

"The Plains" as the area was called was very bare and dry. John Dunn ploughed his paddocks and sowed the seed of wattle (Acacia). His aim was to grow a forest of trees which would produce bark, then in demand for dyeing.

As a Porlock man he must have had in mind the Exmoor team of men who collected oak bark for dyeing.

He hoped to do the same with wattle bark. While the plants grew he spent some of his time building fences. This was done by digging sods in squares and stacking them between the ditches from which the sods were taken. Gorse seed was then sown on the ridges to form a live fence. Gorse plants could have been used also. The ditches gave the fence the appearance of extra height. John Dunn was a stonemason and would find this an easy employment as he contracted the art by the chain.

There are several plantations of wattle to be found around Burnham so it may be assumed that others were doing the same. Before the trees came to maturity, synthetic dyes were on the market which meant there was no market for wattle bark. John Dunn then left the district and settled on a run opposite Kairakei on the South bank of the Waimakariri now identified as Dunns Bank.

FLORA AND VEGETATION OF KAITORETE (ELLESMERE) SPIT

by Colin Burrows

The sere, brown, low-lying Spit south of Lake Ellesmere does not look a very promising place for botany but it is a most interesting area when one gets to grips with it. I will restrict this article to the dunes, sandy flats and grass-covered gravel flats south of Birdlings Flat not including the lake shore and shingle beach ridges. The geological and cultural history of the area is long and complex and, since it has some bearing on the botany, may be mentioned briefly. During periods of rise and fall of sea level between about 6000 and 2000 years ago the Spit was formed, both by marine and, more recently, lake wave action. Since then there has been some marine erosion at the southern end and progradation at the northern end. The dune area has probably only been in existence for two thousand years or more. Maori eyes probably saw a Spit little different superficially from what it is now. Silver tussock (Poa laevis, formerly P.caespitosa) would have been the main plant probably with Notodanthonia unarede, but scrub areas with Muehlenbeckia complexa, bracken, and matagouri prominent would have been present especially on older dunes and pingao (Desmoschoenus spiralis) the main plant on the young dunes. The Spit was an important route for the Maori and there are numerous old oven sites present. No doubt the Maori burned the vegetation and this may have affected some scrub areas.

From about 1845 European settlers began to take up large grazing runs for cattle and sheep on the Spit and this is still the present

farm practice. The main modifications to the vegetation have been interference by grazing with all the vegetation to a greater or less extent, replacement of most of the silver tussock, especially by needle grass (Stipa variabilis) and invasion by many other adventive plants.

Earlier articles by R. Speight, Trans. N.Z. Inst. 61, p 147, 1930, with an appendix By A. Wall: The Plant Covering of the Spit; M. Wraight, Proc. N.Z. Ecological Soc. 11, p27, 1964; and, more recently, Miss R. Mason, Natural History of Canterbury, p95, 1968; deal with some aspects of the botany of the area and various field parties from the University have added further details. In detail, however, there is much basic botany remaining to be done.

A floristic list, far from complete includes:

BEACH, DUNE AREA, AND GRASSLAND.

KEY: S - shore, D - dune, A - Area transitional from dunes to grassland, O - old dunes, G - grassland, R - shingle beach ridge, Ad - adventive, X - not common.

Shrubs and Sub-shrubs

<i>Carmichaelia appressa</i>	Prostrate broom	D A
<i>C. violacea</i>	Native broom	R O
<i>C. corrugata</i>		A
<i>Clematis afoliata</i>	Leafless clematis	R O
<i>Coprosma crassifolia</i>	Thick-leaved Coprosma	R
<i>C. propinqua</i>	Miki miki	R
<i>Discaria toumatou</i>	Matagouri	R O
<i>Dodonaea viscosa</i> X		O
<i>Haloragis erecta</i>		R
<i>Hymenanthera crassifolia</i>	Porcupine bush, Wharekarara	A R O
<i>Lupinus arboreus</i> Ad	Yellow lupin	O
<i>Muehlenbeckia complexa</i>	Pohuehue	A R O
<i>M. astonii</i> X		O
<i>M. ephedrioides</i>	Leafless Pohuehue	R A
<i>Myoporum laetum</i> X	Ngaio	O
<i>Pimelea prostrata</i>	N.Z. daphne, strathmore weed	D A
<i>Rosa rubiginosa</i> Ad X	Sweet brier	O
<i>Sarothamnus scoparius</i> Ad X	Broom	O
<i>Ulex europaeus</i> Ad X	Gorse	D O

Grasses and grass-like plants.

<i>Aira caryophyllea</i> Ad	English hairgrass	G R
<i>Ammophila arenaria</i> Ad	Marram grass	D
<i>Bromus gussonii</i> Ad	Barren brome	D A G R
<i>Carex pumila</i>	Sand sedge	S D
<i>Dactylis glomerata</i>	Cocksfoot	O
<i>Desmoschoenus spiralis</i>	Pingao, Golden sand sedge	D
<i>Holcus lanatus</i> Ad	Yorkshire fog	R O

<i>Hypoxis pusilla</i>	N.Z. Narcissus	G
<i>Lagurus ovatus Ad</i>	Harestail grass	D A R
<i>Notodanthonia unarede</i>	Danthonia	G R A
<i>Poa laevis (formerly caespitosa)</i>	Silver tussock	A G O
<i>P. pratensis Ad</i>	Kentucky bluegrass	G
<i>Stpia variabilis Ad</i>	Needlegrass	G R A
<i>Vulpia bromoides Ad</i>	Hairgrass	G
<i>Zoysia minima</i>	Pygmy twitch	A
<u>Other herbs.</u>		
<i>Acaena ovina Ad</i>	Sheeps burr	D A R
<i>A. novae-zelandiae</i>	Bidi-bidi	A
<i>Arenaria serpyllitolia Ad</i>	Sandwort	D G A
<i>Cakile edentula Ad</i>	Sea rocket	S
<i>Calystegia soldanella</i>	Sand convolvulus	D A
<i>Chenopodium allanii</i>		R D O
<i>Craspedia uniflora</i>	Woollyhead	A
<i>Cyathodes fraseri</i>	Patotara	G A
<i>Dichondra repens</i>	Mercury Bay weed	G A
<i>Erechtites quadridentata</i>		R
<i>Erodium cicutarium Ad</i>	Cranesbill	A G R
<i>Eryngium vesiculosum</i>	Sea Holly	R S
<i>Galium perpusillum</i>	Pygmy bedstraw	D G A
<i>Geranium sessiliflorum</i>	N.Z. cranesbill	G R
<i>Hypo chaeris radicata Ad</i>	Catsear	D G A
<i>Leontodon taraxacoides Ad</i>	Hawkweed	D A
<i>Lepidium murale Ad</i>	Dune cress	D R
<i>Oxalis corniculata</i>	Yellow oxalis	R A
<i>Pterostylis mutica</i>	Green orchid	G
<i>Polycarpon tetraphyllum Ad</i>	All seed	G R
<i>Raoulia australis</i>	Scabweed	D A
<i>Rumex acetosella Ad</i>	Sorrel	D A G R
<i>Salsola kali Ad</i>	Saltwort	S
<i>Sedum acre</i>	Stonecrop	R
<i>Senecio glaucophyllus</i>	Shore groundsel	S D
<i>Scleranthus uniflorus</i>	Kohukohu	A
<i>Silene gallica Ad</i>	Catchfly	D G A
<i>Spergularia marginata</i>	Sand spurrey	D
<i>Tillaea sieberiana</i>	Coastal tillaea	G R
<i>Trifolium arvense Ad</i>	Haresfoot trefoil	A G R
<i>T. dubium Ad</i>	Yellow suckling clover	G R
<i>T. fragiferum Ad</i>	Strawberry clover	G
<i>T. repens Ad</i>	White clover	G R
<i>Verbascum thapsus Ad</i>	Woolly mullein	R
<i>Vicia sp. Ad</i>	Vetch	R
<i>Vittadinia australis</i>		D G R
<u>Ferns</u>		
<i>Pteridium esculentum</i>	Bracken	D O

Mosses

Hypnum cupressiforme
Polytrichum juniperinum
Papillaria sp.
Tortula princeps

G

Lichens

<i>Cladonia</i> spp.	Soil
<i>Parmelia</i> cf. <i>conspersa</i>	Stones, soil
<i>P.</i> cf. <i>olivacea</i>	Stones
<i>P.</i> sp.	Stones
<i>Ramalina</i> sp.	Shrubs
<i>Teloschistes</i> sp.	Shrubs
<i>Usnea</i> sp.	Shrubs

The ecology of the area is fascinating. It is a place of regular summer drought, is swept frequently by strong salt-laden winds, and has a marked winter cold period: the flora and vegetation are well-adapted to these conditions. In addition the sand dunes, the sandy flats between and behind them and the area of gravel flats between the dunes and Lake Ellesmere each has special ecological features, depending largely on the nature of the substrate. The annual drought imposes difficult conditions for plant growth. The main means of surviving it seem to be (a) Annual life cycle. Winter annuals such as the haretail grass and haresfoot trefoil germinate in autumn, grow strongly in spring and die in summer. (b) Summer die-back in perennials. Some plants with shallow root systems grow vigorously in autumn and again in spring but are checked strongly by the summer drought. They include the needle grass and Notodanthonia unarede. The tiny yellow star-flowered Hypoxis pusilla, a member of the Hypoxidaceae, and the only native representative of groups related to the Amaryllidaceae, behaves similarly but dies back to its bulb after the spring flowering. (c) Deep root systems which tap water resources well below the surface. Pingao, matagouri, sand convolvulus and Carmichaelia appressa are in this category. (d) Many of the plants tend towards leaflessness or xeromorphic form. It is not always wise to assume however that transpiration is low in these plants but it is likely that leafless clematis, leafless lawyer, Muehlenbeckia ephedrioides, matagouri (which has leaves in spring and loses them in summer), silver tussock and pingao (both with folded leaves and sunken stomata on the inside) and hairy-leaved plants (Craspedia uniflora, Gnaphalium luteo-album) reduce water loss in this way. Some other plants have less obvious adaptations and may be physiologically drought resistant, i.e. their cells may resist removal of water.

Winter cold affects the general growth of many plants. There are several summer annuals (English hair grass, dune cress). Some plants

die back to the ground level at this time and these include Carex pumila, bracken and sand concolvulus as well as introduced species such as sorrel. Muehlenbeckia complexa and M. astonii lose their leaves in winter. It is not known how much salt spray affects the plants but the shrubs are shaped to some extent by it, being trained away from the prevailing southerly wind direction.

Although the supply of sand from the beach is limited and the sand is coarse and does not blow as freely as e.g. that of the North Canterbury dune areas, the young dunes are well developed and rise to up to 25ft. or more above sea level. The open, relatively unstable surfaces are colonized mainly by pingao. In contrast with other N.Z. dune areas there is little marram and this makes the area of great ecological interest. Harestail grass, catsear, sand convolvulus and sorrel are common on the dunes but pingao is the main sand stabilizer. Further stabilization is afforded by the spread of Carmichaelia appressa usually in somewhat sheltered positions. It is one of the most interesting species of the area because it is endemic to the Spit. It is closely followed by Muehlenbeckia complexa and bracken and silver tussock may follow later in the plant succession. Older dunes, quite low in profile, are present behind the line of foredunes. These have a complex of scrubby and grassy vegetation. M. complexa is one of the common species, as is bracken, C. appressa and C. violacea.

We have recently discovered Muehlenbeckia astonii (and Dodonaea viscosa and Ngaio in these dunes. The former reaches its southernmost known distribution here, though Mr Thompson tells me he had found it previously at Lake Forsyth. Dodonaea also reaches its southernmost known limit here. Other common shrubs are yellow lupin, leafless lawyer and leafless clematis.

On blowout areas between the young dunes the beginning of another plant succession is evident. The substratum consists of a thin layer of windblown sand and stones over gravel. The prominent pioneer plants are Raoulia australis and Scleranthus uniflorus, both forming isolated cushions. Carex pumila, a sand stabilizer with underground rhizomes, may be present in places. The stability of some of the dunes is attested by the presence of Raoulia on their flanks but it is mainly confined to the gravelly flat sites which, though wind-swept, are more stable than the dunes in general. On older flat sites the pioneers persist but harestail, sorrel and catsear are common. Another species which colonizes and quickly stabilizes the surface is the little pygmy twitch, Zoysia minima, which has a creeping rhizome and upright stems with bunches of sparse, short, wiry leaves. Sand continues to be blown onto the surface from the open dunes and is trapped by the plants. Pimelea prostrata, Gnaphalium luteo-album and Craspedia uniflora occur here also, as does haresfoot trefoil. Later, the site may be colonized by Carmichaelia appressa and silver tussock, or needle grass. The inter-dune area often has extensive stands of silver tussocks and in their shelter mosses, lichens and various herbs and small shrubs occur. Dichondra repens, Cyathodes fraseri and

Carmichaelia corrugata occur here and, on open sandy areas, the Acaena species A. novae-zelandiae and the introduced A. ovina. Poa laevis seems to be dominant on the deeper, sandier soils but, behind the dunes, a rather species-poor, heavily grazed grassland dominated by needle grass and Notodanthonia unarede is present on the older, but shallower stony soil. Mosses and herbaceous plants are present here also and it is in this area that the little Hypoxis occurs.

The continuing study of the botany of the area, with its blend of native and introduced plants, strongly influenced by special soil and climatic conditions is a challenge to local botanists. Permission must be obtained for visits to the area from Mr Bayley, Kaitorete R.D. 2, Christchurch (Western half of the Spit), or Mr A. Birdling, Birdlings Flat R.D.3 (Eastern half of the Spit). Other landowners must be contacted for access to the lake shore.

FRONTISPIECE

We are indebted to Mr Cecil W.H. Dunn for the frontispiece of our Journal. The drawing of Myosotis australis var. Lytteltonensis is one of a series which Mr Dunn will supply showing some of the plants that may be found growing in the Lyttelton Reserve No 101.

The drawing shows well the decumbent habit of this white flowered Myosotis. Only four plants now grow in the Reserve.

R.M. Laing found specimens growing on the cliffs above Lyttelton, Governors Bay, and Lyttelton Road in 1917. Oliver found similar plants on cliffs above Governors Bay in November, 1947.

Your Editor has not been able to find any other specimens than those seen in the Reserve. He would welcome reports of other findings. The plants in the Reserve flower from the middle of October to early in December.

SOME NATIVE PLANTS AT GRAVEL PITS

by R. Mason

At first glance, there may not seem much of interest in a gravel pit but sometimes - usually after taking for gravel has stopped and before the stage of rubbish dump is reached - it may provide a home for a considerable collection of native plants.

One such gravel pit is a moderately small one at Springston on the Ellesmere Junction Road, Grid ref. S83/808430. The vegetation is not dominated by native plants. There are adventive shrubs, some broom, some sweet brier, hawthorne, a silver wattle, an apple tree on the dry gravel and small willows by the water and there are also a great many adventives herbs of the type that grow on well drained, shingle soils and also others of damper ground.

No doubt in the past, the area was burnt over and grazed but