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A new species of *Melanotopelia* (*Graphidaceae*) from Africa

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Abstract: *Melanotopelia africana* is described as new to science from Rwanda (continental Africa) and La Réunion (Mascarenes archipelago). *Topeliopsis muscigena* is here reported for the first time from La Réunion.

Key words: *Topeliopsis*, *Thelotrematacеae*, Nyungwe Forest, Parc national de La Réunion

Introduction

Recent detailed morphological and chemical studies have greatly improved the taxonomic knowledge of two large and widespread (especially in tropical areas) families of lichens, for example, the *Graphidaceae* (Staiger 2002) and the *Thelotrematacеae* (Frisch 2006; Frisch & Kalb 2006*a*). Several new genera have been described and old and disused generic names have been resurrected. However, molecular phylogenetic studies, based on parsimony analysis and Bayesian tree sampling of sequences of several genes support only in part the circumscription of many genera, and their relationships are poorly resolved (Staiger *et al.* 2006; Mangold *et al.* 2008*a*). Furthermore, Mangold *et al.* (2008*a*) found no support for the distinction of the two families, and thus reduced the *Thelotrematacеae* into synonymy with the *Graphidaceae*. These molecular phylogenetic studies clearly demonstrate that many of the commonly used characters are homoplasic and either represent conservation of plesiomorphic characters in different clades, or parallel evolution. Nevertheless, several genera such as *Acanthotrema*, *Chroodiscus*, *Glyphis*, *Phaeographis* and *Platygramme*, are strongly supported by morphological and molecular studies.

The genus *Topeliopsis* was introduced by Kantvilas & Vězda (2000) to accommodate species of the *Thelotrematacеae* with urceolate or almost perithecioid ascomata, a proper exciple fused with lateral paraphyses, and hyaline, non-halonate, large, muriform ascospores that turn reddish or purple in iodine (Mangold *et al.* 2008*b*). As already highlighted by Kantvilas & Vězda (2000), the genus as delimited was heterogeneous, and was revisited by Kalb (2001) and Frisch & Kalb (2006*b*). Their work found strong support in a maximum parsimony and bayesian analysis by Mangold *et al.* (2008*b*) and two genera can be distinguished: *Topeliopsis* Kantvilas & Vězda with 8 species (incl. *T. azorica*, see Coppins & Aptroot 2008) and *Melanotopelia* Lumbsch & Mangold with 2 species; *T. meridensis* being of uncertain position and possibly related to *Chapsa*.

During recent field studies, a further species of *Melanotopelia* was found in Rwanda and La Réunion. It differs from the

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other two species assigned to this genus and is described as new in this paper.

Materials and Methods

Morphological characters were studied on dry specimens using a dissecting microscope. Anatomical characters were measured under light and interference contrast microscopy on hand-cut sections and squash preparations mounted in water. An aqueous solution of KOH (10%) and lactophenol-cotton blue were used for detailed observation of asci and hamathecial elements. Amyloidy of the tholus of asci and hymenium was tested with Lugol's solution. The analysis of secondary metabolites was performed using TLC, with solvents C and G (Orange *et al.* 2001); the reagent for the visualization of spots was sulphuric acid sprayed over the plates, followed by heating at 110°C for approximately 5 minutes.

The Species

Melanotopelia africana Sérus., M. Brand, Ertz, Eb. Fischer, Killmann & van den Boom sp. nov.

Mycobank: MB512925

Differt ab *M. rugosa* ascomatis minoribus cum superficiei non 5-6-rugosi et poro terminale valde minore. Haec species *M. toensbergii* ex America boreo-occidentali in forma et magnitudine ascomatorum similis sed praesentiam acidi stictici et constictici et absentiam acidi protocetrarici valde differt.

Typus: Rwanda, Southern Province, Nyungwe National Park, Rwasenkoko swamp, along the road Butare-Cyangugu, S 02°31′29.4″ E 29°20′26.6″, *c.* 2350 m, pristine *Erica* thickets, on *Erica johnstonii,* 28 September 2006, *E. Fischer* & *E. Sérusiaux* (LG—holotypus; BG—isotypus).

(Fig. 1A, B & E)

Thallus crustose, invading corticolous bryophytes or growing directly on bark, whitish grey to pale orange brown when dry, more vivid orange when moistened, not delimited, usually continuous. Photobiont a species of *Trentepohlia* with cells angular-rounded, 12–20 × 5–8 μm.

Ascomata sessile or slightly immersed in the substratum, usually single and not aggregated, subglobose or barrel-shaped, 0·4–0·5(–0·6) mm diam., 0·15–0·2(–0·25) mm high, at first black and closed and eventually opening through its apical, central 'ostiole' and finally with a terminal pore *c.* 50–100 μm wide and a pale brown, pinkish or almost greyish, irregular, slightly but distinctly swollen and denticulate margin, rarely slightly pruinose; disc hardly seen in mature stages through the pore, deeply and persistently urceolate. *Excipulum* 30–60 μm wide, cupular, opaque black-brown, K− and N−, with an internal layer of abundant, perpendicular short paraphyses, 10–20 μm thick. *Hypothecium* hyaline, 10–15 μm thick. *Hymenium* 100–200 μm thick, hyaline, without epihymenial zone. *Paraphyses* numerous, simple, *c.* 1·5 thick, not inflated at their apices. *Asci* subcylindrical (some becoming inflated when fully mature ascospores are still inside), of the *Ostropales*-type (thin-walled, with an easily distinguished tholus and a small ocular chamber, I−), 100–170 × 10–15 μm, (1–)2–spored. *Ascospores* ellipsoid, hyaline, muriform, I+ slightly reddish, not halonate, 130–160 × 30–45 μm when fully mature and ejected.

Conidiomata not found.

Chemistry. Stictic and constictic acids, and related compounds detected by TLC (all collections from Rwanda and one collection from La Réunion tested).

Ecology and distribution. *Melanotopelia africana* was first found in the Nyungwe Forest in Rwanda (now a National Park), one of the most species-rich montane forests in Africa (Ewango 2002; Fischer *et al.* 2003; Fischer & Killmann 2008). *Melantopelia africana* has been found in two different localities and habitats in the Nyungwe Forest: a) on trunk of *Erica,* in pristine *Erica johnstonii* thickets and low forest with *Hagenia abyssinica* and *Rapanea melanophloeios*, in the Rwasenkoko swamp and b) just under the summit of Mt Bigugu, on *Erica johnstonii* and *Podocarpus latifolius* trunks in dense thickets of *E. johnstonii*, within a montane forest dominated by *P. latifolius* with *Psychotria mahonii, Syzygium guineense* and *Apodytes dimidiata*. In La Réunion, whose habitat diversity has recently been assessed by Strasberg *et al.* (2005), *M. africana* has been

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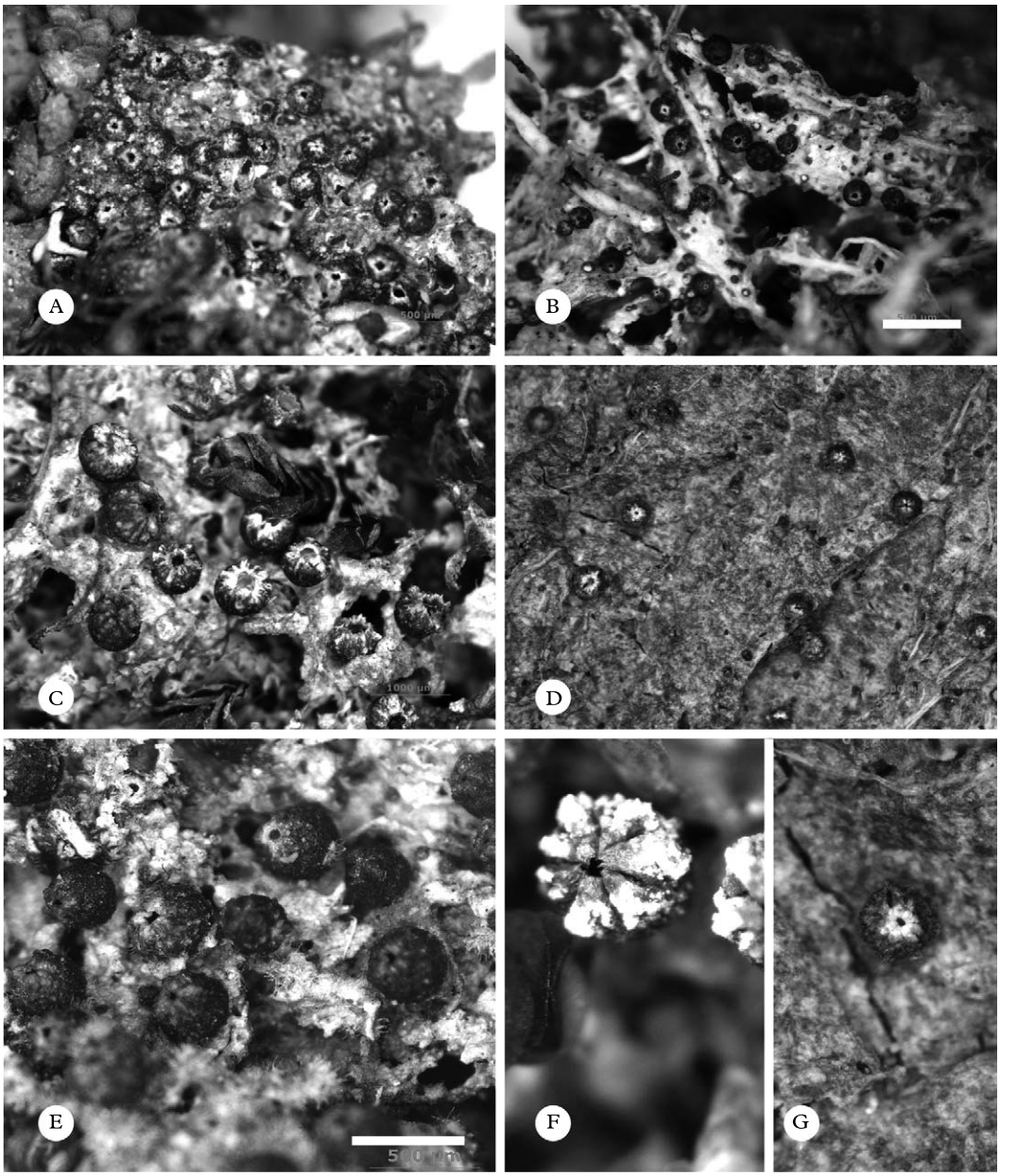

FIG. 1. *Melanotopelia* species, habitus. A & E, *M. africana* (holotype); B, *M. africana* (La Réunion, Forêt du Grand Matarum, 21 v 2008, *M. Brand, E. Sérusiaux, P. van den Boom* s . n., LG); C & F, *M. rugosa* (*G. Kantvilas* 444656, HO); D & G, *M. toensbergii* (isotype LG). Scales. A–D = 1 mm; E–G = 500 µm.

found in several different habitats: a) on isolated trees in a disturbed habitat by a picnic place, in the submontane windward forest zone, b) on a tree trunk (e. g. *Nuxia verticillata*) in the "Bois de couleurs des hauts" in the montane leeward forest zone, and c) on a trunk of *Erica* in "Avoune" wet, subalpine shrubland.

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Notes. This species matches perfectly the description of *Melanotopelia* Lumbsch & Mangold (Mangold *et al.* 2008*b*), i.e. black perithecioid ascomata with a denticulate pore, inner part of the excipulum with numerous, perpendicular paraphyses, muriform, thin-walled ascospores reacting I+ slightly reddish. The previously described species are easily distinguished. *Melanotopelia rugosa* (Kantvilas & Vězda) Lumbsch & Mangold (fig. 1C & F) has larger ascomata (up to 0·8–1·0 mm wide), a much larger terminal pore and 5–6 longitudinal and white pruinose wrinkles over the ascomata surface (easily seen in young ascomata); a species known only from Australia/Tasmania (Kantvilas & Vězda 2000). *Melanotopelia toensbergii* (Vězda & Kantvilas) Lumbsch & Mangold (fig. 1D & G), which has similar ascomata but produces protocetraric acid in its thallus versus substances in the stictic acid group for *M. africana* and *M. rugosa*; a species known from the coasts of Western North America (Kantvilas & Vězda 2000; Breuss 2000).

During this study, material of *Topeliopsis* from many parts of the world has been examined. As a result, we suggest that *Ramonia monospora* Aptroot (described from Papua New Guinea and so far known only from the type collection, Aptroot *et al.* 1997) represents a further species of the *Topeliopsis muscigena* group. *Topeliopsis muscigena* is here reported for the first time from La Réunion (present checklist available at www.biologie.uni-hamburg.de/checklists/lichens/africa/france_reunion_l.htm (visited on Jan. 2nd, 2009).

Specimens examined. **Rwanda:** same locality as the type, 31 iii 2005, *D. Ertz, E. Fischer, D. Killmann, E. Sérusiaux* s. n. (LG); *ibid.*, 2007, *D. Ertz* 10950 & *E. Fischer* (BR); Nyungwe National Park, track to Mt Bigugu, under the summit, S 02°26′26.9″ E 29°15′0.92″, 2800 m, 20 ix 2006, dense thickets of *Erica johnstonii* on gentle slope, *E. Fischer, A. Hambuckers, E. Sérusiaux* s. n. (LG); *ibid.*, 2007, *D. Ertz* 11070 & *E. Fischer* (BR).—**La Réunion:** Grand Etang (NE of Plaine-des-Palmistes), S 21°05.024′ E 55°39.115′, planted trees around the picnic area, 540–550 m, 29 v 2008, *M. Brand, E. Sérusiaux, P. van den Boom* s. n. (LG, REU); Cirque de Cilaos, Forêt du Grand Matarum, S 21°07.416′ E 55°28.983′, heavily disturbed montane forest ("Bois de couleur des hauts"), 1400–1450 m, 21 v 2008, *M. Brand, E. Sérusiaux, P. van den Boom* s. n. (LG); Forêt de Bébour, trail from main road, just N of Col de Bébour, to Cassé de Takamaka, 1340 m, 2008, *P. van den Boom* 40343 & 40355 (hb. van den Boom); *ibid.*, track from the "Gîte" to Caverne Dufour, S 21°05.102′ E 55°31.362′, low shrub with *Erica arborescens* and *E. montana*, with enormous carpets of pleurocarpous mosses and *Sphagnum* on the ground, 1900 m, 2 vi 2008, *M. Brand, E. Sérusiaux, P. van den Boom* s. n. (LG).

Specimens of other species examined. Melanotopelia toensbergii: **USA**: *Washington*: Olympic National Park, Lake Ozetten W of Ozette River, N 48°09′ W 124°40.5′, 10–15 m, on *Thuja plicata* in oldgrowth, coniferous forest, 1998, *T. Tønsberg* 25545 (LG—isotypus).

Melanotopelia rugosa. **Australia:** *Tasmania*: The Sentinels, *c.* 2 km S of old Pedder Track rest area, S 42°53′ E 146°12′, 800 m, in moist, very sheltered rock crevices, on soil and peat, 1991, *G. Kantvilas* 444656 (HO).

Topeliopsis muscigena. **La Réunion:** Forêt de Bébour, track from the "Gîte" to Caverne Dufour, S 21°04.686′ E 55°31.535′, 2030 m, low shrub with *Erica arborescens, E. montana* and *Phylica nitida* with large open wet places, 1 vi 2008, *M. Brand, E. Sérusiaux, P. van den Boom* s. n. (LG).

Key for *Melanotopelia* species

1 Ascomata 0·6–1·0 mm diam., with a wide ostiole (0·1–0·3 mm) when mature; ascomata surface with 5–6 longitudinal wrinkles which are conspicuously white pruinose when young; thallus producing substances in the stictic acid group; Tasmania . . . . . ***M. rugosa***

Ascomata smaller, rarely exceeding 0·5 mm diam., with a punctiform ostiole (50–100 µm diam.); ascomata without pronounced wrinkles or white pruina 2

2(1) Thallus producing substances in the stictic acid group; Africa (Rwanda and La Réunion) . . . . . ***M. africana***

Thallus producing protocetraric acid; Western North America . . ***M. toensbergii***

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