

that the orchids flourish.

At our first visit during the second week in November a few buds had opened. Our second visit was delayed until Christmas time. By then a dry spell of weather had been enjoyed. All the orchids had finished flowering and the majority had completely dried off. It would appear that late November or early December would be the time at which the orchids could be seen at their best.

"Wan orchids strange as ghosts of tropic night."

William Pember Reeves

FLORA AND VEGETATION OF THE SHORES OF LAKE ELLESMERE

by Colin Burrows

In the 1969 Journal I wrote about Kaitorete Spit. During the Society's field day and on several other excursions to Birdlings Flat and the Spit, numbers of species have been added to the known flora and they are listed at the end of the present article. The greater part of this article, however, deals with the area round the shores of Lake Ellesmere.

A brief account of the history of the lake would not be out of place here. About 4000 years ago sea level was at least 10 ft above its present limit and the area now occupied by the lake was a shallow bay, at times forming the estuary of the Rakaia and Waimakariri rivers. As sea level fell, about 2000 years ago, the shingle bar which is now Kaitorete Spit was formed and the lake was dammed behind it. High lake levels led to the development of extensive swamps dominated by Phormium, Typha and Carex species north and west of the lake. Mosaics of podocarp forest were also present and forest remains are plentiful round the lake. When the Maori settled the area Waihora (Lake Ellesmere) became very important in their economy because of the rich supplies of eels, other fish, fresh-water mussels and water birds. The Taumutu (western) and Kaituna and Te Puia (eastern) settlements were strategically situated. The Maori found it necessary to release the lake into the sea when ever the Taumutu settlement became flooded (about 10 ft above m.s.l.).

After about 1845 European settlement began. The vegetation, already modified by Maori fires, has been continually disturbed since then, notably by burning and draining of swampland and its conversion into farmland. Nevertheless the vegetation immediately round the lake retains its character even though there has been a long history of grazing by stock.

There is a very large bird population on the lake, adding to the botanical interest. Apart from the ubiquitous introduced birds, black swan, canada geese and mallard there are many native birds including ducks and waders. Some interesting or unusual bird species include welcome swallows, sooty shearwaters, knots, sandpipers and marsh crake.

The lake is a large, shallow body of brackish water. Its sides are very gently sloping so that small changes in water levels cause large changes in area and the shoreline is of correspondingly different length. The maximum depth is about 6 ft below mean sea level. When the lake level is equal to the mean sea level the lake area is 38,000 acres but at 4 ft above m.s.l., the area is 54,000 acres.

The southern shore tends to be gravelly but the northern shore is mainly sandy or muddy. Fresh water flows into the lake from Selwyn, Irwell and Halswell rivers, other streams and various springs, but at low lake levels and during high tides sea water can flow in. Salinity varies in space and time in the lake. It may rise as high as 56% of seawater but is generally about 20% of seawater and is least near streams. The shores of the lake are very exposed, especially to the south. Sou'west storms whip up waves and push water high onto the north-eastern shores. These various physical factors determine well-marked vegetation patterns. In the main, these take the form of zonation, dependent chiefly on mean length of immersion and concentration of salt in the substrate. Evans (1953) made a study of this and from his work and subsequent studies the general pattern may be summarised as follows:

In the water: beds of the totally submerged plants Ruppia, Zarrichellia and others. Immersed for much of the time: Mimulus repens, Lilaeopsis novae-zelandiae. Immersed for slightly shorter periods: Triglochin striatum, Spergularia marginata. Regularly immersed but also above water level for long periods: Salicornia australis. Occasionally flooded: mixed salt marsh with Salicornia, Selliera radicans, Plantago coronopus and others - often present in depressions. On slightly raised areas, stands of Hordeum marimum and Puccinellia stricta occur and on areas a little higher still, stands of Juncus maritimus which may or may not be accompanied by stands of Plagianthus divaricatus. The Juncus and Plagianthus, about 2 ft and 6 ft tall respectively, contrast with the otherwise very short vegetation. The highest clearly distinguishable zone, which usually merges into cultivated farmland, is characterized by Agrostis stolonifera. Salinity in the soil increases from the lake up the shore until a maximum is reached in the Salicornia zone. Salinity then declines again and in the Agrostis zone, where there is much emergent groundwater in winter, it falls to nil. There are variations in this generalized pattern. Where freshwater streams enter the lake large beds of the 5-6ft tall Typha muelleri occur and where emergent groundwater tends to lower the salinity a little, extensive beds of Scirpus americanus, 6-12ins tall, are present on muddy soils.

FLORA

KEY: L - swamp plants and taller lake shore plants,
 U - floating or submerged plants, 0 - salt meadow plants,
 AD - adventive.

Shrub

Plagianthus divaricatus Shore ribbonwood L

Grasses and grass-like plants

<u>Agropyron repens</u> Ad	Couch grass	L
<u>Agrostis stolonifera</u> Ad	Creeping bent	L
<u>Deyeuxia</u> sp.	-	L
<u>Eleocharis acuta</u>	Spike sedge	L
<u>Festuca arundinacea</u> Ad	Tall fescue	L
<u>Holcus lanatus</u> Ad	Yorkshire fog	L
<u>Hordeum marinum</u> Ad	Sea barley grass	O
<u>H. murinum</u> Ad	Common barley grass	L

<i>Juncus gregiflorus</i>	Common rush	L
<i>J. maritimus</i>	Sea rush	L
<i>J. pallidus</i>	Giant rush	L
<i>Leptocarpus simplex</i>	Jointed 'rush'	L
<i>Lolium perenne</i> Ad	Perennial ryegrass	L
<i>Parapholis strigosa</i> Ad	Sea hard grass	O
<i>P. incurva</i> Ad	Sickle grass	O
<i>Polypogon</i> sp. Ad	Beard grass	O
<i>Puccinellia stricta</i>	Salt grass	O
<i>Scirpus americanus</i>	Three square	L
<i>S. caldwellii</i>		L
<i>S. cernuus</i>		O
<i>S. nodosus</i>	Node sedge	L
<i>Triglochin striatum</i> var. <i>filifolium</i>	Arrowgrass	O
<u>Other herbs</u>		
<i>Apium filiforme</i>	Slender celery	LO
<i>Atriplex hastata</i>	Goosefoot	O
<i>Centaureum exaltatum</i> Ad	Centaury	O
<i>Chenopodium ambiguum</i>	Goosefoot	O
<i>Cirsium vulgare</i> Ad	Spear thistle	L
<i>Cotula coronopifolia</i>	Batchelors button	O
<i>C. squalida</i>	Pincushion	O
<i>Lemna minor</i>	Duckweed	U
<i>Lepilaena bilocularis</i>		U
<i>Lilaeopsis novae-zelandiae</i>	Tape measure	O
<i>Matricaria inodora</i> Ad	Scentless mayweed	L
<i>Mimulus guttatus</i> Ad	Monkey musk	L
<i>M. repens</i>	Purple mimulus	O
<i>Myosotis palustris</i> Ad	Forget-me-not	L
<i>Myriophyllum propinquum</i>	Water millfoil	U
<i>Nasturtium</i> sp. Ad	Water cress	L
<i>Plantago coronopus</i> Ad	Buckshorn plantain	O
<i>Potamogeton pectinatus</i> Ad	Narrow-leaved pondweed	U
<i>Ranunculus sceleratus</i> Ad	Celery buttercup	L
<i>Rumex obtusifolius</i> Ad	Dock	L
<i>Ruppia megacarpa</i>	Horses mane	U
<i>R. spiralis</i>	Horses mane	U
<i>Samolus repens</i>	Sea primrose	O
<i>Salicornia australis</i>	Glass wort	O
<i>Selliera radicans</i>	Remu-remu	O
<i>Spergularia marginata</i>		O
<i>Suaeda novae-zealandiae</i>	Sea-blite	O
<i>Trifolium fragiferum</i> Ad	Strawberry clover	LO
<i>Urtica urens</i> Ad	Stinging nettle	L
<i>Zannichellia palustris</i>		U
<u>Other plants</u>		
<i>Azolla rubra</i>	Water fern	U
Various algae and Charophytes		U

Some uncommon or rare plants occur near Lake Ellesmere and others may await discovery. The large sedge Mariscus ustulatus, rare in Canterbury, is present on the roadside near Motukarara. Spiranthes australis, an attractive pink-flowered orchid still inhabits some of the swampland. A small, rare stinging nettle Urtica linearifolia, is present under willows near the Selwyn Huts. Utricularia monanthos, the tiny bladderwort was recorded by Arnold Wall (1953) from swamp at Lake Ellesmere and U. novae-zelandiae may also be present. Neither have been seen recently.

Addenda to the Flora of Kaitorete Spit

Several members of the Society and some Botany students were responsible for finding and identifying many of the specimens represented in the list below so that it is a composite effort. It applies to the Birdlings Flat area unless otherwise indicated.

Ad adventive
S sand dunes

"Trees"

<u>Cordyline australis</u>	Cabbage tree
<u>Sophora microphylla</u>	Kowhai

Shrub

<u>Pittosporum crassifolium</u> Ad	Karo
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Climbers

<u>Parsonsia capsularis</u>	N.Z. jasmine
<u>P. heterophylla</u>	N.Z. jasmine
<u>Calystegia tuguriorum</u>	Convolvulus

Grass

<u>Lolium perenne</u>	Perennial ryegrass
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Other herbs

<u>Anagallis arvensis</u> Ad	Scarlet pimpernel
<u>Cardamine</u> sp. Ad	Bitter cress
<u>Cerastium</u> sp. Ad	Mouse-ear chickweed
<u>Convolvulus verecundus</u>	Small convolvulus
<u>Echium vulgare</u> Ad	Vipers bugloss
<u>Gazania</u> sp. Ad	
<u>Geranium molle</u> Ad	Soft geranium
<u>Gingidium geniculatum</u>	Climbing angelica
<u>Glaucium flavum</u> Ad	Horned poppy
<u>Linum monogynum</u>	White flax
<u>Lobularia maritima</u> Ad	Sweet alyssum
<u>Sonchus</u> sp. Ad	Sow thistle
<u>Verbascum</u> sp. Ad	
<u>Vicia angustifolia</u> Ad	Common vetch
<u>V. sativa</u> Ad	vetch

Ferns

<u>Cheilanthes</u> sp.	Rock fern
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Phymatodes diversifolia
Pyrrosia serpens

Tongue fern
Snake fern

Lichens

Cladia aggregata

soil

Physcia sp.

shrubs

Pseudocyphellaria spp.

stones,

shrubs

Usnea sp.

shrubs

Xanthoria sp.

shrubs

Some of the adventive plants (Lobularia, Gazania and Pittosporum) are garden escapes from the settlement at Birdlings Flat. Otherwise the assemblage of species is a very interesting one indeed, with some unexpected species occurring side by side. It is hoped that a sufficiently large area will be permanently reserved, although the presence of sheep is probably beneficial to the maintenance of the open vegetation. Dr Lucy Moore tells me that the Horned poppy is a new occurrence in the area. I could no longer find the Sea holly, Eryngium vesiculosum this year but Hypoxis pusilla is abundant. Further along the Spit Dr Brian Molloy and I found, this year, a large colony of Dodonaea viscosa, plenty of Ngaio and a few Kowhai 'trees'. Other interesting finds may turn up in future. Again, it is hoped that part of the dune area will be reserved.

REFERENCES

EVANS, L.T. 1953. The ecology of the halophytic vegetation at Lake Ellesmere, New Zealand. J. Ecol. 41, 106-22.

WALL, A. 1953. The Botany of Christchurch. Reed, Wellington.

"Seek'st thou the plashy brink of weedy lake?"

William Cullen Bryant

IN MEMORIAM

by John Thompson

One of the plants of special interest to me found growing in the Lyttelton Reserve 101 was a solitary specimen of the fern, Ruhmora adiantiformis. This fern may be seen frequently in the West Coast bush, with fronds commonly over 2'6" long, climbing the trunks of established trees.

The specimen in the Lyttelton Reserve grew in a crevice on a cliff face quite in the open. Its rhizomes were stout and short and from them sprung a dozen or more thick tough leaves only 3 to 4 inches long.

For a number of years I have enjoyed looking at this fern and appreciated its success in overcoming the rigorous and unnatural environment.

On my last visit to the Reserve it was no longer to be seen. Whether it died of natural causes or whether it had been taken by a "plant lover" I do not know.

The list of plant species in the Reserve was produced in 1965. At least 7 species on that list are no longer to be found in the