

Survey of *Lepraria* species with lobed thallus margins in the tropics

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Abstract: SIPMAN, H. J. M. 2004. Survey of *Lepraria*-like lichens with lobed thallus margins in the tropics. – *Herzogia* 17: 23–35.

Nine species of the lichen genus *Lepraria* with lobed margins are reported from the tropics, including *Lepraria usnica* (new to Africa and the Americas), *L. caesioalba*, *L. atrotomentosa*, *L. lobificans*, *L. nivalis* and *L. sipmaniana* (new to Asia); *L. impossibilis* (El Salvador) and *L. pallida* (South America, Seychelles, Madagascar) are described as new and the new combination *Lepraria coriensis* made. A key to the species is added.

Zusammenfassung: SIPMAN, H. J. M. 2004. Übersicht der *Lepraria*-Arten mit gelappten Thallusrändern in den Tropen. – *Herzogia* 17: 23–35.

Neun Arten der Flechtengattung *Lepraria* mit gelappten Thallusrändern werden aus den Tropen gemeldet, einschließlich *Lepraria usnica* (neu für Afrika und Amerika), *L. caesioalba*, *L. atrotomentosa*, *L. lobificans*, *L. nivalis* und *L. sipmaniana* (neu für Asien). *L. impossibilis* (El Salvador) und *L. pallida* (Südamerika, Seychellen, Madagaskar) werden neu beschrieben, die neue Kombination *Lepraria coriensis* wird vorgeschlagen und ein Bestimmungsschlüssel für alle Arten hinzugefügt.

Key words: Lichenized Ascomycetes, systematics, identification key.

Introduction

The genus *Lepraria* consists mostly of lichens with a diffuse thallus margin. This evidently results from their leprose structure. Their thallus is mainly composed of loosely connected soredia which easily spread beyond the margin, settle there and cause an obscure delimitation of the lichen. However, some species may develop distinctly delimited, lobed margins. European examples are *L. lobificans* Nyl. and *L. nivalis* J.R.Laundon (LAUNDON 1992a). The feature is often variable within a single species, some specimens showing clear lobes while in others the thallus margin is diffuse throughout. For instance, in *L. nivalis* some specimens tend to be strongly leprose with diffuse margin, while others have a more compact, lobed thallus, not composed of loose soredia (fig. 1). The latter have been formally recognized as *Lepraria crassissima* var. *isidiata* Llimona (VĚZDA 1973). However, subsequent authors (LAUNDON 1992b, LEUCKERT et al. 1995) have not accepted this variety, because it is not supported by chemical characters and is connected to non-lobed, sorediate morphs by a continuum of intermediates. My own observations in mediterranean Greece (SIPMAN & RAUS 1999) confirmed this situation. Sorediate, non-lobed specimens are usually found on steep spots sheltered against precipitation, while lobed forms occur on more horizontal spots in arid regions.

Lobed, leprarioid lichen species have been included in a separate genus, *Leproloma*, e.g. *L. membranaceum* (Dicks.) J.R.Laundon (LAUNDON 1989) [= *Lepraria membranacea* (Dicks.) Vain.]. This genus, however, included also non-lobed species and was said to be characterised



Fig. 1: *Lepraria nivalis*, specimen from Santorini, Greece [Sipman 28741 (B)]. Thallus with lobed margins, partly with raised marginal rim, and irregular granulate, not distinctly sorediate surface. Scale = 3 mm.

chemically by the presence of dibenzofurans, while the lobe development is not a constant character. In *L. membranacea* it is variable, in *L. sipmanianum* Kümmerl. & Leuckert [= *Lepraria sipmaniana* (Kümmerl. & Leuckert) Kukwa] constant and in the other species of the genus it is usually absent (LEUCKERT & KÜMMERLING 1991; LOHTANDER 1995). EKMAN & TØNSBERG (2002) analysed ITS-sequences of *Lepraria* and *Lepruloma* species and found that the type species *L. membranacea* is nested among *Lepraria* species in their cladogram and therefore does not belong to a separate genus. KUKWA (2002) suggested to unite both genera on chemical grounds and provided the necessary recombinations.

Nevertheless, the tropical lichen flora includes some distinctly lobed leprarioid lichens with a distinctive morphology, which is well described by ORANGE et al. (2001a). The thallus is three-layered, composed of a prothallus, a medullary and an algiferous layer. The prothallus consists of loose, thick, straight and scarcely branched hyphae. It may be pale brownish, but often it is darker, brownish or greyish. This layer seems to decay easily and is in many samples difficult to observe. The medulla is white and rather compact, sometimes pale yellow. It usually forms a continuous layer covering the substrate, exposed where the algal layer is worn away. The algiferous top-layer has a dull surface and is without a distinct cortex. In, e.g., *Lepraria usnica* it is granular all over the surface, forming c. 0.1 mm wide, soredium-like granules, while in *L. sipmaniana* a c. 1 mm wide marginal zone usually remains smooth. The thallus margin is formed by more or less semicircular, 1–2 mm wide lobes which often develop a raised, c. 0.1 mm thick, marginal rim, reminding one somewhat of *Normandina pulchella* (Borrer) Nyl.

In the monograph of *Crocynia* by HUE (1924) group II (hyphae inferne coloratae) A (gonidia protococcoidea) appears to correspond largely with the group of species treated here. The pertinent species originate from temperate regions or the type material is lost with the Bouly de Lesdain-herbarium. This leaves *Crocynia coriensis* as the only available species name which has to be considered in this treatment. Fortunately an isotype was investigated chemically by LAUNDON (2003) so that it became possible to identify it with the group of specimens treated below as *Lepraria coriensis*.

In recent publications tropical collections have often been referred to species known from the temperate zone. APTROOT et al. (1997) report *L. caesioalba* (Bouly de Lesd.) J.R.Laundon from Papua New Guinea. APTROOT & SEAWARD (1999) report *Lepraria lobificans* Nyl., *L. neglecta* (Nyl.) Lettau and *Leproloma membranaceum* from Hongkong. APTROOT (2002) reports *Lepraria neglecta* and *Leproloma membranaceum* from Brazil. However, many of these reports appeared to be erroneous.

Three additional species have been described in recent years, *Leproloma sipmanianum* (LEUCKERT & KÜMMERLING 1991), *Lepraria atrotomentosa* Orange & Wolsley (ORANGE et al. 2001a) and *L. usnica* Sipman (SIPMAN 2003). In the present paper two further new species, a new combination and an identification key are presented.

Material and methods

Samples of lobed leprarioid lichens were obtained mainly from recent field work by A. Aptroot (Utrecht) and the author, deposited in B and in herb. Aptroot (ABL). They were investigated in the usual way using optical equipment and TLC as described by ORANGE et al. (2001b). The chemical substances of the pannaric acid group were identified by comparison with lichen samples in (B) cited by LEUCKERT & KÜMMERLING (1991). Measurements are from dry material and colours from dry, rather fresh herbarium samples.

In the investigated material true soredia were uncommon and the available granular structures were generally larger. Most probably they do not disperse well. Therefore the term “granules” is used below. It applies to globular structures without cortex, measuring about 0.1 mm in diameter. More distinctly soredium-like structures were observed only occasionally, in the central parts of the thalli.

Results and discussion

The morphological and chemical analysis revealed the existence of 8 chemical patterns in 9 species (cf. tab. 1): 1. Usnic acid and zeorin (*Lepraria coriensis*, *L. usnica*); 2. atranorin and zeorin with lecanoric acid and an unidentified fatty acid (*L. atrotomentosa*); 3. atranorin and zeorin with an unidentified fatty acid (*L. pallida*); 4. atranorin and zeorin with stictic acid and associated substances (*L. lobificans*); 5. atranorin (lacking in tropical material) with roccellic and protocetraric acid (*L. nivalis*); 6. atranorin with angardianic and fumarprotocetraric or protocetraric acid (*L. caesioalba*); 7. oxypannaric acid-6-methylester with associated substances (*L. sipmaniana*); 8. atranorin, lecanoric acid and pannaric acid-6-methylester (*L. impossibilis*).

The investigated material suggests that there is a relation between the presence of marginal lobes and granule production. In some species the granule production starts only in older, central parts of the thallus and leaves the surface of the young, marginal parts intact. These

Tab. 1: Characters of tropical lobed *Lepraria* species.

name	margin	chemistry			
		usn/atr	fatty acids	zeor	others
<i>L. coriensis</i>	lobate	usn		zeor	
<i>L. usnica</i>	microlobate	usn		zeor	
<i>L. atrotomentosa</i>	±lobate	atr	indet.	zeor	leca
<i>L. pallida</i>	lobate	atr	indet.	zeor	
<i>L. lobificans</i>	±lobate	atr		zeor	stict
<i>L. nivalis</i>	lobate	(atr)	rocc		prot
<i>L. caesioalba</i>	lobate	atr	ang		prot/fum/psor
<i>L. sipmaniana</i>	lobate				oxyp
<i>L. impossibilis</i>	lobate	atr			leca + pan6

abbreviations: ang = angardianic acid; atr = atranorin; fum = fumarprotocetraric acid; leca = lecanoric acid; oxyp = oxypannaric acid-6-methylester; pan6 = pannaric acid-6-methylester; prot = protocetraric acid; psor = psoromic acid; rocc = roccellic acid; stict = stictic acid; usn = usnic acid; zeor = zeorin. Characters based on the material cited below.

develop pronounced marginal lobes, e.g. *Lepraria coriensis*. In other species the granule production appears to start immediately on the youngest, marginal parts of the thallus, so that the surface dissolves and no differentiated marginal structure develops, as in most specimens of *Lepraria lobificans*.

The species containing usnic acid and zeorin as main substances seem to form a cluster of related species characterised by chemistry, similar to the dibenzofuran-containing species united for a while in the genus *Lepruloma*. It includes the lobate *Lepraria coriensis* and the microlobate *L. usnica*. There is also a non-lobate relative, *Lecanora leuckertiana* Zedda (ZEDDA 2000). Originally Zedda intended to publish this species in a separate genus, *Leprolecanora* (listed in SIPMAN & RAUS 1999: 271). LAUNDON (2003) included *L. coriensis* in the genus *Lecanora* because of its chemistry, in spite of its morphological similarity with *Lepraria membranacea*. In our opinion the presence of usnic acid and zeorin is not characteristic for the genus *Lecanora*. It occurs also in, e.g., some species of *Cladonia*, and is particularly common in the genus *Megalospora*. Therefore a new combination is proposed below for *L. coriensis*.

Key to the *Lepraria* species with lobed thallus margins in the tropics

- 1 Marginal lobes rounded, c. 0.5–2 mm wide, with raised marginal rim 2
- 1* Marginal lobes irregular and mostly less than 0.5 mm wide, usually without marginal rim 8
- 2 Thallus yellowish grey, with usnic acid or anthraquinones, without atranorin; surface smooth near the margin, with more or less scattered granules in the centre 3
- 2* Thallus whitish grey, without usnic acid or anthraquinones, mostly with atranorin; surface granular up to the margin 4
- 3 Major substances usnic acid and zeorin, pannaric acid derivatives absent; SE Asia, extending to North Australia and India *Lepraria coriensis*
- 3* Major substances pannaric acid-6-methylester and oxypannaric acid-6-methylester, usnic acid and zeorin absent; widespread in the tropics *Lepraria sipmaniana*
- 4 Thallus C+ or KC+ red, containing lecanoric acid 5

- 4* Thallus C-, KC-, without lecanoric acid 6
- 5 Thallus without pannaric acid-6-methylester; widespread in S and E Asia *Lepraria atrotomentosa*
- 5* Thallus with pannaric acid-6-methylester; known only from El Salvador *Lepraria impossibilis*
- 6 Thallus containing protocetraric acid, lacking atranorin (in tropical material), P+ red, K+ brownish *Lepraria nivalis*
- 6* Thallus lacking protocetraric acid, containing atranorin, P+ yellow to orange, K+ yellow to orange ... 7
- 7 Thallus containing stictic acid, K+ yellow to orange *Lepraria lobificans*
- 7* Thallus lacking stictic acid, K+ pale yellow *Lepraria pallida*
- 8 White medulla and prothallus absent; thallus forming a thin layer over mosses on or directly on acid rock; above 3500 m only *Lepraria caesioalba*
- 8* White medulla and usually also prothallus present; at low to middle elevations 9
- 9 Thallus pale yellowish grey, containing usnic acid, lacking atranorin (K-) *Lepraria usnica*
- 9* Thallus whitish grey, lacking usnic acid, containing atranorin (K+ yellow) 10
- 10 Thallus K-, C+ red, containing lecanoric acid, lacking stictic acid; dark-grey hypothallus usually clearly visible, extending beyond the lobes *Lepraria atrotomentosa*
- 10* Thallus K+ yellow-orange, C-, lacking lecanoric acid, containing stictic acid; hypothallus not exposed *Lepraria lobificans*

Lepraria atrotomentosa Orange & Wolseley (fig. 2)

TLC: atranorin, zeorin, lecanoric acid, unidentified fatty acids.

Notes: The available specimens fit into the distribution pattern indicated by ORANGE et al. (2001a) as they form a bridge between Sri Lanka and Japan. They were collected on siliceous rocks or on tree bark, at 150–2100 m.

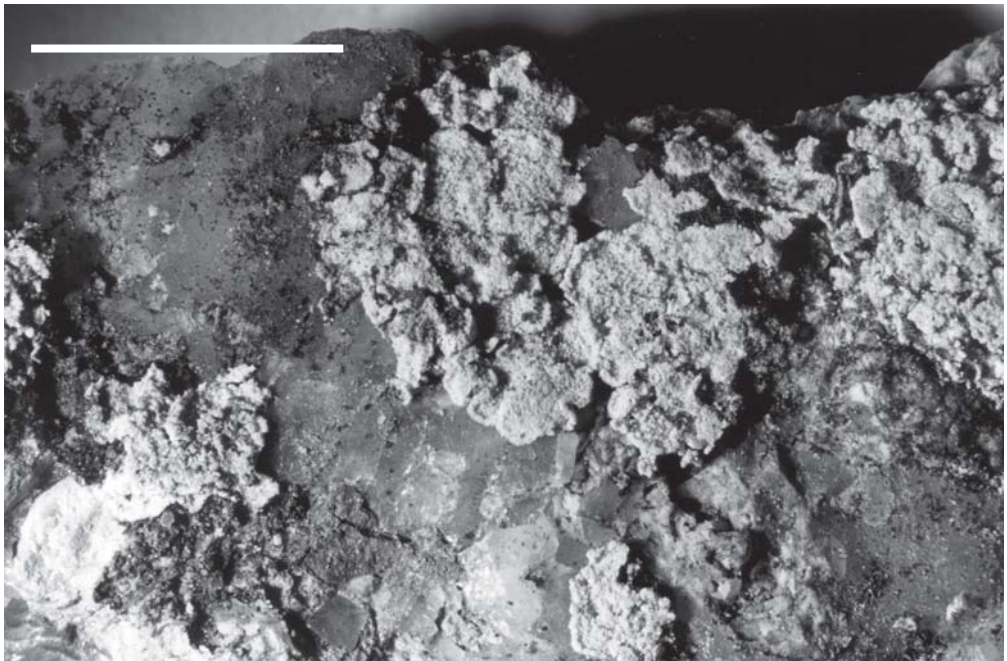


Fig. 2: *Lepraria atrotomentosa*, specimen from Hong Kong [Sipman 45146 (B)], showing distinctly rounded marginal lobes with raised rims. Scale = 3 mm.

The species is morphologically similar to *Lepraria impossibilis* and *L. pallida*, see below, and may have wider marginal lobes (fig. 3) than suggested in the original description.

Material of this species was cited by APTROOT & SEAWARD (1999) as *Lepraria neglecta*.

It was not possible to characterise the fatty acids more clearly because their spots were often indistinct.

Investigated specimens (all tested by TLC):

China: Hong Kong: Hong Kong Island, Lung Fu Shan, mountain slope, 200 m, along mountain stream on exposed granite, June 1998, A. Aptroot 43081 (ABL); id., in mountain forest on shaded granite, June 1998, A. Aptroot 43062 (ABL); id., Pok Fu Lam Reservoir area, 200 m, along mountain stream on exposed granite, June 1998, A. Aptroot 43693 (ABL); Lantau Island, Lantau North Country Park, Ngong Ping, 400–450 m, on exposed granite boulders on mountain summit, 8 July 2000, A. Aptroot 48670 (ABL); New Territories, Tai Po Kau, near Nature Trail, c. 150 m, on tree in c. 10 m tall, open, secondary forest on slope, 9 July 2000, H. Sipman & A. Aptroot 45146 (B); id., Tai Mo Shan, 800 m, on mountain slope on granite, June 1998, A. Aptroot 43582 (ABL).

Taiwan: Taichung County, 22 km E of Tungshi, Tahsuehshan Forest Recreation Area, near entrance, 1500 m, on *Cryptomeria*, 8 Oct. 2001, A. Aptroot 51507 (ABL); Nantou County, 45 km WNW of Hualien, Meifeng, around field centre, 2000–2100 m, on *Cryptomeria*, 9 Oct. 2001, A. Aptroot 51509 (ABL); Taipei County, Yangmingshan National Park, wayside trees in village of Miaopu, 400 m, on *Liquidambar*, 23 Oct. 2001, A. Aptroot 53662 (ABL); Hualien County, 43 km WNW of Hualien, Meifeng, 2250 m, roadside with relict mature trees, on *Striina colesii*, 11 Oct. 2001, A. Aptroot 52496 (ABL).

Lepraria caesioalba (Bouly de Lesd.) J.R.Laundon

TLC: atranorin, angardianic acid, and protocetraric acid with or without fumarprotocetraric or psoromic acids (identified by H. Kümmerling and C. Leuckert).

Notes: This species is usually not distinctly lobed, therefore few specimens were examined. However, some available specimens show vaguely lobed margins. Under the binocular the lobes appear dentate-lacerate, not clearly rounded, and without rim.

The available tropical collections are all from above 3500 m. Outside the tropics, this species is widespread at lower elevations.

Investigated specimens (all tested by TLC):

Papua New Guinea: Simbu, Mount Wilhelm, Pindaunde valley. Along track to the summit, c. 4250 m, 7 Aug. 1992, H. Sipman 35785 (B).

Australia: Australian Capital Territory, Mt. Bimberi, Bimberi Range, 49 km SW of Canberra, 1900 m, 11 Dec. 1979, H. Streimann 9738 (B).

Colombia: Boyacá, Páramo de la Rusia, NW-N of Duitama, Aislada, 3590 m, 6 Dec. 1972, A.M. Cleef 6768b (B). Caldas, Nevado del Ruiz, SW-side, track to Laguna de Otun, c. 3 km SW of Ruiz, ca. 4300 m, 4 Feb. 1979, H. Sipman & H. Valencia 10584 (B).

Peru: La Paz, prov. Murillo, Valle del Zongo, 4500 m, 27 Aug. 1988, S. Stab LB154 (B).

Lepraria coriensis (Hue) Sipman **comb. nov.** (fig. 3)

Basionym: *Crocynia coriensis* Hue, Bull. Soc. Bot. France 71: 386 (1924). *Lecanora coriensis* (Hue) J.R.Laundon, Nova Hedwigia 76: 97 (2003).

Chemistry (TLC of No. 45074, 48553, 43637, 53354 and 53043): major substances usnic acid and zeorin, with minor spots and traces of terpenoids, xanthenes and other unidentified substances.

Notes: The chemical composition of *Lepraria coriensis* is similar to that of *Lecanora leuckertiana* and *Lepraria usnica*. The first species lacks lobes and has a completely leprose surface. It is morphologically very similar to *Lepraria incana* (L.) Ach. The second species has very tiny lobes (microsquamules), rarely over 0.2 mm wide, and its surface is completely granular to leprose.



Fig. 3. *Lepraria coriensis*, specimen from Hong Kong [Sipman 45146 (B)], showing thallus with rounded marginal lobes with raised rims. Scale = 3 mm.

Morphologically *L. coriensis* is most similar to *L. sipmaniana* by the largely flat thallus surface with few granules (cf. fig. 1B in ORANGE et al. 2001a). This species differs clearly by its dibenzofuran chemistry.

Specimen 53043 is aberrant because of its narrow lobes which often lack a raised marginal rim. It is also the only specimen with hairy granules (with projecting hyphae).

The material cited by APTROOT & SEAWARD (1999) as *Leproloma membranaceum* from Hong Kong belongs mostly here.

LAUNDON (2003, sub *Lecanora coriensis*) was the first to present chemical information on this species and reported it from India, China (Hong Kong), Corea and Australia. Our available material is from seemingly natural exposures of hard, siliceous rock, granite and conglomerate, from sea level to 500 m elevation, where it grows on steep, rather sheltered faces. The situation of some localities near large conurbations suggests that the species is fairly resistant against environmental disturbance.

Additional investigated specimens (all tested by TLC):

China: Hong Kong: Hong Kong Island, Victoria Peak, 500 m, in mountain forest on granite, June 1998, A. Aptroot 43637 (ABL); id., Shek O Beach, 1–50 m, in coastal area on exposed granite, June 1998, A. Aptroot 43196 (ABL).

Taiwan: Pingtung County, Kenting, near Frog Rock, 0–1 m, on conglomeratic rock, 18 Oct. 2001, A. Aptroot 53354 (ABL); id., 45 km SE of Kaohsiung, near Fangshan, rock outcrops, 20 m, on conglomeratic rock, 16 Oct. 2001, A. Aptroot 53043 (ABL); Nantou County, 25 km ENE of Puli, Lushan, 1300 m, roadside, on shale, 13 Oct. 2001, A. Aptroot 52998 (ABL); Taichung County, 15 km E of Taichung, 450 m, citrus garden, on sandstone, 7 Oct. 2001, A. Aptroot 51714 (ABL); id., 30 km E of Taichung, 5 km W of Kukwan, 700 m, along the road, on shale, 20 Oct. 2001, A. Aptroot 53529 (ABL).

***Lepraria impossibilis* Sipman spec. nov.**

Diagnosis: A *Lepraria atrotomentosa* simile differt acido lecanorico et acido pannarico-6-methylestro continente.

Type: EL SALVADOR, Depto. Ahuachapán: P. N. El Imposible, sector La Campana; between Rotulo de los Piramides and Cerro El Bonete, alt. 1150 m, primary forest on N-slope of ridge, on Chaperno (*Lonchocarpus*) tree trunk 40 cm diam., 11 Nov. 1988, H. Sipman, E. Sandoval & R. Welz 44851 (B holotype; LAGU isotype).

Thallus crustose, eventually several cm in diam., c. 0.1 mm thick, continuous, closely applied to the substrate or with raised lobe tips, greenish grey; upper side granular, smooth towards the margins, with c. 0.1 mm wide, ecorticate granules which may become detached and soredium-like, and which have a smooth surface; margins lobate, with c. 1 mm wide and long lobes with raised marginal rim; medulla white, thin; prothallus present, grey, visible below upturned marginal lobes; photobiont *Trebouxia*-like, composed of spherical cells c. 7–10 µm in diam.; hyphae c. 2.5 µm thick, densely branched, prothallus hyphae c. 3 µm thick and scarcely branched.

Chemistry: (TLC) atranorin (trace), lecanoric acid, pannaric acid-6-methylester.

Distribution and ecology: So far known only from the type specimen, from El Salvador, Central America. It grew in a primary montane forest remnant on a thick trunk.

Note: This species is morphologically indistinguishable from some specimens of *Lepraria atrotomentosa*, but differs significantly by the presence of pannaric acid-6-methylester and absence of zeorin and fatty acids. This chemistry places the species between *L. atrotomentosa* and *Lepraria* sensu LAUNDON (1989), and is in support of the decision of KUKWA (2002) to unite both genera.

***Lepraria lobificans* Nyl. (fig. 4)**

TLC: atranorin, zeorin, stictic, constictic, cryptostictic acids, unidentified traces. Nrs. 44921 and 44817 contain additionally a trace of norstictic acid.

Notes: The investigated specimens have a granular surface, like *L. atrotomentosa* and *L. pallida*. All specimens (except No. 45150) have a very conspicuous white medulla, to about 1 mm thick. Marginal lobes are not very prominent. They are narrow, not rounded and mostly without raised rim. Where the lower side is free from the substrate, a pale brown hypothallus becomes visible.

No. 45150 deviates by its abundant marginal lobes and thin medulla. Thus it resembles *L. atrotomentosa*, from which it differs clearly in chemistry and in the absence of exposed, dark-grey hypothallus (fig. 4).

The material suggests that the species is widespread in the tropics, at mid-elevations, on various, often man-influenced substrates.

Investigated specimens (all tested by TLC):

Cuba: Santiago de Cuba: Monte Kentucky, c. 5 km SE of La Gran Piedra, pine woods and moist hardwoods along trail, c. 1000 m, on rock, 5 April 1982, R. C. Harris 14420 (ABL).

El Salvador: Ahuachapán: P. N. El Imposible, sector La Fincona; between La Fincona and Paso El Imposible, Plan La Trepadora, c. 800 m, mossy, shady road bank, 12 Nov. 1999, H. Sipman & J. Bohnke 44921 (B, LAGU); id., sector La Campana; cerca del Mirador del Puma, 1350 m, primary forest relic, to 10 m tall, epiphyte on tree trunk, 10 Nov. 1998, H. Sipman, E. Sandoval & R. Welz 44817 (B, LAGU).

Brazil: Minas Gerais: Munip. Catas Altas, Serra do Caraça, close near Caraça monastery, c. 1300 m, on sheltered stone wall, 18 Sept. 1997, H. Sipman 40798 (B).

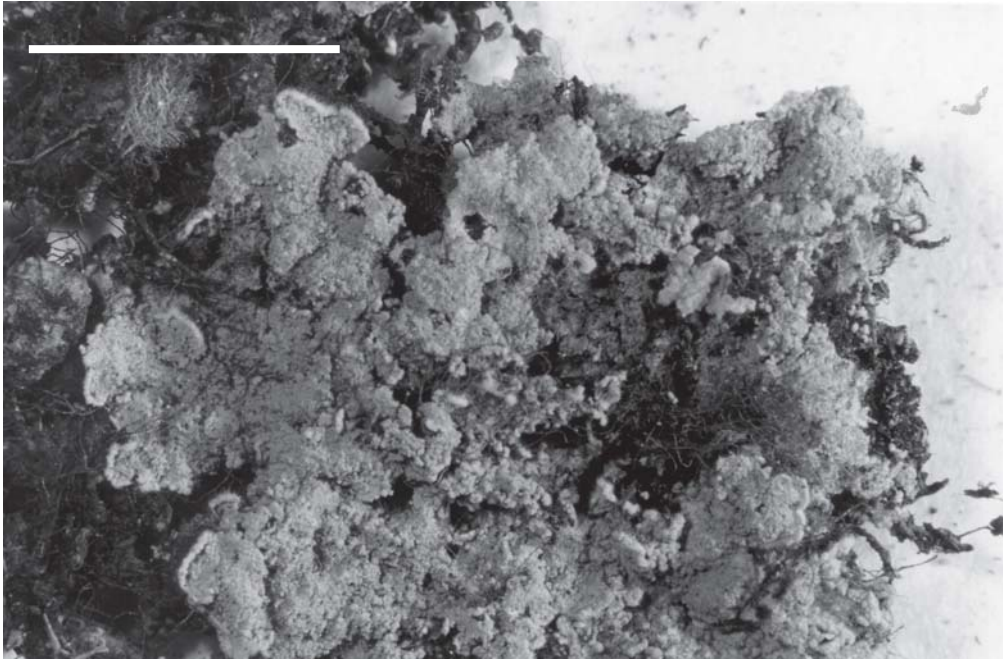


Fig. 4: *Lobaria lobificans*, unusual specimen with thin thallus and rounded lobes, from Hong Kong [Sipman 45150 (B)]. Scale = 3 mm.

Madagascar: Ambohidratrimo, 15 km NW of Antananarive, 1300 m, on loamy roadside, 8 May 1984, A. Aptroot & R. Hensen 13014 (ABL).

China: Hong Kong: New Territories, Tai Po Kau, near Nature Trail, 150 m, on tree in c. 10 m tall, open, secondary forest on slope, 9 July 2000, H. Sipman & A. Aptroot 45150 (B).

Papua New Guinea: Central Province: c. 22 km E of Port Moresby, Varirata National Park, near Headquarters, c. 800 m, dry forest remnants and conglomerate rock outcrops in clearing along stream, on conglomerate rock, 23 Oct. 1995, A. Aptroot 39675 (ABL).

***Lepraria nivalis* J.R.Laundon (fig. 1)**

TLC: roccellic and protocetraric acids.

Note: The available specimen is rather fragmented so that the lobe development could not be observed well. It seems to agree well with European material by its thick medulla and granular thallus. It deviates by the absence of atranorin. For the full range of chemical variation in this species, see LEUCKERT et al. (1995).

Investigated specimen (tested by TLC):

Papua New Guinea: Chimbu: Mount Wilhelm, SE-slope, 3900 m, on siliceous rock in alpine area, overhanging, March 1987, A. Aptroot 18416 (ABL).

***Lepraria pallida* Sipman spec. nov. (fig. 5)**

Diagnosis: *Lepraria marginibus rotundatolobatis*, granulis densis, atranorinum, zeorinum et substantias aliphaticas continens.

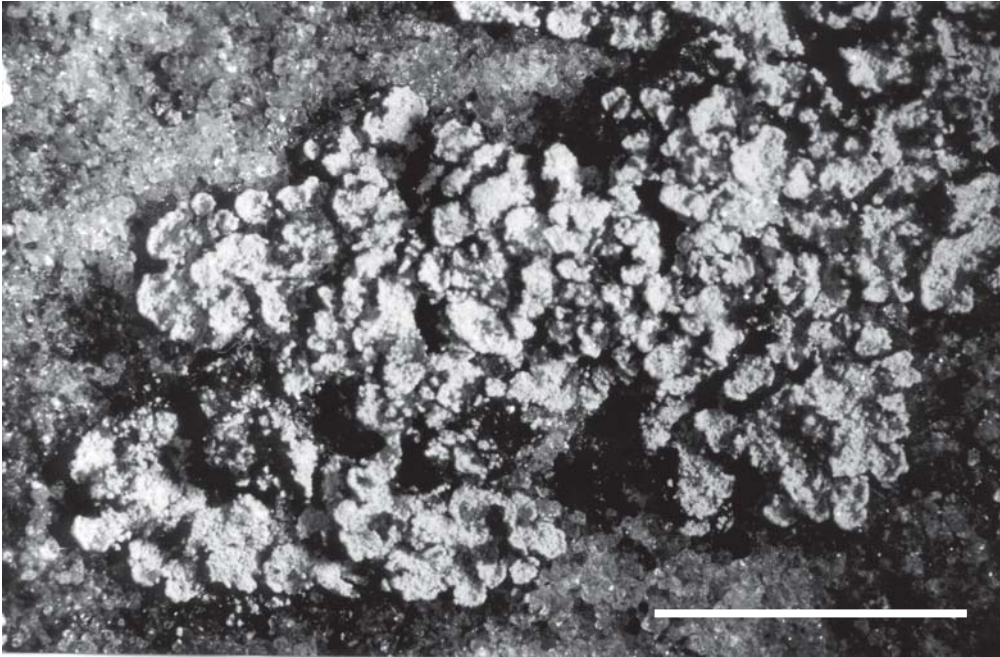


Fig. 5: *Lepraria pallida*, type specimen, showing rounded marginal lobes with raised rim and granulose surface. Scale = 3 mm.

Type: Brazil, Minas Gerais, Munip. Catas Altas. Serra do Caraça, c. 1 km E of Caraça monastery, Gruta de Lourdes, c. 1450 m, on vertical sandstone rock face in shallow cave, well-lit, 20 Sept. 1997, H. Sipman 40945 (B holotype; SP isotype).

Thallus crustose, eventually several cm in diam., c. 0.1 mm thick, continuous, closely appressed to the substrate or with raised lobe tips, pale grey with a slight bluish tinge; upper side granular, smoothening towards the margins, with c. 0.1 mm wide, ecorticate granules which may become detached and soredium-like, and have a smooth surface; margins lobate, with c. (0.3–)0.5–2.0 mm wide and long lobes, with raised marginal rim except in the smallest lobes; medulla white, thin; prothallus well developed, grey; photobiont *Trebouxia*-like, composed of spherical cells 10–12 μm diam.; hyphae c. 3 μm thick, densely branched, prothallus hyphae ca. 4 μm thick and scarcely branched.

Chemistry: (TLC) major substances atranorin and zeorin, with unidentified fatty acids and traces of other unidentified substances.

Distribution and ecology: So far known from three specimens, from Brazil, the Seychelles and Madagascar, at 950–1450 m. One specimen is from a vertical sandstone face, the other two from tree bark.

Notes: *Lepraria pallida* is morphologically similar to *L. atrotomentosa*. Available specimens from Hong Kong and Taiwan show that the latter species can be more strongly lobed than the original publication (ORANGE et al. 2001a) suggests. The main difference is in the absence of lecanoric acid in *L. pallida*. An additional difference seems to be in the fatty acid content, but this needs further study. However, for the time being it can be assumed that there are at least two chemical differences and that the taxon merits species rank. Also similar is *L. impossibilis*,

which deviates by the presence of both lecanoric acid and pannaric acid-6-methylester. The TLC plates show several fatty acid spots, which do not seem to be constantly present. It is unclear if any of them corresponds to the fatty acids found in other *Lepraria* species. Morphologically the available material is variable, the Brazilian material being composed of small, discrete, rounded lobes with raised rims, the other specimens being poorly lobed without raised rims. This morphological variation is similar to that found in *L. atrotomentosa*.

Additional specimens (all tested by TLC):

Madagascar: Perinet=Andasibe: prov. Tamatave, primary tropical mountain forest, 950 m, 10 May 1984, A. Aptroot & R. Hensen 13357 (ABL).

Seychelles: Mont Sebert, Mahé, 1. Aug. 2002, J. Gerlach s.n. (hb. Seaward).

Lepraria sipmaniana (Kümmerl. & Leuckert) Kukwa

TLC: pannaric acid-6-methylester, oxypannaric acid-6-methylester.

Notes: The available specimens are morphologically similar to *Lecanora coriensis* by their prominent lobes and smooth surface with scarce granules. They differ clearly in chemistry and by their more intensely yellow colour.

The Taiwan specimen means a considerable range extension, as the species was so far known from South America, Africa and Sri Lanka (ORANGE et al. 2001a). Apparently it is pantropical.

Investigated specimens (all tested by TLC):

Brazil: Minas Gerais: Catas Altas, Serra do Caraça, Parque Natural do Caraça, near monastery Santuario do Caraça, c. 1300 m, on tree, 15–21 Sept. 1997, A. Aptroot 40836 (ABL).

El Salvador: Ahuachapán: P. N. El Imposible, sector La Fincona; between La Fincona and Paso El Imposible, along road near Paso El Imposible, c. 800 m, on well-lit boulder along the road, 8 Nov. 1998, H. Sipman, E. Sandoval & R. Welz 44720 (B, LAGU).

Taiwan: Nantou County, 15 km ENE of Puli, near Wishe, river gorge, 950 m, on soil, 9 Oct. 2001, A. Aptroot 51508 (ABL).

Venezuela: Merida: Straße zwischen Merida und Carbonera, bei Alto del Manzado, 1600 m, 18 Jan. 1979, V. Wirth 20093 (STU) (TLC by M. Heklau & V. Wirth).

Lepraria usnica Sipman (fig. 6)

TLC: usnic acid, zeorin, unidentified traces.

Note: The new records listed below show that the species occurs also in Africa and the New World, sometimes in rather dry areas.

Investigated specimens, additional to SIPMAN (2003) (all tested by TLC):

Colombia: Risaralda: Mnpio. de Santuario, carretera desde Santuario a Los Planes, 2000 m, selva andina de roble, epífita sobre *Quercus humboldtii*, Oct.-Dec. 1989, J. Wolf et al. 5214a (ABL).

El Salvador: Ahuachapán: P. N. El Imposible, sector La Fincona; between La Fincona and Paso El Imposible, Plan La Trepadora, c. 800 m, road bank, 12 Nov. 1999, H. Sipman & J. Bohnke 44927 (B, LAGU).

Namibia: Okakaruru, Waterberg-Plateau, W of Onjoko, 1600 m, *Terminalia sericea-Croton gratissimum-Burkea* woodland, sandstone outcrops, 16 Feb. 1989, V. Wirth & D. Wessels 18339 (STU).

Panama: Panama, Ciudad de Panama, Barrio de San Felipe, Iglesia de La Merced, sobre roca en la fachada de la Iglesia, 30 Aug. 2002, N. Salazar Allen & J. C. Villareal A. 20771 (B).

Seychelles: La Digue, Westküste: La Reunion, am Weg nach Bellevue, c. 100–150 m, 18 Sept. 1999, M. Heklau s.n.(STU); Praslin, am Weg von der Anse Boudin zum Grand Fond, c. 150–200 m, 16 Sept. 1999, M. Heklau s.n.(STU); Mahé, Beau Vallon, Bel Ombre, am Weg zur Anse Major, c. 50–100 m, 21 Sept. 1999, M. Heklau s.n.(STU); La Passe, above round roots of Cocos, 25 July 2000, M.R.D. Seaward 023 (hb. Seaward 109816); Bel Air, Mahé, on granite, 5 March 1994, T. Feuerer 60575 (hb. Seaward).

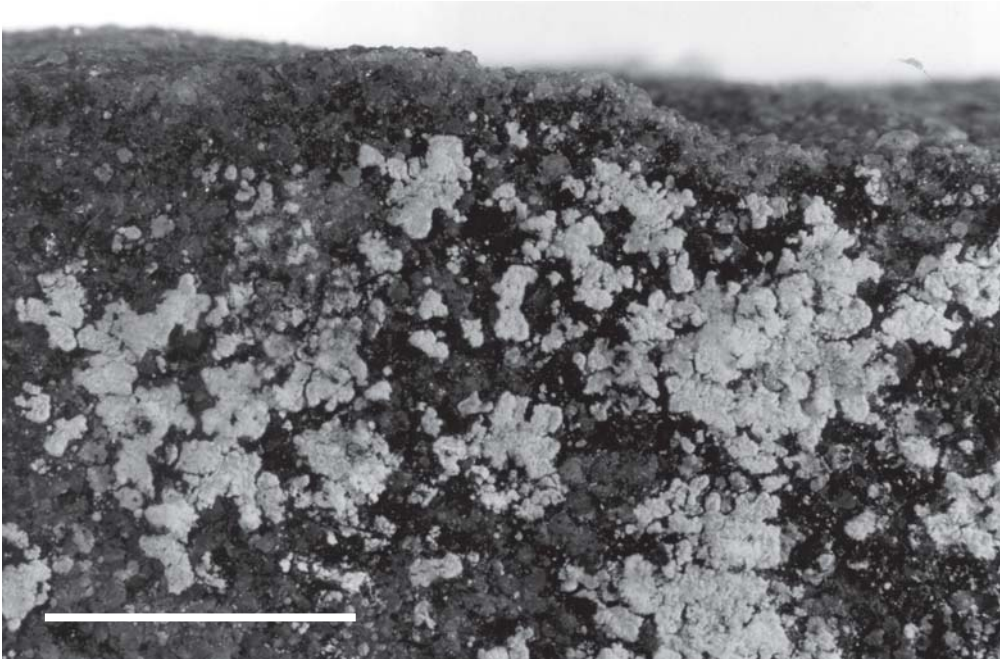


Fig. 6: *Lepraria usnica*, specimen from Australia [Streimann 39507 (B)], showing scattered microlobes with raised rim, and granulose patches, where the thallus is more concentrated. Scale = 3 mm.

South Africa: Transvaal, distr. Pilgrims Rest, Treur River near Bourkes Luck, 1400 m, sandstone rock outcrops in steep grassland slope, 14 Jan. 1986, V. Wirth 17985 (STU).

Sri Lanka: Uva, Badulla distr., Badulla, Ella, beim Resthouse, Wegböschung, 1 June 1997, M. Heklau s.n. (STU).

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