Leucoloma crosbyi (Dicranaceae), a New Species Endemic to Northern Madagascar

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ABSTRACT. *Leucoloma crosbyi*, a new species from northern Madagascar, is described, resulting from a revision of the pantropical genus. Diagnostic characters include: robust habit; narrow, opaque, juxtacostal bands tapering to basal region; costal-laminal transition zone with 2–9 multi- to bistratose rows; interior cells forming broad scarious region; narrow hyaline margin; and longitudinally thick-walled alar cells. It is most closely related to *L. grandidieri* Ren. & Card. and has been confused with *L. talazaccii* Ren. & Card.

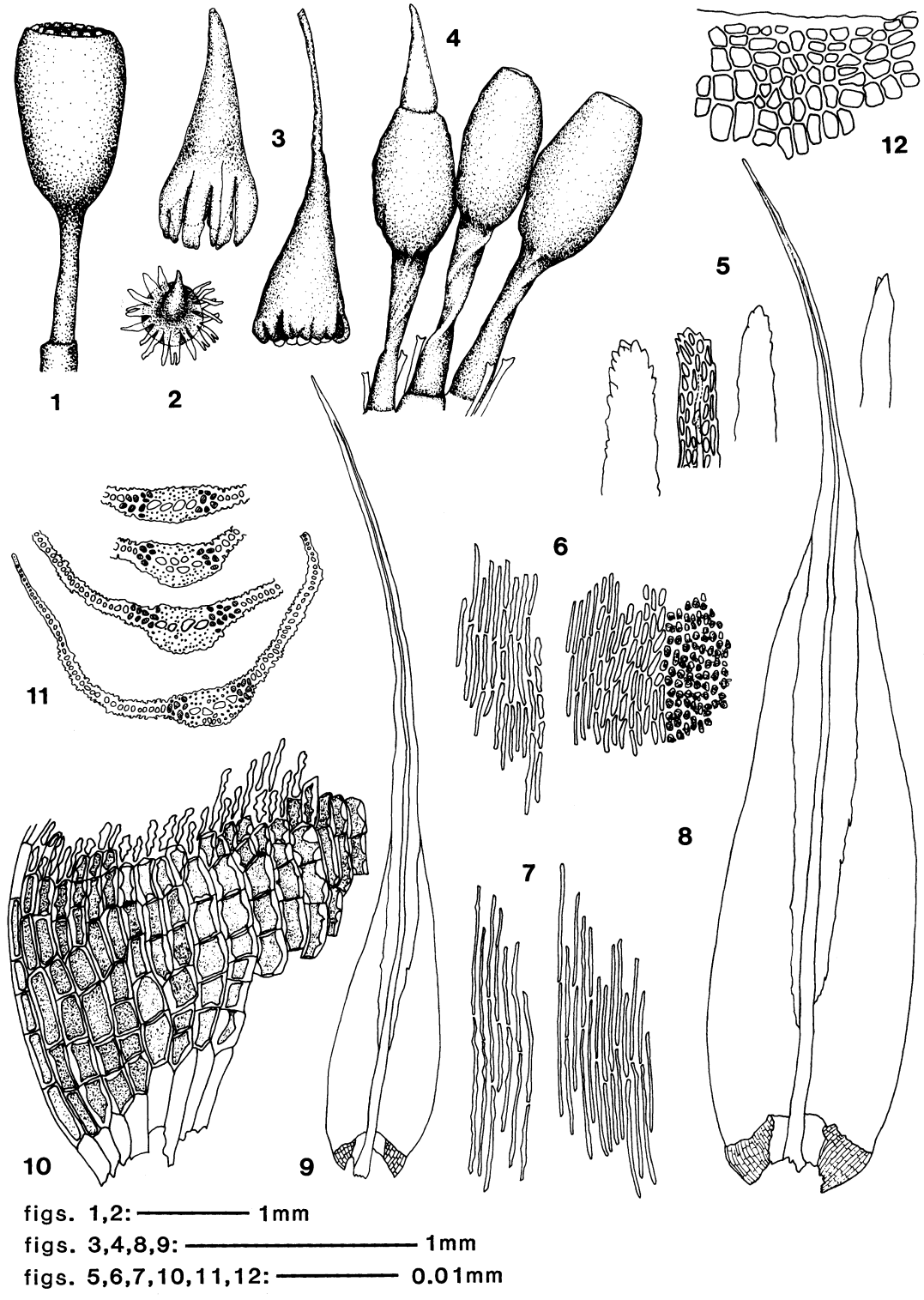
Ferdinand Renauld published *Essai sur les Leucolomas* in 1909, the first and only comprehensive treatment of *Leucoloma*, enumerating 131 species for the world. Renauld & Cardot (1915) produced *Les Mousses de Madagascar*, which described 38 species of *Leucoloma* for Madagascar. Crosby et al. (1983) listed 51 species for Madagascar and nearby islands, based on available literature. From current revisionary work on the genus, collections from Montagne d'Ambre by Crosby in 1972 have resulted in the description of a distinct taxon, *Leucoloma crosbyi* LaFarge-England.

Leucoloma is a large pantropical genus that has a strong center of diversity in the rainforests of east Africa, Madagascar, and surrounding islands. Specific endemism for this region is 94 percent. The revision of the genus is expected to modify this figure, though rates of endemism should remain high for this region. The species described below supports this view.

Leucoloma crosbyi LaFarge-England, sp. nov. TYPE: Madagascar. Diego Suarez: Montagne d'Ambre, Parc National, 10 km along trail between Petit Lac and Grand Lac, 12°34′S, 49°12′E, 13 Nov. 1972, 1,200 m, *Crosby & Crosby 7167* (holotype, MO; isotype, ALTA). Figures 1–12.

Dioicous. Plantae robustae, pallide vel glauco-virides ad 5 cm altae. Folia longa et flexuosa. Cellulae juxtacostales papillosae densissimae obscurae in vittis utrinque ⅘ distalis costae latere dispositae. Latibasis scariosa sensim angustata versus marginem hyalinam. Cellulae alares planae, rufo-fuscae, scalariformes. Setae 1.0–2.0 mm longae. Capsulae 0.9–1.5 mm longae, ovales ad oblongae, erectae, immersae. Dentes peristomii quasi ad basim divisi. Calyptrae mitratae. Species haec ab *Leucoloma grandidieri* Ren. et Card. differt vix rugosis laminis et foliis longioribus, costa latiore et vittis cellularum juxtacostalium papillosarum versus basim angustioribus.

Dioicous. Plants robust, erect to spreading, pale to glaucous green or tan to light-brown, forming loose tufts up to 5 cm tall. *Stems* red, nontomentous, elliptic in transverse section (0.36–0.32 mm long by 0.31–0.24 mm wide), central strand lacking, outer 3–5 layers of red-brown, thick-walled cortical cells with smaller lumen than the homogenous inner, yellow to tan walled cortical cells; stems densely leaved, unbranched or sympodially branched, fertile branches distally ramulose from subapical innovations below perichaetia or perigonia, 1 to several. *Rhizoids* smooth, red-brown, several to numerous at the base of stem or potentially deciduous branches encircling supporting axis. *Juvenile* leaves 0.3–3.0 mm long, ovate to ovate-lanceolate, apices shortly acuminate to acuminate, at base of each branch and stem. *Leaves* erect to wide spreading wet or dry, 4.0–6.5 mm long, 0.2–1.2 mm wide, narrowly ovate-lanceolate to lanceolate, plane to slightly concave below, not to slightly transversely rugose in medial region, tapering gradually to a long, subulate, subtubulous, nonrugose acumen; apices flexuose to slightly incurved when dry. Mean acumina to shoulder, shoulder to base ratio is 1 : 1.65. *Margins* plane, entire, with a distinct, narrow, hyaline border ranging from 1 to 2 cells at the base of the leaf, reaching a maximum width of 3–6 cells (9.6–16.8 μm wide) in the median region of the leaf, narrowing to a single cell in the upper region and ending below the apex; apex rounded or acute, serrulate to multiserrate. *Costa* 52.8–106.0 μm wide at base, subpercurrent, ending 3–6 cells below the apex, shiny, translucent; transverse section plano-convex to elliptic, 24.0–33.6 μm diam., with abaxial and adaxial stereids in 3–5 rows, guide cells 4–6 in a single row, sometimes double. *Juxtacostal cells* 4.8–12.0 μm long, 4.8–7.2 μm wide, irregularly quadrate



Figures 1–12. *Leucoloma crosbyi* LaFarge-England. —1. Mature capsule, *Crosby & Crosby 7167* (ALTA). —2. Operculum with fringed calyptra, *7167* (MO). —3. Calyptrae, *7167* (MO). —4. Polysetous perichaetium, immature capsules, *7167* (MO). —5. Mature leaf apicies, *7167* (MO, ALTA). —6. Medial interior and juxtacostal cells, *7167*

rounded to oblong, pluripapillose, with low multifid papillae on abaxial and adaxial surfaces, filling acumen and extending as narrow, opaque bands on either side of the costa, gradually tapering as a narrow V-shaped wedge in the lower ⅓ of lamina, bi- to multistratose in 2–6(–9) rows on either side of the costa, becoming unistratose toward the interior cells, occasionally with isolated, irregular, narrow bistratose bands, sharply delimited from smooth interior cells. *Interior cells* smooth, hyaline to brownish, nonchlorophyllose, thick-walled, forming a shiny, scarious membrane, extending from the base to the base of the acumen; *medial to upper* 24–72(–106) μm long, 6–7 μm wide, elongate to linear, nonporose to porose; *basal* (24–)36–132 μm long, 7–11 μm wide, elongate to linear, strongly porose. *Marginal cells* 168–204 μm long, 2–3 μm wide, narrowly linear, hyaline, smooth. *Alar cells* quadrate to rectangular, 12–72 μm long, 12–34 μm wide, in 11–17 seriate columns, cell lumen conspicuously granulose, longitudinal walls thick, ± nodose, scalariform, red-brown (sometimes hyaline), flat, sharply differentiated into a triangular to trapezoidal region, separated from the costa by a band of strongly nodose, elongate, yellow-brown cells. *Perichaetia* terminal, sessile. *Perichaetial leaves* 2–6 mm long, 0.75–1.1 mm wide, broadly ovate-lanceolate, sharply contracted to long, narrow, acuminate, aristate, flexuose apex; base clasping convolute, alar cells not differentiated; *basal* cells 36–60 μm long, 7–12 μm wide, elongate, strongly porose, yellow-brown to orange-brown; *medial* cells elongate, elliptic, somewhat inflated (enlarged), orange-brown in basal region; *margins* subentire at base, plane; *costa* 72–48 μm wide at base, single, excurrent. *Archegonia* 0.8–1.4 mm long, with necks 0.7–1.3 mm long, red-brown, ca. 20–28 per perichaetium; with numerous hyaline *paraphyses* 0.7–0.9 mm long. *Perigonia* terminal, sessile with 1–4 short subapical branchlets, each producing a terminal perigonium. *Perigonial leaves* 0.9–1.6 mm long, ovate with abruptly narrowing, short, acuminate apices, convolute; *basal* cells 36–84 μm long, 7–12 μm wide, elongate, yellow to yellow-orange, extending up into ⅔ of leaf; *medial* cells 24–67 μm long, 7–24 μm wide; *antheridia* 0.70–0.95 mm long, 0.10–0.15 mm wide, red-brown to yellow-brown, with numerous hyaline paraphyses, 0.60–0.95 mm long. *Sporophyte* single or polysetous (to

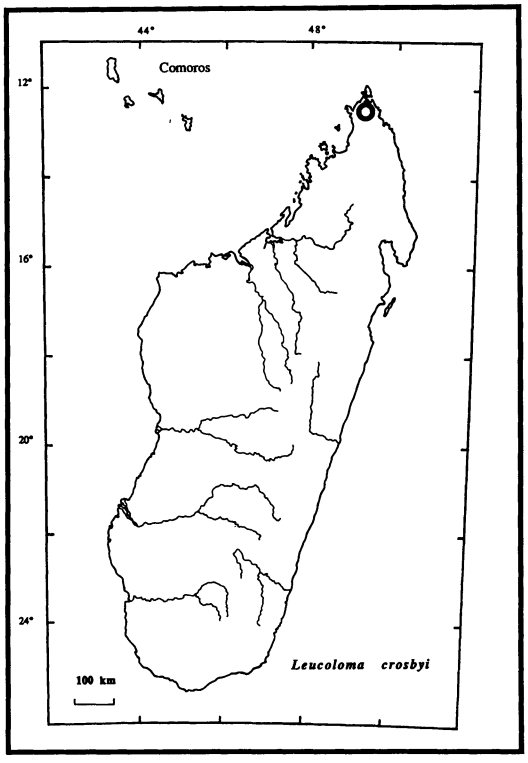


Figure 13. Distribution of *Leucoloma crosbyi*.

4 per perichaetium observed), immersed. *Seta* stout, short, 1.0–2.0 mm long, slightly twisted toward the right, somewhat flexuose, orange-tan, smooth. *Capsules* oval to oblong 0.9–1.5 mm long, 0.5–0.6 mm wide, stomates lacking, light brown to tan, annulus not differentiated; exothecial cells 19–60 μm long, 9.6–36.0 μm wide, rectangular to quadrate, becoming oblate just below rim. *Operculum* conic with flanged base. *Peristome* teeth 16, asymmetrical, bifid almost to ⅔ of length, bases commonly reflexed, distally erect, filiform (some capsules have incurved peristome), inserted well below rim, red-brown, differentially thickened on inner surface; primary peristomal layer with external surface smooth at base, medial portion roughened to papillose, papillose to striate-papillose distally; inner peristomal layer with internal surface smooth at base, papillose to papillose striate distally. *Calyptra* mitrate, broadly fringed to lobate (7–20 lobes), hyaline, pale yellow to tan be-

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(MO, ALTA). —7. Basal interior cells, *Crosby & Crosby 7170* (MO). —8. Mature stem leaf, *7170* (MO). —9. Juvenile leaf, *Crosby & Crosby 7034* (L). —10. Alar cells, *7170* (MO). —11. Costal cross section, *7304* (L), *7167* (MO). —12. Exothecial cells just below mouth, *7167* (ALTA).

low, orange-brown above, smooth to slightly roughened above. *Spores* 24–31 μm, finely granulate.

Paratypes. MADAGASCAR. DIEGO SUAREZ: Montagne d'Ambre, Parc National, 10 km along trail between Petit Lac and Grand Lac, 12°34′S, 49°12′E, 13 Nov. 1972, 1,200 m, *Crosby & Crosby 7170* (MO); 0–5 km along trail between Petit Lac and Grand Lac, 12°34′S, 49°12′E, 12 Nov. 1972, 900–1,100 m, *Crosby & Crosby 7304* (L).

Habitat. Corticolous, ramicolous, 900–1,200 m above sea level.

Leucoloma crosbyi is distinguished by its robust habit, with erect to wide spreading leaves with transparent, shiny laminae sharply differentiated from a narrow band of opaque, densely papillose juxtacostal cells gradually tapering to costa in the basal region, which are not to hardly rugose, with long flexuose acumina. The leaves are bordered by a very narrow, hyaline margin and have abruptly differentiated alar cells, which are longitudinally thick-walled, red-brown, arranged in 11–17 columns, forming a triangular to trapezoidal region. *Leucoloma crosbyi* is distinguished from *L. grandidieri* Ren. & Card. by its longer, stiffer, nonrugose leaves; opaque juxtacostal bands extending farther into the basal region of the leaf and gradually narrowed; laminal transverse section showing a greater number of bi- or multistratose rows between the costal and unistratose laminal cells. *Leucoloma grandidieri* has 1–2(–3) rows, and *L. crosbyi* has (2–)3–6(–9).

The known distributions of these two species are allopatric, *L. crosbyi* endemic to Montagne d'Ambre at the northern tip of Madagascar and *L. grandidieri* confined to the eastern central region. *Leucoloma crosbyi* is distinguished from *L. talazaccii* by its more robust habit, lack of caducous lower stems, larger leaves, longer interior cells, and well-developed, granulose, scalariform alar cells.

The leaves of *Leucoloma crosbyi* vary from smooth to slightly rugose in the medial opaque region, with flexuose to slightly incurved acumina. The apices vary from acute to rounded and toothed. The number of rows of bi- to multistratose cells between the costa and the unistratose lamina varies from 2 to 9. Isolated bistratose strips have been observed within the opaque bands, as well as the more common bistratose to multistratose transition between the costa and unistratose lamina.

Distribution. Leucoloma crosbyi is known only from Montagne d'Ambre, Province de Diego Suarez, Madagascar (Fig. 13). The distribution is based on four specimens, which form the type material for the new species.

Etymology. The species has been named *L. crosbyi* after Marshall R. Crosby, the collector of all the known specimens. His contribution of recent material from the 1970s, as well as the critical compilation of the bryological literature, has helped to establish a foundation for future bryological research in Madagascar.

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