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FURTHER NOMENCLATURAL AND CHEMICAL NOTES ON *PSEUDOCYPHELLARIA* IN NEW ZEALAND*

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Abstract: Nomenclatural notes on the following taxa are provided: *Pseudocyphellaria billardierii*, *P. carpoloma*, *P. faveolata*, *P. rufovirescens* and *P. subvariabilis*. Detailed chemical profiles are given for all described species of *Pseudocyphellaria* in New Zealand. *Pseudocyphellaria ardesiaca*, *P. degelii*, *P. durietzii*, *P. fimbriata*, *P. fimbriatoides*, *P. gretae*, *P. knightii*, *P. maculata* and *P. sericeofulva* spp. nov. are described for the first time.

Introduction

During the preparation of a monograph on New Zealand species of *Pseudocyphellaria* a resolution of some of the many nomenclatural problems surrounding Southern Pacific taxa in this genus was attempted (Galloway & James 1977, 1980). In several instances, discussed below, additional studies and/or reappraisal of type material not previously available disclosed several errors in our original interpretation of some taxa. Further, it is now certain that the publication date of Delise's *Histoire des lichens. Genre Sticta* was 1825; not 1822 as printed on the title page. This important monograph was published in vol. 2 of the *Mémoires de la Société Linnéenne du Calvados* (later *Mém. Soc. linn. Normandie*) pp. 1–167, 598–600 (1825), with a separate atlas of plates published the same year. A bibliographic study of this monograph, together with typifications of Delisean species of *Pseudocyphellaria* described in it, based on material from Delise's herbarium (PC-LENORMAND) is in preparation.

Continuing chemical studies in the genus, undertaken by P.W.J. and A.L.W., have helped to clarify areas of nomenclatural difficulty and it appears that most species of *Pseudocyphellaria* in New Zealand have a well-defined chemistry that, except in a few cases, shows little variation. Detailed chemical profiles as they are presently known are tabulated for 42 species in Tables 1 and 2. In addition, diagnoses of nine new species are included; fuller descriptions and discussion of these will appear in the forthcoming monograph.

Material and Methods

Type and other material was obtained from the following herbaria: BM, FI, PC-HUE, PC-LENORMAND, PC-MONTAGNE, PC-THURET, hb J. K. Bartlett (Auckland).

Thin-layer chromatography of hot, acetone-extracts of specimens was performed with standardized one- and two-way methods (Goh *et al*, 1978, Wilkins & James 1979, Walker & James 1980, Culberson *et al.*, 1981).

*See *Lichenologist* **12**: 291–303 (1980).

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TABLE 1. *White medulla species—chemistry*

		Depsides										Triterpenoids																												Depsidones												Pigments					
	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44		
1	*allanii*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*f*	1
2	*australiensis* (A)	·	X	·	·	·	X	·	·	·	T	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	T	T	·	·	·	X	T	X	·	·	·	X	X	X	·	*a*	2
	(B)	·	X	·	·	·	X	·	·	·	·	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	T	T	X	X	·	·	·	·	·	·	·	X	X	X	·	*a*	
3	*billardierii*	X	X	T	T	X	X	T	T	T	X	·	·	·	·	X	X	X	X	X	·	·	·	·	·	·	·	·	T	·	·	T	·	·	·	X	T	X	·	·	·	·	·	·	·		3
4	*carpoloma*	X	X	T	T	X	X	T	T	T	T	·	X	·	X	·	·	·	·	·	T	T	T	T	T	T	T	T	T	·	·	T	·	·	·	X	X	X	T	·	·	X	X	X	·	*j*	4
5	*cinnamomea*	·	·	·	·	·	·	·	·	·	T	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		5
6	*condensata*	·	·	·	·	·	·	·	·	·	·	·	T	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	X	X	T	·	·	·	X	X	X	X	·	·	·	·	·	·	*b*	6
7	*coriacea*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*f*	7
8	*crocata* (A)	·	X	·	·	·	X	·	·	·	T	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	T	T	·	·	·	X	T	X	·	·	·	X	X	X	·	*a*	8
	(B)	·	X	·	·	·	X	·	·	·	T	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	T	T	X	X	·	·	·	·	·	·	·	X	X	X	·	*a*	
9	*delisea*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·	X	X	X	·	T	T	·	·	·	X	*d*	9
10	*dissimilis*	·	·	·	·	·	·	·	·	·	T	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	10
11	*durietzii*	X	X	T	T	X	X	T	T	T	X	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	·	T	·	·	·	X	X	X	X	·	·	·	·	·	·	*c*	11
12	*episticta*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*k*	12
13	*faveolata*	·	·	·	·	·	·	·	·	·	·	·	T	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	X	X	T	·	·	·	X	T	X	X	·	·	·	·	·	·	*b*	13
14	*fimbriata*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*f*	14
15	*fimbriatoides*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*f*	15
16	*granulata*	·	·	·	·	·	·	·	·	·	·	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	·	X	X	T	·	·	·	X	T	X	X	·	·	·	·	·	·	*b*	16
17	*gretae*	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*g*	17
18	*homoeophylla*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·	X	X	X	·	T	T	·	·	·	X	*d*	18
19	*hookeri*	X	X	T	T	X	X	T	T	T	X	·	·	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	·	T	·	·	·	X	X	X	X	T	·	T	T	T	·	*c*	19
20	*intricata*	·	T	·	·	·	T	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*h*	20
21	*knightii*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		21
22	*lechleri*	T	X	·	·	T	X	·	·	·	T	·	·	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	T	X	X	X	·	·	·	·	·	·	X	X	X	·	*e*	22
23	*lividofusca*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*k*	23
24	*maculata*	T	X	T	T	T	X	T	T	T	T	·	T	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	T	X	X	X	·	·	·	·	·	·	X	X	X	·	*e*	24
25	*margaretae*	T	X	·	·	T	X	·	·	·	T	·	·	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	T	T	·	·	X	T	X	T	·	·	T	T	T	·	*i*	25
26	*montagnei*	X	X	T	T	X	X	T	T	X	X	·	·	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	T	·	·	·	X	T	X	·	T	T	·	·	·	·	*c*	26
27	*murrayi*	·	·	·	·	·	·	·	·	·	·	X	·	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		27
28	*neglecta*	T	X	T	T	T	X	T	T	T	T	·	X	·	X	·	·	·	·	·	T	T	·	T	T	·	T	T	T	·	·	T	·	·	·	X	X	X	X	·	·	X	X	X	·	*j*	28
29	*psilophylla*	·	·	·	·	·	T	·	·	·	T	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		29
30	*pubescens*	T	X	·	·	T	X	·	·	·	T	·	·	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	T	T	·	·	X	X	X	X	·	·	T	T	T	·	*i*	30
31	*rufovirescens*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	T	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		31
32	*sericeofulva*	·	X	·	·	·	X	·	·	·	·	·	T	·	X	·	·	·	·	·	T	T	·	·	·	·	·	·	T	·	·	T	·	·	·	X	T	X	X	·	·	X	X	X	·	*a*	32
33	*subvariabilis*	·	·	·	·	·	·	·	·	·	·	X	T	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·		33
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44		

A, always present; -, never present; T, sometimes present, or only revealed on heavy loading of chromatogram.

Depsides: 1, methyl evernate; 2, tenuiorin; 3, unidentified; 4, unidentified; 5, methyl lecanorate; 6, methyl gyrophorate; 7, unidentified; 8, unidentified; 9, evernic acid; and 10, gyrophoric acid.
Triterpenoids: 11, 7β-acetoxyhopan-22-ol, 12, hopane-7β, 22-diol; 13, hopane-15α, 22-diol; 14, hopane-6α, 7β, 22-triol; 15, hopane-6α, 22-diol(zeorin); 16, leucotylin derivative—probably 6α, 16β-diacetoxyhopan-22-ol; 17, leucotylin derivative—probably 6α-acetoxyhopane-16β, 22-diol; 18, leucotylin derivative—probably 6α-acetoxyhopan-23-oic acid; 19, leucotylin derivative—probably 6α-22-dihydroxyhopan-23-oic acid; 20, 7β-acetoxyhopane-6α, 22-diol; 21, 6α, acetoxyhopane-7β, 22-diol; and 22–28, unidentifed.

Depsidones: 29, methyl virensate (granulatin); 30, physciosporin (5-chloromethyl virensate, chlorogranulatin); 31, norstictic acid; 32, salazinic acid; 33, consalazinic acid; 34, galbinic acid; 35, stictic acid; 36, cryptostictic acid; 37, constictic acid; 38, unidentified (2); 39, hypostictic acid; and 40, hyposalazinic acid.

Pigments: 41, pulvinic dilactone; 42, calycin; 43, pulvinic acid; and 44, usnic acid.

Note: three of the unidentified depsides probably correspond to the three recently reported tridepsides of Elix & Lajide (1981). The depsidone menegazziac acid was not found in any species.

Observations:

(*a*) *P. australiensis* and *P. crocata* have similar pairs of two chemodemes: A—stictic, constictic and cryptostictic acids. B—salazinic and consalazinic acids; the latter occurs in *c.* 20% of specimens examined. Physciosporin is of rare occurrence in both species. The related *P. sericeofulva* contains the stictic acid and complex only.
(*b*) *P. condensata, P. faveolata* and *P. granulata* have a very similar chemistry including two unidentified depsidones (38) one of which may be PQ-4 of Culberson *et al.* (1981). All species contain physciosporin. In addition the type of *P. condensata* contains a greenish-black pigment not found in the other two species.
(*c*) The chemistries of *P. durietzii, P. hookeri* and *P. montagnei* are very similar, characterized by a wide range of depsidones and hopane-6α, 7β, 22-triol(14) as the main triterpenoid.
(*d*) *P. delisea* and *P. homoeophylla* have identical chemistries and are obviously a species-pair, the former being the isidiate counterpart of the latter. Usnic acid is unique to these two species.
(*e*) *P. lechleri* has an unusual chemistry, and with the related species *P. maculata,* is the only New Zealand species to have salazinic acid (usually with galbinic acid) as the major depsidone. One specimen of *P. lechleri* has an unusual chemistry of possibly consalazinic acid and a substance related to cryptostictic acid, and is being investigated further. Neither of these chemistries correspond to the type and other material of the species from South America: these uniformly contain the stictic acid complex. This and other characters suggest that the New Zealand lichen may be a distinct species.
(*f*) *P. allanii, P. coriacea, P. fumbriata* and *P. fimbriatoides* are closely related species, a relationship which is borne out by similar chemistries and pubescent margins to the lobes.
(*g*) *P. gretae* is the only species in the genus so far encountered in New Zealand which entirely lacks any demonstrable chemistry.
(*h*) *P. intricata:* Most New Zealand specimens appear to lack tenuiorin and methyl gyrophorate (see Coppins & James 1979: 173).
(*i*) *P. margaretae* and *P. pubescens* are closely related species and this is reflected in their chemistries. They are unusual in the combination of the triterpenoids hopane-15α, 22-diol(13) and hopane-6α, 7β, 22-triol(14); both species contain traces of salazinic acid besides the usual stictic acid complex.
(*j*) *P. carpoloma* and *P. neglecta* are related species with similar chemistries.
(*k*) *P. episticta* and *P. lividofusca* both have chemodemes containing the triterpenoid amphistictinic acid, 15α-acetoxy-22-hydroxyhopan-24-oic acid (Ronaldson & Wilkins 1978).

TABLE 2. *Yellow medulla species—chemistry*

	Species	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
34	*aurata*	X	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	X	·	X	*c*	34
35	*ardesiaca*	X	X	X	·	X	·	X	T	X	X	X	·	·	·	·	·	·	·	·	*a*	35
36	*coerulescens*	X	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	*a*	36
37	*colensoi*	X	X	X	X	X	X	X	X	X	X	X	·	·	·	·	·	·	·	·	*b*	37
38	*coronata*	X	X	X	X	X	X	X	X	X	X	X	·	·	·	X	·	·	·	·	*b*	38
39	*degelii*	X	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	·	X	·	*d*	39
40	*flavicans*	X	X	X	·	X	·	X	X	X	X	X	X	X	X	·	·	·	·	·	·	40
41	*poculifera*	X	X	X	·	·	·	·	·	·	·	·	·	·	·	·	·	X	·	X	*c*	41
42	*rubella*	X	X	X	·	·	·	·	·	·	·	·	·	·	·	·	X	·	·	·	·	42
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		

X, always present; ·, never present; T, sometimes present, or only revealed on heavy loading of chromatogram.

Compounds: 1, pulvinic acid; 2, pulvinic dilactone; 3, calycin; 4, polyporic acid; 5, 2α, 3β, 22α-tria-cetoxystictane; 6, 22α, hydroxystictane-3-one; 7, 2α, 3β-diacetoxystictane-22-ol; 8, stictane-3β-22α-diol; 9, 2α-acetoxystictane-3β, 22α-diol; 10, 3β-acetoxystictane-2α, 22α-diol; 11, stictane-2α, 3β, 22α-triol; 12, 3β, 22α-diacetoxystictane; 13, 2α, 3β-diacetoxystictane-22-ol; 14, 3β-acetoxystictane-22-ol; 15, pigments(3) red-purple in acetone; 16, lupanes; 17, sterols; 18, seco-stictanes; and 19, other substances.

Observations:

(*a*) The chemistry of the New Zealand material named *P. coerulescens* has not yet been critically studied; it does not correspond to type material from Chile, nor to that of *P. ardesiaca* which might have been considered the sorediate counterpart of the New Zealand plant.

(*b*) *P. colensoi* and *P. coronata* are closely related species and contain the same suite of stictanes. In addition, *P. coronata* contains a magenta-purple pigment soluble in acetone resolving into three elements on two-way t.l.c. assays.

(*c*) The chemistry of *P. aurata* and *P. poculifera* is the same, reflecting the close morphological relationship between the two species which is paralleled in *P. crocata* and *P. australiensis*.

(*d*) The chemistry of *P. degelii* differs from that of the South American *P. berberina* (Wilkins 1977), a feature which endorses the distinctiveness of this new taxon.

Nomenclatural Notes

Pseudocyphellaria carpoloma (Delise) Vainio

Hedwigia **37**: 34(1898).—*Sticta carpoloma* Delise, *Mém. Soc. linn. Calvados* **2**: 159(1825); type:—New Zealand, 'Sur les vieux arbres à la Nouvelle Zélande, 1824, Bay of Islands, *?Dumont-D'Urville* (PC-LENORMAND—holotype!).

Sticta expansa Stirton, *Trans. N.Z. Inst.* **32**: 72(1900); type:—New Zealand, near Wellington. *J. Buchanan* (BM—lectotype!).

For additional synonyms and their typification see Galloway & James (1980: 293).

Galloway & James (1980) lectotypified *Sticta carpoloma* on a fragment from Montagne's herbarium (BM) but in October 1982 Delise's original material was located in PC-LENORMAND. This collection represents the only material of this species from New Zealand that is named *S. carpoloma* in Delise's own handwriting and is thus regarded as the holotype. Although without an exact locality, the specimen would have come from the Bay of Islands in North Auckland, from collections of D'Urville or Lesson made during the voyage of the corvette *Coquille*. According

to Dunmore (1969), this vessel, under the command of Louis-Isidore Duperrey, anchored in the Bay of Islands from 3–17 April 1824, and during that time *P. carpoloma*, which is a prominent and common epiphyte of northern, coastal forest, would certainly have been collected. The *Coquille* returned to France early in 1825, arriving in Marseilles on 24 March. Thus the only material of this species that Delise could have examined is the material regarded as the holotype. The fact that he could not have seen this material until some time after the end of March 1825, confirms mid- to late 1825 as the most likely date of publication of Delise's monograph.

Sticta expansa Stirton, must be added to the synonymy recorded in 1980 (*loc. cit.*). *Pseudocyphellaria carpoloma* is a dichotomously branched species with yellow pseudocyphellae on the lobe margins and lower surface, a character which immediately distinguishes it from *P. billardierii*, *P. faveolata* and *P. rufovirescens*. Its chemistry is Code D of Wilkins & James (1979). Although most common in northern coastal forest, it occurs also on the west coast of South Island, and in Stewart Island. A good illustration is given in Babington (1855: pl. cxxvi).

Pseudocyphellaria billardierii (Delise) Räsänen

Ann. Bot. Soc. zool.-bot. fenn. Vanamo 2(1): 39 (1932).–*Sticta billardierii* Delise, *Mém. Soc. linn. Calvados* **2:** 99 pl. 8 fig. 35 (1825).—*Sticta flotowiana* Laurer, *Linnaea* **2:** 40 (1827).—*Sticta linearis* J. D. Hook. & Taylor, *Hook. Lond. J. Bot.* **3:** 648 (1844).

For homotypic synonyms, additional synonyms and their typification see Galloway & James (1980: 293 & 298).

During a survey of the lichens of the Webbian Herbarium (FI) in 1981, D.J.G. found a sheet with three specimens of *S. billardierii* collected by La Billardière from *Terra Diemen* (Tasmania), which agree in all respects with the lectotype in Delise's herbarium (PC-LENORMAND). Both the Florence and Paris specimens appear to be part of the original collection La Billardière made from Tasmania, and the FI material is accordingly an isolectotype. All of the La Billardière material corresponds to Code C of Wilkins & James (1979) and hence is conspecific with *S. flotowiana* Laurer, and *S. linearis* J. D. Hook. and Taylor, which we earlier placed in synonymy with *P. faveolata* (Galloway & James 1980: 298). Our earlier interpretation of *P. billardierii* (Galloway & James 1980: 293) is therefore in error and refers to an endemic taxon now called *P. rufovirescens* (Renner & Galloway 1982: 205).

The name *P. billardierii* refers to an Australasian taxon with the following characters: green photobiont; white medulla; pale to brown or blackened lower surface with moderate to dense tomentum; elevated, verruciform, white pseudocyphellae with puckered margins and an impressed decorticate area; narrow, ± flat, often widely divergent lobes ± ascending at apices, and with regular dichotomous branching; rounded, smooth margins which lack pseudocyphellae; marginal or submarginal apothecia which are dark brown to black and epruinose. The spores are brown and polarilocular. Although *P. billardierii* is said to be confined to Tasmania by Imshaug (1977), it is also quite widespread in New Zealand. Some specimens from Tasmania collected by La Billardière (PC-LENORMAND, PC-THURET), determined by Delise as a young state of *S. billardierii*, are referable to *P. subvariabilis* (see p. 141).

Pseudocyphellaria faveolata (Delise) Malme

Bih. K. svenska Vetensk. Akad. Handl. **25**(3)6: 233(1899).—*Sticta faveolata* Delise, *Mém. Soc. linn. Calvados* **2**: 102 (1825).

Sticta elatior Stirton, *Trans. N.Z. Inst.* **32**: 73 (1900); type: New Zealand, near Wellington, *J. Buchanan* (BM-lectotype!).

For additional synonyms and their typification see Galloway & James (1980: 298).

Pseudocyphellaria faveolata is characterized by: a green photobiont; variable lobes (broadly rounded to ± dichotomously branched); margins with ± prominent, raised, verruciform or conical, white pseudocyphellae; marginal or laminal black apothecia which are often white-pruinose; a thick, dark tomentum on the lower surface, with raised, verruciform pseudocyphellae which are normally white but may be occasionally faintly yellow or cream, the margins of which are swollen, smooth, fawnish and with a flat, decorticate area. The chemistry is characteristic, corresponding to Code B of Wilkins & James (1979) and includes physciosporin. Although a polymorphic species it appears to have a remarkably uniform chemistry.

Pseudocyphellaria rufovirescens (Church. Bab.) D. Galloway

Mycotaxon **16**: 205 (1982).—*Sticta richardii* var. *rufovirescens* Church. Bab., *Fl. Nov. Zel.* **2**: 278 (1855).—*Sticta fossulata* f. *pallida* Krempelh., *Verhandl. zool.*—bot. Ges. Wien **26**: 446 (1876).—*P. billardierii sensu* D. Galloway & P. James, *Lichenologist* **12**: 293 (1980).

Typification of taxa follows Galloway & James (1980: 293).

Pseudocyphellaria rufovirescens is a commonly collected, conspicuous, endemic epiphyte characterized by: a green photobiont; white medulla; pale lower surface with only sparse, thin tomentum; white, punctate pseudocyphellae; rather narrow, dichotomously branched, shallowly faveolate lobes; pale red-brown of pinkish-brown, marginal apothecia which are never pruinose. It is distinguished from *P. billardierii* by the pale red-brown apothecia, colourless spores, pale, ± glabrous lower surfaces, flat, fleck-like pseudocyphellae and a different chemistry. The same characters also distinguish it from *P. faveolata*, and it is much less variable in lobe morphology than this species. Galloway & James (1980: 293) referred this species to *P. billardierii* (see above). The characteristic chemistry (two dominant hopanes) of *P. rufovirescens*, Code A of Wilkins & James (1979), was first described by Corbett & Young (1966*a*, *b*).

An excellent coloured engraving of *P. rufovirescens* is given in Richard (1833), as well as a description of the species as *S. carpoloma sensu* Richard, *non* Delise (Richard 1832), in which attention is drawn to that fact that white, and not yellow pseudocyphellae were present on the lower surface. Montagne (1835, 1845) recognized Richard's description of *S. carpoloma* as referring to a new species differing from *S. carpoloma* Delise. This new species he named *S. richardii* Mont., basing the name on material collected by Bertero from Juan Fernandez. In his 1845 paper, Montagne refers all similar New Zealand material (including the type of *P. rufovirescens*) to *S. richardii*. However, Juan Fernandez material differs chemically from New Zealand plants and appears to be an independent taxon.

Pseudocyphellaria subvariabilis (Nyl.) Vainio

Philipp. J. Sci. C **18:** 116 (1913).—*Sticta subvariabilis* Nyl., *Flora, Jena* **50:** 439 (1867).—*Sticta dissecta* Laurer, *Linnaea* **2:** 41 (1827); type:—Nov. Holland (Australia), *Sieber 45*, ex hb. Churchill Babington (BM—lectotype!).—non *S. dissecta* (Sw.) Ach. *Lich. Univ.:* 451 (1810).

Pseudocyphellaria multifida (Laurer) D. Galloway & P. James, *Lichenologist* **12:** 310 (1980), *nom. inval.*

Laurer did not publish a description of *S. multifida*, though he labelled specimens from New Holland (Australia) collected by Sieber (no. 45) with this name, and both Nylander (1860: 363) and Krempelhuber (1868: 318–319, tab. IV fig. 2 *a–b*) saw specimens so designated. Nylander did not validate *S. multifida*, but merely pointed out that this name of Laurer's was in use in herbaria. Recently, a specimen collected by Sieber (no. 45) from New Holland was found in unincorporated material from Churchill Babington's herbarium (BM) labelled '... Sticta dissecta Laurer-multifida Laurer. Nov. Holland. Sieb. Crypt.: 45', apparently in Laurer's own handwriting. *Sticta dissecta* Laurer is a later homonym of *S. dissecta* (Sw.) Ach., from Central America [correctly *Lobaria dissecta* (Sw.) Räuschel]. As both epithets *dissecta* and *multifida* are invalid for the Australasian lichen, *P. multifida* must therefore be placed as a synonym of *P. subvariabilis.*

Authentic material of Sieber no. 45 from New Holland was examined in BM, G, L, PC-LENORMAND and PC-THURET. In both Delise's and Bory de Saint Vincent's herbaria (PC-LENORMAND and PC-THURET respectively), material of Sieber no. 45 (1826) is annotated as a juvenile state of *S. billardierii* Delise. A specimen labelled *S. billardierii* in Montagne's herbarium (PC-MONTAGNE) collected in 'Nouv Holl.' by La Billardière and given to Montagne by Philip Barker Webb, is also referable to *P. subvariabilis.*

New Species

Pseudocyphellaria ardesiaca D. Galloway sp. nov.

Pseudocyphellariae coerulescentis similis, sed thallus supra sorediosus, sorediis marginalibus congestis, granulatis, flavescenti-erosis.

Typus: New Zealand, Canterbury, Boyle River near Lewis Pass, on bark of *Leptospermum* on terrace overlooking Boyle Lodge, 9 January 1979, *D. J. Galloway* (CHR 343237—holotypus; BM—isotypus).

Pseudocyphellaria ardesiaca is a small-lobed, rosette-forming, corticolous species with a characteristic, clear azure- to grey-blue upper surface when wet, yellow medulla and yellow soralia. It is distinguished from *P. coerulescens* by the presence of soralia and the blue-green photobiont. It seems similar, but distinct from *P. encoensis* R.Sant. *nom. nud.* (Huneck *et al.* 1973) from southern Chile. *Pseudocyphellaria ardesiaca* is known also from Tasmania.

Pseudocyphellaria degelii D. Galloway & P. James sp. nov.

Pseudocyphellariae berberinae similis sed lobae laciniatae angustatae, marginalibus integris. Thallus supra laevigatus, non profunde faveolatus. Excipulum scabridum vel areolatum. Sporae 8: nae, ellipsoideae–fusiformae, 1–3-septatae, (20)25–34(-39) × 6·5–8·5 µm.

Typus: New Zealand, Nelson, Mt Haast, on *Nothofagus solandri* var. *cliffortioides* at treeline, 28 December 1978, *D. J. Galloway* (CHR 381020—holotypus; BM—isotypus).

Pseudocyphellaria degelii is related to the South American *P. berberina* (Galloway & James 1977) but differs in several characters. It is distinctive chemically (Wilkins 1977, Goh *et al.* 1978); the lobes are narrower and not as broadly rounded; margins are entire or notched but not conspicuously indented, incised or ± phyllidiate as in *P. berberina*. In *P. degelii* the upper surface is smoother, less deeply faveolate and more rarely scabrid–areolate; the exciple is also much more massively developed (even at an early stage) and is more coarsely verrucose–areolate–scabrid. Spores in *P. degelii* are consistently shorter and thicker than in *P. berberina*.

It is named in honour of Professor Gunnar Degelius in recognition of his researches on *Collema* in New Zealand.

Pseudocyphellaria durietzii D. Galloway sp. nov.

Pseudocyphellariae hookeri similis sed subtus fulvus tomentosus, pseudocyphellis niveis. Photobiontis viridis. Sporae 8: nae, fuscae, polariloculares, (18–)22–25·5 × 6·5–8·5 µm.

Typus: New Zealand, Stewart Island, lower Kopeka River; on *Coprosma foetidissima* roots on rata, in riverine rata-kamahi-totara-miro forest, *c.* 10 m, 12 February 1980, *C. D. Meurk* (CHR 375960—holotypus; BM—isotypus).

First collected by G. Einar and Greta Du Rietz from bark of *Dacrydium cupressinum* in mixed rain forest on Seymour Island, Doubtful Sound in 1927. It is characterized by: the rounded, deeply faveolate lobes; black, laminal apothecia; the pale, bullate lower surface with scattered, punctate, white pseudocyphellae. It is related to *P. hookeri* but distinguished by the green photobiont. When sterile, its appearance is reminiscent of certain species of *Lobaria* (e.g. *L. linita, L. pulmonaria*).

Pseudocyphellaria fimbriata D. Galloway & P. James sp. nov.

Pseudocyphellariae coriaceae similis sed lobae ad marginem phyllidiis complanatis, palmatis, puberulis. Sporae 8: nae, fuscae, 1-septatae, 20–25 × 8–11 µm.

Typus: New Zealand, Nelson, Lake Rotoiti, Peninsula, on bark of *Nothofagus menziesii*, 28 February 1980, *D. J. Galloway* (CHR 381021—holotypus; BM—isotypus).

Pseudocyphellaria fimbriata is one of a small group of closely related endemic species characterized by marginal tomentum on the lobes. It is distinguished from *P. coriacea* by the marginal, tomentose, squamiform phyllidia, and from *P. fimbriatoides* by the green photobiont and rather broader spores.

Pseudocyphellaria fimbriatoides D. Galloway & P. James sp. nov.

Pseudocyphellariae dissimilis similis sed phyllidiis squamiformibus, tomentosis. Sporae 8: nae, fuscescentes, 1-3-septatae, 20–27 × 6·5–8·5 µm.

Typus: New Zealand, Canterbury, Banks Peninsula below summit of Mt Sinclair, 670 m, on rocks on forest floor in dense bush, 14 February 1980, *J. A. Elix 7125* (CHR 381117—holotypus; BM—isotypus).

Pseudocyphellaria fimbriatoides is distinguished from *P. dissimilis* by the distinctly tomentose squamiform phyllidia and the rather shorter spores. It is related to *P. fimbriata* but distinguished by the blue-green photobiont.

Pseudocyphellaria gretae D. Galloway sp. nov.

Pseudocyphellariae pubescentis similis sed lobae parvulae, rosulatae, imbricatae marginibus isidiosus, isidiis coralloideis vel granulatis, supra dense tomentosae. Sporae 8: nae, 1–3-septatae, fuscae, 25·4–29 × 10–13·5 µm.

Typus: New Zealand, Canterbury, Boyle River near Lewis Pass, on bark of *Nothofagus menziesii*, 13 September 1981, *D. J. Galloway* (CHR 381118—holotypus; BM—isotypus).

Pseudocyphellaria gretae is a very distinctive species characterized by: the dense tomentum on the upper and lower surfaces; the delicate, coralloid, marginal isidia which are also densely tomentose; white, rather indistinct pseudocyphellae; a negative chemistry. This last character is noteworthy since it appears to be the only New Zealand species in the genus with no detectable metabolites after acetone extraction. It is distinguished from *P. pubescens* by the marginal isidia; the epruinose apothecial discs which are red-brown and not black (apothecia are extremely rare in *P. gretae*); by the white pseudocyphellae; and by the chemistry (*P. pubescens* has a complex chemistry).

Named in honour of Greta Du Rietz who collected lichens widely throughout New Zealand in 1926–27 with her husband, G. Einar Du Rietz. Greta Du Rietz prepared all of the plant collections, took the photographs on their expedition and made the botanical drawings to illustrate Einar Du Rietz's accounts of New Zealand plants. She maintained an active interest in lichens, especially in those of New Zealand, until her death in 1981.

Pseudocyphellaria knightii D. Galloway sp. nov.

Pseudocyphellariae lividofuscae similis sed lobis linearis-elongatis, fragilis. Photobiontis cyaneus Nostocaceus.

Typus: New Zealand. Nelson, 5 miles north of Westport, on bark of *Dacrycarpus dacrydioides* on side of small stream, March 1980, *D. J. Galloway* (CHR 375745—holotypus).

Pseudocyphellaria knightii is distinguished from *P. lividofusca* by the linear–elongate, rather fragile lobes, and the blue-green photobiont. Named in honour of Charles Knight (1808–1891), a former Auditor-General of New Zealand and the most important lichenologist there in the nineteenth century.

Pseudocyphellaria maculata D. Galloway sp. nov.

Pseudocyphellariae crocatae similis sed lobis maculatis, sorediis destitutis. Sporae 8: nae, fuscae, 1–3-septatae vel polariloculares, 20–31 × 8–10·5 µm.

Typus: New Zealand, Nelson, Maruia River, Speargrass Flat near Springs Junction, on twigs of wayside shrubs, 22 September 1981, *D. J. Galloway* (CHR 381022—holotypus; BM—isotypus).

Pseudocyphellaria maculata is distinguished from *P. lechleri* by the flat lobes which are never canaliculate-ascending and rarely dark chestnut-brown at the apices; by the smooth faveolae and shallow interconnecting ridges; the thin tomentum of the lower surface and the distinctly thickened lower margins to the lobes. It is also corticolous and never terricolous as is *P. lechleri*. It is separated from *P. neglecta* by the pale, thinly tomentose, bullate lower surface; from *P. crocata* by the absence of soredia; from *P. australiensis* by the absence of marginal isidia. Its chemistry is also distinctive.

Pseudocyphellaria sericeofulva D. Galloway sp. nov.

Pseudocyphellariae crocatae similis sed thallus supra tomentosus, non faveolatus, sorediis destitutus.

Typus: New Zealand, South Auckland, Kopuku coalmine near Mercer, on *Cordyline australis*, 1 May 1981, *J. K. Bartlett* (CHR 375961—holotypus; BM—isotypus).

Pseudocyphellaria sericeofulva is distinguished from *P. crocata* by the tomentose, non-faveolate upper surface and the absence of soredia, characters which also separate it from *P. australiensis*, *P. lechleri* and *P. maculata*.

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References

Babington, C. (1855) Lichenes. In *The Botany of the Antarctic Voyage of H.M. Discovery Ships Erebus and Terror in the years 1839–1843. Flora Novae Zelandiae* (J. D. Hooker, ed.) II, *Flowerless Plants:* 266–311. London: Lovell Reeve.

Coppins, B. J. & James, P. W. (1979) New or interesting British lichens IV. *Lichenologist* **11:** 139–179.

Corbett, R. E. & Young, H. (1966*a*) Lichens and fungi. Part II. Isolation and structural elucidation of 7β-acetoxy-22-hydroxyhopane from *Sticta billardierii* Del. *J. chem. Soc.* C: 1556–1563.

Corbett, R. E. & Young, H. (1966*b*) Lichens and fungi. Part III. Structural elucidation of 15α, 22-dihydroxyhopane from *Sticta billardierii* Del. *J. chem.Soc.* C: 1564–1576.

Culberson, C. F., Culberson, W. L. & Johnson, A. (1981) A standardized TLC analysis of β-orcinol depsidones. *Bryologist* **84:** 16–29.

Dunmore, J. (1969) *French Explorers in the Pacific.* Vol. 2. *The Nineteenth Century.* Oxford: Clarendon Press.

Elix, J. A. & Lajide, L. (1981) 2′-O-Methyltenuiorin, 2′′-O-methyltenuiorin and 2′, 2′′-di-O-methyltenuiorin. Three new tridepsides from the lichen *Pseudocyphellaria faveolata. Aust. J. Chem.* **34:** 2005–2011.

Galloway, D. J. & James, P. W. (1977) *Pseudocyphellaria berberina* (G. Forster) D. Galloway & P. James: notes on its discovery and synonymy. *Lichenologist* **9:** 95–105.

Galloway, D. J. & James, P. W. (1980) Nomenclatural notes on *Pseudocyphellaria* in New Zealand. *Lichenologist* **12:** 291–303.

Goh, E. M., Wilkins, A. L. & Holland, P. T. (1978) Structural elucidation of a new group of secostictane triterpenoids. *J. chem. Soc. Perkin Trans.* **1:** 1560–1564.

Huneck, S., Redon, J. & Quilhot, W. (1973) Mitteilungen über Flechteninhaltsstoffe. XCVII. Zur Phytochemie südamerikanischer Pseudocyphellariaceen. *J. Hattori bot. Lab.* **37:** 539–562.

Imshaug, H. A. (1977) Austral lichen populations. In *Adaptations within Antarctic Ecosystems* (G. A Llano, ed.): 947–966. Washington: Smithsonian Institution.

Krempelhuber, A. von (1868) Exotische Flechten aus dem Herbar des k.k. Hofkabinetes in Wien. *Verh. zool.-bot. Ges. Wien* **18:** 303–330.

Montagne, C. (1835) Prodromus Florae Fernandesianae. Pars prima, sistens enumerationem plantarum cellularium quas in Insulá Juan Fernandez à cl. Bertero collectas describi edique curavit. *Annls Sci. nat., Bot.*, sér. 2, **4:** 86–99.

Montagne, C. (1845) *Voyage au Pôle Sud et dans L'Océanie sur les corvettes L'Astrolabe et la Zélée, exécuté par ordre du Roi pendant les années 1837–1838–1839–1840 sous le commandement de M. J. Dumont-D'Urville capitaine de vaisseau. Botanique.* Vol. 1. *Plantes cellulaires:* 169–201. Paris: Gide.

Nylander, W. (1860) *Synopsis methodica Lichenum.* Vol. 1(2). Paris: Martinet.

Renner, B. & Galloway, D. J. (1982) Phycosym biodemes in *Pseudocyphellaria* in New Zealand. *Mycotaxon* **16:** 197–231.

Richard, A. (1832) *Voyage de découvertes de l'Astrolabe exécuté par ordre du Roi pendant les années 1826–1827–1828–1829 sous le commandement de M. J. Dumont-D'Urville. Botanique.* Vol. 1. *Essai d'une flore de la Nouvelle Zélande:* 23–38. Paris: J. Tastu.

Richard, A. (1833) *Voyage de la corvette l'Astrolabe exécuté pendant les années 1826–1827–1828–1829 sous le commandement de M. Jules Dumont-D'Urville capitaine de vaisseau. Atlas:* p. 9. Paris: J. Tastu.

Ronaldson, K. J. & Wilkins, A. L. (1978) The structure of amphistictinic acid, a triterpenoid constituent of the lichen *Pseudocyphellaria amphisticta*. *Aust. J. Chem.* **31:** 215–219.

Walker, F. J. & James, P. W. (1980) A revised guide to microchemical techniques for the identification of lichen products. *Bull. Brit. Lichen Soc.* **46** *(Suppl.):* 13–29.

Wilkins, A. L. & James, P. W. (1979) The chemistry of *Pseudocyphellaria impressa, s. lat.*, in New Zealand. *Lichenologist* **11:** 271–281.

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