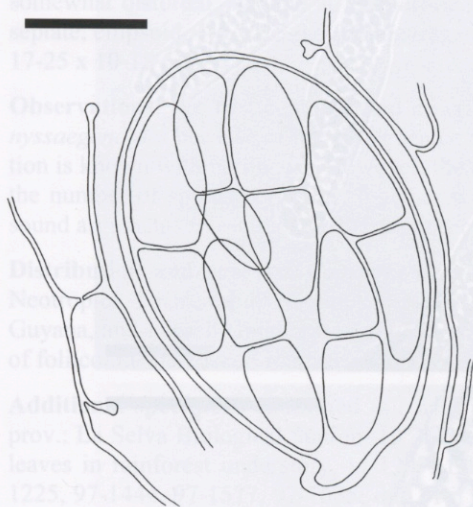


Fig. 2: *Caprettia nyssaegenoides* (holotype), mature ascus with ascospores and paraphyses. Scale = 20 μ m.

AFRICA. Democratic Republic of Congo: Kivu: Kahuzi range, km 58 of road Bukavu-Walikale, Bitale, very humid small valley, c. 1850 m., epiphyllous on epiphytic *Asplenium*, iv 1978, J. Lambinon 78/319 (LG).

AUSTRALASIA. Papua New Guinea: Central prov.: Varirata National Park, c. 22 km W of Port Moresby, 9°26' S 147°21' E, forest remnants along stream, c. 800 m, x 1995, epiphyllous, E. Sérusiaux s. n. (LG). Ibid., iii 1987, epiphyllous, J. R. De Sloover 87L15 (LG). — Australia: Queensland: Daintree National Park, 16°29' S, 145°23' E, 50 m, epiphyllous in tropical rainforest understory, ix 1992, Kalb & Kalb s.n. (hb. Kalb). — New Caledonia: see LÜCKING & KALB 2001: 259 (hb. Kalb).

***Caprettia neotropica* Lücking & Sérus. sp. nova**

(Fig. 1 B-C)

Sicut *Caprettia nyssaegenoides* sed peritheciis laevigatis vel leviter pilosis et ascis 2-4(-8)-sporis differt.

Type: Costa Rica, Heredia prov., wet rainforest at La Selva Biological station, 10°26' N, 84°03' W, 50-100 m, epiphyllous on dicotyledonous leaf in rainforest understory, vi 1997, Lücking 97-1059 (CR-holotype).

Thallus foliicolous, circular or dispersed, sometimes irregular in outline, up to 10 mm in diam., yellowish to greenish brown, very thin, sometimes with a dark brown to blackish hypothallus when contiguous with other lichens species. Photobiont a species of *Phycopeltis* forming circular plates, with regularly radiating rows of brownish or orange, somewhat greenish, rectangular cells 7-15 x 4-7 μ m. Perithecia found on few individuals only, sessile, subglobose, 0.15-0.25 mm in diam. and 120-180 μ m high, dark brown to brownish black, glabrous to irregularly and slightly setose; hairs soft, often deflexed, 40 - 100 μ m long, dark brown

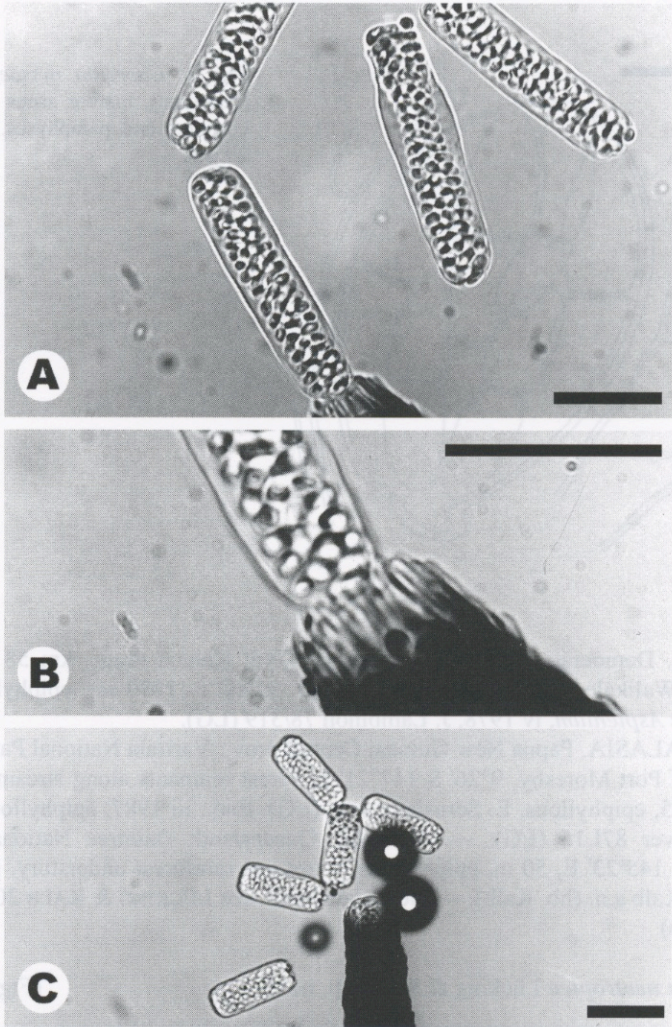


Fig. 3 A: *Caprettia amazonensis* (Papua New Guinea, De Sloover 87L15), conidial sacci extruded by pycnidium. **B:** *C. amazonensis* (Papua New Guinea, De Sloover 87L15), detail of pycnidial apex and extruded conidial saccus. **C:** *C. nyssaegenoides* (holotype), two air droplets and five conidial sacci extruded within eight seconds by pycnidium. Scale = 20 μ m.

with pale tips or entirely pale brown; ostiole usually seen as a greyish spot at the centre of the upper part of the perithecium. Excipulum 16-25 μ m thick, consisting of intricate hyphae with dark brown to blackish walls. Asci c. 40-45 x 15-20 μ m. Ascospores 2-4(-8) per ascus, hyaline, ellipsoid to drop-shaped, straight or slightly curved, 1-septate, slightly constricted at the septum, with the distal cell usually enlarged, (18-)25-32 x 5-8 μ m. Pycnidia always present, produced at about mid-height in a black hair which is 0.6-1.2 mm long; hairs straight or

slightly curved, with their tip typically blunt and rounded (never acute), usually somewhat distorted, swollen at least at the level of the pycnidium. Conidia non-septate, ellipsoid, 4-6 x 2.5-3.5 μm , aggregated into gelatinous, cylindrical sacci c. 17-25 x 10-15 μm .

Observations: We first contemplated describing this taxon as a subspecies of *C. nyssaegenoides* because of the rather scarce material. Indeed, only a single collection is known with perithecia. However, the distinct mostly smooth perithecia and the number of spores per ascus, together with the different distribution, provide sound arguments to establish a different species.

Distribution and ecology: *Caprettia neotropica* is probably widespread in the Neotropics, but certainly overlooked. Thus far, it has been found in Costa Rica, Guyana, and French Guiana. It is not abundant but seems to be a regular member of foliicolous lichen communities in the lowland rainforest understory.

Additional specimens examined (all with pycnidia only): Costa Rica: Heredia prov.: La Selva Biological Station, 10°26' N, 84°03' W, 50-100 m, epiphyllous on leaves in rainforest understory, vi 1997, Lücking 97-452, 97-656, 97-1049, 97-1225, 97-1444, 97-1577, 97-1675; *ibid.*, i-ii 1999, Lücking 99-145; *ibid.*, ii 2000, Lücking 00-147 (all hb. Lücking). Puntarenas prov.: Corcovado National Park, near Los Patos station, 8°31' N, 83°34' W, 50-100 m, epiphyllous on leaves in rainforest understory, vii 1992, Lücking 92-3750 (hb. Lücking). — Guyana: see LÜCKING 1998b: 57, sub *Caprettia* sp. (BRG). — French Guiana: Canton Sinnamary: Piste de St. Elie Field Station, 5°20' N, 53°02' W, 50 m, epiphyllous on leaves in rainforest understory, v 1995, Lücking 95-1412 (CAY).

Caprettia nyssaegenoides Sérus. & Lücking **sp. nova** (Fig. 1D, 2, 3C, 4, 5)

Sicut *Caprettia neotropica* sed peritheciis setis ornatis et ascis (4-)6-8-sporis difert.

Type: Papua New Guinea, Madang prov., humid rainforest between Awar plantation and Boroi, 4°06'S 144°48'E, UTM BR5545, 0-5 m, 1980, epiphyllous on palm leaves, V. Demoulin 5952 & L. Smeets (LG-holotype, hb. Vězda - isotype).

Thallus foliicolous, rather circular and up to 8-10 mm in diam., but usually much less, formed of discontinuous, circular or deformed patches, greenish and very thin, interconnected by a few hyaline hyphae (visible only under the microscope), with a dark brown to blackish hypothallus when contiguous with other lichens species. Photobiont a species of *Phycopeltis* forming circular plates, with regularly radiating rows of brownish or orange, somewhat greenish, rectangular cells 8-13 x 5-7 μm ; sporocysts sometimes seen. Perithecia found on few individuals only but then rather abundant, sessile, subglobose, 0.2-0.25 mm in diam. and 130-180 μm high, brownish black, with a crown of 5 or 6 (rarely more), 100-120 μm long setae in the upper half of the perithecia; setae rather stiff and tapering towards their tips, incurved (*sensu* LÜCKING 1998a: 377), black to brownish, paler or sometimes almost translucent at their tips; ostiole usually seen as a rather pale greyish spot at the centre of the upper part of the perithecium. Excipulum 16-25 μm thick, consisting of intricate hyphae with dark brown to blackish walls. Asci c. 40-45 x 25-30 μm . Ascospores (4-)6-8 per ascus, hyaline, ellipsoid to drop-shaped, straight or curved (sometimes bean-shaped), 1-septate, slightly con-

stricted at the septum, with the distal cell usually enlarged, (22-)24-28(-33) x 6-8 μm . Pycnidia always present, produced at about mid-height in a jet black hair which is 0.5-0.8(-1.1) mm long; hairs straight or slightly curved, with their tip typically blunt and rounded (never acute), usually somewhat distorted, swollen at least at the level of the pycnidium. Conidia non-septate, ellipsoid, 4-6 x (2.5-)3-4 μm , aggregated into gelatinous, cylindrical sacci c. 17-25 x 10-15 μm .

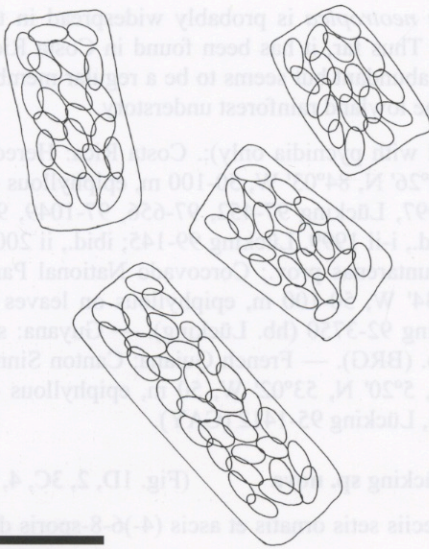


Fig. 4: *Caprettia nyssaegenoides* (holotype), conidial sacci. Scale = 20 μm .

Etymology: This new species has been known to us for several years and we first named it "*nyssaegenoides*" referring to its unique conidia sacci, similar to those of *Anisomeridium polypori*. The epithet was given when the latter was known as *A. nyssaegenum* and we choose to keep it as meanwhile duplicates have been given to several herbaria under the epithet "*nyssaegenoides*".

Observations: *Caprettia nyssaegenoides* closely resembles a species of *Trichothelium*, in particular small forms of *T. bipindense* F. Schill., and in the absence of pycnidia, microscopic examination is needed to verify its generic position.

Distribution and ecology: The species is a striking feature of the foliicolous flora in lowland rain forests of Papua New Guinea but is never abundant. It is also reported from Australia (Queensland) and from the Vanuatu archipelago (LÜCKING et al. 2001). A small but typical collection from Thailand demonstrates that the species is probably more widespread in SE Asia.

Selected specimens examined: Thailand: Saraburi prov.: Khao Sam Lan National Park (10 km SE of Saraburi), 130 m, secondary forest on slope, near a small pond, epiphyllous on *Capparis*, iii 1987, J. Lambinon 87/51 (LG). — Papua New

Guinea: Madang prov.: Road Awar-Bunapas, near the bridge over the river Seven, 4°11' S 144°45' E, epiphyllous on palm in forest, viii 1990, V. Demoulin s. n. (LG). Ramu highway, 12 km NE of Ono Camp, 5°25' S 145°34' E, epiphyllous in forest undergrowth, s. d., V. Demoulin 7532 (LG). Hills W of Yoro (=Mugamat), 4°28' S 145°10' E, 100-300 m, foliicolous in forest, ii 1980, V. Demoulin 5931 & 5937 & L. Smeets (LG). Road Madang-Lae, 15 km from Madang, 5°20' S 145°43' E, c. 30 m, edge of dense rainforest, epiphyllous on *Arenga microcarpa* inside the forest, iv 1987, J. Lambinon 87/370 (LG). Brahman Mission (S side of the Ramu river), c. 2-3 km W of the mission, 5°45' S 145°20' E, 100 m, lowland forest re-growth after selective logging, epiphyllous, x 1995, E. Sérusiaux s. n. (LG, hb Lücking). Central prov.: Varirata National Park, c. 22 km W of Port Moresby, 9°26' S 147°21' E, forest remnants along stream, c. 800 m, epiphyllous, x 1995, E. Sérusiaux s. n. (LG). — Vanuatu: see LÜCKING et al. 2001: 196 (CANB) — Australia: Queensland: see LÜCKING et al. 2001: 196 (CANB).

Caprettia setifera (Malcolm & Vězda) R. Sant., Lücking & Sérus. **comb. nova**

(Fig. 1E)

Bas.: *Porinula setifera* Malcolm & Vězda, Folia Geobot. Phytotax., Praha 30: 317, 1995. — Type: New Zealand, South Island, Nelson, York Valley, 41°18' S 173°16' E, 200 m, on *Polystichum* sp., 11 xi 1993, Malcolm 1285 (CHR 413962—holotype; hb. Vězda—isotype!).

Thallus foliicolous, circular or dispersed, up to 5 mm in diam., pale yellowish to greenish brown, very thin. Photobiont a species of *Phycopeltis* forming circular plates, with regularly radiating rows of brownish or greenish, rectangular cells 13-25 x 5-8 µm. Perithecia frequent, sessile, wart-shaped, 0.1-0.2 mm in diam. and 100-150 µm high, pale yellowish to reddish brown, irregularly pilose-setose; hairs soft, often deflexed, 60-100 µm long, pale yellowish to pale brown; ostiole usually seen as a pale spot at the centre of the upper, darker part of the perithecium. Excipulum 10-20 µm thick, consisting of intricate hyphae with hyaline to pale brown walls. Asci c. 35-45 x 15-20 µm. Ascospores 4-6(-8) per ascus, hyaline, ellipsoid to drop-shaped, straight or slightly curved, 1-septate, slightly constricted at the septum, with the distal cell enlarged, 15-20 x 5-8 µm. Pycnidia rarely present, produced at the inflated (70-90 µm) base of a hyaline hair which is 0.3-0.5 mm long and 25-40 µm in diam. above the base; hairs slightly curved and bent towards the leaf surface, with their tips typically blunt and rounded (never acute). Conidia ellipsoid, non-septate, 2.5-4 x 1.5-2.5 µm, aggregated into gelatinous, cylindrical sacci c. 17-25 x 10-15 µm.

Observations: This species is known from populations in southern Chile (Valdivia), New Zealand (type gathering) and Tasmania (McCARTHY et al. 2001: 20). The Chilean sample matches quite well the type collection, although some perithecia appear to be necrotic and unusually dark, and the setae are less developed. In addition, the Chilean gathering features pycnidia not found in the type material and which confirm placement of this species in *Caprettia*. The pycnidia, and especially the conidia aggregated in gelatinous sacci, are of the same type as in the species with dark perithecia, but differ in their smaller size, absence of dark pigmentation, and in the position of the conidiogeneous chamber at the base of the pycnidial hair (as in *C. amazonensis*).

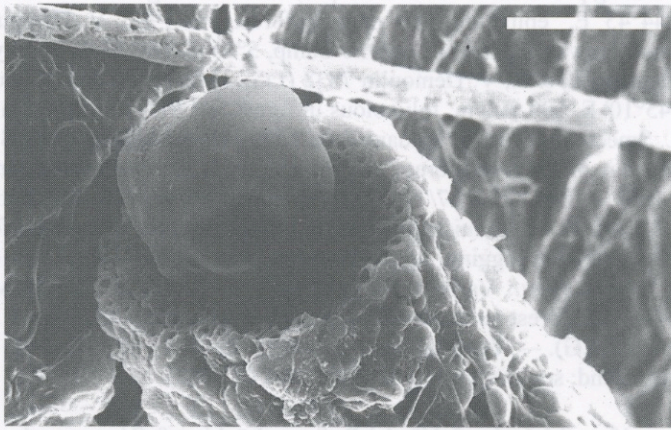


Fig. 5: *Caprettia nyssaegenoides* (holotype), SEM view of broken pycnidium showing lumina of wall hyphae and conidial saccus. Scale = 10 μ m.

Distribution and ecology: One of the very few foliicolous lichens apparently restricted to the temperate rainforests of the southern hemisphere, known from New Zealand (South Island), Australia (Tasmania), and Chile (Valdivian region).

Additional specimen examined: Chile: X. Region: Corral near Valdivia, xii 1905, Thaxter 8:1a (UPS).

Caprettia tanzanica (Vězda) Lücking & Sérus. **comb. nova** (Fig. 1F)

Bas.: *Porinula tanzanica* Vězda, Folia Geobot. Phytotax., Praha **10**: 400, 1975.

Type: Tanzania, Morogoro prov., Uluguru-Gebirge, Nordhang des Berges Bondwa, 1700-1900 m, montaner Regenwald, 26 ix 1970, T. Pócs 6259 (hb Vězda-holotype!).

Thallus foliicolous, circular or irregular in outline, up to 3 mm in diam., pale yellowish, very thin. Photobiont a species of *Phycopeltis* forming circular plates, with regularly radiating rows of brownish or greenish, rectangular cells 6-12 x 4-7 μ m. Perithecia frequent, sessile, wart-shaped, 0.15-0.25 mm in diam. and 100-170 μ m high, pale yellowish, glabrous; ostiole usually seen as a pale spot at the centre of the upper, slightly darker part of the perithecium. Excipulum 10-15 μ m thick, consisting of intricate hyphae with hyaline walls. Asci c. 40-50 x 15-20 μ m. Ascospores 4-6 per ascus, hyaline, ellipsoid to drop-shaped, straight, 1-septate, slightly constricted at the septum, with the distal cell enlarged, 14-20 x 5-7 μ m. Pycnidia unknown.

Observations: This species is closely related *Caprettia setifera* but differs in its glabrous perithecia, in the same way that *C. neotropica* differs from *C. nyssaegenoides*. Pycnidia have not been found so far.

Distribution and ecology: *Caprettia tanzanica* is known only from the type gathering in the African Paleotropics (Tanzania, Uluguru mountains).

Discussion

Characteristics of the pycnidia and conidia: The pycnidia produced by this fascinating genus are remarkably similar to those of the widespread and similarly enigmatic *Anisomeridium polypori* (Ellis & Everh.) Barr [= *A. juistense* (Ellis & Everh.) R.C. Harris, = *A. nyssaegenum* (Ellis & Everh.) R.C. Harris, = *Sarcinulella banksiae* Sutton & Alcorn, anamorph] (see APTROOT 1999 for further synonyms): see for example illustration fig. 2,C of SUTTON & ALCORN (1983: 559). It must be noted that *A. polypori* is the only described species in the genus to produce sacci of conidia in long beaked pycnidia. They have been described in great details by SUTTON & ALCORN (1983), and the most striking features are identical to those of *Caprettia*: conidia are small, unicellular and hyaline and, after passing the periphyses crown at the base of the pycnidial beak (which can be named the ostiolar tube), are aggregated into cylindrical sacci that are dispersed as single diaspores. In *A. polypori* however, the sacci form a long, rather rigid cylindrical matrix that extrudes out of the beak as a long cirrus, easily seen in dry conditions in the field. Under the dissecting microscope, the cirrus can be seen as septate (see Abb. 3 in POELT & TÜRK 1994). The breakdown at the junctions between sacci is easily observed in water in microscopic preparations, and thus occurs in the field under humid conditions.

In *Caprettia* species, the situation is slightly different. No extruded chains of sacci have ever been seen either in the field, or in the laboratory. When placed in water, either under a dissecting or a light microscope, two or three air bubbles are immediately expelled followed by a single saccus, which is rapidly followed by a succession of others, until the 'tube' is empty. It is of course unknown how long it takes before the tube is refilled and ready for dispersal.

Long beaked pycnidia are also known in two other species of *Anisomeridium*: *A. throwerae* R.C. Harris (HARRIS 1995: 150) and *A. conorostratum* Aptroot (APTROOT & SEAWARD 1999: 62), both described from Hong Kong. Thanks to the courtesy of our colleague and friend Dr. A. Aptroot, we have been able to examine material of both species. Their pycnidia are morphologically identical with those of *Caprettia amazonensis* (those of *A. throwerae* are cilia-like, while those of *A. conorostratum* can be described as rostrate). Although the conidia are also embedded in a gelatinous sheath following their passage through a periphyses layer, they do not aggregate into sacci and are expelled singly. In *A. throwerae*, the conidia are oblong, distinctly constricted in their middle and measure 8-10 x 4-5 μm and in *A. conorostratum*, they are linear, straight or slightly curved and measure 20-25 x 1-1.5 μm . Perithecia are known in the former, and unknown in the latter.

The anamorph of *Anisomeridium throwerae* has been described as the new genus of non-lichenized coelomycete *Compsosporiella* by SANKARAN & SUTTON (1991) from dead twigs in Sierra Leone (West Africa), including a single species, *C. deightonii*. *Compsosporiella* has been reduced into synonymy with *Anisomeridium* by APTROOT & SIPMAN (2001).

Systematic position of *Caprettia*: *Anisomeridium polypori* and the undescribed species "*Anisomeridium* sp. Buck 22812" (HARRIS 1995: 126) are the only lichen species with closely similar pycnidia and conidia. Moreover, several species cur-

rently placed in the same genus feature either similar pycnidia or conidia. Together with the similar hamathecium structure, our observations thus demonstrate that *Caprettia* is closely related to the genus *Anisomeridium* and belongs to the Monoblastiaceae.

The genus *Anisomeridium* (Müll. Arg.) Choisy [type species: *A. subnectendum* (Nyl.) R.C. Harris] seems rather heterogeneous and further studies should demonstrate that it can be divided into several genera (or subgenera) (HARRIS 1995). *Anisomeridium* is placed in the Monoblastiaceae together with *Acrocordia* Masal., *Monoblastia* Riddle and *Musaespora* Aptroot & Sipman. *Monoblastia* is easily separated by its unicellular ascospores with a reticulate ornamentation (SÉRUSIAUX & APTROOT 1998). Most species of *Anisomeridium* and *Acrocordia* differ from *Caprettia* in their cylindrical asci and uniseriate, straight ascospores, but some species in *Anisomeridium* and all in *Musaespora* have obclavate or ellipsoid asci with irregularly arranged, large and slightly curved ascospores. We see no significant features in the ascomata structure, asci and ascospores of the species here referred to *Caprettia* to exclude them from the Monoblastiaceae.

It must be noted that several species of *Anisomeridium* and *Musaespora* have their conidia embedded in a mucilaginous sheath and expelled in +/- compact masses, especially those growing on living leaves. *A. epiphyllum* (Vězda) R.C. Harris, *A. foliicola* R. Sant. & Tibell, and two further, yet undescribed *Anisomeridium* species from the Neotropics feature such characteristics, as well as several species in *Musaespora* (see fig. 71 for the corticolous *M. kassamensis* Sérus. in APTROOT et al. 1997: 109, and fig. 2 for the foliicolous *M. kalbii* Lücking & Sérus. in LÜCKING & SÉRUSIAUX 1997: 664). The pycnidia of such species also have a periphyses layer at the base of the ostiolar tube.

While most species of *Anisomeridium* have 'normal' pycnidia, in some species, the pycnidia form a distinct, more or less prolonged beak (HARRIS 1995). Entirely tubular, hair-like pycnidia as in *Caprettia* are so far known in *A. throwerae*, *A. conorostratum* (although its pycnidia could be described as rostrate), and in several other undescribed species [see HARRIS 1975: 126, under "*A. sp.* Buck 22812", and p. 150-151, under *A. throwerae* "similar long-beaked macropycnidia are known in (...) 1 or 2 undescribed species from Brazil"]. One of the undescribed *Anisomeridium* species just mentioned above also has such long beaked pycnidia.

In addition, the undescribed *Anisomeridium* "sp. Buck 22812" is said to disperse its conidia in gelatinous packets, and the second, unnamed foliicolous species of *Anisomeridium* mentioned above (with 'normal' pycnidia and extruding its conidia in drop-like masses) agrees with *Caprettia nyssaegenoides* in perithecial features.

One might therefore argue whether *Caprettia* can be separated from *Anisomeridium* at all, or whether several species of the latter genus should be placed in *Caprettia*. As in many other groups of lichens (and other organisms), the relationship between *Anisomeridium* and *Caprettia* shows the characteristic patterns of a plesiomorphic versus an apomorphic entity: the plesiomorphic entity exhibits tendencies towards certain characters (in this case pycnidial and conidial types) which are fully explored in the apomorphic entity. Thus, only those species are included in *Caprettia* which fully develop all characters of the genus and which therefore represent a monophyletic group.

The same might be true for another apomorphic derivate of *Anisomeridium*, the genus *Musaespora*. In *Musaespora* (APROOT & SIPMAN 1993; LÜCKING & SÉRUSIAUX 1997), the upper projection of the pycnidia is transformed into a campylidial lobe. Intermediate morphological forms between this type of campylidia and the 'normal' pycnidia of *Anisomeridium* are known in several undescribed foliicolous and corticolous species (THOR et al. 2000: 25-26, and unpublished data by the authors). Those interesting relationships will be studied in more details in a forthcoming paper, and may necessitate the transfer to *Musaespora* the species currently placed in *Anisomeridium* that produce large, thick-walled ascospores with their ascoplasm surface covered with crystals. Detailed examination of the type species of *Megalotremis* Aptroot [*M. verrucosa* (Makhija & Patwardhan) Aptroot; see APTROOT 1991: 124] may show that this genus name has priority.

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