

## New saxicolous species of *Hypotrachyna* and *Parmotrema* (*Parmeliaceae*) from Rwanda

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**Abstract:** The following new species of *Parmeliaceae* are described from Rwanda: *Hypotrachyna rwandensis* Elix, Eb. Fischer & Killmann and *Parmotrema afroctratum* Elix, Eb. Fischer & Killmann.

**Key words:** *Hypotrachyna*, lichenized Ascomycota, *Parmeliaceae*, *Parmotrema*, Rwanda

### Introduction

At present the lichen flora of Rwanda is poorly known. Despite the diverse landscape with a mosaic of montane rainforests, afroalpine vegetation and savanna, so far only 62 species have been recorded (Lindau 1914; Thell 2002). In 1996 Eberhard Fischer and Dorothee Killmann began an investigation of the lichen flora of Rwanda (Killmann & Fischer, in press) and collected specimens during 12 field trips to the region.

The genera *Hypotrachyna* and *Parmotrema* are among the most conspicuous taxa in tropical habitats. They are particularly diverse in all tropical and subtropical areas, with some species extending into temperate regions. Previously, only two species of *Hypotrachyna* and eight species of *Parmotrema* were known from Rwanda (Lambinon & Sérusiaux 1983, Sérusiaux 1984). Two additional species are described in the present paper.

### Material and Methods

The specimens were collected during a field trip to Rwanda in October 1999. The morphology of the

lichen specimens was examined using a Zeiss Stemi 2000C stereo microscope, and conidia and ascospores were studied using a Zeiss Axiolab compound microscope. Chemical constituents were identified by thin layer chromatography (Culberson 1972; Culberson *et al.* 1981; Culberson & Johnson 1982; Elix & Ernst-Russell 1993), high performance liquid chromatography (Elix *et al.* 2003) and by comparison with authentic samples.

### The New Species

#### *Hypotrachyna rwandensis* Elix, Eb. Fischer & Killmann sp. nov.

Thallus ut in *Hypotrachyna neodissecta* sed superficie lobulatis, lobis marginibus ciliatis, ascosporis majoribus et acidum 5-*O*-methylhiasicum continente differt.

Typus: Rwanda, Prov. Gikongoro, Rwasenkoko, 2350 m, on schistose rocks, 15 October 1999, E. Fischer s.n. (B—holotypus; CANB—isotypus).

(Fig. 1A)

*Thallus* foliose, corticolous, loosely adnate, 5–6 cm wide. *Lobes* sublinear, imbricate, 1–3.5 mm wide, flat to weakly convex, subdichotomously to trichotomously branched, margins entire, ciliate, cilia simple to dichotomously branched; apices subtruncate to subrotund. *Upper surface* pale grey to dark grey, smooth, shiny at the apices, emaculate, lobulate and isidiate, lacking soralia, pustules, and dactyls. *Lobulae* present in thallus centre, monophyllous but sometimes notched or incised, sublinear to subrotund, 0.2–1.0 mm wide. *Isidia*

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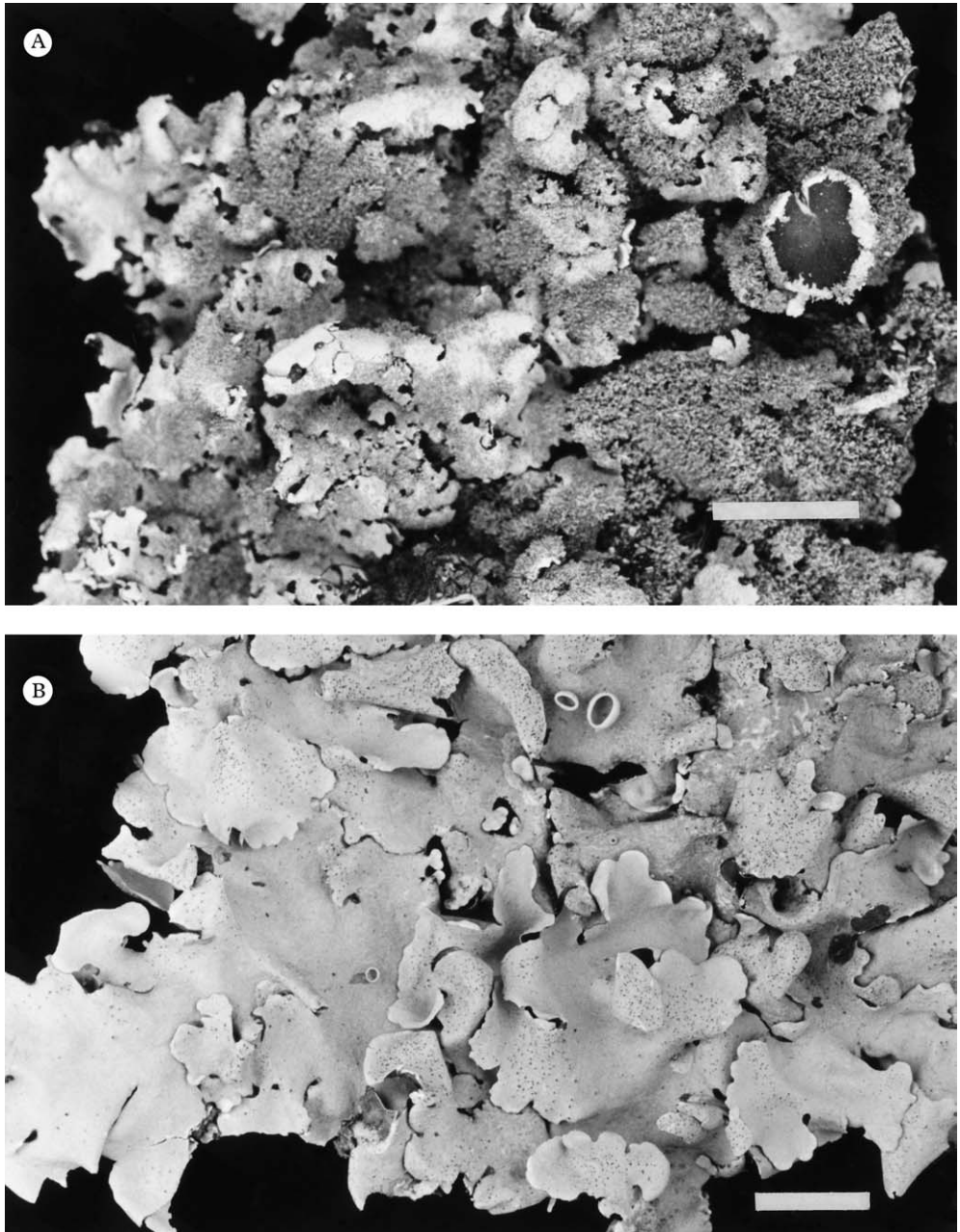


FIG. 1. New species of *Parmeliaceae*. A, *Hypotrachyna rwandensis* (holotype in B); B, *Parmotrema afrocratum* (holotype in B). Scales: A & B=5 mm.

dense, laminal, cylindrical then coralloid-branched, apices syncorticate, darkening, often ciliate. *Medulla* white, with a continuous algal layer above. *Lower surface* black but

$\pm$  brown at apices. *Rhizines* very dense, black, 2–4 times dichotomously branched.

*Apothecia* sparse, laminal, substipitate, 3–5 mm wide; disc concave, becoming

radially cracked with age, dark brown, thalline exciple densely isidiate. *Ascospores* ellipsoid,  $13\text{--}15 \times 8\text{--}10 \mu\text{m}$ .

*Pycnidia* not seen.

**Chemistry.** Cortex K+ yellow, C–, KC–, P+ yellow; UV–, medulla K–, C+ red, KC+ red, P–; containing atranorin (minor) and chloroatranorin (minor), gyrophoric acid (major), 5-*O*-methylhiassic acid (major), lecanoric acid (minor), hiassic acid (minor), 4-*O*-methylhiassic acid (trace), 2,4,5-tri-*O*-methylhiassic acid (trace).

**Etymology.** The specific epithet derives from the Latin *ensis* (place of origin) and the central African nation of Rwanda.

**Notes.** This new species resembles *H. neodissecta* (Hale) Hale, both having fragile thalli with sublinear lobes, a densely isidiate upper surface, cortical atranorin and chloroatranorin and medullary gyrophoric and hiassic acid derivatives. However, *H. rwandensis* can be distinguished by the development of lobulae in the thallus centre, the ciliate lobe margins, isidia that often become ciliate at the apices (*H. neodissecta* is eciliate and elobulate), and the larger ascospores ( $13\text{--}15 \times 8\text{--}10 \mu\text{m}$  cf.  $12\text{--}14 \times 6\text{--}8 \mu\text{m}$ ). Furthermore, the lobes of *H. neodissecta* generally become subsacceding in part, and have a subcanaliculate lower surface, features not apparent in *H. rwandensis*. These two species also differ in medullary chemistry: *Hypotrachyna rwandensis* containing gyrophoric acid (major), 5-*O*-methylhiassic acid (major), lecanoric acid (minor), hiassic acid (minor) whereas *H. neodissecta* contains gyrophoric acid (major), 3-methoxy-2,4-di-*O*-methylgyrophoric acid (major), 3-methoxyumbilicic acid (major/minor), 5-*O*-methylhiassic acid (minor/trace), lecanoric acid (minor), hiassic acid (minor/trace). In overall morphology this species also resembles *Parmelinopsis horrescens* (Nyl.) Elix & Hale, but the latter is distinguished by the narrower lobes (0.5–2 mm wide), mainly simple rhizines and the presence of 3-methoxy-2,4-di-*O*-

methylgyrophoric acid as the major medullary metabolite.

**Distribution and habitat.** At present this new species is known only from Precambrian schistose rocks in the Rwasekoko swamp. This swamp is a cold-air lake with a vegetation profile inversion. *Hypogymnia physodes* (L.) Nyl. has also been recorded from this locality at an altitude of 2350 m, although this species is not known from below 3000 m elsewhere in East Africa (Swinsow & Krog 1988). Here the montane forest with *Ocotea usambarensis* and *Podocarpus latifolius* is situated on hill crests, while afroalpine *Hagenia abyssinica* and *Erica johnstonii*-stands occur on the slopes. The valley is covered by afroalpine swamp vegetation with *Lobelia mildbraedii*, *Cyperus denudatus* and numerous alpine species, e.g. *Alchemilla johnstonii* and *Swertia adolfi-fiderici*. Here, night-time temperatures sometimes drop below freezing-point.

***Parmotrema afroctratum* Elix, Eb. Fischer & Killmann sp. nov.**

Thallus ut in *Parmotrema cetratum* sed lobis eciliatis, apotheciis imperforatis, ascosporis majoris et conidiis sublageniformibus differt.

**Typus:** Rwanda, Butare, park of the Institut de Recherche Scientifique et Technologique, c. 1750 m, on rocks, 14 October 1999, E. Fischer s.n. (B—holotypus; CANB—isotypus).

(Fig. 1B)

**Thallus** foliose, loosely adnate, 8–10 cm wide. Lobes imbricate or contiguous, flat to undulating, subirregular to irregular, irregularly branched, 5–15 mm wide; margins eciliate, entire or ± lobulate and sinuous, lobules monophyllous, rotund or incised, unbranched, 0.5–2 mm wide; apices rotund. **Upper surface** grey to grey-green, flat to undulating, lacking isidia and soredia, shiny at first, maculate; maculae developing into reticulate cracks. **Medulla** white. **Lower surface** black, rhizinate or papillate to lobe margins, or with a narrow (1–2 mm wide) brown, rhizinate marginal zone; rhizines sparse in centre, grouped subapically, simple or forked.

*Apothecia* scattered, sessile to substipitate, 1–3 mm wide; disc concave at first, becoming undulate, pale brown, shiny; thalline exciple smooth, maculate. *Ascospores* ellipsoidal, 9–11 × 6–7 µm.

*Pycnidia* common, sessile to immersed. *Conidia* sublageniform, 5–7 × 1 µm.

*Chemistry.* Cortex K+ yellow; medulla K+ yellow then red, C–, KC+ red, P+ deep orange; containing atranorin, chloroatranorin, salazinic acid (major), consalazinic acid (minor).

*Etymology.* The specific epithet refers to the African origin of the type material, and its superficial resemblance to *Parmotrema cetratum* (Ach.) Hale.

*Notes.* This species is characterized by the subirregular, eciliate, ± lobulate lobes, the reticulate-cracked upper surface, the lack of isidia and soredia, and by the presence of salazinic acid in the medulla. Morphologically *P. afroctratum* resembles the well-known *P. cetratum* but it can be distinguished by the absence of cilia, the lobulate lobe margins, the eperforate apothecia, the smaller ascospores (9–11 × 6–7 µm cf. 13–15 × 7–9 µm) and the sublageniform conidia (*P. cetratum* has filiform conidia, 10–14 µm long). This species could be confused with *P. latissimum* (Fée) Hale as the latter has identical chemistry, imperforate apothecia, lacks cilia and the upper surface of the lobes becomes reticulately cracked with age. However, *P. latissimum* has not been recorded in Africa and prefers corticolous substrata, has larger thalli (10–25 cm cf. 8–10 cm wide), broader lobes (8–20 mm cf. 5–15 mm wide) and much larger ascospores (28–32 × 14–16 µm cf. 9–11 × 6–7 µm).

*Distribution and habitat.* This species is known only from the type locality. The park of the I.R.S.T. (Institut de Recherche Scientifique et Technologique) at Butare is

an artificial habitat with open meadows and planted exotic trees at an altitude of about 1750 m. It is adjacent to the Ruhande Arboretum, the type locality of the *Parmotrema subhanningtonianum* Sérus.

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