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Sirenophila macquariensis (Teloschistaceae) – a new name for the lichen *Caloplaca maculata*

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Abstract

A new combination for *Caloplaca macquariensis* C.W. Dodge is made in *Sirenophila* Søchting, Arup & Frödén, *S. macquariensis* (C.W. Dodge) Søchting & de Lange. In the process we reduce the Aotearoa / New Zealand *Caloplaca maculata* D.J. Galloway into synonymy within the new combination, noting the lack of morphological distinctions between that species and *S. macquariensis*. Very little is known about *S. macquariensis*, which is known only from the type collected from Macquarie Island; however, we offer an update on the species ecology based on collections and observations of the species on the Chatham Islands – the eastern most extension of the Aotearoa / New Zealand archipelago.

Keywords

Teloschistaceae, *Sirenophila*, *Caloplaca*, *C. macquariensis*, *C. maculata*, new combination

Introduction

Caloplaca maculata D.J. Galloway (Figure 1) was described by David Galloway (2004) based on a collection from Rēkohu / Wharekauri / Chatham Island, Chatham Islands group, which was obtained from a coastal exposure of tuff rock near Ellice Point (43.944212°S, 176.563577°W (Figure 2), west of Waitangi wharf, near Waiteki / Waitangi, the main settlement on that island. It was initially believed to be the only endemic lichen from the Chatham Islands (Galloway 2004, 2007) until it was discovered by Allison Knight and the first author at Akatore River mouth (46.112364°S, 170.191597°E) near Taieri Beach, Otago, Te Waipounamu / South Island on basaltic rocks (de Lange 2019). It has subsequently been observed at a number of additional localities in the Chatham Islands (de Lange et al. 2021). In this paper we report its taxonomic affiliation based on novel molecular data, and on that basis and its morphological similarity propose its conspecificity with *Caloplaca macquariensis* described by C.W. Dodge (Dodge 1968) (Figure 3).

Figure 1. *Caloplaca maculata* (*Sirenophila macquariensis*) as seen at the type locality west of Ellice Point, near Waiteki / Waitangi, Rēkohu / Wharekauri / Chatham Island. This specimen exhibits the deeply areolate-cracked morphology developed by specimens growing on the more friable and so readily eroded Red Bluff Tuff Formation. Photo: P. J. de Lange, November 2018.

Figure 2. Type locality of *Caloplaca maculata*, west of Ellice Point, near Waiteki / Waitangi, Rēkohu / Wharekauri / Chatham Island. Photo: P. J. de Lange, December 2008.

Figure 3. Holotype of *Caloplaca macquariensis* (*Sirenophila macquariensis*), Australia, Macquarie Island, Gordon Cove, held at the Farlow Herbarium. Photo: Patrik Frödén, January 2009.

Molecular taxonomy

The lichen family *Teloschistaceae* has in recent years been the subject of intensive taxonomic studies based on molecular characters (e.g., Arup et al. 2013). This has resulted in the description of numerous genera, which are now hosting the majority of the species from the old genus *Caloplaca*. One clade includes a large number of Aotearoa / New Zealand species, namely *Sirenophila* Søchting, Arup & Frödén. *Caloplaca maculata* belongs in this genus.

An nrDNA ITS sequence from the collection of *C. maculata* from Akatore, Taieri (US 11771, GenBank PP383874) that was obtained following the protocol methods described in Arup et al. (2013) gave a blast

result firmly nesting that species within the genus *Sirenophila* with *S. bermaguiana* (S.Y. Kondr. & Kärnefelt) Søchting, Arup & Frödén as the closest relative.

Nomenclature

Southern Hemisphere lichen taxonomy is hampered by the many erroneous taxa published by the late Carrol Dodge (20 January 1895–21 July 1988), who described numerous species often based on very poor collections (Castello & Nimis 1995). His herbarium is deposited at the Farlow Herbarium (FH), where a number of his type collections from Macquarie Island can be studied. One of them, *Caloplaca macquariensis* C.W. Dodge is represented by an unusually, for Dodge, fine type specimen (Figure 2), which has a strong morphological similarity to the later named *Caloplaca maculata*.

As the anatomical details of *Caloplaca macquariensis* C.W. Dodge fit well within those described for *C. maculata* by Galloway (2007), we consider both species to be conspecific, and so treat the later named *C. maculata* (Galloway 2004) as a synonym of *C. macquariensis* (Dodge 1968). Furthermore, as nrDNA ITS sequence data place *C. maculata* (treated below as *C. macquariensis*) in *Sirenophila* Søchting, Arup & Frödén, we make the necessary combination for this species in that genus. A revised description, ecological notes and distribution is also presented.

Taxonomy

Sirenophila Søchting, Arup & Frödén, *Nordic Journal of Botany 31*(1): 63 (2013).

Mycobank No. 802006.

Sirenophila macquariensis (C.W. Dodge) Søchting & de Lange comb. nov.

Mycobank No. MB 852424.

Basionym: *Caloplaca macquariensis* C.W. Dodge, *Nova Hedwigia 15*: 295 (1968).

Mycobank No. MB344780.

Holotype: Australia, Macquarie Island, Gordon Cove, on coastal rocks, 31.x.1956, *D.A. Brown M-56-Li-24* (FH!) (Figure 3).

= *Caloplaca maculata* D.J. Galloway, *New Zealand Journal of Botany 42*: 105 (2004).

Mycobank No. MB371368.

Holotype: Aotearoa / New Zealand, Chatham Island, just west of Waitangi wharf, Ellice Point, on coastal rock, on ledge of tuff on headland, 3 m, 28.iii.2000, *P. N. Johnson 3472* (Allan Herbarium [CHR 523670!]).

Etymology: The epithet "*macquariensis*" refers to the geographic location of the type collection Macquarie Island, and presumably the belief that the species was endemic to that location.

Description: Saxicolous on base-rich substrates. Thallus spreading in irregular ± circular patches, 10–40 mm diameter, deeply areolate-cracked, prothallus absent; areolae angular, 0.5–2.0 mm diameter, separated by deep cracks, surface convex, verruculose-papillate to minutely cerebriform; pale greenish white, distinctly maculate when wet, grey-white when dry; K-. Apothecia conspicuous, 1(–3) per areole, sessile, rounded to contorted through mutual pressure, (0.2–)0.5–1.0(–1.8) mm diameter, disc plane to convex, matt, or glossy, clear yellow when wet, orange when dry; thalline margin persistent, thin or thick, verrucose-papillate, maculate, concolorous with thallus; proper margin thin, pale yellow, often obscured. Epithecium yellow, granular, 8.5–13.5 µm thick. Hymenium colourless, inspersed with oil droplets, 60–70 µm tall. Paraphyses slender, 1.5–2.0 µm thick, apices furcate, swollen, 3.5–5.0 µm diameter. Hypothecium massive, interspersed with oil droplets. Asci clavate, 50–60 × 12–16.5 µm, 8-spored. Ascospores ellipsoid, apices rounded, (10–)11.5–13.5 × 5.0–6.5 µm; septum 2.0–3.2 µm thick, ¼ the length of spore. Chemistry: Based on HPLC analysis *S. macquariensis* has dominance of parietin, corresponding to chemosyndrome A of Søchting (1997).

Representative Specimens: Aotearoa / New Zealand, Te Waipounamu / South Island: Akatore River Mouth, near Taieri Bridge, NW-exposed, vertical outcrop, *U. Søchting & A. Knight*, 28 Jan 2012, US 11771 (C). Chatham Islands: Rēkohu / Wharekauri / Chatham Island, south of Waitangi Wharf, near Ellice Point, *P.J. de Lange* CH1958, 2 Dec 2008, AK 303931; Rēkohu / Wharekauri / Chatham Island, Mairangi (south of Mairangi Point), *P.J. de Lange CH4489, T. Hitchon & T.J.P. de Lange*, 2 Feb 2021, UNITEC 14269; Rēkohu / Wharekauri / Chatham

Island, Wharekauri, Maunganui, Taniwha (Splatter Rock), *C.J. James s.n.*, 9 Feb 2024, UNITEC 14271; *P.J. de Lange CH4489, T. Hitchon & T.J.P. de Lange*, 2 Feb 2021, UNITEC 14269; Wharekaikite (Rabbit Island), *P.J. de Lange CH4490 & T.J.P. de Lange*, 11 Feb 2021, UNITEC 14270; Maung'Re Island, *T. Emmett CIA347*, 15 Nov 2020, UNITEC 14275.

Distribution

As circumscribed here, the range of *Sirenophila macquariensis* encompasses the southeastern portion of Te Waipounamu / South Island and the Chatham Islands group of Aotearoa / New Zealand (all part of the submerged Zealandia continent), and Macquarie Island, a subantarctic island that is part of geopolitical Australia. We are unaware of any recent collections from Macquarie Island, where the species is only known from the type, nor has it been located in historical collections from the other subantarctic islands of Aotearoa / New Zealand, south Indian and Atlantic oceans, but it should be looked for in those sites. The dearth of specimens means that for now it is difficult to analyse distribution patterns and biogeography. Regardless, some studies, such as Søchting et al. (2023), suggest that *Sirenophila macquariensis* may represent a southeastern element in the lichenised mycobiota of Australia and Aotearoa / New Zealand.

Recognition

Sirenophila is a genus of currently ten species, but with a number of additional species, which still require taxonomic adjustment (U. Søchting unpubl. data). As currently circumscribed, the genus is Australasian with one species, *S. ovis-atra* Søchting, Søgaard & Sancho recorded from Patagonia and the Falkland Islands (Søchting et al. 2016). As the genus is still in taxonomic adjustment, the distinctions offered within the *Caloplaca* s.l. treatment of Galloway (2004, 2007) should be referred to for determination of specimens of *Sirenophila macquariensis*. There, on the basis of morphology, the species is distinguished from *C. papanui* D.J. Galloway, another saxicolous, maritime species of *Caloplaca* sens. lat. on the basis of the maculate, pale greenish-white, verrucose-papillate thallus, orange apothecial discs whose thalline margins are maculate, verrucose-papillate; by the slightly smaller (10.0–13.5 × 5.0–6.5 µm c.f. 10–15 × 5.0–6.5 µm in *C. papanui*) ellipsoid ascospores with rounded apices, and with wider septa (2.0–3.2 µm c.f. 1.5–2.0 µm in *C. papanui*).

Ecology

We have scant information about the ecology of *Sirenophila macquariensis* on Macquarie Island. On the Chatham Islands, however, the species is much better known (de Lange 2019; de Lange et al. 2021). On those islands *Sirenophila* is strictly coastal, where it is mostly found in very exposed sites on volcanogenic rocks (basalt, basaltic tuff) subjected to salt spray and periodic salt-water inundation. At the type locality of *Caloplaca maculata* (Figure 1), the lichen grew on partially palagonised basalt tuff known as the Red Bluff Tuff Formation (Sorrentino et al. 2014), where it was once locally dominant (de Lange 2019), associating with *Disphyma papillatum* Chinnock, *Festuca coxii* (Petrie) Hack. and *Salicornia quinqueflora* Bunge ex Ung.-Sternb. subsp. *quinqueflora*, and the lichens *Buellia* De Not., other undetermined taxa in the Calicaceae, and *Dufourea ligulata* (Körb.) Frödén, Arup & Søchting. On the same substrate at Wharekaikite / Rabbit Island, *C. maculata* was also locally common, associating with *Amandinea* spp., *Buellia* spp., *Myriolecis dispersa* s.l. and other undetermined species of *Caloplaca* s.l. On this substrate, specimens tend to have smaller and more deeply cracked thalli than on basalt rock. *Sirenophila* has also been collected from the same substrate on Maung'Re, but for that island we have no data on associated species.

On basalt rock at Mairangi Point (Figure 4) and Taniwha, Rēkohu, associates are more diverse and in most cases as yet undetermined, though we have noted Caliciaceae – including *Amandinea* M.Choisy ex Scheid. & M.Mayrhofer, *Buellia*, Teloschistaceae – mostly *Caloplaca* s.l., *Dufourea ligulata* and other common saxicolous lichens such as *Ochrolechia* spp. *Pertusaria graphica* C.Knight, *Physcia caesia* (Hoffm.) Hampe ex Fürnr., *Rinodina* (Ach.) Gray, and *Rhizocarpon geographicum* (L.) DC. On basalt, the thalli of *Sirenophila* tend to be larger, less deeply cracked, and with less deeply lobed margins.

Little information is available about the Akatore site for *Sirenophila*, beyond that here, too, it was associated with basalt rock and grew in association with lichens in the Pertusariaceae and Teloschistaceae.

Figure 4. *Sirenophila macquariensis* as seen on basalt lava flow, Mairangi Point, Rēkohu / Wharekauri / Chatham Island. This specimen shows the morphology developed by this lichen when growing on a less fissured, friable, or easily eroded substratum. Photo: P. J. de Lange, February 2021.

Data Accessibility Statement

No additional database.

Author Contributions

Ulrik Søchting: Conceptualisation (lead); investigation (lead); project administration (lead); resources (lead); data curation (qual); validation (equal); writing – original draft preparation (equal); writing – review and editing (equal).
Peter de Lange: Investigation (equal), project administration (lead), resources (equal), data curation (equal), validation (equal), writing – original draft preparation (equal), writing – review and editing (equal).

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