

Discussion

Leptinella rotundata appears to grow in patches and, because of its creeping rhizomes, can migrate over short distances, thereby spawning satellite patches. Even though *L. rotundata* is found in open exposed positions, it also requires at least some micro-habitat protection.

The population at the site we visited appears to be more or less stable, but it is literally living on the edge. Coastal erosion, and certainly any increase in coastal erosion rates, could easily wipe it out.

It was good to confirm this as one of Cam's early sites (AK 312881) and we learned that recorded

G.P.S. coordinates, especially those acquired years ago using older technology, can be inaccurate.

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References

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Appendix. Plants associated with *Leptinella rotundata* at the northern-most known Auckland region site. Recorded by Cameron Kilgour and John Rugis on 21 May 2021.

* = exotic species

Ferns

Adiantum cunninghamii
Asplenium oblongifolium

Dicotyledons

Apium prostratum var. *filiforme*
Centella uniflora
Coprosma repens
Dichondra brevifolia
Disphyma australe
Erigeron sumatrensis *
Hypochaeris radicata *

Leontodon saxatilis *
Leptinella rotundata
Lobelia anceps
Lotus pedunculatus *
Lysimachia arvensis *
Muehlenbeckia complexa
var. *complexa*
Oxalis rubens?
Plantago australis *
Plantago raoulii
Salicornia quinqueflora
Samolus repens var. *repens*

Selliera radicans
Senecio lautus
Sonchus oleraceus *
Tetragonia trigyna

Monocotyledons

Ficinia nodosa
Isolepis cernua var. *cernua*
Lachnagrostis billardiarei
subsp. *billardiarei*
Lachnagrostis littoralis
Poa anceps

Lichens of Arch Hill, Auckland City

Marley Ford

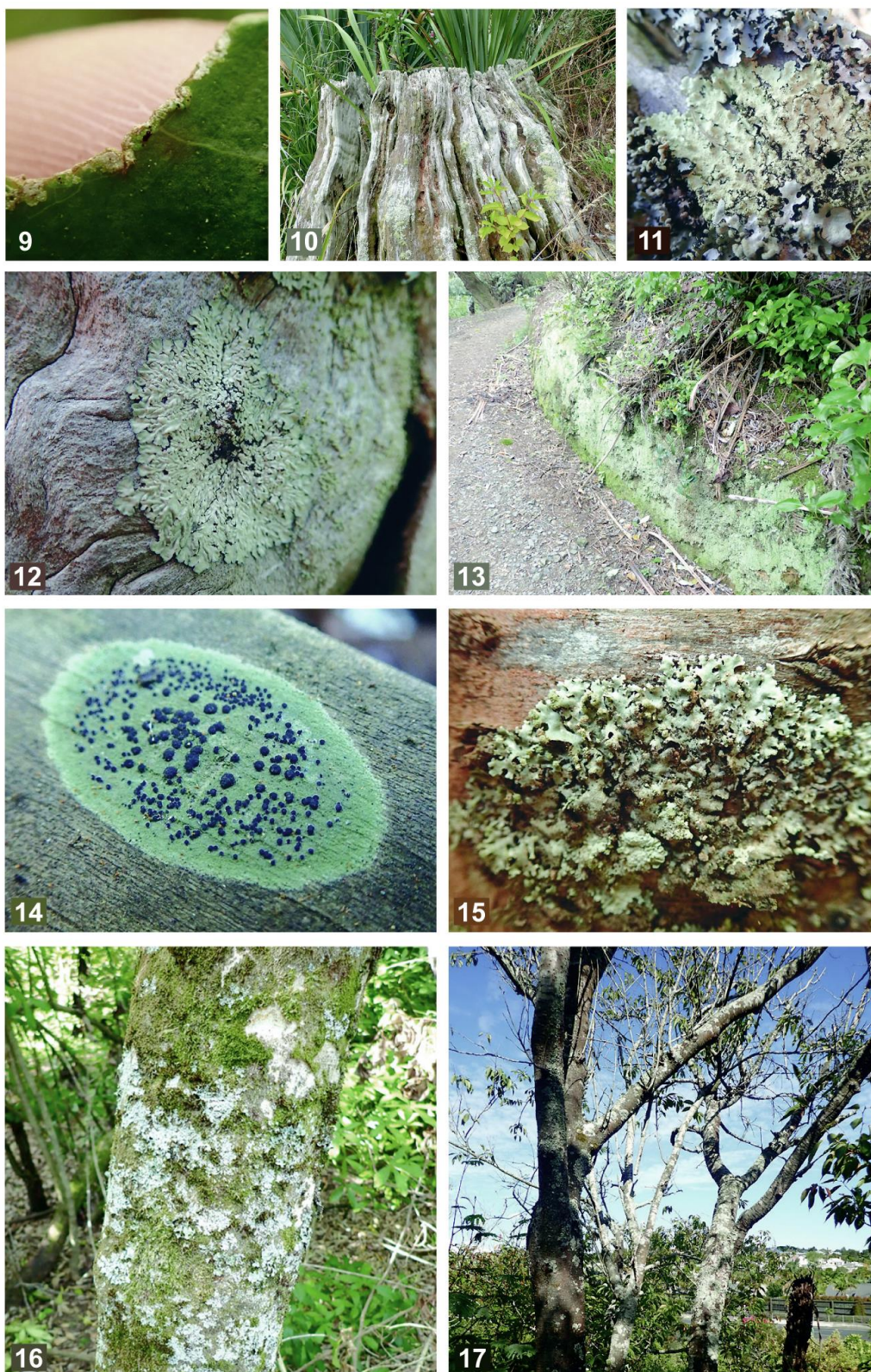
Over multiple excursions (April 2020 - September 2021) to Arch Hill Scenic Reserve during intermittent lockdowns, a list of lichens has been compiled. Previously a list of the native vascular plant flora of the reserve was recorded (Gardner 2020). In his article, Gardner stated that "in an ideal world its equally

educational lichens and bryophytes would have been covered too" (Gardner 2020). This article aims to meet part of this statement, in providing a list of lichens.

Compiling lists helps us to understand the lichen communities in these highly modified urban reserves.



Figs. 1–8: **1.** Mutated larger than normal thallus of *Ramalina celastri* on oak (*Quercus robur*) above the Western Motorway (23 May 2019). All photos by author. **2.** The common urban Auckland lichen *Dirinaria applanata* on mānuka. Approx. 70 mm across)(1 April 2020). **3.** The graphid lichen *Halegrapha mucronata* (patch approx. 70mm across) with *Dirinaria applanata* (1 Apr 2020). **4.** *Physcia poncinsii*, on willow, a common urban Auckland lichen. Approx. 80 mm diam. (1 Apr 2020). **5.** The yellow-green *Pertusaria thiospoda* on a fallen branch (branch approx. 30 mm diam), a common urban Auckland lichen (1 Apr 2020). **6.** *Phlyctis uncinata* (approx. 7 cm across) an occasional lichen on the trunks of hill cherry (1 Apr 2020). **7.** Fallen tree fern trunk covered in foliose lichens (26 Oct 2020). **8.** The elf ear lichen *Normandina pulchella* (individuals approx. 1 mm diam), local on the bark of mānuka (18 Apr 2021).



Figs. 9–17: **9.** The lichen *Strigula fossulicola* was found on tree privet leaves – in this case forming a strip approx. 1 mm wide on the damaged edge (1 Apr 2020). **10.** Lichen-covered exposed macrocarpa stump below the Arch Hill library (23 Feb 2021). **11.** The brightly coloured yellow *Flavoparmelia haywardiana* (approx. 7 cm wide) on the macrocarpa stump (12 Oct 2021). **12.** The one example of *Dirinaria picta* (approx. 3 cm diam.) growing on the macrocarpa stump (26, Oct 2020). **13.** The thick squamales of *Cladonia darwinii* lining the cut paths of Arch Hill (14, Sep 2021). **14.** *Byssoloma adpersum* (approx. 2 cm widelocal on the tanalized wood edging the path (26 Oct 2020). **15.** *Hypotrachyna horrescens* (approx. 5 cm diam.), on the bark of hill cherry (1 Apr 2020). **16.** Lichens and bryophytes covering a tree privet trunk (1 Apr 2020). **17.** Exposed Japanese hill cherry trunks dotted in white lichens (1 Apr 2020).

Lichens are known to be bioindicators of pollutants in urban environments (Nash 2008). There is potential for Arch Hill to be a good example of this as it is next to the motorway, a highly polluted environment. Near the motorway are deformed specimens of the common lichen species *Ramalina celastri*, the thallus becoming much wider than the normal form of this species. The deformities are highly likely to be due to the high level of pollutants (Fig. 1). There are few lichen lists for the Auckland isthmus, and indeed for the rest of New Zealand. However, recent lichen lists have been compiled for the nearby reserves St John's Bush (Ford 2020), Western Springs (Goodwin & Wilcox 2019) and Symonds Street Cemetery (Wilcox 2020).

Arch Hill has been described as a 'neglected frontage' of bush; this 5 ha reserve is a slope of bush with a mix of revegetation and mown grass (Gardner 2020). Most of the forested slope is covered in three species: shining privet (*Ligustrum lucidum*), Japanese hill cherry (*Prunus serrulata*), and crack willow (*Salix × fragilis*), with an understorey of pōnga or silver tree-fern (*Cyathea dealbata*) (Gardner 2020). The history of the reserve is discussed by Gardner (2020).

Lichens

Lichens can play an integral part of nutrient cycling in nature systems (Nash 2008). Rangitoto Island is noted for its lichen diversity (194 species), where they are known as bioengineers (Blanchon et al 2008). They create the first soil from the barren rock fields, by physically breaking apart rocks on a geological time scale (Nash 2008). Erroneously believed to have created soil from bare rock on Rangitoto, trees such as pōhutukawa (*Metrosideros excelsa*) merely take advantage of the lichen-created soil by growing where it accumulates in cracks (pers. obs.).

Forty-three species of lichens have been identified from Arch Hill Scenic reserve (see Appendix). All species of lichens in New Zealand are believed to be native (Galloway 2007). The reserve hosts typical communities of northern New Zealand urban lichens, the most common species being *Dirinaria applanata* (Fig. 2), *Halegrapha mucronata* (Fig. 3), *Heterodermia speciosa*, *Leparia finkii*, *Parmotrema reticulatum*, *Physcia poncinsii* (Fig. 4) and *Ramalina celastri*. Lichen species frequently seen at the reserve include *Chrysothrix xanthina*, *Flavoparmelia soredians*, *Hyperphyscia adglutinata*, *Pertusaria thiospoda* (Fig. 5), *Physcia adscendens*, *Phlyctis uncinata* (Fig. 6), *Usnea cornuta* and *Xanthoria parietina*. Most of these species are hosted on the trunks of Japanese hill cherry and pōnga which both dominate the bush remnant. The scribe lichen *Halegrapha mucronata* (formerly *Phaeographis mucronata*) has been noted as

'a very common epiphyte on trees in parks and gardens in Auckland city, often co-dominant with *Dirinaria applanata*' (Galloway 2007, p.1175-1176) as seen here at Arch Hill (Figs. 2 & 3).

Japanese hill cherry hosted the largest diversity of lichens at Arch Hill including: *Dirinaria applanata*, *Halegrapha mucronata* (most common), *Hyperphyscia adglutinata*, *Parmotrema reticulatum*, *Phlyctis uncinata* and *Usnea cornuta*. Tree privet hosted the second largest diversity of lichens including: *Collema leave*, *Leparia finkii*, *Parmotrema reticulatum*, *Physcia poncinsii* and *Scytinium kauaiense*. On willow *Leparia finkii*, *Parmotrema reticulatum* and *Scytinium kauaiense* were most common. *Ramalina celastri* is seen on smaller twigs of all three of these main host species. On Cyathea trunks *Chrysothrix xanthina*, *Dirinaria applanata*, *Leparia finkii* and *Parmotrema reticulatum* were most common (Fig. 7). Other host trees included mānuka (*Leptospermum scoparium* agg.) and ngaio (*Myoporum laetum*).

Lichens rare in abundance and only seen at one or two locations at the reserve include *Normandina pulchella* seen on the planted mānuka on reserve edge (Fig. 8), *Parmotrema crinitum* found on tree privet, *Phaeophyscia hispidula*, rare on the branches of tree privet and willow but also seen on the concrete path running through the reserve, *Punctelia borrieri* rare on hill cherry, *Scytinium kauaiense* on planted ngaio, *Strigula fossulicola* on the leaves of tree privet (Fig. 9) and *Teloschistes chrysophthalmus* on the twigs of hill cherry.

The weathered stump of a macrocarpa (*Cupressus macrocarpa*) (Fig. 10) supported a community of lichens found nowhere else at the reserve. This included *Flavoparmelia haywardiana* (Fig. 11), *Cladonia floerkeana* and *Dirinaria picta* (Fig. 12), the last being an "At Risk – Naturally Uncommon" species (de Lange et al. 2018). *Dirinaria picta* has also been recorded from the nearby Western Springs (Goodwin & Wilcox 2019). Other lichens colonise the ground or cover the cut banks, such as large collections of squamales from the common lichen *Cladonia darwinii* (Fig. 13) and the greenish crust of the species *Trapeliopsis granulosa*.

Five species recorded in the reserve were noted "as At Risk" in the last threat assessment of New Zealand lichens (de Lange et al. 2018). These are: *Byssoloma adspersum*, a "Data Deficient" locally common species of the tanalised wooden path edging (Fig. 14); the previously mentioned "At Risk – Naturally Uncommon" *Dirinaria picta* (Fig. 12); the "At Risk – Naturally Uncommon" *Hypotrachyna horrescens* rare on the bark of hill cherry (Fig. 15); and dried specimens of

Leptogium coralloideum, locally common at the reserve, but an “At Risk – Naturally Uncommon” species occasionally seen on the urban trees of Auckland.

Conservation

Management of these highly modified urban reserves may not be as simple as it was once thought in the past. The three tree species that dominate this reserve are considered pest plants: shining privet (Fig. 16), Japanese hill cherry (Fig. 17), and crack willow. However, they play a major role in the ecology of this urban forest remnant, as carbon sequesters, habitat for puriri moth (*Aenetus virescens*), food for birds such as koko/tūi (*Prothemadera novaeseelandiae*) and habitat for flightless ground based native beetles, who need year round shade. As pest plants it is highly likely that removal of these trees is planned, but their role as host for a diversity of native lichen species must be acknowledged. Rather than the removal of these large lichen hosts, it is recommended that they are left to

reach the end of their life expectancy, while removing their seedlings. This will give time for lichens to colonise the native successional species in the understorey. Integrated management such as this, will ensure the natural succession of the lichens in the ecosystems. Lichen substrate such as the Cyathea trunks are naturally being phased out due to forest succession. Without hosts in the next succession of forest, some of these lichen species may disappear from the urban landscape.

There are still a lot of unknowns about lichen presence and abundance in New Zealand. Regional assessments of lichens would work towards remedying this and could feed into regional threat lists of lichens. Modified environments such as Auckland would provide a good reference against more intact regions.

Acknowledgements

I would like to thank Rhys Gardner for his suggestion and encouragement to undertake this study.

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Appendix. Arch Hill lichen list (43 spp.)

= species recorded on iNaturalist website <https://inaturalist.nz/>

<i>Amandinea punctata</i> #	local	<i>Flavoparmelia haywardiana</i> #	rare	(Fig. 11)
<i>Bacidia allotropa</i>	local	<i>Flavoparmelia soredians</i>	occasional	
<i>Bacidia laurocerasi</i> #	local	<i>Halegrapha mucronata</i> (syn. <i>Phaeographis mucronata</i>)	common	(Fig. 3)
<i>Byssoloma adpersum</i> #	rare (Fig. 14)	<i>Heterodermia speciosa</i>	common	
<i>Candelariella vitellina</i>	local on concrete footpath	<i>Heterodermia japonica</i>		
<i>Cladonia floerkeana</i> #	rare on tree stump	<i>Hyperphyscia adglutinata</i> #	occasional	
<i>Cladonia darwinii</i> #	local (Fig. 13)	<i>Hypotrachyna horrescens</i> #	rare	
<i>Cladonia glebosa</i> #	rare on tree stump	<i>Hypotrachyna spumosa</i> #	local	(Fig. 15)
<i>Chrysothrix xanthina</i>	frequent	<i>Lecanora expallens</i>	rare	
<i>Coenogonium implexum</i> #	rare	<i>Leptogium coralloideum</i> #	local	
<i>Coenogonium lutescens</i>	local	<i>Leparia finkii</i>	common	
<i>Collema laeve</i>	local	<i>Normandina pulchella</i> #	local	(Fig. 8)
<i>Dirinaria applanata</i> #	very common (Fig. 2)	<i>Parmotrema crinitum</i>	rare	
<i>Dirinaria picta</i> #	rare (Fig. 12)	<i>Parmotrema perlatum</i>	common	

<i>Parmotrema reticulatum</i>	common		<i>Ramalina celastri</i> #	frequent	(Fig. 1)
<i>Pertusaria thiospoda</i> #	local	(Fig. 5)	Cf. <i>Scytinium kauaiense</i>	occasional	
<i>Phaeophyscia hispidula</i>	local		(syn. <i>Collema kauaiense</i>) #		
<i>Phyllopsora</i> sp.			<i>Strigula fossulicola</i> #	rare on tree privet leaves	(Fig. 9)
<i>Physcia adscendens</i> #	rare		<i>Teloschistes</i>		
<i>Physcia poncinsii</i>	common	(Fig. 4)	<i>chrysophthalmus</i> #	rare	
<i>Phlyctis uncinata</i> #	occasional	(Fig. 6)	<i>Usnea cornuta</i>	local	
<i>Protoblastenia rupestris</i> #	local on concrete foot path		<i>Xanthoria parietina</i>	occasional	
<i>Punctelia borrieri</i>	rare				

The kikuyu dilemma

Maureen Young

The African grass, kikuyu (*Cenchrus clandestinus*) is named for the Kikuyu Tribe of Kenya. It has adapted to allow high rates of photosynthesis at higher temperatures, and thus in New Zealand it mainly grows in the warmer north of the North Island. It can become a rampant weed and has poor feed values unless managed properly. However, if kept grazed and combined with ryegrass and clover it can be an adequate food source for farm stock. It becomes mostly dormant in winter, especially where there are frosts. It is an exceptionally good coloniser of raw sand country as it increases the moisture retained in the top layer of sand, assisting the survival of other

grasses and clover. Ray Seymour, a farmer from Motutangi in the Far North, told me that farming on the sandy tombolo of the Aupouri Peninsula would be impossible in the dry summers without kikuyu, and the same would apply to the sandy soils of the Poutu Peninsula, North Kaipara.

For the last fifteen years I have had the good fortune to be included as a volunteer with the annual Lakes Survey Team from the National Institute of Water and Atmospheric Research (NIWA) and the Northland Regional Council (NRC), which records the health of the many lakes in the Far North. Most of



Fig. 1. Lake Rototuna, Poutu Peninsula with kikuyu and raupo. Photo by Brooke Hartigan, April 2021.