Lepraria larrainiana (Stereocaulaceae, Lichenized Ascomycetes), a new species from Central Chile

Lepraria larrainiana (Stereocaulaceae, Ascomycetes Liquenizado), una nueva especie de Chile central

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RESUMEN

Lepraria larrainiana se describe como nueva para la ciencia basada en colecciones de una única localidad en la costa de Chile central. La especie crece en dunas de arena estabilizadas y se caracteriza por la alta concentración de los compuestos secundarios strepsilina y ácido lecanórico.

After having been neglected for more than two centuries the sterile lichen genus *Lepraria* Ach. has become subject of considerable study in recent years (see summary in Saag *et al.* 2009). Much of this work has focused on the members of the genus occurring in North and South America where new species continue to be described and reported at a remarkable rate (Sipman 2004, Kukwa 2006, Flakus & Kukwa 2007, Knudsen *et al.* 2007, Lendemer 2007, 2008; 2010 Lendemer & Harris 2007, Tønsberg 2007, Lendemer *et al*. 2008, Kukwa & Flakus 2009, Pérez-Ortega & Spribille 2009).

In early 2009 I had the opportunity to spend a month collecting *Lepraria* in central Chile in conjunction with my dissertation studies of the genus *Lepraria s.l.* in North America. One of the localities visited as part of this fieldwork was a beach with stabilized sand dunes and large rock outcrops directly exposed to the Pacific Ocean in Ñuble Province, VIII Región of Bío-Bío. Among the lichens collected at this locality was an unusual species of *Lepraria* that upon further study proved to be new to science. It is here described as *L. larrainiana*.

This study is based on material collected by the author during fieldwork in central Chile conducted in April, 2009 and deposited in the herbaria of The New York Botanical Garden (NY) and the Universidad de Concepción (CONC). The methodology used in the present study follows that described in detail by Lendemer *et al*. (2008) with the SEM methods as corrected by Lendemer & Elix (2010). Morphological terminology follows Lendemer *et al*. (2010).

Lepraria larrainiana Lendemer *sp. nov*.
Mycobank #518329.
Sicut *Lepraria xerophila* sed acidum strepsilinicum et acidum lecanoricum continente differt.

TYPE: CHILE. VIII Región del Bío-Bío. Ñuble Prov.: Rada de Buchupureo, N end of Buchupureo, vicinity of Iglesia de Piedra, ~12.07 km N of Cobquecura, elev. 0-10 m, 36º 05' S 72º 48' W, black sand beach with extensive volcanic remnants (cool shaded S-faces, hot sunny N-faces, sea caves), bromeliads dominant, on stabilized soil of dune, 6-IV-2009, J.C. Lendemer 15936 & A. Moroz (holotype: CONC!; isotype: NY!).

Description. Thallus crustose, granulose-leprose, marginally lobate, continuous and distinctly bi-layered, initially beginning as isolated granules that open apically to form small discrete flat circular thalli (0.3-0.5 mm thick) which expand marginally, overlap, and becoming confluent to form a thick crust (up to 1.0 mm thick), off-white to dirty brownish in color; hypothallus white, a compact paraplectenchymatous layer of densely intertwined hyphae, variable in thickness (up to 0.2 mm), with the lowermost portions often dirty brown where the hyphae attach to the substrate; hyphae hyaline, 4-6 µm wide, thick walled, septate, often branching at the septa, densely coated with coarse crystals of probably calcium oxalate (POL+, not dissolving in K); rhizohyphae absent; granules large, 400-500 µm in diameter, with a thick well developed pseudocortex (10-15 µm thick) of heavily

gelatinized irregularly arranged hyphae, and large algal core of consisting of >10 photobiont cells, at first apically "opening", then flattening and expanding marginally with new granules fragmenting and cleaving off from the upper surface; photobiont chlorococcoid, green, cells globose, 11-15(-18) µm in diameter.

Chemistry. Strepsilin (pseudocortex/outer gelatinized layers of the thallus), lecanoric acid (internal portions of the thallus). Spot tests: pseudocortex, K-, C+ green, KC-, P-, UV-; internal portions of the thallus, K-, C+ red, KC+ red, P-, UV-.

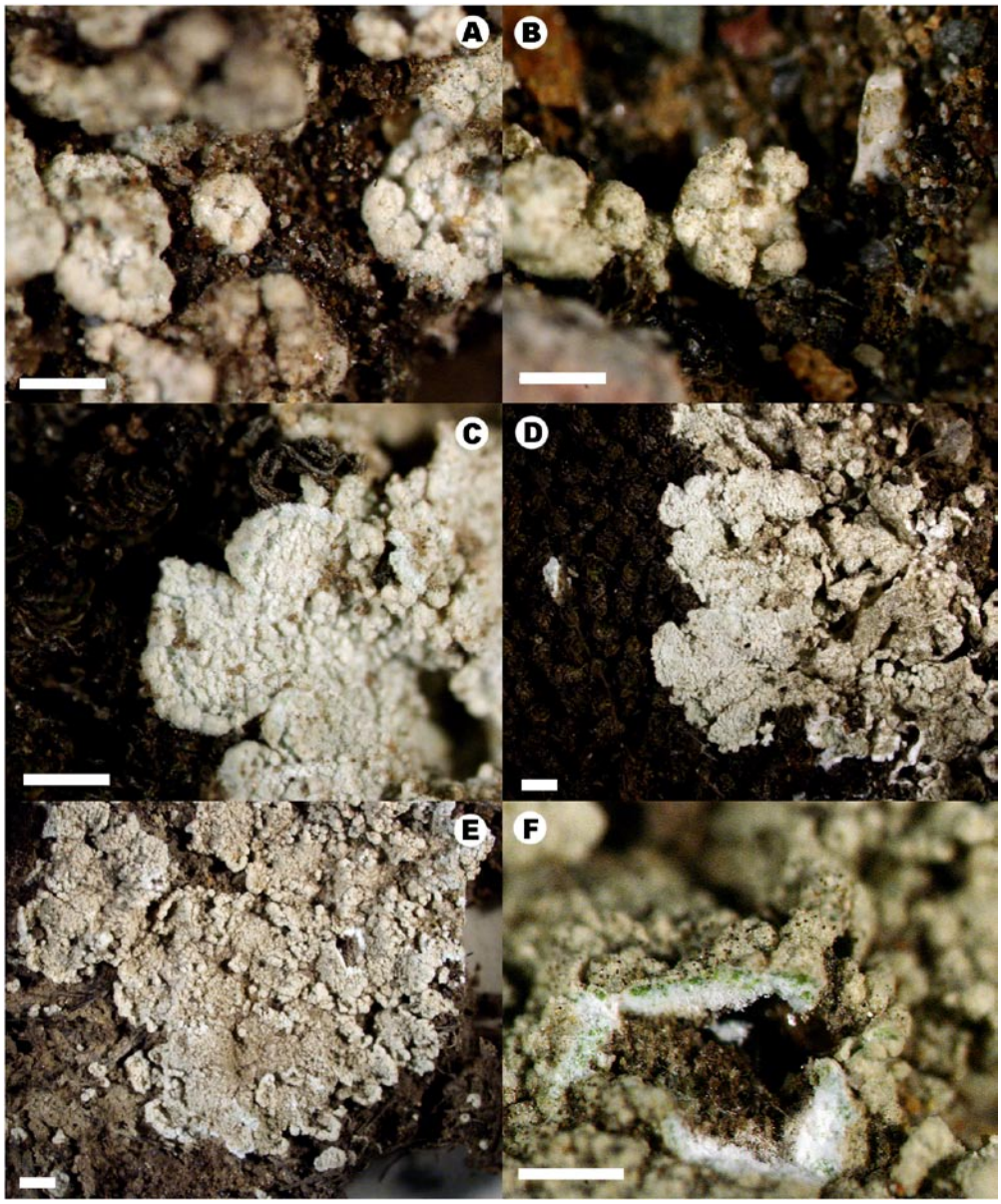

Figure 1. *Lepraria larrainiana* (all from holotype). A, young granule in the early stages of opening (scale = 0.5 mm). B, granule in later stages of opening (scale = 0.5 mm). C, detail of thallus margin (scale = 0.5 mm). D, lower magnification of thallus margin (scale = 1.0 mm). E, gross morphology of well developed thallus (scale = 1.0 mm). F, section of thallus illustrated in E showing well developed pseudocortex with alga concentrated near the upper surface.

Figura 1. *Lepraria larrainiana* (imágenes del holotipo). A, gránulo joven en las primeras etapas de apertura (escala = 0.5 mm). B, gránulo en las etapas finales de apertura (escala = 0.5 mm). C, detalle del margen del talo (escala = 0.5 mm). D, margen del talo a menor aumento (escala = 1.0 mm). E, vista general de un talo bien desarrollado (escala = 1.0 mm). F, sección del talo ilustrado en E mostrando un pseudocortex bien desarrollado con algas concentradas cerca de la superficie superior.

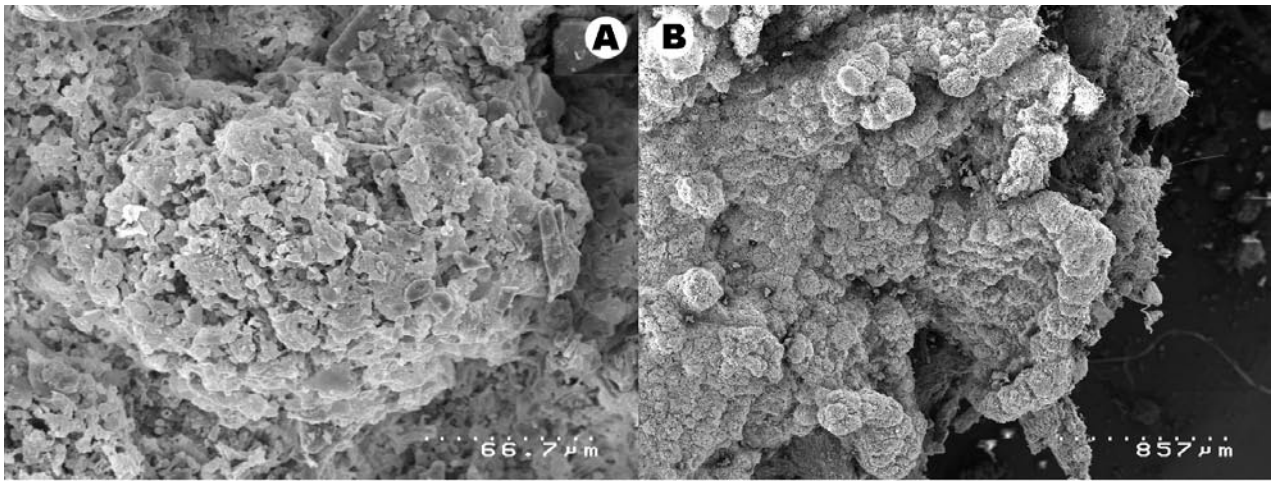

Figure 2. Scanning electron micrographs of *Lepraria larrainiana* (both from holotype). A, detail of upper surface of thallus showing gelatinized pseudocortex. B, gross morphology of thallus with granules developing from the upper surface (left and top-middle) and distinct "crisped" margin (lower right).

Figura 2. Fotografías al microscopio electrónico de barrido de *Lepraria larrainiana* (ambas del holotipo). A, detalle de la superficie superior del talo mostrando el pseudocortex gelatinizado. B, morfología general del talo con desarrollo de gránulos en la superficie superior (a la izquierda y la zona superior central) y márgenes "crispados" definidos (inferior derecha).

Etymology. The epithet "larrainiana" honors Juan Larraín B. (b. 1979) a bryologist in Concepcion who aided the author in his fieldwork in central Chile.

Ecology and distribution. The new species is presently known only from the type locality, where it is locally abundant growing over mosses and sandy soil over rock and stabilized sand dunes. Further study is urgently needed to determine if it is more widespread along the coast in the region. However considering the restricted distributions of other terricolous *Lepraria* species in coastal Europe, Macaronesia, and western North America it may be a regional endemic with a narrow distribution. If this is the case it is likely threatened by anthropogenic change and disturbance as the region is actively being developed.

Discussion. *Lepraria larrainiana* is morphologically similar to several species that occur on soil in regions with a Mediterranean climate in Europe and North America. In fact the development of the thallus is almost identical to that described by Tretiach *et al*. (2009) for *L. isidiata* (Llimona) Llimona & A.Crespo and *L. santosii* Argüello & A.Crespo. None of these taxa have been reported from South America and all of them can easily be distinguished from the new species by their chemistries using the key below. It is possible that *L. larrainiana* is related to *L. goughensis* Elix & Øvstedal, which is the only other species presently known to produce lecanoric acid and strepsilin (Elix *et al*. 2005). That species, which is known only from Gough Island in the South Atlantic, differs chemically in producing anthraquinone pigments in the thallus and strepsilin only as a minor accessory to lecanoric acid (thus the thallus is not C+ green). It also differs morphologically in having smaller granules (20-26 µm in diameter) that lack a well developed pseudocortex and instead have numerous projecting hyphae.

Additional specimens examined: CHILE. VIII Región del Bío-Bío. Ñuble Prov.: data as for the type, J.C. Lendemer 15934 & A. Moroz (NY!), J.C. Lendemer 15937 & A. Moroz (CONC!, NY!).

Key to the terricolous "lobate" species of *Lepraria*

1. Spot tests of two types, thallus externally C+ green (strepsilin), internally C+ red (lecanoric acid)……..***L. larrainiana***
1'. Spot tests uniform throughout thallus; thallus C- or C+ red…….....……...…2
2. Thallus with dibenzofurans, C-, P-……..……..…….....……...3
3. Granules indistinct merging to form well developed pseudocortex; thallus robust with erect squamule or isidium-like structures…….....***L. xerophila*** Tønsberg
3'. Granules distinct, without a well developed pseudocortex; thallus thinner and without the above structures…….....……4

4. Thallus with distinct marginal lobes; anthraquinone pigments present ……...…….....
.....……..***L. sipmaniana*** (Kümmerl. & Leuckert) Kukwa
4'. Thallus without distinct marginal lobes; anthraquinones rarely present …….....
.....***L. vouauxii*** (Hue) R.C. Harris
2'. Thallus without dibenzofurans, C+ red or P+ orange-red…….....…..5
5. Thallus C+ red (lecanoric acid present in addition to atranorin and roccellic/angardianic acid), P- (fumar/protocetraric or stictic acid absent)…….....……***L.* sp**.
5'. Thallus C- (lecanoric acid absent), P+ orange-red (fumar/protocetraric or stictic acid present) ……..…….....6
6. Typically on calcareous soils; fumar/protocetraric acids present……..…….……...***L. isidiata***
6. Typically on non-calcareous soils; stictic acid or fumar/protocetraric acid present……..…...***L. santosii***

ACKNOWLEDGEMENTS

Thanks to Juan Larraín for his help facilitating my fieldwork and to the herbarium CONC for the shipment of specimens. Mike Baxter is thanked for his help with the SEM.

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Recibido: 18.03.10
Aceptado: 27.04.10