

LICHENS OF THE CAVALLI ISLANDS, NORTHERN NEW ZEALAND

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SUMMARY

Eighty-five species from thirty-nine genera are recorded from the Cavalli Islands. Rich lichen floras (dominated by members of the Parmeliaceae, Physciaceae and Ramalinaceae) grow on greywacke rocks in the maritime zone and in grasslands. Scattered clumps of epigeal lichens (particularly Cladoniaceae) occur on sparsely grassed ridges and beneath older patches of manuka heath. A rich and diverse flora (dominated by Pannariaceae, Stictaceae and crustose taxa) grows on bark in semi-open canopied, mixed native forest on Motukawanui. A stand of cabbage trees on Nukutaunga supports a less diverse epiphytic flora (mostly Collemaaceae in the centre of the grove and Parmeliaceae towards the fringes). A wide variety of lichens occur on old fruit trees and exotic plants in the overgrown homestead garden on Motukawanui. Depauperate lichen floras grow beneath dense-canopied native forest (mostly Collemaaceae), on the bark of shrubs at the fringes of petrel scrub (mainly Parmeliaceae, Physciaceae, Teloschistaceae), on the rough bark of pohutukawas and on rocks and clay on exposed cliff-tops.

The rare squamulose lichen *Heppia spectabilis*, grows on maritime rocks on Haraweka.

INTRODUCTION

The lichens recorded here were collected on the Cavalli Islands during a ten day visit over the New Year period, 1978-1979. The Cavallis lie off the east coast of Northland, midway between the Bay of Islands and Whangaroa Harbour (Fig. 1).

The Cavalli Islands consist of a large, central island, Motukawanui, surrounded by thirty or more smaller islands. Motukawanui was grazed by cattle up until 1974. Since then the grass has grown and the patches of manuka heath have spread. Several remnant clumps of mixed native forest still grow around the heads of the two major valleys. Of the smaller islands, Motukawaiti is still grazed, but the remainder are Maori Reserve land clothed in varying combinations of long grass, flax, coastal scrub, regenerating coastal forest and petrel scrub.

Representative collections of lichens were made from the main vegetation

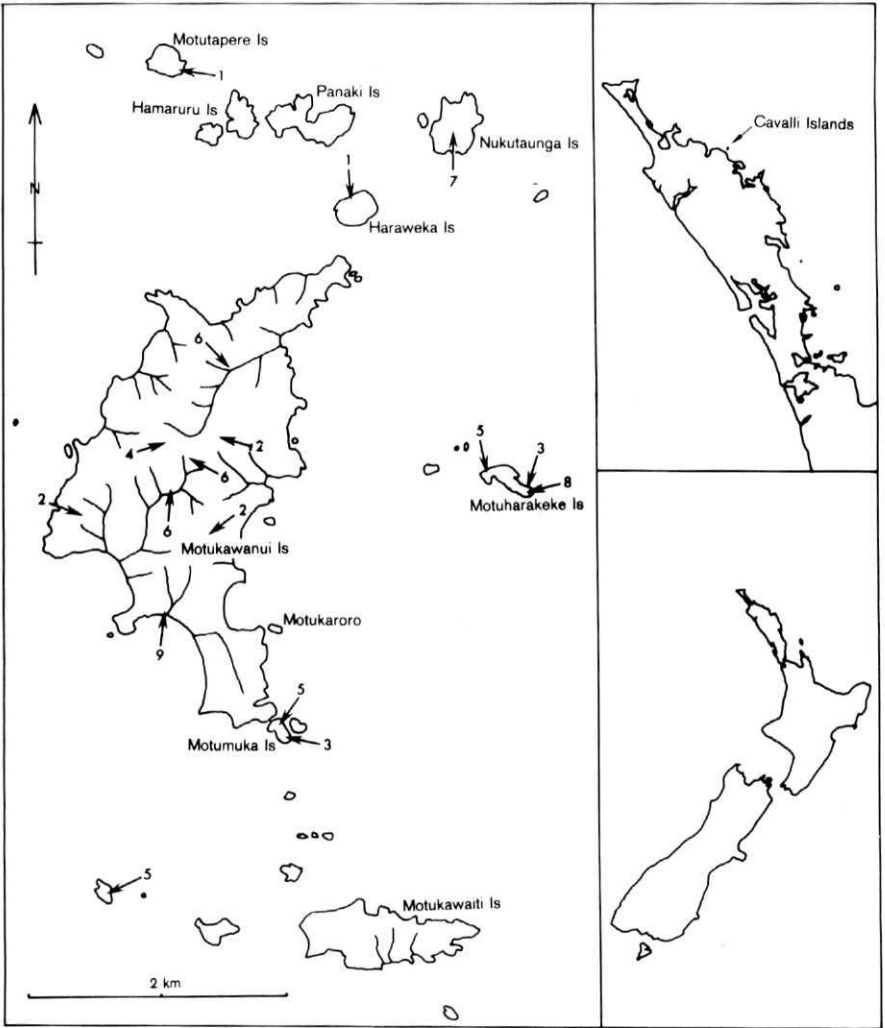


Fig. 1. Map of the Cavalli Islands, north east New Zealand, showing localities (arrowed) where representative collections of lichens were made from nine habitat types: 1. marine, maritime, 2. grassland, 3. open, rocky cliff-tops, 4. manuka heath, 5. coastal pohutukawa, 6. native forest, 7. cabbage tree grove, 8. petrel scrub, 9. overgrown garden.

habitats (Fig. 1, Species List). Voucher specimens of these lichens are held in the authors' herbarium.

The only previous reference to lichens on the Cavallis is by Zahlbruckner (1941) who recorded three species from the maritime zone. All three (*Anaptychia dendritica*, *Parmelia cetrata* var. *corniculata*, *Ramalina yemensis* var. *ecklonii*) were also found by us.

SPECIES LIST

Key to distribution symbols:

Habitat

- 1 = marine, maritime
- 2 = grassland
- 3 = open, rocky cliff-tops
- 4 = manuka heath
- 5 = coastal pohutukawa
- 6 = native forest
- 7 = cabbage tree grove
- 8 = petrel scrub
- 9 = overgrown garden

Substrate

- d = decaying logs
- r = rocks
- s = soil
- t = tree bark

CLASS ASCOMYCETES

ORDER LECANORALES

Suborder Lecanorineae

Baeomycetaceae	<i>Baeomyces fungoides</i> (Sw.) Ach.	2s
Cladoniaceae	<i>Cladia aggregata</i> (Sw.) Nyl.	2rs 4ds
	<i>Cladonia capitellata</i> (Tayl.) Bab.	2rs 4s
	<i>C. carassensis</i> Vain.	2s
	<i>C. cervicornis</i> Ach.	2s
	<i>C. chlorophaea</i> (Floerke) Spreng.	2s
	<i>C. coniocraea</i> (Floerke) Sandst.	2s 4s
	<i>C. degenerans</i> (Floerke) Spreng.	2rs
	<i>C. fimbriata</i> (L.) Fr.	4dr
	<i>C. floerkeana</i> (Fr.) Floerke	2s 4ds
	<i>C. gracilis</i> (L.) Willd.	2s
	<i>C. leptoclada</i> Des. Abb.	3r 4s
	<i>C. pyxidata</i> (L.) Fr.	2s
	<i>C. squamosa</i> (Scop.) Hoffm.	2s
	<i>C. subulata</i> (L.) Wigg	2s
	<i>C. turgida</i> (Ehr.) Hoffm.	2s
	<i>C. verticillata</i> (Hoffm.) Schaer.	2s 4s
Coccocarpiaceae	<i>Coccocarpia cronia</i> Tuck.	6t
Collemataceae	<i>Collema laeve</i> Hook. f. Tayl.	5t 6t 7t
	<i>C. cf. subflaccidum</i> Degel.	6rt
	<i>Leptogium cyanescens</i> (Ach.) Kremp.	6t 7t
	<i>Leptogium</i> spp.	6t 7t
Heppiaceae	<i>Heppia spectabilis</i> Zahlbr.	1r
Lecanoraceae	<i>Lecanora</i> spp.	3r 6t 9t
Lecideaceae	<i>Bacidia</i> sp.	6t
	<i>Catillaria melaclina</i> (Nyl.) Zahlbr.	6t 7t 9t
	<i>Lecidea crustulata</i> (Ach.) Spreng.	1r
	<i>Lecidea</i> spp.	2s 7t 8t 9t

	<i>Megalospora marginiflexa</i> (Hook.f.Tayl.) Zahlbr.	6t
Pannariaceae	<i>Pannaria fulvescens</i> Nyl.	6t
	<i>P. granulifera</i> Mull. Arg.	6t
	<i>P. nov. sp.</i> (isidiate)	5t
	<i>P. sp.</i>	6t
	<i>Psoroma araneosum</i> Nyl.	6t
Parmeliaceae	<i>Menegazzia circumsoarediata</i> R.Sant.	6t
	" <i>Parmelia</i> (<i>Xanthoparmelia</i>) <i>isidiigera</i> (Mull.Arg.) Gyeln."	1r 2r 3r
	<i>Parmotrema cetratum</i> (Ach.) Hale	1r 6t
	<i>P. crinitum</i> (Ach.) Choisy	3r 5t 6t 7t 8t 9t
	<i>P. grayanum</i> (Hue) Hale	1r 2r
	<i>P. perlatum</i> (Huds.) Choisy	1r 2r 3r 7t 8t 9t
	<i>P. reticulatum</i> (Tayl.) Choisy	5t 6t 7t
	<i>P. tinctorum</i> (Nyl.) Hale	7t
	<i>Pseudoparmelia caperata</i> (L.) Hale	9t
	<i>Usnea arida</i> Mot.	2r 7t
	<i>U. flexilis</i> Stirt.	7t
	<i>U. inermis</i> Mot.	7t
	<i>U. xanthopaga</i> Stirt.	4r
	<i>U. spp.</i>	2r 5t 9t
	<i>Xanthoparmelia furcata</i> (Mull.Arg.) Hale	1r 2r 3r
Ramalinaceae	<i>Ramalina allani</i> Zahlbr.	1r
	<i>R. linearis</i> Ach.	1r 2r 3r 7t 9t
	<i>R. yemensis</i> Nyl.	1r 7t 8t 9t
	<i>R. sp.</i>	9t
Stereocaulaceae	<i>Stereocaulon ramulosum</i> (Sw.) Rausch.	2rs 3r 4s
	Suborder Lichinieae	
Lichinaceae	<i>Lichina</i> sp.	1r
	Suborder Teloschistineae	
Teloschistaceae	<i>Caloplaca elegans</i> (Link.) Th.Fr.	1r 3r
	<i>Teloschistes chrysophthalmus</i> (L.) Th.Fr.	7t 8t 9t
	<i>Xanthoria parietina</i> (L.) Th.Fr.	1r 5t 8t 9t
	Suborder Peltigerineae	
Stictaceae	<i>Pseudocyphellaria aurata</i> (Ach.) Vain.	5t 6t 7t
	<i>P. cinnamomea</i> Vain.	6r
	<i>P. colensoi</i> (Nyl.) Vain.	5t
	<i>P. episticta</i> (Nyl.) Vain.	6rt
	<i>P. faveolata</i> (Del.) Malme	6t
	<i>P. flavicans</i> (Hook.f.) Vain.	6t
	<i>Sticta coriacea</i> Hook.f.Tayl.	6t
	<i>S. psilophylla</i> Mull. Arg.	6t
	<i>S. subcoriacea</i> Nyl.	6t 7t
	Suborder Physciineae	
Physciaceae	" <i>Anaptychia boryii</i> (Fee) Massal."	6t
	" <i>Anaptychia japonica</i> (Sato) Kurok."	2r 3r 4s 5t 6rt 9t
	<i>Buellia</i> cf. <i>punctata</i> (Hoffm.) Mass.	5t 6t
	<i>B. stellulata</i> (Tayl.) Mudd.	1r 2r
	<i>B. subdisciformis</i> Vain.	1r 2r
	<i>Dirinaria picta</i> (Sw.) Clem.&Schaer.	9t
	<i>Heterodermia</i> cf. <i>dendritica</i> (Pers.) Poelt.	5t 6r
	<i>H. pseudospeciosa</i> (Kurok.) Culb.	1r 2r 3r 5t 6t 8t
	<i>Physcia albicans</i> (Pers.) Thomson	6t

	Suborder Pertusariineae	
Pertusariaceae	<i>Pertusaria</i> sp.	6t
	ORDER OSTROPALES	
	Suborder Ostropineae	
Thelotremaaceae	" <i>Ocellularia</i> " sp.	6t 9t
	<i>Thelotrema lepadinum</i> Ach.	6t
	Suborder Graphidineae	
Graphidaceae	<i>Graphis inquinata</i> (Knight & Mitt.) Hook.f.	6t
	<i>Phaeographis australiensis</i> Mull. Arg.	9t
	<i>P. inusta</i> (Ach.) Mull. Arg.	6t
	ORDER SPHAERIALES	
Porinaceae	<i>Clathroporina endochrysea</i> sensu Bab. (1855)	6t
	ORDER ARTHONIALES	
Opegraphaceae	<i>Opegrapha intertexta</i> Knight	6t 7t 9t
	<i>O.</i> spp.	6t 9t

HABITAT ASSOCIATIONS

1. Marine, maritime

The intertidal lichen, *Lichina*, grows in abundance on the greywacke rocks of the Cavallis. Above high tide level in the maritime zone, the rocks are covered in Parmeliaceae ("*Parmelia* (*X.*) *isidiigera*", *Parmotrema cetratum*, *P. grayanum*, *P. perlatum* and *Xanthoparmelia furcata*), Ramalinaceae (*Ramalina allani*, *R. linearis* and *R. yemensis*), the orange and yellow Teloschistaceae (*Caloplaca elegans* and *Xanthoria parietina*), the crustose lichens *Buellia stellulata*, *B. subdisciformis* and *Lecidea crustulata*, and the foliose *Heterodermia pseudospeciosa*. The most interesting lichen growing in this zone is the dark brown, squamulose *Hepia spectabilis*. It was found growing along joints beneath small overhangs about 10m above sea level towards the top of the maritime zone on the north side of Haraweka. This is only the third record of this species from New Zealand. Elsewhere it has been recorded from the rocky cliffs at its type locality on Hen Island and from the schists of Otago.

2. Grassland

Lichens are absent from most of the grass covered slopes of Motukawanui (Fig. 2). They do grow however, on a few of the more exposed ridges where erosion over the years has removed most of the soil leaving only clay with a sparse cover of stunted tea tree and grasses. Here the ground lichens are all fruticose; mostly swards of *Cladia aggregata* and species of *Cladonia* but also sparse *Baeomyces fungoides* and *Stereocaulon ramulosum*.

Greywacke rock outcrops occur in a few places on the grassed ridges. These rocks support a diverse lichen flora which includes foliose species of Parmeliaceae (*Parmotrema grayanum*, *P. perlatum*, *Xanthoparmelia furcata*, "*P.* (*X.*) *isidiigera*") and Physciaceae (*Anaptychia japonica*,



Fig. 2. Looking north from the trig on Motukawanui to the group of northern islands. From left: Horonui, Motutapere, Hamaruru, Panaki, Haraweka (rounded, partly obscured) and Nukutaunga. On Motukawanui lichens grow on rocks and soil in the grasslands (foreground) and on the ground beneath manuka heath (slopes in middle distance). A rich, epiphytic lichen flora grows on the bark of trees in patches of native forest in Kikipaku Valley (cuts across photograph from bottom left to middle right).

Heterodermia pseudospeciosa), fruticose species of *Cladonia*, *Usnea*, *Ramalina* and *Stereocaulon*, and the crustose *Buellia stellulata* and *B. subdisciformis*.

3. Open, rocky cliff-tops

A few of the smaller islands have exposed, open clearings along their cliff-tops (Fig. 3). The rocks in these areas support a limited flora consisting of four species of Parmeliaceae, two of Physciaceae, the orange *Caloplaca elegans*, fruticose *Ramalina linearis*, *Stereocaulon ramulosum* and *Cladonia leptoclada* and species of the crustose genus *Lecanora*.

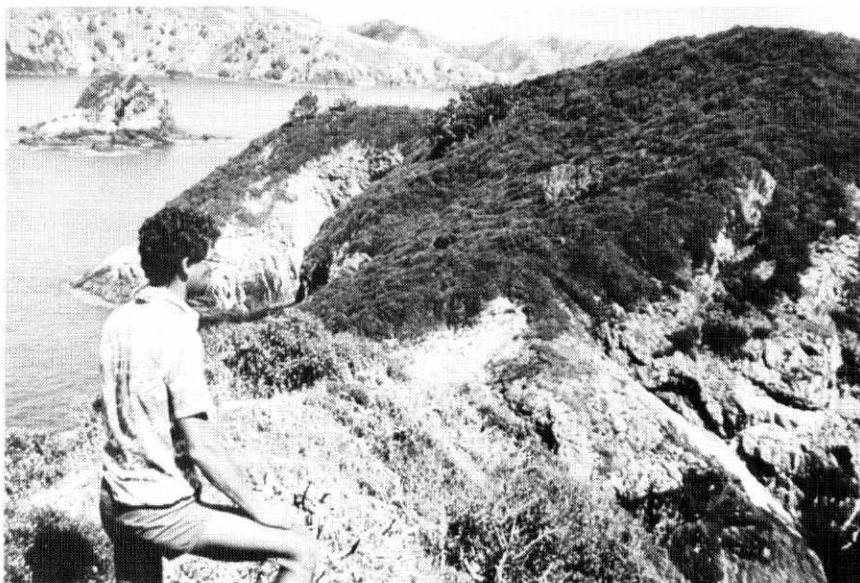


Fig. 3. Looking west over Motuharakeke to Te Anaputa (upper left) and Motukawanui beyond. A sparse lichen flora grows on the open, rocky cliff-tops in the foreground. No lichens are present beneath the dense canopy of petrel scrub on the slopes of Motuharakeke (upper right) but a few grow on the more exposed branches around the fringes of the scrub patch.

4. Manuka heath

Most of the manuka heath of Motukawanui is young and dense and is lichen-free. In several places however, the manuka is older and higher-canopied and abundant ground lichens grow beneath it. The most common are the erect Cladoniaceae (*Cladia aggregata*, *Cladonia capitellata*, *C. coniocraea*, *C. fimbriata*, *C. floerkeana*, *C. verticellata*), especially the reindeer lichen *C. leptoclada*. Other lichens present include *Stereocaulon ramulosum* and the foliose *Anaptychia japonica*.

5. Coastal pohutukawa

Pohutukawas grow around the coastlines of many of the islands but generally support very few lichens on their rough bark. The most common lichens present are the silvery-green Physciaceae (*Anaptychia japonica*, *Heterodermia* cf. *dendritica*, *H. pseudospeciosa*), Parmeliaceae (*Parmotrema crinitum*, *P. reticulatum*), and small specimens of *Usnea* and *Xanthoria parietina*. A large specimen of *Pseudocyphellaria colensoi* was collected from one pohutukawa, whilst several pohutukawas within the dense petrel scrub on Motuharakeke (Fig. 3) had a scattering of the dark grey *Collema laeve* and an undescribed *Pannaria*.

6. Native forest

On Motukawanui two large patches of native forest occur, one along the course of Kikipaku Stream and the other in the headwaters of Waiiti Stream. The forest is a mixture of many tree and shrub species (Court in prep.), and is the habitat supporting the greatest diversity of lichens on the islands. Where the canopy is not too dense, large rocks on the stream banks have a scattered cover of foliose lichens. These include the dark gelatinous *Collema* cf. *flaccidum*, the grey *Heterodermia* cf. *dendritica*, and the Stictacean species *Pseudocyphellaria cinnamomea* and *P. episticta*.

In darker areas the forest trees have few epiphytic lichens apart from the black and dark grey Collemataceae (*Collema laeve*, *C.* cf. *subflaccidum*, *Leptogium cyanescens* and other species) and the crisp, light green *Clathroporina endochrysea*. Where the canopy is less dense, the bark of the forest trees is often completely hidden by lichens. Here the most abundant lichens are the foliose Stictaceae, particularly the narrow lobed *Pseudocyphellaria faveolata* (often previously called *P. impressa*). Other Stictaceans present include *P. aurata*, *P. episticta*, *P. flavicans*, *Sticta coriacea*, *S. psilophylla* and *S. subcoriacea*. Another family which occurs most commonly here is the Pannariaceae (*Pannaria fulvescens*, *P. granulifera* and *Psoroma araneosum*). Although the Parmeliaceae and Physciaceae are not as common in the forest environment as in more open habitats, they still have representatives growing on the bark of forest trees. The most notable are the forest species *Menegazzia circumsorediata* and the extremely narrow lobed *Anaptychia boryii*. Also present are *Parmotrema cetratum*, *P. crinitum*, *P. reticulatum*, *Anaptychia japonica*, *Heterodermia pseudospeciosa* and *Physcia albicans*.

Crustose lichens are also abundant on the bark of forest trees and include species of *Lecanora*, *Bacidia*, *Catillaria*, *Megalospora*, *Buellia*, *Pertusaria*, "Ocellularia", *Thelotrema*, *Graphis*, *Phaeographis*, and *Opegrapha*. Of the script lichens, this is only the third record of *Graphis inquinata* and the first Northland record of *Phaeographis inusta*. One of the *Opegrapha* species is an as yet unidentified new record for New Zealand.

7. Cabbage tree stand

A large stand of cabbage trees (*Cordyline australis*), is present on the flat top of Nukutaunga (Figs 1,2). The soft, rough bark on the trunks of these trees supports a moderately rich lichen flora. The most common lichens in the darker centre of the grove are once again the Collemataceae. In lighter areas, usually nearer the fringes of the grove, the lichen flora is more diverse with numerous Parmeliaceae (*Parmotrema crinitum*, *P. perlatum*, *P. reticulatum*, *P. tinctorum*, *Usnea arida*, *U. flexilis* and *U. inermis*), scattered Ramalinaeaceae (*Ramalina linearis*, *R. yemensis*), Stictaceae (*Pseudocyphellaria aurata*, *Sticta subcoriacea*) and *Teloschistes chrysophthalmus*. Crustose lichens include *Catillaria melaclina*, *Opegrapha intertexta* and *Lecidea* sp.

8. Petrel scrub

Several of the smaller islands (especially Motuharakeke) are covered in dense petrel scrub (Fig. 3) of *Hymenanchera novaezelandiae* and taupata (*Coprosma repens*). No lichens grow beneath the dense canopy but the trunks and branches of plants on the fringes of the scrub support a reduced flora. The most common lichens are the grey foliose species *Parmotrema crinitum*, *P. perlatum* and *Heterodermia pseudospeciosa* and the yellow lichens *Teloschistes chrysophthalmus* and *Xanthoria parietina*. *Ramalina yemensis* and *Lecidea* sp. also grow here.

9. Overgrown garden

The old farm homestead in Papatara Bay, Motukawanui, is surrounded by its overgrown garden. Many of the old fruit trees and exotic plants have a rich lichen flora. Most of the lichens present also occur in other habitats on the Cavallis. Three that were not recorded elsewhere are *Pseudoparmelia caperata*, *Dirinaria picta* and *Phaeographis australiensis*. The flora on these introduced trees is a varied mixture of foliose (*Parmotrema crinitum*, *P. perlatum*, *Xanthoria parietina*, *Anaptychia japonica*), fruitcose (*Ramalina linearis*, *R. yemensis*, *Usnea* sp, *Teloschistes chrysophthalmus*) and crustose (*Catillaria melaclina*, *Opegrapha intertexta*, *O. sp.*, *Lecanora* sp., *Lecidea* sp., "Ocellularia" sp.) lichens.

COMPARISON WITH NEIGHBOURING AREAS

The lichen flora of the Cavalli Islands can be compared with other northern island groups. Overall the flora is more diverse than those of the Moturoa Islands (Hayward & Wright 1977) or Aldermen Islands (Hayward 1973), but slightly less diverse than the floras of Hen Island (Hayward & Hayward 1978) Great Mercury Island (Hayward *et al.* 1976) or the Slipper Island group (Hayward & Hayward 1974a).

The marine and maritime lichens of the Cavalli Islands are typical of

northern New Zealand coastlines (Hayward & Hayward 1974a, b), with all the more common taxa being present. One lichen, *Parmotrema grayanum* has not been recorded before from the maritime zone of northern shores.

The lichens that grow on rocks in the grasslands of the Cavallis are no different from those in similar habitats on Great Mercury and Slipper Islands. Ground lichens in the grasslands and manuka heath of the Cavalli Islands are of moderate diversity and similar to those on Great Mercury. Two notable absences are the coral lichen *Cladia retipora* and the ground and rock inhabiting genus *Peltigera*.

Although the epiphytic lichen flora of the native forest and cabbage tree grove on the Cavallis is more diverse than other habitats, it still lacks many of the taxa found in forested areas elsewhere in northern New Zealand. Notable absences include many of the Stictaceae (*Lobaria* spp., *Pseudocyphellaria argyracea*, *P. chloroleuca*, *P. crocata*, *P. granulata*, *P. hirta*, *Sticta latifrons*, *S. multifida*, *S. sylvatica*) and Pannariaceae (*Pannaria immixta*, *Parmeliella nigrocincta*, *P. duplicata*, *Psoroma anthrophyllum*, *P. contortum*, *P. leprolomum*, *P. sphinctrinum*). A number of distinctive crustose taxa were not found either and these include *Catillaria kelica*, *Coenogonium implexum*, *Graphina subvelata*, *Graphis librata*, *Opegrapha agelaeoides* and *Lecidea corallina*.

The epiphytic lichens of northern petrel scrub have only been recorded previously on the Moturoa Islands, where they are generically similar to those on the Cavallis but specifically quite different.

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