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Four new lichens from tropical and subtropical Australia

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Abstract: *Cryptothecia queenslandica* Elix, *Dirinaria sekikaica* Elix, *Fellhanera tropica* Elix and *Protoparmelia rogersii* Elix are described as new to science, and the new names *Menegazzia menyamyensis* Elix and *Rinodina austroleprosa* Elix are proposed.

The examination of various collections of lichens in preparation for a further lichen volume of the *Flora of Australia* has led to the identification of several undescribed species. Four such new species are described in the present paper: *Cryptothecia queenslandica* Elix, *Dirinaria sekikaica* Elix, *Fellhanera tropica* Elix and *Protoparmelia rogersii* Elix. Chemical constituents were identified by thin-layer chromatography (Elix & Ernst-Russell 1993), high performance liquid chromatography (Elix *et al.* 2003) and comparison with authentic samples.

The New Species

Cryptothecia queenslandica Elix, sp. nov.

Fig. 1

Sicut *Cryptothecia australasica* sed acidum gyrophoricum et acidum confluenticum continente differt.

Type: Australia. Queensland, Mossman-Mount Molloy road, 1 km S of Lions Lookout, 20 km N of Mount Molloy township, 16°32'05"S, 145°22'59"E, 390 m, on leaves of roadside treelet at margin of rainforest, J.A. Elix 36915, 4.viii.2006 (holotype BRI; isotype CANB).

Thallus crustose, foliicolous, adnate, ecorticate, pale grey to grey or greenish grey, with scattered paler slightly raised areas, continuous, thin (to 0.1 mm thick), effuse, forming irregularly spreading patches 2–5 cm wide; prothallus very thin and narrow, byssoid, comprising radiating hyphae, whitish. Photobiont a species of *Trentepohlia*, cells rounded to oblong, 7–12 × 5–8 µm, solitary or a few cells aggregated. Medulla indistinct, white. Isidia present, cylindrical, simple, sparsely branched or subcoralloid, 0.1–0.3 mm long, 0.03–0.07 mm wide. Ascigerous parts and pycnidia not seen.

Chemistry: Thallus K–, C+ red, KC+ red, P–, UV+ pale grey-white; containing gyrophoric acid (minor), confluent acid (major), lecanoric acid (trace), constipatic acid (minor), and protoconstipatic acid (minor).

Etymology: The specific epithet denotes the occurrence of the species in Queensland.

Notes:

Cryptothecia queenslandica is characterized by the adnate, grey to greenish grey thallus which reacts C+ red (gyrophoric and confluent acids) and the presence of cylindrical isidia. Its morphology closely resembles that of *C. australasica* Elix, but the latter reacts C–, P+ yellow due to the presence of psoromic acid and, in part, develops an orange-red pigmented prothallus (white in *C. queenslandica*) (Elix 2007). *Cryptothecia philippinum* (Vain.) G.Thor is also similar to *C. queenslandica*, but lacks confluent acid and is known from only corticolous substrata (Thor 1997).

At present *C. queenslandica* is known from only the type locality. Associated species included *Bulbothrix tabacina* (Mont. & Bosch) Hale, *Cryptothecia australasica* Elix, *C. faveomaculata* Mukhija & Patw., *Haematomma solediatum* R.W.Rogers, *Laurera meritospora* (Mont. & Bosch) Zahlbr., *Parmotrema gardneri* (C.W.Dodge) Hale, *Pertusaria scaberula* A.W.Archer, *Pyxine copelandii* Vain. and *P. fallax* (Zahlbr.) Kalb.

Dirinaria sekikaica Elix, sp. nov.

Fig. 2

Sicut *Dirinaria applanata* sed acidum sikikaicum continente differt.

Type: Australia. New South Wales, Old Macleay River estuary, Stuarts Point, 30°49'S, 153°00'E, 1 m, on *Casuarina glauca* in strand vegetation adjacent to mangrove swamp, J.A. Elix 21346, 18.i.1987 (holotype CANB).

Thallus 5–10 cm wide, adnate to tightly adnate, pinnately to subpinnately lobate. Lobes radiating, contiguous, longitudinally plicate and rugose, flat to convex, ±concave towards the tips, 0.5–2.0 mm wide, distinctly flabellate towards the apices. Upper surface grey, bluish grey to yellow-grey or off-white, ±pruinose, sorediate, dactyls absent. Soralia laminal, hemispherical or becoming elongate, sometimes erose and crateriform, soredia farinose. Medulla white, rarely the lower medulla orange towards the apices. Lower surface black in the centre, ±brown at the margins. Apothecia rare, sessile to ±constricted at base, 0.5–1.5 mm wide; disc black, rarely sparsely grey-pruinose; thalline exciple prominent or reflexed, distinct and persistent. Epithecium dark yellow-brown, c. 10 µm thick; hymenium colourless, 75–85 µm thick; hypothecium dark brown to brown-black, 160–200 µm thick. Ascospores brown, 1-septate, thick-walled, *Dirinaria*-type, ellipsoid, 15–22 × 6–8 µm. Pycnidia black, laminal, immersed in elevated warts. Conidia bacilliform, 3.5–5 × 0.8–1 µm.

Chemistry: Cortex K+ yellow, C-, KC-, P+ yellow; medulla K-, C-, KC-, P-; containing atranorin (minor), chloroatranorin (minor), sekikaic acid (major), 4'-O-demethylsekikaic acid (minor), ramalinic acid (trace), homosekikaic acid (trace), 3β-acetoxypentane-1β,22-diol (minor), ±unknown terpenes (minor).

Etymology. The specific epithet is derived from the presence of sekikaic acid in this species.

Notes:

Morphologically, *D. sekikaica* closely resembles *D. applanata* (Fée) D.D.Awasthi in that both have adnate to tightly adnate thalli with pinnately to subpinnately branched, contiguous, longitudinally plicate and rugose lobes with flabellate apices, with laminal soralia and distinctly farinose soredia. However, *D. sekikaica* can be distinguished by its chemistry. Whereas *D. applanata* contains divaricatic acid as the major medullary substance, *D. sekikaica* contains sekikaic acid. Previous authors (Swinscow & Krog 1978) considered this taxon a chemical race of *D. applanata*.

At present this new species is known to occur on bark, wood and rocks in coastal and montane forests in eastern Queensland and New South Wales. Commonly associated species included *Dirinaria applanata* (Fée) D.D.Awasthi, *Lecanora helva* Stizenb., *L. melacarpella* Müll.Arg., *Parmotrema reticulatum* (Taylor) M.Choisy, *Pertusaria lordhowensis* A.W.Archer & Elix, *P. montpittensis* A.W.Archer, *Pyxine cocoes* (Sw.) Nyl., *Ramalina pacifica* Asahina, and *R. peruviana* Ach.

ADDITIONAL SPECIMENS EXAMINED

Queensland: • 10 km NW of Crows Nest, c. 50 km N of Toowoomba, 27°12'S, 152°00'E, 600 m, K. Kalb & R.W. Rogers, 15.viii.1988 (herb. Kalb 21459).

New South Wales: • Several km N of Gloucester, 32°00'S, 151°30'E, 50 m, on free-standing tree along road, K. & A. Kalb, 9.viii.1988 (herb. Kalb 20362).

Fellhanera tropica Elix, sp. nov.

Fig. 3

Sicut *Fellhanera microdiscus* sed corticola, saxicola vel lignicola, superfice granulosus et zeorinum et 4,5-dichlorolichexanthoneum continente differt.

Type: Australia. Northern Territory, Howard Springs National Park, 37.5 km SE of Darwin, 12°28'03"S, 131°02'54"E, 15 m, on dead log in monsoon vine forest along stream, J.A. Elix 36741, 3.viii.2005 (holotype DNA; isotype CANB).

Thallus crustose, whitish green to pale green, continuous to rimose-areolate, areolae 0.5–2.0 mm wide, granular, ecorticate, forming extensive, irregularly spreading patches to 10 cm wide; not delimited, hypothalline line not apparent. Photobiont a chlorococcoid green alga; cells single or a few cells aggregated, 7–10 µm wide. Apothecia common, biatorine, 0.2–0.6 mm wide, sessile, roundish, ±constricted at the base; proper margin thin, smooth, not prominent, paler than the disc, reduced or excluded with age; disc ±flat or becoming convex, flesh-coloured to pale tan at first, becoming brown or dark brown with age, epruinose; excipulum paler than the disc, colourless to very pale brown, up to 50 µm thick in the lower part, lower part paraplectenchymatous, without photobiont cells; hymenium colourless, 40–60 µm thick, 1+ blue; hypothecium red-brown to brown, 50–65 µm thick, K-; paraphyses branched and anastomosing, 1.0–1.5 µm thick, apical cells not thickened. Asci (6–)8-spored, clavate, 45–65 × 10–18 µm. Ascospores colourless, fusiform to narrowly ellipsoid, 3–5-septate, 15–20 × 4–6 µm; not or very slightly constricted at septa. Pycnidia not seen.

Chemistry. Thallus K- C-, KC- P-, UV-; containing 4,5-dichlorolichexanthone (major), zeorin (major), 4,5-dichloro-6-O-methylorlichexanthone (minor), unknown (minor).

Etymology. The specific epithet refers to the tropical habitat of this species.

Notes:

Fellhanera tropica is characterized by the whitish green to pale green, granulose thallus, the abundant, flesh-coloured to brown, roundish apothecia with a paler proper margin, the 4–5-septate, fusiform to narrow ellipsoid ascospores and the chemistry. The apothecia and ascospores of this new species resemble those of *F. microdiscus* (Vain.) Vězda, but the latter species is foliicolous rather than being lignicolous, corticolous or saxicolous, the thallus is non-granulose, the apothecia are somewhat smaller (0.15–0.3 mm vs. 0.2–0.6 mm wide), and the ascospores are 3-septate (Vainio 1921). Furthermore, *F. microdiscus* lacks lichen substances.

At present this new species is known from several localities in the Northern Territory, where it occurs on dead wood, rocks or bark in moist, monsoon vine forests. Commonly associated species included *Chrysothrix xanthina* (Vain.) Kalb, *Coccocarpia palmicola* (Spreng.) Arv. & D.J.Galloway, *Coenogonium luteum* (Dicks.) Kalb & Lücking, *Cratiria lauricassiae* (Fée) Marbach, *Cryptothecia faveomaculata* Makhija & Patw., *Dirinaria consimilis* (Stirt.) D.D.Awasthi, *D. picta* (Sw.) Schaer. ex Clem., *Hafellia rechingeri* (Zahlbr.) Marbach, *Letrouitia leprolytoides* S.Y.Kondr. & Elix and *Pertusaria velata* (Turner) Nyl.

ADDITIONAL SPECIMENS EXAMINED

Northern Territory: • type locality, on exposed root, J.A. Elix 36742, 3.viii.2005 (CANB), on rocks on forest floor, J.A. Elix 36745, 36746, 36747, 3.viii.2005 (CANB); • Howard Springs Road, 34.5 km SE of Darwin, 12°28'37"S, 131°01'59"E, 30 m, on laterite rocks in *Callitris* plantation, J.A. Elix 37116, 37119, 37121, 37122, 37123, 3.viii.2005 (CANB, DNA, F).

Protoparmelia rogersii Elix, sp. nov.

Fig. 4

Sicut *Protoparmelia badia* sed acidum alectoronicum continente differt.

Type: Australia. Queensland: by road to Mt. Nebo, 10 km past the Enoggera Reservoir, 27°26'S, 152°57'E, on granitic rock in *Eucalyptus* forest, R.W. Rogers 2342, 1.x.1981 (holotype BRI; isotype M).

Thallus saxicolous, pale to medium brown, thin, rimose and areolate to coarsely warted, ±bullate, 0.5–1.2 mm thick, 3–4 cm wide, effuse, no prothallus seen. Photobiont a unicellular green alga, cells 8–12 µm diam. Areolae irregularly shaped, contiguous, 0.5–1.2 mm wide; upper surface subconvex to convex, lacking soredia and isidia. Apothecia common, dispersed, sessile, constricted at the base, round, 0.4–2.0 mm

wide; disc dark brown, ±plane to undulating or convex, glossy, darker than the margin; thalline exciple concolorous with the thallus, persistent; excipulum poorly delimited; epithecium 5–10 µm tall, dark brown; hymenium 40–60 µm tall, colourless to brownish; hypothecium colourless to pale yellow-brown, 60–100 µm thick. Paraphyses with clavate to capitate apical cells 3–5 µm wide, with a brown cap. Ascospores ellipsoidal-fusiform, often with distinctly pointed apices, 10–13 × 4–5 µm. Pycnidia scattered, immersed, black. Conidia acicular, straight or slightly curved, 6–11 × 0.7–1.2 µm.

Chemistry: Cortex K–, C–, KC–, P–, N–; medulla K–, C–, KC+ pink, P–, UV+ blue-white; containing alectoronic acid (major), dehydroalectoronic acid (trace), ±β-alectoronic acid (trace).

Etymology. The species is named in honour of the collector, the Australian botanist and lichenologist Dr Roderick W. Rogers.

Notes:

The growth habit, apothecial anatomy and ascospores of this species closely resemble those of *Protoparmelia badia* (Hoffm.) Hafellner, but *P. badia* can readily be distinguished by its typically darker brown upper surface, the crowded, immersed to sessile, round or subangular apothecia (dispersed, round, sessile and constricted at the base in *P. rogersii*) and by the chemistry. Whereas *P. badia* contains lobaric acid (major), oxolobaric acid (minor), conlobaric acid (trace), sublobaric acid (trace), norlobaric acid (trace), ±zeorin (minor), and ±usnic acid (minor), *P. rogersii* contains alectoronic acid (major), dehydroalectoronic acid (trace), and ±β-alectoronic acid (trace). *Protoparmelia pulchra* Diederich, Aptroot & Sérus. is chemically identical to *P. rogersii*, but grows on dead wood and bark rather than rocks, and has narrower ascospores (2–3 µm vs. 4–5 µm wide) that are ellipsoid and not pointed at the ends (Aptroot *et al.* 1997).

At present this species is known from only the type collection. Associated species included *Lecanora farinacea* Fée, *Parmotrema reticulatum* (Taylor) M.Choisy and *Relicina sydneyensis* (Gyeln.) Hale.

The New Names

Menegazzia menyamyaensis Elix, nom. nov.

Synonym: *Menegazzia fumarprotocetrarica* Elix, *Biblioth. Lichenol.* **96**, 63 (2007), *nom. illeg., non Menegazzia fumarprotocetrarica* Calvelo & Adler, *Mycotaxon* **59**: 369 (1996).

Type: Papua New Guinea. Morobe Province, Spreader Divide, Aseki-Menyamya road, 9 km NW of Aseki, 7°18'S, 146°08'E, 2180 m, on fallen twigs in *Nothofagus-Podocarpus* forest, J.A. Elix 12018A & M. Tota, 5.xii.1982 (holotype CANB).

Rinodina austroleprosa Elix, nom. nov.

Synonym: *Rinodina leprosa* Elix, *Australas. Lichenol.* **61**, 22 (2007), *nom. illeg., non Rinodina leprosa* (Schaer.) A.Massal., *Sched. Crit.*: 160 (1855).

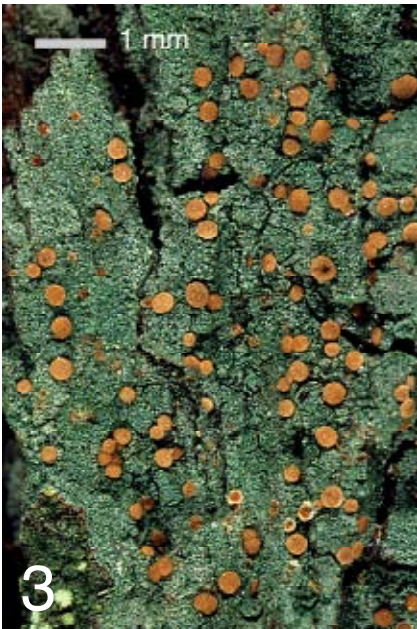
Type: Australia. Victoria, Reef Hills State Park, 7 km SSW of Benalla, 36°36'53"S, 145°56'03"E, 155 m, on base of *Eucalyptus* in open *Eucalyptus* woodland, J.A. Elix 37189, 5.v.2006 (holotype MEL; isotypes CANB, HO).

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Figures: 1. *Cryptothecia queenslandica* (holotype in BRI); 2. *Dirinaria sekikaica* (holotype in CANB); 3. *Felthanera tropica* (isotype in CANB); 4. *Protoparmelia rogersii* (holotype in BRI).