Volume 18: 91–95
Publication date: 6 May 2015
dx.doi.org/10.7751/telopea8526

TELOPEA
Journal of Plant Systematics

The Royal Botanic Gardens & Domain Trust

plantnet.rbgsyd.nsw.gov.au/Telopea • escholarship.usyd.edu.au/journals/index.php/TEL • ISSN 0312-9764 (Print) • ISSN 2200-4025 (Online)

A new species of the lichen genus *Monerolechia* (Ascomycota, Physciaceae) from Australia

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Abstract

Monerolechia norstictica Elix from Western Australia, Northern Territory and Queensland (Australia) is described as new to science. In addition, the new combinations *Monerolechia californica* (H.Magn.) Elix and *M. glomerulans* (Müll.Arg.) Elix are made and a key is provided for these three species.

Introduction

This paper describes a continuation of investigations into *Buellia*-like lichens in Australia, following on from the first accounts of *Buellia* and related genera (Elix 2009, 2011; Elix and Kantvilas 2013b, 2014a, 2015) and revisions to *Amandinea* (Elix and Kantvilas 2013a), *Baculifera* (Elix and Kantvilas 2014b), *Cratiria* (Elix 2014) and other crustose Physciaceae (Elix and Kantvilas 2015). In this paper, I deal with *Monerolechia*, a genus originally erected to accommodate *M. badia* (Fr.) Kalb. The species are characterized by thalli which are initially parasitic on various other lichens but become autonomous, asci approximating the *Lecanora*-type, short, bacilliform conidia 3–6 µm long, a non-inspersed hymenium, and small *Buellia*-type ascospores which lack wall-thickenings at maturity (Marbach 2000, Kalb 2004). This paper describes a species new to science, two new combinations and provides a key to the Australian species.

Methods

Observations and measurements of photobiont cells, thallus and apothecium anatomy, asci and ascospores were made on hand-cut sections mounted in water and dilute KOH (K). Asci were also observed in Lugol's Iodine (I), with and without pretreatment in K. Medullary sections were treated with 10% sulfuric acid (H_2SO_4–) and apothecial sections with 50% nitric acid (N). Chemical constituents were identified by thin-layer chromatography (Elix 2014) and comparison with authentic samples.

New Species

***Monerolechia norstictica* Elix, sp. nov.** Fig 1

MycoBank No.: MB 811862

Similar to *Monerolechia badia* (Fr.) Kalb but differs in containing norstictic and connorstictic acids.

Type: Australia: Queensland: Red Falls Road, 37 km NW of Charters Towers, 19°53' S, 145°59' E, alt. 280 m, on basalt rocks in *Eucalyptus* woodland, *J.A. Elix 20536 & H. Streimann*, 21 Jun 1986; holotype: CANB.

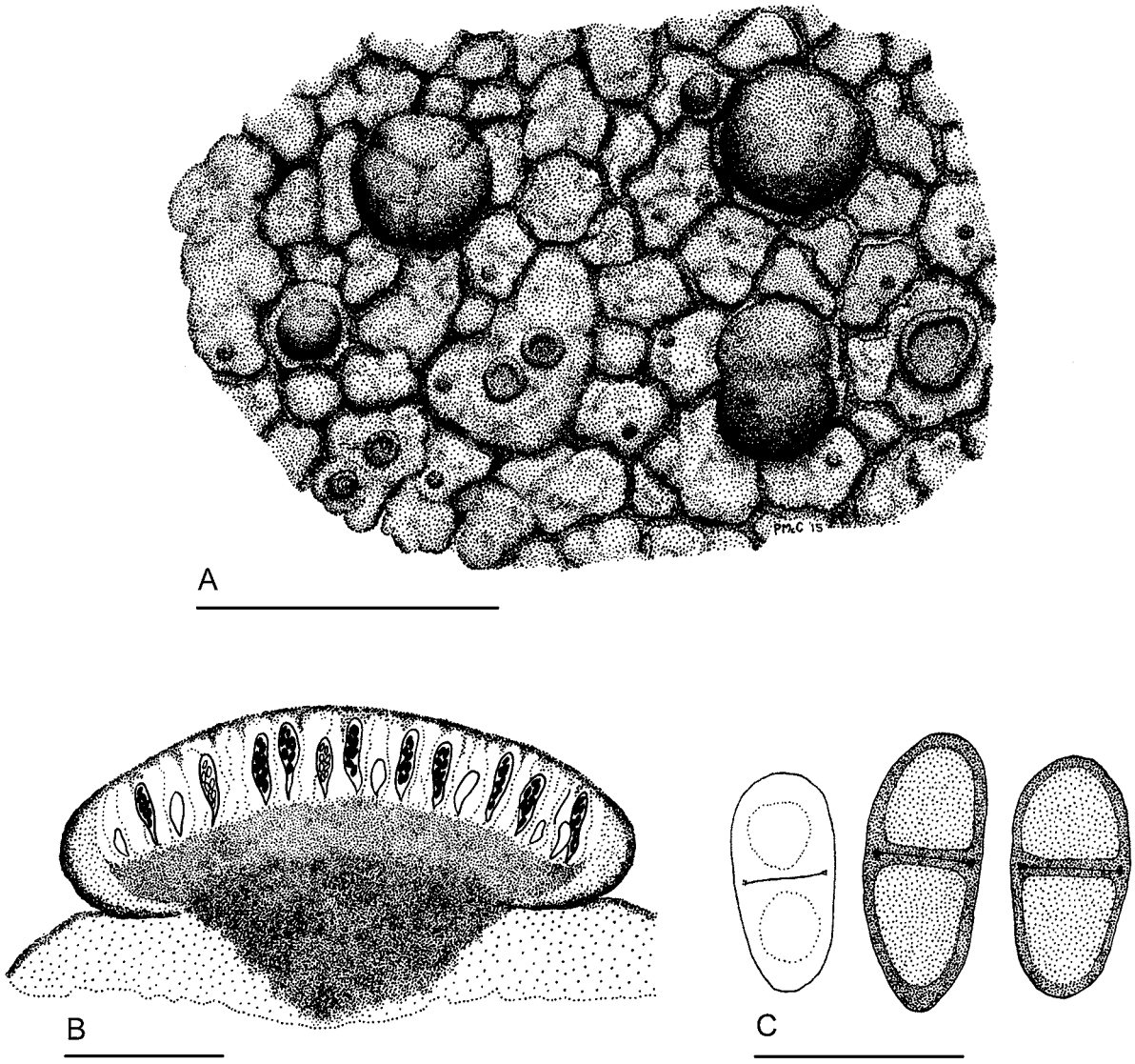

Fig. 1. *Monerolechia norstictica* (holotype in CANB). Scales: A = 1 mm; B = 0.1 mm; C = 10 μm

Thallus autonomous or initially parasitic on various *Lecanora* of *Pertusaria* species, crustose, areolate or subsquamulose or becoming distinctly squamulose, continuous or becoming dispersed, areoles 0.1–0.5 mm wide, flat, weakly convex or bullate, ± contiguous, thallus up to 50 mm wide; upper surface deep chocolate brown or rarely yellow-brown or greenish brown, smooth and shiny; prothallus not apparent; medulla white, lacking calcium oxalate (H_2SO_4–), I–; photobiont cells 10–15 μm diam. *Apothecia* 0.3–0.8 mm wide, lecideine, scattered or crowded, broadly adnate or sessile; disc black, epruinose, plane to markedly convex; proper exciple thin, concolorous with the disc, slightly elevated above disc, entire but soon excluded, in section 40–50 μm thick, outer zone dark brown, K+ orange with formation of red crystals, N–, inner zone colourless. *Hypothecium* 40–50 μm thick, brown; subhypothecium dark brown to brown-black, 100–150 μm thick,

K+ orange with formation of red crystals. *Epihymenium* 8–10 µm thick, dark brown, K–, N–. *Hymenium* 50–90 µm thick, colourless, not inspersed; paraphyses 1.5–1.7 µm wide, simple to sparingly branched, capitate, with apices dark brown, 3.5–4.5 µm wide. *Asci* approximating the *Lecanora*-type, 8-spored. *Ascospores* at first of the *Pachysporaria*- or *Physconia*-type, mature spores of the *Buellia*-type, 1-septate, olive-brown to brown, ellipsoid, 10–15 µm long, 5–7 µm wide, older spores very rarely constricted at the septum; outer spore-wall smooth. *Pycnidia* immersed; conidia bacilliform, straight, 3–5 µm long, 0.8–1.2 µm wide.

Chemistry. Thallus K+ yellow then red, P+ yellow-orange, C–, UV–; containing norstictic acid (major), connorstictic acid (minor).

In overall morphology this new species closely resembles the cosmopolitan, *Monerolechia badia*. The thalli of both species are often initially parasitic on a range of other lichens but then become autonomous with a crustose thallus of bullate areoles with a chocolate-brown upper surface or becoming subsquamulose or squamulose. The two species have very similar apothecia, ascospores and conidia but can readily be differentiated chemically since *M. badia* lacks lichen substances whereas *M. norstictica* contains norstictic acid. The latter substance is definely not derived from any parasitized species and can readily be detected in sections of the apothecia or squamules by treatment with K (turning orange with formation of red crystals). Chemically this species is similar to *Monerolechia californica* (H.Magn) Elix comb. nov. (see below) from North America, but the latter is restricted in its choice of host lichens, initially parasitic on *Dimelaena radiata* (Tuck.) Müll.Arg., and differs by often containing stictic acid as well as or in place of norstictic acid and in having immature apothecia with a thalline exciple.

Etymology: The epithet is derived from the chemistry of this species.

Distribution and habitat: At present this new species is known from inland areas of central Queensland, the Northern Territory and the Kimberley region of Western Australia where it occurs on siliceous rocks. Associated species included *Acarospora citrina (*Taylor) Zahlbr. ex Rech., *Australiaena streimannii* Matzer, H.Mayrhofer & Elix, *Caloplaca leptozona* (Nyl.) Zahlbr., *Dimelaena elevata* Elix, Kalb & Wippel, *Diploschistes actinostomus* (Pers.) Zahlbr., *Lecanora austrosorediosa* Lumbsch, *L. galactiniza* Nyl., *L. pseudistera* Nyl., *Paraporpidia leptocarpa* (C.Bab. & Mitt.) Rambold & Hertel, *Parmotrema praesorediosum* (Nyl.) Hale, *Peltula euploca* (Ach.) Poelt ex Ozenda & Clauzade*, Pertusaria remota* A.W.Archer and *Tephromela arafurensis* Rambold.

Specimens examined: Western Australia: East Kimberley, Durack River Property, c. 40 km due S of Gibb River Road, tributary of Horse Creek, crater and gorge walls, 16°12'17" S, 127°29'48" E, alt. 450 m, on sheltered sandstone, *P.M. McCarthy 4393* (part), 29 May 2014 (PERTH); East Kimberley, Durack River Property, c. 8 km due S of Gibb River Road, Mazzarol Creek, gorge walls above falls, 15°52'11" S, 127°31'48" E, alt. 305 m, on sheltered sandstone boulder, *P.M. McCarthy 4417* (part), *4453,* 4 May 2014 (PERTH), below falls, 15°53'04" S, 127°31'37" E, alt. 295 m, on dry shaded sandstone, *P.M. McCarthy 4442* (part), 4 Jun 2014 (PERTH). **Northern Territory:** Baroalba Creek, 15 km SSE of Jabiru airfield, 12°48' S, 132°55' E, alt. 200 m, on semi-exposed boulder beside creek among rocky outcrops and platforms with poor scattered patches of low vegetation, *H. Streimann 42365,* 22 Apr 1989 (CANB). **Queensland:** Razorback Range, 3 km NW of Mount Morgan, 23°28' S, 150°22' E, alt. 280 m, on metamorphic rocks in dry sclerophyll forest on steep slope with *Cycas* and *Macrozamia*, *J.A. Elix 34628*, *34633*, 26 Aug 1993 (CANB).

New Combinations

***Monerolechia californica* (H.Magn.) Elix comb. nov.**

MycoBank No.: MB 811863

Basionym: ***Rinodina californica*** H.Magn.,*Acta Horti Gothoburgensis* 3: 16 (1927)

Dimelaena californica (H.Magn.) Sheard, *Bryologist* 77: 131 (1974)

Type: United States of America: California, Santa Monica Mountains, *Hasse*, 1911 (holotype : UPS – not seen).

This species is typically parasitic on or associated with *Dimelaena radiata* and other crustose species. It is characterized by its dark thallus with poorly developed lobate margins, the brown hypothecium and its chemistry. The congeneric status of this species and of *Monerolechia badia* has been discussed in detail by Bungartz et al. (2007, p. 131). This species does not occur in Australia.

***Monerolechia glomerulans* (Müll.Arg.) Elix comb. nov.** Fig 2

MycoBank No.: MB 811864

Basionym: *Catolechia glomerulans* Müll.Arg., *Hedwigia* 31: 195 (1892)

Buellia glomerulans (Müll.Arg.) Zahlbr., *Catalogus lichenum universalis* 7: 464 (1931)

Type: Australia: Western Australia: "Ad terram sabulosam rubidam", near Wallangering,*R. Helms 55* (holotype: G).

Like other species of *Monerolechia*, *M. glomerulans* is closely associated with or initially parasitic on various *Xanthoparmelia* species. It is characterized by the olive-brown to olive-black, bullate to squamulose thalli, black lecideine apothecia, small, *Buellia*-type ascospores, 10–15 µm long, 5–8 µm wide, and bacilliform conidia, 4–6 µm long, 1–1.5 µm wide. However, the most characteristic feature of this species is the morphology of the thallus where the bullate areoles or convex squamules become clustered closely together and agglomerated to form weakly elevated, broccoli-like heads (or glomerules). With age these glomerules may become markedly elevated or stalked (to 3 mm high) and isidia-like. Since more specimens of this rare species are now available an amended description follows.

Fig. 2. *Monerolechia glomerulans* (*Elix 41083*in CANB). Scale: = 1 mm

Thallus crustose, bullate-areolate to subsquamulose or squamulose, ± continuous, up to 50 mm wide and 0.4 mm thick; areolae and/or squamules aggregated, with or without marginal lobules at the periphery; areoles 0.2–1 mm wide, squamules 0.5–1 mm wide, rounded or almost so, aggregated to form pulvinate glomerules in thallus centre; prothallus black or not apparent. Upper surface dark olive-brown to olive-black, dull or glossy; medulla white or with patches or crystals of orange-red pigment (pigment soluble in K forming an intense yellow solution), to 250 µm thick, lacking calcium oxalate (H_2SO_4–), I–. *Apothecia* 0.2–0.7 mm wide, lecideine, scattered or crowded, rounded, immersed then broadly adnate or sessile; disc black, epruinose, plane or becoming markedly convex; proper margin thin, black, persistent or excluded with age, in section 35–45 µm thick, inner part colourless or pale brown; outer part dark red-brown to black-brown, in part K+ forming an intense yellow solution or K–, N–. *Hypothecium* 60–80 µm thick, dark reddish brown or brown-black. *Epihymenium* 8–10 µm thick, olive-brown to dark brown, N–. *Hymenium* 50–90 µm thick, colourless, not inspersed; paraphyses 1.5–2.5 µm wide, simple to moderately branched; apices 3–5 µm wide, with dark brown caps. *Asci* approximating the *Lecanora*-type, 8-spored. *Ascospores* at first of the *Pachysporaria*- or *Physconia*-type, mature spores *Buellia*-type, 1-septate, olive-brown to dark brown, oblong to ellipsoidal, 10–15 µm long, 5–8 µm wide; outer wall smooth or finely ornamented. *Pycnidia* sparse, immersed; conidia bacilliform, 4–6 µm long, 1–1.5 µm wide.

Chemistry: Thallus and medulla K–, P–, C–, UV–; with red-orange patches in the medulla and excipulum, containing an unknown pigment or lacking lichen substances.

Distribution and habitat: This species was previously known only from the type collection on soil (Wallangering, 30°49' S, 120°06' E, Western Australia), but several new records from siliceous rocks in Western Australia and South Australia are listed below.

Specimens examined: Western Australia: Yilliminning Rock, 18 km NE of Narrogin, 32°57' S, 117°22' E, alt. 320 m, on large, exposed granite outcrop surrounded by dry sclerophyll forest, *J.A. Elix 41083,* 12 Sep 1994 (B, CANB, NY, HO). **South Australia:** Wilpena River crossing near Martins Well, 31°27' S, 139°07' E, on rock, *W.A. Weber 67222,* Nov 1967 (CANB).

Key to *Monerolechia*

1: Thallus and excipulum K+ red or K+ yellow; norstictic and/or stictic acid present 2
1: Thallus and excipulum K–; norstictic and stictic acid absent 3

2: Initially parasitic on *Dimelaena radiata*; immature apothecia with a thalline exciple; often containing stictic acid ..... ***M. californica***
2: Initially parasitic on *Lecanora* or *Pertusaria* sp.; immature apothecia lacking a thalline exciple; stictic acid absent ..... ***M. norstictica***

3: Areoles and/or squamules aggregated to form elevated, broccoli-like glomerules; medulla often red-orange pigmented in patches ..... ***M. glomerulans***
3: Areoles and/or squamules not aggregated nor forming elevated glomerules; medulla white ..... ***M. badia***

Acknowledgments

I would like to thank Dr Patrick McCarthy (*Australian Biological Resources Study*) for the excellent drawings of *M. norstictica* and for providing the specimens from the Kimberley region of Western Australia, collected during a 2014 *Bush Blitz* survey co-funded by the Department of the Environment, Australian Government, and *BHP Billiton Limited* and Dr Alan Archer (Sydney) for the photograph of *M. glomerulans*

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Manuscript received 10 March 2015, accepted 28 April 2015