

Lichens of Westmere, Central Auckland

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Another lockdown has enabled further study of the lichens of Central Auckland. During Auckland's 'Level 4' (17 August 2021 to 21 September 2021) observations were made on the lichens in the greater Grey Lynn - Westmere area including: Grey Lynn, Cox's Bay, Westmere, Weona Reserve, Meola Reef, Western Springs and Arch Hill, the last two sites already with some recent study (Wilcox & Goodwin 2019; Ford 2021). All threat assessments used here are from de Lange et al. (2018).

The importance of cryptogams (small, often hard to identify plant-like organisms, mostly referring to mosses, liverworts, hornworts and lichens) is slowly becoming recognised in ecosystems. Recent research into rainforest cryptogams has shown that they emit large quantities of sesquiterpenoid compounds. These compounds have a great influence on the concentration of oxidative substances such as those in the atmosphere which create photochemical smog that can negatively affect human health and cause damage to plants. Therefore, cryptogams have a large effect on the self-purifying power of the atmosphere (Edtbauer 2021). Similar roles of lichens and other cryptogams in the urban environment remain unstudied. The role of lichens as 'canaries' in the urban environment is becoming increasingly known. Just by understanding what species are present we can begin to understand the level of pollution.

Studies of urban lichens have shown that non-native tree species can negatively affect lichen diversity (Möller et al., 2021). However, Auckland hosts interesting interfaces between natural and urban systems because of the relatively recent settlement of New Zealand. Thus, although non-native specimen trees are common in the urban New Zealand landscape, in Auckland we see distinct natural communities close to urban environments such as the mangroves (*Avicennia marina*) of Meola Reef, remnant native forest trees of Cox's Bay, the rock fields of Western Springs, the old vegetation in Jagger's Bush and the coastal cliffs of Point Chevalier. The proximity of these natural systems allows for good 'spore banks' of lichen species. Species can spread from the intact systems to colonise modified urban environments if they are able to tolerate the hostile polluted habitat. As esoteric as it superficially seems, further study into these lilliputian worlds could reveal important insights into the natural world.

Mangroves

The mangroves of lower Motions Creek host distinct communities of lichens. The 'naturally uncommon' jelly lichen *Collema subflaccidum* was frequent, forming coverings on the bases of mangrove trunks in an untypical form. *Phaeophyscia hispidula*, more often seen on urban rock, was a frequent corticolous (growing on bark) lichen on mangroves (Fig. 1), as was an urban lichen *Hyperphyscia adglutinata*, with the minute lichen, *Normandina pulchella*, growing over the top. Other common lichens include: *Flavoparmelia haywardiana*, *Pannaria elixii*, *Parmotrema crinitum* and the 'naturally uncommon' *Parmotrema subtinctorium* (Fig. 2). On the scrub bordering the mangroves urban lichen communities seen typically included: *Halegrapha mucronata*, *Lecanora expallens*, *Parmotrema reticulatum*, *Usnea cornuta* and *Usnea rubicunda* (Fig. 3). A species of interest on these shrubby margins was the 'Data Deficient' crustose lichen *Haematomma sorediatum*, with its distinctive red apothecia and sorediate thallus (Fig. 4). Further study is urgently needed into the particular lichen communities of New Zealand's mangroves, given the ever-increasing threats of climate change, especially rising sea levels.

Pōhutukawas of Weona Reserve

The large pōhutukawas (*Metrosideros excelsa*) of Westmere's coastline host distinct lichen communities, including common grey-blue foliose species such as *Dirinaria applanata*, *Notoparmelia erumpens*, *Parmotrema reticulatum* and *Punctelia subrudecta* (Fig. 5). Less common was the isidiate *Austroparmelina conlabrosa* (Fig. 6) and the yellow mustard lichen *Pyxine subcinerea*. Smaller crustose lichens on pōhutukawa included *Coenogonium luteum* with orange apothecia and the small *Bacidia laurocerasi*. An interesting graphid lichen, *Arthonia nigrocincta*, was noted corticolous on pōhutukawa of Herne Bay (Fig. 7). This endemic and 'Data Deficient' species has only been recorded a handful of times recently, since it was first named from an Auckland specimen (de Lange et al. 2018; Blanchon et al. 2021). Further east along the coast a bright orange *Caloplaca*, best fitting *C. acheila* (Fig. 8), was common with *Dufourea ligulata* on a basalt man-made sea wall of Westmere.

Vascular plants of note along this coastline include large clumps of the silver coastal *Astelia banksii*, one adult shrubby tree of *Coprosma crassifolia* in flower, a seemingly natural plant of akeake (*Dodonaea*



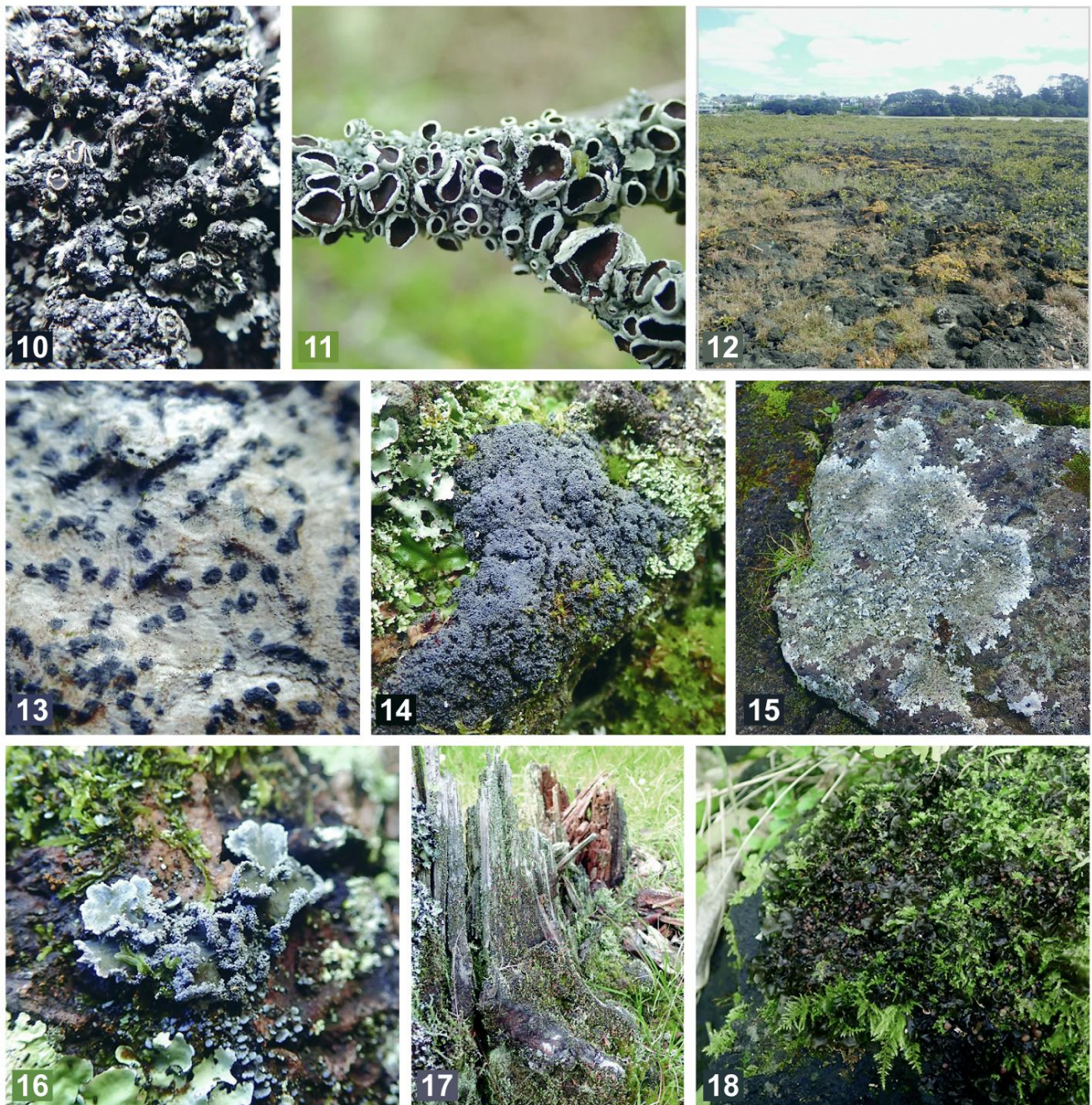
Figs. 1–9: **1.** *Phaeophyscia* and *Collema* on mangrove, Motions Creek. All photos by the author, 17 Aug-21 Sept 2021. **2.** Grey lichen covering mangroves, Weona Mangroves, 20 Sept 2021. **3.** Branch of māpou (*Myrsine australis*) covered by *Halegrapha mucronata*, *Lecanora expallens*, *Parmotrema reticulatum* and *Usnea* species, Motions Creek, 20 Sept 2021. **4.** *Haematomma sorediatum* with white thallus and red apothecia, Motions Creek, 20 Sept 2021. **5.** Grey foliose lichens on pōhutukawa, 20 Sept 2021. **6.** The isidiate *Austroparmelina conlabrosa*, on pōhutukawa, 5 Sept 2021. **7.** The graphid like lichen *Arthonia nigrocincta* on pōhutukawa, 20 Sept 2021. **8.** The yellow lichens *Caloplaca acheila* and *Dufourea ligulata* on a basalt sea wall, 12 Mar 2022. **9.** Cabbage tree trunk with a 'dog zone' where the sunburst lichen *Xanthoria parietina* thrives, 6 Sep 2021.

viscosa), scattered shrubs of coastal five-finger also known as houpara (*Pseudopanax lessonii*) under pōhutukawa, and good populations of *Sophora chathamica* in full flower.

Suburbs

The urban trees of Grey Lynn host distinct communities of urban lichens. Some cabbage trees/ ti kouka (*Cordyline australis*) on the margins of Garnet Road were almost entirely lichen covered. These trees hosted the typical 'dog zone' where

the sunburst lichen *Xanthoria parietina* thrives in this high nutrient habitat (Fig. 9). Other lichen species covering these trees included the common *Heterodermia speciosa*, *Parmotrema reticulatum*, a corticolous form of *Xanthoparmelia scabrosa* and *Phaeophyscia hispidula* (Fig. 10). The latter was an interesting record as it had distinctive apothecia rimmed with a dense corona of rhizines, a feature not previously noted in New Zealand material (Galloway 2007) (<https://inaturalist.nz/observations/93825546>).



Figs. 10–18: **10.** *Phaeophyscia hispidula* with each apothecium bearing a dense corona of rhizines, appearing as a thickened white rim, 6 Sep 2021. **11.** *Austroparmelina pseudorelicina* covered with apothecia, on saltmarsh ribbonwood, 2 Oct 2021. **12.** The yellow orange lichen *Dufourea ligulata* covering basalt lava flows, 2 Oct 2021. **13.** The barnacle lichen *Collempsidium ostrearum* growing on pacific rock oyster shell, 2 Oct 2021. **14.** The blue grey squamules of *Fuscopannaria subimixta* on basalt rock, Western Springs, 24 Aug 2021. **15.** The grey foliose lichen *Xanthoparmelia murina* on basalt rock, Western Springs, 24 Aug 2021. **16.** The blue grey cyanolichen *Pannaria fulvescens* growing on bark, Western Springs, 16 Sep 2021. **17.** *Cladonia* species covering decaying pine stump, Cox's Bay, 5 Oct 2021. **18.** The jelly lichen *Collema subconveniense* growing amongst bryophytes, Cox's Bay, 6 Oct 2021.

A small, stunted specimen of the 'naturally uncommon' species *Teloschistes sieberianus* was also present in the lichen communities of this roadside tī kouka. Further up the road on Francis Street there are iconic London planes (*Platanus x hispanica*); one fallen branch hosted *Amandinea punctata*, *Hyperphyscia adglutinata*, *Lecanora flavopallida* and probably many more minute species all hidden under

the weedy *Ramalina celastri* and *Xanthoria parietina*. Other lichens seen throughout the suburbs include *Cladonia fimbriata* growing on urban trees, *Flavoparmelia haywardiana* (a bright foliose lichen occasionally seen on rock walls), and the 'At Risk – Naturally Uncommon' jelly lichen *Leptogium coralloideum* is locally common in small urban reserves on a cabbage tree (*Corydine australis*).

Meola Reef

The saltmarsh ribbon wood (*Plagianthus divaricatus*) scrub on the basalt rock fields of Meola Reef hosted an interesting community of lichens. The bright orange *Teloschistes sieberianus* (At Risk – Naturally Uncommon) was rare on the twigs, accompanied by the common species *Parmotrema reticulatum* and *Ramalina celastri*. Two members of the genus *Austroparmelina*, *A. labrosa* and the 'Data Deficient' *A. pseudorelicina* (Fig. 11) were local in the scrub. Three species of the genus *Physcia* were seen: *P. adscenders* with its prominent marginal cilia, and the heavily fertile *Physcia jackii*, both corticolous; and *Physcia caesia* on rock with *Lecanora galactiniza*. Three species of beard lichen were present, the newly recognised species in New Zealand, *Usnea dasaea*, the 'At Risk – Naturally Uncommon' *Usnea nidifica* and the very common *Usnea rubicunda*. The basalt rock lava flows hosted a large population of the bright yellow-orange lichen *Dufourea ligulata* (Fig. 12). Where these rock fields are periodically submerged in water the lichen *Collembosidium ostrearum* (Fig. 13) was seen growing on the shells of the pacific rock oyster (*Magallana gigas*). *Lecanora xylophila* was also noted on the wooden benches of the nearby dog park.

Western Springs

The lichens of Western Springs were studied in detail recently by Goodwin and Wilcox (2019) but wandering during lockdown provided 12 more species to add to the list for the site. Often associated with volcanic rock in Auckland, *Cladonia enantia* was seen growing with the liverwort *Chiloscyphus semiteres* atop the basalt rock boulders; less common or obvious was the related species *Cladonia glebosa*. The basalt also hosted the dark squamules of *Fuscopannaria subimixta* (Fig. 14). The built rock walls and some of the natural rock faces hosted the crustose lichen *Lecanora galactiniza* and the grey foliose lichen *Xanthoparmelia murina* (Fig. 15). The beard lichen *Usnea daesaea*, a recent addition to the New Zealand flora, was noted growing on karo (*Pittosporum crassifolium*). On a fallen willow branch the orange yellow *Lecanora flavopallida* was common, along with an unknown *Pertusaria* species. It is hypothesized that the latter is a new species record for the country. The foliose lichen *Parmotrema crinitum* was local on some of the specimen trees in the lower park as well as on the Western Spring pines (*Pinus radiata*), and another foliose lichen *Hypotrachyna spumosa* was local on the trees that were once the understorey of the Western Springs pines (these pines were felled in early 2021). Around the base of some of the older pines grew the fruticose lichens *Cladonia floerkeana* and *C. rigida*, the former especially distinguished by its bright red, match-like apothecia. *Lecanora expallens* coated many of the pine stumps as a leprose yellow dust,

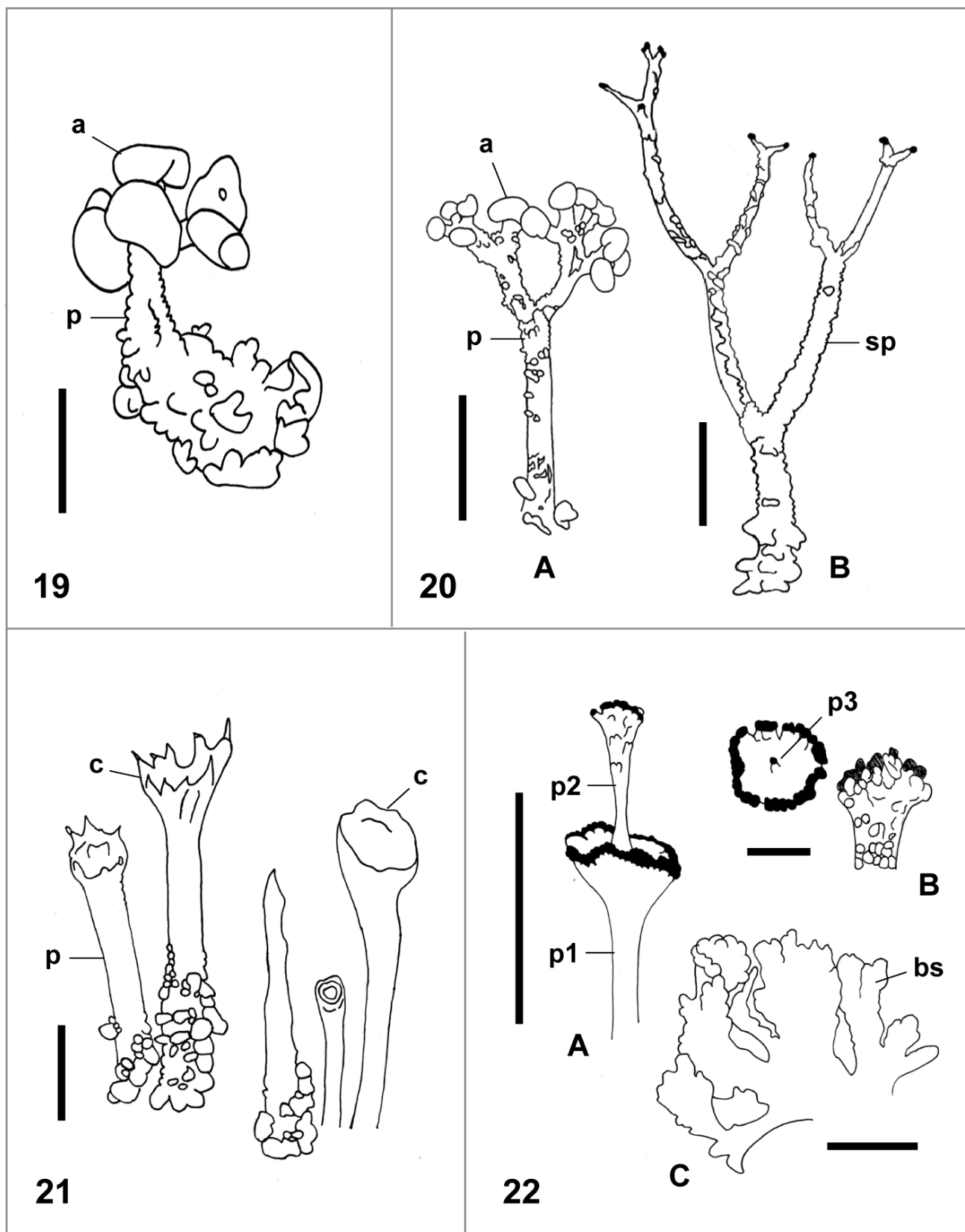
occasionally fertile with apothecia. There is no doubt that Western Springs will host even more species for future lichenologists' explorations. A second look at the lichen identified in Goodwin and Wilcox (2019) as *Leioderma solediatum* growing on willow myrtle (*Agonis flexuosa*) revealed it to be instead *Pannaria fulvescens* (Fig. 16), distinguished by the hairless and wrinkled upper surface.

Cox's Bay

Cox's Bay Creek has a long history of being vegetated as reflected in the many forest lichen species present. Similar to nearby Western Springs, *Cladonia floerkeana* and *C. rigida* were common around the bases of the large pines, and the species *C. furcata* and *C. fimbriata* were also seen with them (Fig. 17). The large pines (*Pinus pinaster* and *P. radiata*) were covered in *Lecanora expallens* as well as *Punctelia subrudecta* and patches of *Hypogymnia physodes*. The foliicolous lichen *Calopadia subcoerulescens* was noted on the leaves of a presumably planted kauri (*Agathus australis*). *Crocodia aurata* was common on the planted oaks (*Quercus robur*) along the creek. Moss-covered basalt rocks in this forest hosted both jelly lichens *Collema subconveniens* (Fig. 18) and *Leptogium limbatum*. A few basalt rocks in the saltmarsh hosted the saxicolous lichens *Porpidia albocaerulescens* (At Risk – Naturally Uncommon) and *Trapelia coarctata*. Branches of the saltmarsh ribbonwoods here also hosted *Physcia jackii*.

A note on Cladonia

The Westmere area of Auckland contains a diversity of *Cladonia*, nine species in total. New Zealand has many species in this genus (80), and they are tricky to distinguish between. The name pixie cap is a common name given to the cup-forming species, but the cupped species are not the prominent form of this genus. *Cladonia*'s main form is as squamules with podetia, which are stalk-like structures that host cups bearing either pycnidia (asexual fruiting bodies) or apothecia (the round spore-producing 'fruits' of lichens). Many of these species have a variety of forms based on life stages and habitat conditions. Anatomically these many different forms can include: the prominence of cups; presence of soredia (popcorn-like structures involved in vegetative reproduction) and the presence of apothecia. A species growing in the shade may have larger granular soredia than an exposed form of the same species, where harsher conditions knock off the granular soredia leaving only fine farinose soredia. *Cladonia* species occupy many habitats, mostly nutrient-poor and successional in nature. For most of their life cycle, *Cladonia* species can be difficult to distinguish between as they are in the form of squamules – the small scale-like thallus typical of the genus *Cladonia*. Because of these difficulties, very few detailed studies have been undertaken on this



Figs. 19–22: **19.** Drawing of *Cladonia enantia* podetium (**p**) with apothecia (**a**). Scale bar = 1 cm. All drawings by the author. **20.** Drawing of *Cladonia furcata*. **A.** Podetium (**p**) with apothecia (**a**). **B.** sterile podetium (**sp**). Scale bars = 1 cm. **21.** Drawing of the various forms of *Cladonia fimbriata* podetia (**p**) and cups (**c**). Scale bar = 1 cm. **22.** Drawing of *Cladonia cervicornis*. **A.** Lateral view of the tiered podetia (**p1**, **p2**). Scale bar = 1 cm. **B.** Top and side view of cups with pycnidia (black) around the rim, and a new podetial tier (**p3**) forming at the centre. Scale bar = 5 mm. **C.** Basal squamules (**bs**). Scale bar = 5 mm.

genus in New Zealand. However, some studies were undertaken by Martin William more than 60 years ago (William 1958). Here an attempt is made to illustrate the gestalt of some of the more common species of *Cladonia* found in Westmere by either drawings or photographs.

One of the most obvious species of *Cladonia* is *C. floerkeana*, commonly called British soldiers, recognized by the prominent red apothecia, the granular soredia and the habit of growing on decaying wood or peaty soil. *Cladonia rigida* is another species common on wood; this is a variable species with fine to granular soredia, distinguished by this and its K+ (potassium hydroxide) yellow reaction. Another common species sometimes on wood is *Cladonia enantia* (Fig. 19). Most commonly found on rock and soil, this variable species is most often seen as sterile squamules, but when fertile it has multiple forms dependent on habitat conditions. *Cladonia glebosa* is a relatively non-descript species characterized by its glebose (lumpy) meristem formations around the small cup-like apex. *Cladonia furcata* (Fig. 20) is a locally common species, noted here on the basalt rock walls of Western Springs, a variable species said to have a 'shaggy appearance with a downward curved podetial tip' (Galloway, 2007). *Cladonia capitellata* var. *capitellata* is a species of heaths, locally rare under mānuka

(*Leptospermum scoparium* agg.) or coastal banks in urban Auckland. Distinguished by its noodle-like growth form, it is a variable species with multiple colour forms that deepen with increasing shade. *Cladonia fimbriata* (Fig. 21), a common cup-forming species found on multiple substrates including living and decaying wood and rock, is distinguished by its narrow cups and fine soredia. Another cup lichen is *Cladonia cervicornis* (Fig. 22) seen on the coastal cliffs of Point Chevalier and Herne Bay. This locally common species is very variable but generally has prominent, persistent basal squamules with short podetia only forming 1–2 tiers that stack on top of each other. Rare on the heathy coastal cliffs of Point Chevalier was the cup lichen *Cladonia pleurota*, distinguished by its wide yellow cup-forming podetia with red apothecia.

For more information on this genus see the factsheets on the New Zealand Plant Conservation Network website:

https://www.nzpcn.org.nz/flora/species/?scientific_name=cladonia

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References

- Blanchon, D. J., Ranatunga, D., Marshall, A. J., de Lange, P. J. 2020: Ecological communities of tree species threatened by myrtle rust (*Austropuccinia psidii* (G. Winter) Beenken): The lichenised mycobiota of pōhutukawa (*Metrosideros excelsa* Sol. ex Gaertn., Myrtaceae). *Perspectives in Biosecurity* 5: 23-44.
- de Lange, P.; Blanchon, D.; Knight, A.; Elix, J.; Lucking, R.; Frogley, K.; Harris, A.; Cooper, J.; Rolfe, J. 2018: Conservation status of New Zealand indigenous lichens and lichenicolous fungi. *New Zealand Threat Classification Series* 27. Department of Conservation, Wellington.
- Edtbauer, A., Pfannerstill, E. Y., Pires Florentino, A. P., Barbosa, C. G., Rodriguez-Caballero, E., Zannoni, N., Alves, R. P., Wolff, S., Tsokankunku, A., Aptroot, A., de Oliveira Sá, M., de Araujo A. C., Sorgel, M., de Oliveira, S. M., Weber, B. & Williams, J. 2021: Cryptogamic organisms are a substantial source and sink for volatile organic compounds in the Amazon region. *Communications Earth & Environment* 2(1): 1-14.
- Ford, M. 2021: Lichens of Arch Hill. *Auckland Botanical Society Journal* 76 (2): 130- 135.
- Galloway D.J. 2007: *Flora of New Zealand: Lichens, including lichen-forming and lichenicolous fungi*. 2nd edition. Lincoln, Manaaki Whenua Press. 2261 p.
- Goodwin, W. & Wilcox, M. 2019. Plants Of Western Springs Lakeside Park. *Auckland Botanical Society Journal* 74 (2): 62-87.
- Möller, T., Oldeland, J., & Schultz, M. 2021: The value of alien roadside trees for epiphytic lichen species along an urban pollution gradient. *Journal of Urban Ecology* 7 (1): 1-9.
- William, M. 1958: Notes on some *Cladonias* of Otago and Southland. *Wellington Botanical Society Bulletin* No. 30: 14-6.