P.tenuifolium, Pseudowintera colorata, a specimen of Olearia nummularifolia, both Earina mucronata and E.autumnalis on one log and Corybas triloba were the only orchids we saw. There were numbers of ferns, amongst which were Lindsaea trichomanoides, L.viridis, Asplenium hookerianum, Botrychium australe. At the eastern side of the lake the track took us along a sandy beach where we were exposed to a fierce wind which whistled through a gap in the crater wall, but in the forest at the other end of the beach it was quite calm. We tramped on further and eventually joined the track we came in by and returned down it to the bus, thence back to Taupo arriving back about 5 p.m., tired but cheerful and ready for dinner.

On Monday we left in misty weather after breakfast and started off home, travelling through Wairakei and Reporoa through Waiotapu to the Waimangu geyser valley. I think we saw more rangioras in flower here than anywhere else in New Zealand and, considering that the whole of the plant life was destroyed in 1917, the regeneration is remarkable.

Led by Mr. Marx, the officer in charge of this area, we tramped down the track to Rotomahana through very active volcanic country. On the banks of a small stream we saw clumps of Psilotum nudum, and on the hot flat adjacent Microtis uniflora and several Thelymitras not in flower and I could not identify them. We climbed back to the bus for lunch and then the rain came down heavily. We were lucky to have had it reasonably fine for our scenic jaunt.

The rain ceased after we had passed through Rotorua and over the Mamaku range and the weather became quite fine as we proceeded to Hamilton and the main road home. Unfortunately we struck a terrific traffic jam at Pokeno, which made us later home than we expected.

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MOANATUATUA BOG, HAMILTON. 15th November C.L.Purdie.

Just two hundred years ago, Captain James Cook, accompanied by Banks and Solander, made his furthermost inland trip during his New Zealand visit - up the Waihou River from the Firth of Thames to see what the inland looked like. It was a pure coincidence that on the 15th November 1969, just five days short of the bi-centenery of that trip of Cook's, the Auckland Botanical Society made a similar trip to the opposite end of the bog complex and visited the Moanatuatua Bog about 8 miles south-east of Hamilton.

The guest leader, Mr.E.W.E.Butcher, an authority on this bog, greeted the party and over lunch gave a most interesting talk illustrated by samples of the plant life we were to see during the afternoon walk over the bog with him. This land is some of New Zealand's most interesting country.

Between 12,000 and 8,000 years ago the Waikato River used to wander over the flats which are today the fertile farmlands of the Waikato. Terraces and disused stream beds indicate that the river used to alter it's course from time to time. Some of these flats which had depressions in them were to become today's peat bogs. Moanatuatua is one of these and is roughly of oval shape, covering about 18,000 acres situated about 130 ft. above sea level. Tests indicate that the peat varies in depth between 10 and 40 feet and is dome shaped, rising several feet in the central portion.

This thick blanket of peat has developed slowly under favourable conditions. The climate of the area is mild to warm, humid, with a mean annual temperature of 56 degrees fahrenheit. Wind is frequent and often strong as there is no protection afforded in the bog. The rainfall of about 50 inches is spread equably throughout the year.

Reference is continually made to the word bog and it will be noted that no reference has been made to a swamp. This is one of the interesting differences about the area. Water-logged land is usually termed a swamp and has a very different vegetation to the land described here. Swamps are normally fed by streams or rivers whose waters have a reasonably high mineral content that stops acidity forming. These are known as eutrophic conditions. A bog is fed by low mineral content rainwater that permits acid formation in the peat as the vegetation decomposes. This is known as an oligotrophic condition. It is possible for swamp land to become acid and while in the state of transition it is referred to as mesotrophic. These swamps are obvious because during the period of change the wire rush, Calorophus lateriflora starts to grow and ultimately becomes the dominant plant.

VEGETATION.

Due to the very acid conditions of the peat, the vegetation has become specialised and there are only 23 species of plants of higher order than algae and fungi growing naturally in the bog.

Near the edge of the bog weeds are developing with drainage, as well as a few native plants which have encroached from the normal land surrounding the bog.

On the periphery the peat is less water-logged due to natural drainage and artificial drainage which has altered the ecology of this area. In dry weather conditions the surface layer of the peat tends to dry out and it is quite noticeable that the sedges and dicotyledons are more developed.

As the distance from the edge increases there is a marked and continuous belt of Schoenus brevifolius and Cladium Teretifolium, interspersed with low growing Leptospermum scoparium and Epacris pauciflora. The moisture content of the peat rises also. It is in this band that the orchid Thelymitra venosa, with its blue flowers

south-west end of the bog with flowering stems up to 2 ft. 6 inches high.

Blending through the outer belt and increasing in density toward the body of the bog is a layer of Calorophus lateriflora. This is the dominant restiad which has a root system that forms a water carrying sponge. The capacity of the rood mat to hold water is approximately 15 times its dry weight and, as the roots tend to remain near the surface, a certain amount of the root system even builds up over and around the surrounding vegetation. This 'upper' root system looks like an accumulation of sphagnum moss. It is white when shaded but under light conditions it turns pinkish magenta. The water held in the root mass is quite fresh as it is above the water table of the bog and has accumulated from rain water and evaporation. This clean water enhances the growth of some of the mosses and liverworts.

In the deepest portion of the peat Sporodanthus traversii grows. Due to its unusual root system it is able to withstand high winds even though it may be as tall as 6 - 7 feet. The bamboo like shoots develop from a strong, thick rhizome, which is about $2\frac{1}{2}$ to $3\frac{1}{2}$ inches under the peat surface in the wet level, and during the damp conditions will be submerged in acid bog water. From the rhizome, side shoots grow horizontally forming a mesh under the peat surface on which all the other vegation is supported. The main roots of the Sporodanthus descend from the rhizome to a depth of 2'6" and sometimes even deeper. The Epacris pauciflora that grows in association with the Sporodanthus will grow to a height of 4 or 5 feet, but even then the root system remains above the mesh provided by the Sporodanthus.

Due to the Sporodanthus having its root system submerged, there has developed a waterproof skin which extends up the stems of the plant. Underneath this skin and adjacentto the stem is a layer of powdery substance which will let air reach down to the underground system of the plant, providing aeration to the roots. It is a matter of interest that hawks are very fond of this powder substance and they have been seen pulling the outer tissue away to obtain the matter underneath.

Other vegetation is to be found spread over the surface of the bog. The Droseras remain near the outer ring where the moisture content, although present, is not too high, giving way to the Utricularia in the shallow water holes. The Lycopodiums, mosses and liverworts cover patches over the entire area. The orchid, Corybas carsei, which is endemic to the restiad bogs, is found in limited patches, usually more frequently after a burn has regenerated. It is a very small plant and not easily found. Lycopodium laterale is the only fround layer plant whose root system is well developed in the peat. Utricularia delicatula is not found growing anywhere other than in a restiad bog and when not in flower is difficult to find without sifting through the peat slurry.

ECONOMIC FUTURE

The future of the bog is now obviously apparent. Due to the nature of the peat, it is very useful for plant propagation and there is a firm processing the peat and bagging it for distribution to users throughout the country. The peat is of a very acid nature, Moanatuatua peat having a pH of 4, and is ideal for many horticultural uses.

The Rukuhia Station of the Ruakura Agricultural Research Centre has an area under the control of Miss Bates, who is doing research into growth rates of plants in peat soil mixtures. She also has a section devoted to the development of the American High Bush Blueberry. This could prove to be a well worthwhile project because in the United States it has developed into a multi-million dollar industry. The blueberry grows in pure peat which as been cleared of its natural growth and the orchard that I have seen developed looked very healthy and promising.

There is a small area of the bog set aside as a reserve but I feel that unless a much larger area is preserved the future may not be as secure as hoped, due to the development going on in the rest of the bog and its concomitant drainage.

ACKNOWLEDGEMENT

I wish to thank Mr.Butcher for his interest in showing the Society around the Moanatuatua bog and the information provided by him. Also Mr.J.Adam, an erstwhile scientist who specialised in peat land development and research at Ruakura, for the information he gave and his hospitality when he escorted me around the blueberry industry of Hamilton.

REFERENCES

Butcher, E.W.E. 1965. Banks Lecture. Journal R.N.Z.I.H. Vol.VI No.11 pp. 54-64

Campbell, Ella O. 1964. The Restiad Peat Bogs at Moanatuatua and Motumaoko. Trans.R.Soc.N.Z. Vol.2 No.16. pp.221-227

Cranwell, L.M. 1953. An Outline of New Zealand Peat Deposits Proc.7th Pacific Soc.Congresss 5. pp.186-206

High Bush Blueberry Culture. Pamphlet, Dept.of Agriculture, Ottowa, Canada.

APPENDIX.

Higher Plants Native To The Area Above Algae and Fungi

DICOTYLEDONS :

1. Woody.

Leptospermum scoparium
Epacris pauciflora. 2

2. Insectivorous.

Utricularia delicatula.
" novae-zealandiae.
Drosera spathulata.
" binata. 4

MONOCOTYLEDONS :

1. Restiads.

Sporodanthus traversii
Calorophus lateriflora. (syn. Hypolaena lateriflora) 2

2. Sedges.

Schoenus brevifolius.
Cladium teretifolium. 2

3. Orchids.

Thelymitra venosa
Corybas carsei
Microtis unifolia 3.

FERNS :

Gleichenia circinata
Schizaea fistulosa. 2.

LYCOPODS:

Lycopodium laterale.	
" serpentinum.	2.

MOSSES:

Campylopus kirkii.	
Sphagnum cristatum.	
" falcatum.	3.

LIVERWORTS:

Goebelobryum unguiculatum.	
Riccardia species.	
Lepidozia species.	3.
TOTAL	23.

BUCKLETON'S BEACH. 21st February, 1970. A.D.Mead.

The Society's two meal summer trip sometimes becomes a picnic outing rather than a botanical excursion but the party which visited Buckleton's Beach found much of interest in the world of plants. This beach is a semi-private one in a small bay just north of the Matakana inlet. The tide was out, enabling us to walk along the rocks under the overhanging pohutukawas north of the bay. The cliff carried a very full assortment of coastal vegetation typical of this region, among which we listed kowhai, kohekohe, mahoe, nikau, tawa, rangiora, rewarewa, karaka, cabbage tree, flax, tutu, Pseudopanax crassifolium, P. cornifolium, Olearia furfuracea, Cyathodes juniperina, Macropiper excelsum, Myrsine australis, Griselinia lucida, Hebe stricta, Astelia banksii, Collospernum hastatum, Centella uniflora, Peperomia urvilleana, Apium australe, sedges and ferns. On the steep slope just above the cliff top were several stands of kauri, surprisingly near the edge.