

II. — BOTANY.

ART. XXIV.—*Notes on the Botany of Certain Places in the Waikato District, April and May, 1870.* By T. KIRK.

[Read before the Auckland Institute, June 13, 1870.]

THE extensive sand hills at the North Head of the Waikato River, are dotted over with a sparse vegetation of *Carex pumila*, *Spinifex*, *Desmochaenus*, and other common arenarean plants, with patches of *Cassinia retorta*, and tussocks of *Arundo conspicua*; in moist places *Euphorbia glauca* may be found, and about the margins of the shallow sand lakes and pools, *Limosella aquatica*, *Azolla rubra*, and the common European water-cress. At the South Head the sand hills occupy but a comparatively small space, and being for the most part but low, have become covered with a dense growth of manuka and other shrubs, mixed with various sedges and rushes; in the moister places, *Leptocarpus filiformis* attains the height of seven feet. On the sand hills near the Port, the European *Iris Germanica* is abundantly naturalized, while *Malva crispa* and many other introduced plants are plentiful amongst the deserted houses and by the road sides. A form of *Potentilla anserina*, scarcely different from the European plant, is most abundant at the foot of the hills; and in plashy places, *Callitriche Muellerii*, F. Sond, *Crantzia lineata*, and *Myriophyllum varicefolium* are common. The sea cliffs are garnished with *Arthropodium cirrhatum*, and in sheltered places, *Olearia albida*, *Myoporum laetum*, and a few other common shrubs are found, but the number of species is remarkably limited.

On the hills about Port Waikato, *Sporobolus elongatus* forms the chief herbage, in many places to the exclusion of all other grasses. Notwithstanding its extreme toughness, it is as closely cropped by cattle as if regularly mown, and from its hardiness and quick growth, forms a remarkably dense and elastic sward. The settlers call it "Chilian grass," and think highly of its value; it is however a true native of the colony, and is found from the North Cape to the Upper Waikato, where it is increasing from the depasturing of cattle and the steady spread of agricultural operations.

From Port Waikato southward to Waikawa the country is much broken, the crests of the low hills being chiefly covered with fern and the usual ericetal plants, and the valleys filled with luxuriant forest, differing from that in the north in the entire absence of kauri and tarairi; viewed from the crests of the

hills, the epiphytic form of *Griselinia lucida*, which was unusually abundant, had a remarkable effect, from the contrast of its bold glossy foliage with that of the rimu, tawa, or rata, upon which it chanced to be growing. It is but rarely that the genera *Hymenophyllum* and *Trichomanes* are seen, as they appear to be in these patches of forest; only a few of the commoner forms were observed, and those only in small quantity.

On the sand hills about Peringa and Whakawa, *Zoysia pungens*, a small growing native grass is abundant, forming a compact turf, and affording a large supply of succulent herbage to horses and cattle. Although this grass occurs in many localities, from the North Cape southwards, it is rarely found in so great abundance. *Astelia Banksii* occurs on the cliffs, evincing its decided preference for a maritime habitat. *Crantzia*, *Salicornia*, *Mesembryanthemum*, and other littoral plants occur here in profusion.

Ascending the river from Port Waikato, *Avicennia officinalis* and *Plagianthus divaricatus* are found for a short distance, but the extensive swamps and low lands which stretch to the vicinity of Tuakau, present but little of interest, except occasionally to the flax manufacturer; occasionally extensive patches of kahikatea are seen, and, on a large island opposite Mercer, are some fine specimens of the tarairi (*Nesodaphne Tarairi*, Hook. f.), the finest I saw in the Waikato. This handsome tree appears to attain its southern limit between Mercer and Rangiriri, thus exhibiting a very restricted range when compared with the tawa (*Nesodaphne Tawa*, Hook. f.), the only other member of the genus, and which, according to Buchanan, is found in the Province of Marlborough.

At Kohe-kohe, above Mere-mere, a solitary ngaio (*Myoporum laetum*), evidently planted, is pointed out by the Maoris as a "pakeha" tree; two stunted specimens were observed on abandoned native cultivations at Rangiriri. In the Waikato it appears to be confined to the coast, and flourishes only in situations exposed to the sea breeze. The puriri (*Vitex littoralis*) is not observed by the river side further south than about three miles above Mere-mere, although it is met with in several localities between the river and the coast; it is however decidedly rare in the Upper Waikato.

In places where the current is not too swift, a dense growth of *Typha latifolia*, *Scirpus lacustris*, and *S. maritimus*, is found at the foot of the bank and in the adjacent marshes; in shallow places in the river, *Myriophyllum varicefolium*, an undescribed *Potamogeton* allied to *P. zosteræfolius*, Schum., and a species with floating as well as submerged leaves, allied to *P. natans* and *P. heterophyllum*, are abundant. *Nitella Hookeri* often forms large patches, and in shallow gravelly places, *Zannichellia palustris* is occasionally met with; this appears to be a rare plant in the colony, having been previously collected on the east coast of the North Island only. The paucity of fluviatile plants in the Waikato is remarkable, although some allowance must be made

for the advanced period of the season at which these observations were made.

Several feeders empty themselves into the Waikato, more especially on its western bank; most of these are of tortuous course, running for many miles among the hills. A description of the chief features of the Opuatia Creek, which was explored for twenty-five miles from its mouth, may be taken as a general representation of those of other creeks. The first five or six miles passes through extensive raupo swamps, occasionally relieved by large patches of New Zealand flax and various sedges; on the margins of quiet reaches, *Riccia fluitans*, previously known as a New Zealand plant only in deep water in the Wairarapa Valley, is occasionally found, but is by no means common. Large kahikatea swamps were relieved by a dense undergrowth of various species of *Coprosma*, which, at this late period of the season, atoned for the absence of flowers by their brilliant show of berries of orange, purple, crimson, white, red, and jet black; the effect being enhanced by the immense panicles of snow-white berries of the ti (*Cordyline australis*), and, high above all, the bright red fruit of the kahikatea, which were produced in unusual abundance. *Asplenium australe*, Br., one of the few New Zealand plants which evince a decided geognostic preference, was abundant in marshy woods on the impure limestone through which the stream has forced its way. Alluvial ground along the entire course of the creek is covered with European docks, of so dense a growth that it is difficult to force one's way through them, and the common water-cress (*Nasturtium officinale*) is abundant; for some fifteen miles, the only fluviatile plants were the *Potamogetons* before mentioned. In the low woods, *Plagianthus betulinus*, one of the most ornamental trees in the flora, was common, but except on dry ground had lost most of its leaves. It deserves to be largely used for ornamental planting; in habit it is the best representative we have of the European birch, its foliage closely resembling the var. *laciniata* of that well known tree.

But the most remarkable feature was the immense abundance, in one or two localities, of a peculiar group of plants for the most part members of widely separated families, but agreeing in the production of minute, usually dioecious, flowers, and so closely similar in foliage, and often in ramification, as to be distinguished only with extreme difficulty in the absence of fruit. Acres were covered with a dense intertwined growth of *Panax anomalum*, *Pennantia corymbosa*, *Meliclytus micranthus*, *Myrsine divaricata*, *Coprosma*, sps., *Epicarpurus microphyllus*, *Muhlenbeckia complexa*, and young states of *Eleocharis Hookerianus*;—one of the most curious assemblages of plants similar in external appearance, but widely different in structure, that could possibly be met with.

The young leaves of *Panax anomala* have hitherto escaped notice; in this locality they were usually trifoliate, and irregularly lobed and toothed, resembling those of *Melicope simplex*, but of more irregular form. They

are but rarely developed on old branches and never in connection with fruit.

At Tepakiruna, *Geranium sessiliflorum* is found in abundance on the pumice deposit by the river; this is probably the northern boundary of this interesting little plant, which had not previously been observed in the North Island. *Potentilla anserina*, and other plants of interest, were collected here. The open country in the vicinity is clothed with short-growing manuka and fern, largely mixed with an undescribed *Schoenus* allied to *S. pauciflorus*, and presents few plants of interest.

Whangape Lake is the habitat of many interesting plants. *Asperula perpusilla* attains here its northern limit, the usually littoral *Chenopodium ambiguum* occurs on its banks, *Potamogeton pectinatus*, only collected elsewhere as a New Zealand plant, near Napier, is abundant in the lake and in the Whangape Creek, as are the undescribed members of the genus already spoken of. *Elatine Americana* is not unfrequent, *Ruppia maritima*, usually confined to muddy beaches and salt-water ditches, is common, as is *Zannichellia palustris*; *Scirpus fluitans*, L., has not been found elsewhere in New Zealand; a *Pitularia*, with solitary fronds, is found on the margin of the lake, as well as in deep water, but good specimens have not yet been collected, and the genus has not at present been found elsewhere in the colony. *Isoetes Kirkii*, Braun, originally discovered here, forms a compact turf at the bottom of the lake, whilst charads of several species are abundant,—amongst them *Chara fragilis*, Desv., var. *C. australis*, R. Br., and *C. gymnopitys*, A. Br., are additions to our flora, as is an interesting minute plant, an undescribed *Ranunculus* of abnormal form, having four sepals and four petals, with spatulate leaves, and which formed matted patches in water of one to six feet in depth.

In the adjacent forest, the elegant *Metrosideros Colensoi*, with its weeping branches, clothed many of the tallest trees; when in flower, in December and January, it must present a charming sight, the rose-coloured flowers being borne on the extremities of its slender pendulous shoots. It would be a striking addition to the lawn or shrubbery if grafted on the rata or pohutukawa, and treated as a weeping tree. A *Fuchsia*, of sub-scandent rambling habit, was found here, but without flower or fruit; it is, perhaps, a form of *F. Colensoi*. *Myosotis Forsteri* occurred sparingly. *Asplenium australe* was collected of unusual luxuriance, some of the fronds being six feet high. Occasional specimens of the kauri were observed, but it is decidedly rare.

Waikare Lake is of irregular shape, and about eight miles long by three in width. It presents a marked contrast to Whangape Lake, in the comparative absence of lacustrine vegetation. The only representative of the charads was *Nitella Hookeri*, which occurred in large masses; the undescribed *Ranunculus*, already referred to, was abundant, but nowhere to be seen in flower. The maritime plants, *Scirpus maritimus*, *Ruppia maritima*, *Leptocarpus*

filiformis, were abundant, together with *Selliera radicans*, Cav., at the east end of the lake. *Isoëtes Kirki* occurred in scattered patches in many parts of the lake, but was nowhere so abundant as at Whangape, nor did it make any approach to covering the bottom in those places where it grew; this is probably owing to the shifting sandy nature of the bed of the lake. The uliginal vegetation is similar to that of Whangape Lake.

The Waihi Lake is smaller than either of those just described; it has, however, a more copious vegetation than either. The very imperfect examination made of this lake, exhibited *Elatine Americana*, and most of the plants previously collected, together with an undescribed *Cladium*, with a much branched drooping panicle and long sheathing bracts, but the specimens were too far advanced to admit of an accurate diagnosis being drawn. A slender *Utricularia*, with weak stems two feet long, much divided capillary leaves, and rather large bladders on the leaves, was observed in several places at the bottom of the lake, but, of course, without fruit or flower at this season. It may prove to be a form of *U. protrusa*, Hook., originally discovered by Mr. Colenso in the Bay of Plenty, and which has not been found elsewhere.

Tetragonia expansa, usually confined to the vicinity of the sea, occurred by the marshes, and as an abundant weed on native cultivations; nearly every specimen was prolific, a phenomenon I have not before noticed in connection with this plant.

At Taupiri, Rangiriri, and other places, the false acacia (*Robinia pseudoacacia*) is abundantly naturalized; it already forms coppices in many localities, and from its great durability is likely to prove serviceable for fencing purposes. The ordinary cultivated fruits, the fig, peach, vine, Kentish cherry, strawberry, raspberry, and tomato, are abundantly naturalized in many localities; the tobacco and thorn-apple (*Datura stramonium*) are occasionally met with, and *Navarretia squarrosa*, Hook. and Arn., is plentiful at Ngaruawahia, whilst the vicinity of every township and military post is marked by a large number of exotic grasses and viatical plants, one of the most common being *Lepidium ruderale*, a littoral plant which has, of late years, spread largely over the interior of the British Islands, and is increasing rapidly in this colony.

Above Ngaruawahia the current of the Waikato becomes much more rapid, consequently the vegetation at the margin of the river is greatly diminished in quantity, forming a marked contrast with that of the sluggish Waipa, which is fringed with a dense margin of uliginal and paludal plants. Approaching Hamilton, the river runs between high banks, clothed with *Weinmannia racemosa* and other shrubs, mixed with luxuriant clumps of wharaekie (*Phormium Colensoi*); in fruit this plant is easily distinguished from *P. tenax* by its twisted and rounded capsules, which are invariably pendulous, never erect and angled as in *P. tenax*. The fibre is also much weaker, in fact,

worthless to the manufacturer, but the undressed leaf is split into narrow strips by the natives for fishing nets, which are said to last longer than those made from the ordinary swamp flax.* The wharaekie is occasionally to be seen planted in Maori cultivations, both in the Waikato and Thames districts; it is much more abundant in the Upper than in the Lower Waikato, its favourite habitat being the faces of moist banks and cliffs.

At the Tamahere narrows, *Dracophyllum strictum* attains its northern limit, and from its numerous panicles of white flowers, forms an attractive object. At Cambridge, *Microseris Forsteri* was collected in abundance; *Zoysia pungens*, a low-growing grass usually confined to littoral situations, formed a dense sward in many places, and afforded a large amount of short succulent herbage, which was closely cropped by sheep and cattle; a few fragments of other grasses, apparently referable to the maritime *Glyceria stricta* and *Poa*, sp., were collected here, but in too advanced a stage to admit of identification.

ART. XXV.—*On the Occurrence of Littoral Plants in the Waikato District.*

By T. KIRK.

[Read before the Auckland Institute, June 13, 1870.]

THE frequent occurrence of several species of maritime plants in the Waikato District, far beyond the present range of tidal waters, appears to call for special remark from its important geological bearings. Dr. Hochstetter was, I believe, the first to advance the theory, "that the whole Middle Waikato basin was but recently a shallow arm of the sea or a far extending estuary." The accuracy of this opinion has however been impugned; it may therefore be advisable to recapitulate the maritime plants observed in and about the river and adjacent lakes and marshes.

Tetragonia expansa,—chiefly as a weed in native cultivations.

Apium filiforme,—woods by the Opuatia.

Selliera radicans, Cav.,—Waikare Lake. Has been found by the "Lower Waitaki River, Otago, apparently far from the sea."

Chenopodium glaucum, L., var. *ambiguum*,—on the shores of Whangape Lake.

Ruppia maritima, L.,—in Whangape, Waikare, and Waihi Lakes.

Leptocarpus simplex, A. Rich.,—Waikare Lake. This occurs in a solitary locality in the North, a short distance only from the present reach of tidal water, and in small quantity.

Scirpus maritimus, L.,—from Waikato Heads to a few miles above Hamilton; abundant in all the lakes and marshes; also in the Waipa.

Zoysia pungens, Willd.,—Cambridge, abundant.

* The above is written from personal observation of this plant in the North only. It is said to produce a fibre of high quality in the South Island.