

## THE VEGETATION OF GREAT MERCURY ISLAND

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### SUMMARY

Although almost the whole of Great Mercury Island (northern North Island, New Zealand) has undergone burning and other modification by man over many centuries, it still contains a rich and diverse flora, and in places supports extremely interesting plant communities. Most of the island is presently farmed; however several streams and cliff areas are sufficiently steep to deny animals access, and thus some natural vegetation survives.

Remnants of the island's probable former cover of kauri (*Agathis australis*) forest are difficult to discern; only a few specimens of the kauri tree now exist, and nowhere were the typical kauri plant associations seen. However, especially in the south of the island, strong similarities can be seen with the poor gumland scrub around the Waipoua kauri forest in Northland.

The major plant communities are discussed in detail, particularly those with largely indigenous composition. A number of areas contain plants which are rare or local on the mainland; these are definitely worthy of preservation. Accompanying the vegetation descriptions is a species list of the vascular plants totalling 414 species, of which 253 are indigenous to New Zealand.

The island's flora is discussed, and compared with those of other islands and the nearby mainland.

### INTRODUCTION

Studies on the vegetation of Great Mercury Island (Ahuahu) were carried out during the Auckland University Field Club scientific trip to the island, 11-17 May, 1975. Following a short visit to the island (15-17 March, 1976) Mr A.E. Esler of the Botany Division, Department of Scientific and Industrial Research kindly made available further observations, including an addition of 126 species to the flora recorded in May, 1975.

Great Mercury Island (1800 hectares) is the largest of the Mercury Island Group (latitude 36°37'S, longitude 175°48'E) lying off the north-eastern Coromandel Peninsula (Fig. 1). The island is composed of two main land masses joined by a sand and boulder tombolo. The northern area is mainly rolling to steep hills, well grassed, with boulder beaches and steep coastal cliffs. The larger, southern land mass is greatly dissected and eroded, with sandy beaches and vertical, often overhanging cliffs. Vegetation is largely manuka/kanuka (*Leptospermum*) scrub, with scattered areas of native pasture and isolated remnants of coastal forest. Efforts were made to cover as much as possible of the island, and as a result, the vegetation has been grouped into a series of broad, often merging communities. Those communities largely composed of indigenous species are described in more detail, as they generally represent remnants of past (most probably not virgin) vegetation covers of the island.

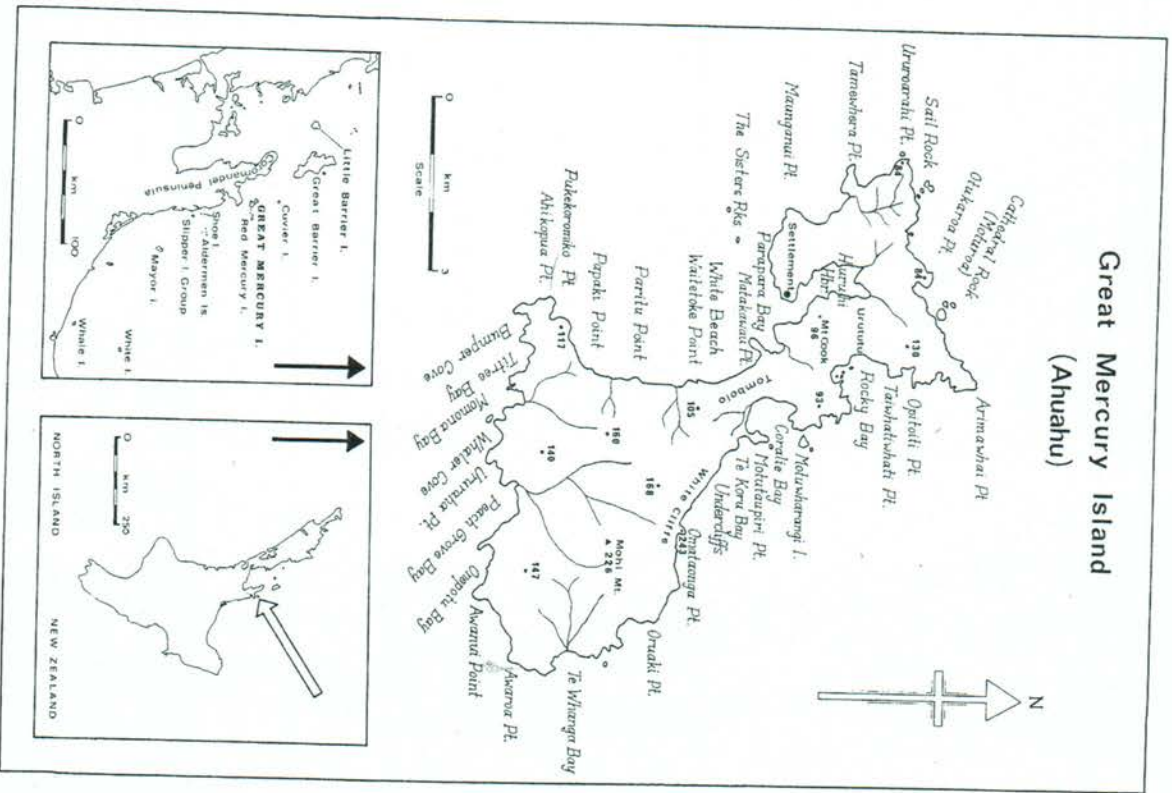


Fig. 1. Places names, localities, major streams and spot heights (in metres) for Great Mercury Island. Insets show location with respect to nearby offshore islands and the North Island of New Zealand.

VEGETATION HISTORY

Accounts of the vegetation of Great Mercury Island are extremely scarce, and almost no material has been published. Early European accounts (Best 1925a, b; Gudgeon 1892) retell legends concerning the early arrivals of the Archaic Maori, and indicate that Ahuahu may have been the site of one of the very earliest canoe landings in New Zealand. The canoe Horouta is said to have originally arrived at the island, bringing the first introduction of the kumara (*Ipomoea batatas*) to this country.

The island shows abundant evidence of a considerable Maori occupation, and that in itself implies clearing and modification of the natural vegetation. Approximately one third of the island's total area shows signs of cultivation (largely the northern part of the island). Local legend claims a disastrous fire around the year 1670, which destroyed the kauni (*Agathis australis*) forest over the southern part of the island, and led to the abandonment of the island as a permanent dwelling place by the Maori. The sometime presence of major kauri forests is corroborated by the large amounts of gum removed from the island in the early twentieth century; the gundiggers themselves being responsible for further modification of the vegetation through firing of the scrub in their search for gum.

Following the sale of the island (in several transactions between 1858 and 1863 - Turton 1877) by the Maori owners, sheep were grazed on the island, and intermittent farming carried on until 1868 when the first homestead was built in Huruli Harbour (Cochrane 1954). Soon after, gorse (*Ulex europaeus*) was planted as a hedge on the island, and quickly spread. Goats (*Capra hircus*) had been introduced previously, apparently as a food source, and now exist in large numbers in the northern part of the island. Although the goats do eat gorse, especially young regrowth, they were more often observed browsing on pasture and native cliff communities.

At present, an area north of a line between Waitetoke and Undercliffs is grazed, and is continually being improved. All vegetation in this northern area is dominantly modified, except for limited areas on cliffs or otherwise out of the reach of grazing animals. Pastures are largely danthonia (*Notodanthonia* spp.) and meadow rice grass (*Microlaena stipoides*), although the flat area on which the settlement is built and the central tomboilo have been sown and planted in pasture mixtures. The majority of the remainder of the island is grazed by roaming cattle who maintain areas of native pasture around the coast. Repeated slashing of gorse and burning of manuka scrub are temporarily opening up further areas for the establishment of pasture. With the exception of Urututu and Undercliffs lava fields, the most important native forest communities occur in stream valleys and around the coast of the southern part of the island.

This communication is the first published account of the vegetation of Great Mercury Island; the only previous record being a brief description and vegetation map included in Cochrane (1954).

PLANT COMMUNITIES

The vegetation cover of Great Mercury Island falls loosely into twelve main groupings (some of which are further subdivisible) ranging from pasture

Table 1. Major plant communities of Great Mercury Island in relation to soil types and site.

Community	Soil type	Site
1. Lava field coastal forest	Rich humus between rocks	Jumbled blocks of lava and other volcanic rocks
2. Towai dominant coastal forest	Friable humic loam	Moderately steep sheltered valleys
3. Dense, mixed coastal forest	Friable humic loam	Inaccessible extremely steep valleys
4. Cliff, talus slope and shore	Stony humic loams	Cliffs and plateforms, talus slopes down to high tide level
5. Pohutukawa Groves	Firm humic loam	Raised coastal flats, ridges
6. Rewarewa dominant coastal forest	Friable humic loam	Flat areas in major stream valleys
7. 40-50 year old kanuka/manuka scrub	Firm humic loam over clay	Sheltered seaward slopes
8. 20-30 year old kanuka/manuka scrub	Thin humus over clays	Margins of coastal forest, sheltered valleys
9. Poor gumland scrub	Leached podsoils	Southeastern plateau, much of southern basin
10. Raupo/Cyperus swamp	Rich peats	Low, poorly drained flats
11. Indigenous grassland	Various	Rolling hills in north, coastal areas in south
12. Sown/planted grassland	Humified sands and gravels	Alluvial flats

(indigenous and sown/planted), through scrub to various types of more mature coastal forest. Representative examples of each vegetation community were studied in detail, and the descriptions are largely based on these typical localities.

The twelve communities with brief notes on their soil type and situation are summarised in Table 1.

#### Lava field

Two areas of lava field at Undercliffs and Urututu provide the most interesting and unusual plant associations on Great Mercury Island. Huge blocks

of rhyolite (up to 4m high) lie in jumbled masses, similar to the basalt lava fields of Auckland (Wall & Cranwell 1943; Millener 1965). Rich humus derived from leaf litter has accumulated between the mossy blocks of lava, and in crevices and hollows upon them; supporting a wide range of rare and uncommon plants. The inner regions of each of the two areas appeared to be inaccessible to grazing animals, and contain purely indigenous vegetation. The only adventives observed to penetrate even the outer edges of the lava fields were Mexican devil (*Eupatorium adenophorum*) and the nightshade (*Solanum nigrum*).

At Undercliffs the lava field and its plant communities lay between the base of the White Cliffs talus slope and the top of the 20m high immediate coastal cliffs. Average elevation was 25-30m above sea level, with prevalent slopes between 10° and 30°.

A two metre wide transect was made through the forest to record the large number of uncommon and interesting species encountered, and the composition of the lava field community. The 117m long transect ran from the inland edge of the lava field (ie. the base of the White Cliffs talus slope) in a straight line to the top of the coastal cliffs. The distance of each plant from the origin of the transect was logged, together with the diameter at breast height of all trees and shrubs. These data are presented in Table 2.

Table 2. Individual plants present in a two metre wide transect through lava field vegetation at Undercliffs, with distances from the origin of the quadrat and diameter at breast height (D.B.H.) where applicable.

Distance (m)	Species of trees and shrubs	D.B.H. (cm)	Groundcover
0	<i>Metrosideros excelsa</i>	10	
5	<i>Melicope ramiflora</i>	5	
8	<i>Myoporum laetum</i>	18	
10	<i>M. ramiflora</i>	3	
	<i>Macropiper excelsum</i>	2	
11	<i>M. ramiflorus</i>	2	
12.5	<i>M. ramiflorus</i>	3	<i>Peperomia urvilleana</i>
13.5	<i>Brachyglottis repanda</i>	6	and <i>Macropiper</i>
14	<i>B. repanda</i> (2)	6,6	seedlings
15	<i>M. ramiflorus</i>	10	
	<i>M. excelsum</i>	5	
16	<i>B. repanda</i>	8	<i>P. urvilleana</i> , <i>Asplenium</i>
17	<i>M. excelsum</i> (3)	3,1,2	<i>luctidum</i> and <i>Phymatodes</i>
18	<i>Entelea arborescens</i>	10	<i>diversifolium</i>
18.5	<i>E. arborescens</i>	5	
19	<i>E. arborescens</i>	8	
19.5			<i>Asplenium flaccidum</i>
21	<i>Dysoxylum spectabile</i>	20	<i>Collospermum hastatum</i> (rupestral)
21.5	<i>Pitiosporum umbellatum</i>	5	<i>P. urvilleana</i>
	<i>Tetrapathaea tetrandra</i>	1.5, 2	
22-24			<i>C. hastatum</i>
23	<i>Planchonella novo-zelandica</i>	8	
	<i>M. excelsum</i>	4	

24	<i>M. ramiflorus</i>	10	
25			
26-27	<i>E. arboreseus</i> (3)	8,5,2	<i>Arthropteris tenella</i>
27	<i>M. excelsum</i>	5	<i>Asplenium lamprophyllum</i>
27.5	<i>B. repanda</i>	6	<i>T. terpanda</i> seedlings
29	<i>M. ramiflorus</i>	5	<i>A. lamprophyllum</i>
30	<i>Tangle of Tetraphaeta stens</i>	5	<i>A. lamprophyllum</i>
31	<i>Coprosma robusta</i>	3	
32			
32-40			
34	<i>B. repanda</i>	8	<i>A. lamprophyllum</i> and
36.5	<i>D. spectabile</i>	35	<i>P. urvilleana</i>
37	<i>B. repanda</i>	15	<i>Phymatodes scandens</i>
39	<i>D. spectabile</i>	15	<i>A. lucidum</i>
39.5			<i>P. scandens</i>
			seedlings of <i>M. excelsum</i> ,
			<i>M. ramiflorus</i> and
40	<i>C. robusta</i>	3	<i>Rhabdolanthus solandri</i>
41			<i>A. lamprophyllum</i>
42	<i>C. robusta</i>	2	<i>M. excelsum</i> , <i>B. repanda</i> seedlings
44	<i>Heinrichodendron brunonianum</i>	10,15,10	<i>A. lamprophyllum</i>
45	<i>M. ramiflorus</i>	10,10	<i>A. lamprophyllum</i>
46	<i>H. brunonianum</i>	5,10	<i>A. lamprophyllum</i>
46.5	<i>H. brunonianum</i>	12,10	
49	<i>B. repanda</i>	6	<i>P. diversifolium</i>
50	<i>D. spectabile</i>	10,4	<i>A. lamprophyllum</i>
53	<i>Vitex lucens</i>	60	<i>M. excelsum</i> and <i>D. spectabile</i>
54			seedlings, <i>P. diversifolium</i>
57	<i>C. robusta</i>	12	
58	<i>C. robusta</i>	16	
59	<i>Paratrophis banksii</i>	3	<i>M. excelsum</i> and <i>D. spectabile</i>
62	<i>Corynocarpus laevigatus</i>	5	seedlings, <i>C. hastatum</i>
64	<i>Planchonella novo-zelandica</i>	60	
65	<i>M. excelsum</i>	5,5,2,2,1	
66	<i>M. excelsum</i>	6	
68	<i>M. ramiflorus</i>	5	
70	<i>Geniostoma ligustrifolium</i>	3	<i>A. lamprophyllum</i>
71	<i>M. excelsum</i>	5	
72.5	<i>M. ramiflorus</i>	20	
73	<i>Hedycarya arborea</i>	6	
74	<i>M. excelsum</i>	6,5,3,2,1	
74.5	<i>C. laevigatus</i>	10	
75	<i>H. brunonianum</i>	9	<i>C. hastatum</i>
76	<i>Metrosideros excelsa</i>	4,5,5	
77	<i>C. laevigatus</i>	8	<i>A. lamprophyllum</i>
78	<i>H. brunonianum</i>	12,12,10	
79	<i>H. brunonianum</i>	15	
80	<i>M. ramiflorus</i>	14	
81	<i>C. laevigatus</i>	9	
82	<i>M. excelsum</i>	5,5,5	<i>B. repanda</i> seedlings,
			<i>Tetragonia trigyna</i>
85			
86	<i>P. novo-zelandica</i>	15	
86.5	<i>P. novo-zelandica</i>	35	<i>Sicyos angulata</i>
87	<i>C. laevigatus</i>	10	
87.5	<i>M. excelsum</i>	10,9,8,5	
88	<i>M. ramiflorus</i>	8	seedlings of <i>S. angulata</i> ,
89	<i>C. laevigatus</i>	12	<i>C. laevigatus</i> , <i>M. excelsum</i>
90	<i>M. excelsum</i>	12,10	and <i>B. repanda</i>
91	<i>C. robusta</i>	5,5	<i>Pteris tremula</i> , <i>Pteris comans</i>
94	<i>B. repanda</i>	6,4	
95	<i>C. laevigatus</i>	10	
96	<i>Pseudopanax lessonii</i>	2	
98	<i>M. excelsum</i>	8,5	
99	<i>Metrosideros excelsa</i>	60	
100	<i>H. brunonianum</i>	3	
101	<i>M. excelsum</i>	6	
102			<i>P. comans</i> (1.5m tall)
103	<i>C. laevigatus</i>	8	
104	<i>M. excelsum</i>	5,3	
107	<i>M. laetum</i>	25	
109	<i>C. laevigatus</i>	15,10,8	
110	<i>M. ramiflorus</i>	8,5,5	
111	<i>M. excelsum</i>	10	
112	<i>M. excelsum</i>	8	
112.5	<i>Ploridium tenax</i>	15	<i>Sicyos angulata</i>
113	<i>M. laetum</i>		<i>Ploridium tenax</i>
114	<i>M. excelsum</i>	8,5	<i>Muehlenbeckia complexa</i>
115			
116	<i>Coprosma repens</i>	10	<i>P. tenax</i>
117	<i>Pittosporum crassifolium</i>	10,2	
	(cliffTop) <i>Cassinia retorta</i>		

A similar parallel transect through the northern fringe of the forest revealed many of the same species; notably a large-leaved milk tree (*Paratrophis banksii*) 12cm in diameter at breast height (D.B.H.), several parapara (*Heinrichodendron brunonianum*) ranging from 10-20cm D.B.H. and a tapapou (*Planchonella novo-zelandica*) 45cm D.B.H. However, groundcover was heavily reduced, being confined to the native grass *Oplismenus undulatifolius* and the herb *Peperomia urvilleana*. Grazing by cattle and goats had completely removed all seedling regeneration of shrub and tree species.

Throughout the whole of the Undercliffs lava field, pohutukawa (*Metrosideros excelsa*) was the largest and most common tree, although never forming a continuous canopy. Many large specimens over 4.5m in girth and 15-20m tall stood well above the majority of other trees. Puriri (*Vitex lucens*), mahoe (*Melicorys ramiflorus*) and pigeonwood (*Hedycarya arborea*) provided much of the remaining canopy, all 10-15m tall with clean straight trunks. In

strong contrast were the gnarled pohutukawa trunks, lying at all angles and covered in a profusion of epiphytes, including asteliads, *Peperomia*, and the ferns *Asplenium flaccidum*, *A. falcatum*, *A. lucidum*, *Phymatodes diversifolium* and *Pyrosia serpens*. Other trees occasionally forming the canopy were wharangi (*Melicope temata*), *Hymenanthera novae-zelandiae*, the large-leaved milk tree and parapara. This last was very common in a few areas, often forming pure stands. In one instance an area 10m x 10m contained over 30 parapara with D.B.H. greater than 10cm, and a further five slightly smaller specimens. The large leaves and thick growing habit of the trees considerably reduced light penetration, and groundcover plants were correspondingly confined to occasional *Pteris comans*, *Asplenium lamprophyllum* and parapara seedlings. However, the ground below these groves was thickly littered with the sticky fruit of these trees — after unwittingly sitting on the ground, a companion removed over 40 fruit from the seat of his trousers! Three stages of flowers and fruit were observed on all trees, suggesting (with the quantity of dropped fruit) that these functions may occur over an extended period. For all the large production of seeds, the density of the canopy precluded the prolific regeneration of this species recorded by Newhook *et al* (1971) on other Coromandel offshore islands.

Subcanopy and shrub plants included karamu (*Coprosma robusta*), rangiora (*Brachyglottis repanda*), whau (*Entelea arborescens*), *Rhabdanthus solandri* and kawakawa (*Macropiper excelsum*). The two colonies of whau seen were extremely healthy and growing vigorously. In several areas dense tangles of native lianes occurred: kaiwhiria, the N.Z. jasmine (*Parsonsia heterophylla*) and koha, the N.Z. passionfruit (*Tetrapthaena terrandra*). The latter appeared to grow most successfully in the karamu shrubs, often almost killing the trees through sheer density of the vines.

Groundcover was provided mainly by ferns, together with tree and shrub seedlings, a few herbs and the grass *Oplismenus*. Uncommon ferns were also found, especially *Arthropteris tenella* which occurred almost entirely in its smaller, rupestral, nonfertile state, and the velvet fern (*Ctenitis velutina*). Several spleenworts were common, most notably *Asplenium lamprophyllum* which formed large colonies in areas of slightly higher light penetration. The herbs *Peperomia* and Mercury Bay weed (*Dichondra repens*) were also present.

Even over the 100m of the quadrat, distinct zonation of some plants could be seen; most noticeably the incoming of several species towards the coastal cliffs. The cliffs themselves supported examples of a separate community including dune tauhuhu (*Cassinia rectoria*), karo (*Prinosporum crassifolium*), taukata (*Coprosma repens*) and flax (*Phormium tenax*), none of which were seen within the lava field forest. Creeping mawhat (*Sicyos angulata*) seedlings (up to 1m long with cotyledons intact) were abundant within 5m of the cliff-top and were never observed more than 35m inland. A similar pattern was exhibited by the coastal fern *Pteris comans*.

To the east of Urututu (Fig. 1) another somewhat different area of lava field occurred. The forest was generally more open than at Undercliffs, with fewer, larger blocks of rock and correspondingly larger areas of rich humic/volcanic soil. Much of the area had been opened by cattle and goats, although damage to native plants was minimal. Dominant tree species again included

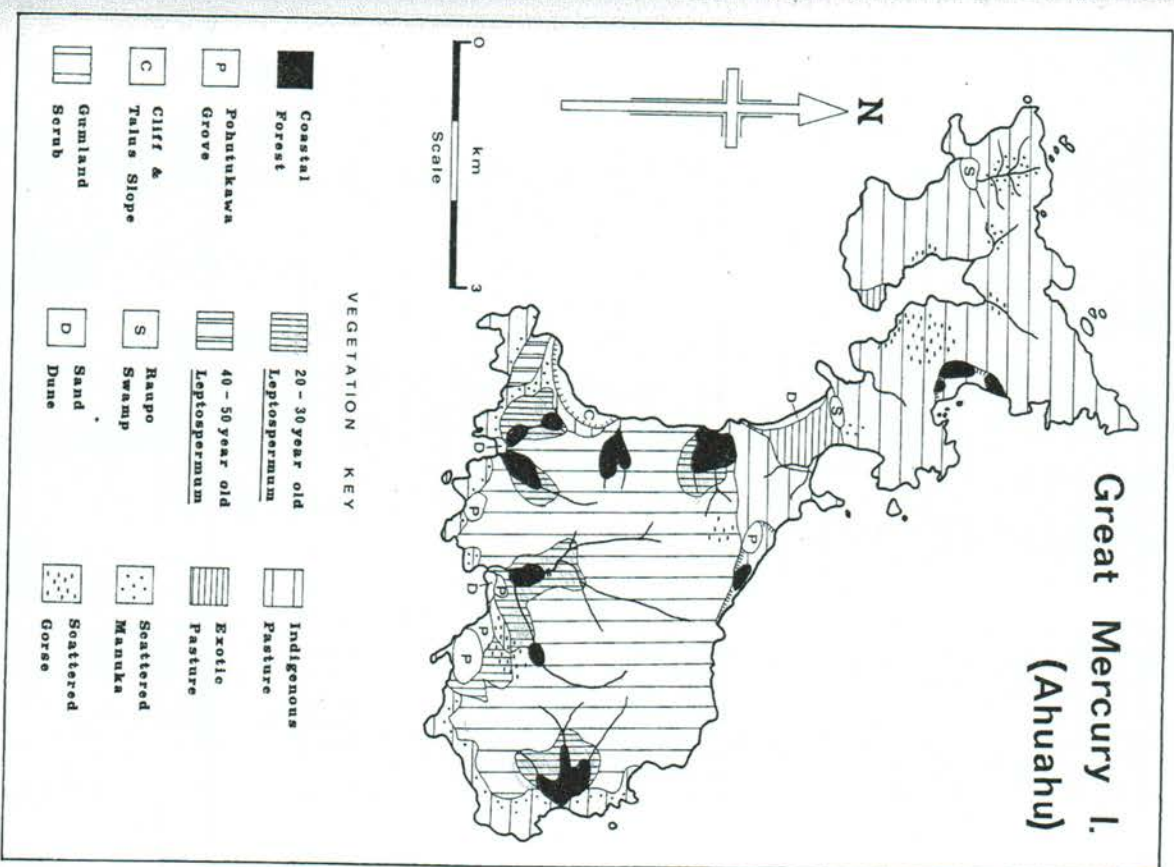


Fig. 2. Vegetation distribution on Great Mercury Island, May 1975.

pohutukawa, kohekohe, wharangi, mahoe, tawapou and puriri. Two specimens of kohekohe were over 1m D.B.H., their trunks covered in hanging panicles of flower buds. Common shrubs were kawakawa and *Rhabdothamnus solandri*, with occasional karamu, rangiora and whau. The rocks were frequently covered in creeping rata (*Metrosideros perforata*), *Peperomia*, *Anarthropteris lanceolata*, *Adiantum diaphanum*, *Phymatodes scandens* and *Blechnum filiforme*. Despite the lack of running water, the filmy fern *Trichomanes eschlicherianum* was common, covering 5m<sup>2</sup> on one near-vertical rock face. The large soil-filled spaces between some of the rocks and the general dampness have given rise to large colonies of *Asplenium lamprophyllum* and *Ctenitis decomposita* and numerous tree-ferns, both ponga (*Cyathea dealbata*) and manaku (*C. medullaris*). Asteleads (including *Collosperrum hastatum*) were abundant perched on rocks and epiphytic in pohutukawas. The only orchid seen in either lava field was one plant of *Earina autumnalis* which had recently flowered.

#### Towai dominant coastal forest

Within several sheltered stream valleys in the south of the island, a moderately mature coastal forest dominated by towai (*Weinmannia sylvicola*) has developed. The best example was seen in the true left branch of the Momona Bay stream where towai trees to 18m tall and 60cm D.B.H. were common. Other canopy trees in the light, relatively open forest were kohekohe (to 10m/40cm D.B.H.), puriri (15m/40cm), rewawewa (*Knighita excelsa* - 15m/35cm) and wharangi (10m/8cm). The black tree-fern, manaku (*Cyathea medullaris*) formed the canopy between the crowns of the larger trees. Major constituents of the understorey were mahoe, rangiora, hangehange (*Gentostoma ligustrifolium*), fivefinger (*Pseudopanax arboreus*), mapou (*Myrsine australis*) and ponga. Groundcover was composed of numerous compact shrubs of *Coprosma rhamnoides*, together with *Gabnia lacera*, mingimingi (*Cyathodes fasciculata*), prickly heath (*C. juniperina*), *Blechnum filiforme* and *Adiantum cunninghamii*. Lianas were locally abundant, e.g. supplejack (*Ripogonum scandens*), clematis (*Clematis paniculata*), bush lawyer (*Rubus cissoides*) and clinging rata (*Metrosideros perforata*).

Seedlings of all canopy and understorey trees were observed. Filmy ferns such as *Hymenophyllum demissum* and *Trichomanes eschlicherianum* were common on the banks of the stream and the orchid *Bulbophyllum pygmaeum* was seen on several towai trunks.

Moving up the sides of the valley (away from the stream) a gradual transition to *Leptospermum* scrub occurred, indicating that perhaps the more sheltered stream valley and its coastal forest had escaped the more recent burnoffs.

#### Dense, mixed coastal forest

This was found only once, in the valley of the true left branch of the first stream south of Waitoke Point. After passing through a cattle-browsed coastal belt, the stream entered a deep ravine cut in the bedrock, which completely excluded animals. The density of the forest was second only to the centre of the Undercliffs lava field forest, although ferns were far more important and

numerous than in the lava field. The banks of the stream were covered in knee-deep *Blechnum norfolkianum* and *B. lanceolatum* with *Ctenitis decomposita* and *Asplenium lamprophyllum* further from the water. In drier places, large clumps of *Pteris maclurei*, *P. cornuta* and *P. tremula* stood over 1m high.

Pohutukawa was the dominant canopy tree, with the remainder of the canopy and much of the subcanopy filled with a thick growth of puriri, karaka and kohekohe. Dominant shrubs were kawakawa and quantities of flowering *Rhabdothamnus solandri*. It is possible that the luxuriance of vegetation was due to a combination of permanent water and inaccessibility to stock, and that some other areas of forest on the island would have similar vegetation under the same conditions.

#### Cliff, talus slope and shore

Due to the relative inaccessibility of many of these areas, they supported interesting associations of plants in an often undisturbed state. The most extensive example studied lay between Papaki and Pukekorumiko Points on the west coast of the island. Pohutukawas were the dominant tree with occasional dense groves of whau (up to 15cm D.B.H.). Karaka, rangiora, hangehange, mapou, kawakawa, wharangi and karamu were also common with groundcover of *Peperomia*, kawakawa seedlings, *Opismenus*, *Pteris cornuta* and asteliads. Occasional tawapou and lancewoods (*Pseudopanax crassifolius*) were seen in flatter places.

In some areas, extremely dense regeneration of whau, wharangi and kawakawa were seen; the whau and wharangi seedlings being extensively browsed in accessible places while the kawakawa seedlings were untouched. From personal observations on other Coromandel offshore islands, wharangi seedlings are not palatable to cattle, and it is therefore concluded that the browsing was by goats and that the kawakawa was unpalatable to these animals.

Further down towards sea level, *Asplenium lucidum* and NZ spinach (*Tetragonia* spp.) become more common. Taupata (*Coprosoma repens*) and *Pseudopanax lessonii* formed the front line of shrubs to the sea, with the actual shore covered in dense growths of *Scirpus nodosus*, jointed rush (*Leptocarpus similis*), shore lobelia (*Lobelia anceps*), NZ spinach, NZ celery (*Apium australe*), dune tauhinu (*Cassinia retorta*) and native daphne (*Prunella prostrata*).

Between Papaki and Pukekorumiko Points, a rudimentary zonation of plants from high water up the talus slope to the base of the cliffs was noted. Flax (*Phormium tenax*) and dune tauhinu formed a coastal belt, followed by extremely compact and wind-shorn *Coprosma rhamnoides*. Behind this were *Coprosma robusta* trees, laden with climbing pohuehue (*Mitelenbeckia complexa*). Finally came a mixed coastal forest belt, composed of karaka, mahoe, wharangi and kawakawa with some manuka. Groundcover was sparse apart from occasional turtu (*Dianella nigra*) and *Doodia media*. Scattered throughout the coastal forest belt were small groves of the black tree-fern, manaku (*Cyathea medullaris*), underlain by thick growth of bracken (*Pteridium aquilinum* var. *esculentum*) and Mexican devil (*Eupatorium adenophorum*).

#### Pohutukawa Groves

These occurred in coastal areas, and were invariably under-eroded and opened up by stock. Light penetration was sufficient to allow establishment of a continuous groundcover of native grasses. The most extensive grove observed was on the eastern headland of Peach Grove Bay, stretching along the coast and inland for a considerable distance. The pohutukawa trees were tall (18-22m) with slender trunks, and were far more closely spaced than most natural populations of the species. In response to the competition for light, growth was very even, with most of the trunks falling within a narrow size class. The range of other plants present was extremely limited. *Blechnum filiforme* and *Pyrosoma serpens* were common epiphytes on the pohutukawa trunks, almost the only other plants being *Coprosma rhamnoides*, *Ctenitis decomposita* and grasses. The *Coprosma* shrubs were obviously browsed by cattle and were maintained as compact bushes about 50cm in diameter and 1-2m tall. The *Ctenitis* was common on the ground in damper spots, and kaiwhiria, the NZ jasmine increased in abundance towards the margins of the groves. At sea level, great tangles of the vines laden with maturing fruit hung down within 50cm of high tide waters.

The groves appeared to be well used by stock as shelters.

#### Rewarewa dominant coastal forest

The best example of this vegetation community was found around the main stream running into Peach Grove Bay (the largest stream on the island). The open canopy was dominated by apparently unhealthy rewarewa (*Krighitita excelsa*), with kanuka and occasional pohutukawa and towai as sub-dominants. The rewarewa reached 14-16m in height, and ranged up to 50cm D.B.H. Cattle appeared to have browsed the undergrowth and shrubs were confined to numerous mapou and tree-ferns (mainly ponga: *Gyathea dealbata*). Seedlings of mapou were common, although none of the forest tree species were seen. Many rocks and boulders on the forest floor were covered in *Grammitis ciliata*, and the two orchids *Actinthus fomicatus* var. *sinclairii* and *Pterostylis trullifolia* were just beginning to flower in open places.

On the stream banks, juvenile kanuka, the sword sedge (*Lepidosperma laterale*) akepiro (*Olearia furfuracea*), karamu (*Coprosma lucida*), raurekau (*Coprosma australis*), NZ honeysuckle (*Abeuornia macrophylla*), *Coprosma macrocarpa* and *Hebe macrocarpa* provided far thicker vegetation than in the forest proper.

Large inaccessible rock faces below the main waterfall on the Peach Grove Bay Stream supported a good cover of brilliant green ferns: *Loxonia cunninghamii*, *Lindsaea viridis* and *Blechnum capense*. As the coastal forest merged into relatively mature *Leptospermum* scrub upstream, the grass tree (*Dracophyllum sinclairii*) became common, with the umbrella fern (*Gleichenia microphylla*) and clubmoss (*Lycopodium cernuum*) on the ground. The main rewarewa forest was below the first waterfalls in Peach Grove Stream; a further area of "rewarewa grove" mapped by Cochrane (1954) was not investigated due to lack of time.

#### 40-50 year old kanuka/manuka scrub

Occurring in several sheltered valleys southwest of the island, this community was a up by cattle. The ground beneath the *Leptospe Oplismenus undulatifolius* with meadow rice grass. clearings, together with large clumps of *Cyperus usti*, coastal forest trees were scattered throughout the scrub.

#### 20-30 year old kanuka/manuka scrub

Where this community had escaped interference by continuous groundcover by mosses, lichens and low plants occurred manuka to 5m tall formed the canopy, with mingimingi (*Cyathochaeta*) and prickly heath (*C. juniperina*) the dominant shrubs. The prickly heath were almost all fruiting, with approximately equal numbers of red and white-berried plants. Red-berried plants were noticeably more compact than white-berried counterparts. Less common shrubs were snowberry (*Caulanthropoda*) and akepiro (*Olearia furfuracea*).

Large areas of ground were covered in mosses and lichens; the most common species of the latter being *Cladia aggregata*, *Cladonia lepioclada* and *Peltigera dolichorhiza*. Patches of the three filmy-fern species *Hymenophyllum multifidum*, *H. sanguinolentum* and the kidney fern *Trichomanes reniforme* were common amongst the moss and on the lower 30cm of *Leptospermum* trunks. The community most commonly occurred on poor clay soils with a thin humus covering; in one instance however, it was seen on alluvial flats, the fertile soils causing a remarkable change in the nature of the scrub. Kanuka was the more common of the *Leptospermum* species, and the undergrowth far more varied and dense. Various sedges, rushes and the fern *Hypolepis tenuifolia* became common with larger shrub and subcanopy species such as akeake (*Dodonaea viscosa*). It is likely that the fertile soils were allowing quicker establishment and succession of coastal forest species.

#### Poor Gunland scrub

Much of the southern part of the island was covered in a variety of stages of gunland scrub. Repeated burning has resulted in considerable erosion, and many areas of bare clay and weathered thyoilite existed. Due to the burning off of different areas at different times, several successional stages occurred from recently burnt (in 1974) to apparently semi-mature scrub, probably over 50 years old. The scrub was roughly subdivided into three of these successional stages. The oldest was the most interesting, and in many respects paralleled the gunland scrub found in the eastern areas of the Waipoua State Forest in Northland. It was restricted to the southeastern portion of the island (east of Mohi Mt), apparently a gently-rolling plateau remnant. Mixed manuka and kanuka to 2m high dominated the scrub, with occasional mingimingi, prickly heath and akepiro. The adventive noxious weed, prickly hakea (*Hakea sericea*) had become relatively common, often forming dense clumps to the complete exclusion of other plants. Young seedling trees (to 50cm tall) of fivefinger (*Pseudopanax arboreus*) were common, although adult trees were extremely

sparse. The most striking plants were dark-green rewarewa up to 5m tall. Their apparent healthiness and strong growth on the poor gunland is directly analogous with similar areas in the Waipoua State Forest where rewarewa form the dominant, often only, tree species.

Groundcover was sparse although a great variety of species were found: clubmoss (*Lycopodium deuterodensum*), sword sedge (*Lepidosperma laterale*), tauhinu (*Pomaderris phyllicifolia* var. *ericifolia*), *Lindsaea linearis* (often only blackened, tightly curled fertile fronds standing rigidly out of the soil), comb fern (*Schizaea fistulosa*), umbrella ferns (*Gleichenia cirrhata* and *G. microphylla*) and several orchids. Seed heads of two species of sun orchid (*Thelymitra* spp.) were common, as were flowering plants of *Microtis unifolia*. Several fragments of kauri gum were observed in the soil.

The most recently burnt area stretched across the centre of the island from west to east. The stream valleys of the central basin had silted-up considerably, and supported bright yellow-green swamp vegetation in sharp contrast to the grey of the burnt scrub and maritime pines (*Pinus phillaster*) abundant throughout the central basin. Regeneration in the east of this belt has been extremely poor, with large tracts of generally bare, occasionally weedy ground. In the west, rough stalky grasses have established together with adventive weeds such as tolpis (*Tolpis barbata*), inkweed (*Phytolacca octandra*) and ragwort (*Senecio jacobaea*). In sheltered areas, thick regrowth of manuka had occurred. A third stage of intermediate age occurred in a northern strip across the southern part of the island. The last burning in this area was probably 5-10 years ago, since when a thick regeneration of kanuka, manuka and tauhinu has occurred, now around 30cm tall in exposed places and taller in sheltered valleys and hollows. Cattle are continually enlarging some grassed areas in the scrub.

#### Rauo/Cyperus swamp

Several areas had been recently drained; however, two moderately sized swamps remained. The largest lay inland from Tamewhera Point and was approximately 400 x 150m in area. Rich peat accumulations were overlain by a few centimetres of freshwater, and gave rise to a dense community of swamp and water plants. The second major swamp was situated at the north end of the central tombo. *Cyperus ustulatus* was dominant around the drier margins, while rauo (*Typha orientalis*) was dominant actually within the water. Other species frequenting the muddy margins were bachelor's button (*Cotula coronopifolia*), *Polygonum* spp., and *Cyperus brevifolius*, with the milfoil (*Myriophyllum elatinoides*) and water purslane (*Ludwigia palustris*) actually within the water.

#### Indigenous grassland

Much of the northern part of the island and coastal areas in the south were clothed in native pastures, dominated by meadow rice grass (*Microlaena stipoides*) and dantthonias (*Notodanthonia* spp.). Although cattle maintained limited areas, invasion by gorse (*Ulex europaeus*), manuka and kanuka provided a serious problem for the farmers, especially in the south of the island.

#### Sown and planted pasture

Largely confined to the flat around the settlement in Huruhi Harbour and the central tombo, where stock are conditioned before sale. Dominant species were perennial ryegrass (*Lolium perenne*) and white clover (*Trifolium repens*), with lesser amounts of ratstail (*Sporobolus africanus*), Yorkshire fog (*Holcus lanatus*) and *Paspalum dilatatum*. Buffalo grass (*Stenotaphrum secundatum*) was planted during initial grassing of the tombo.

#### Minor plant communities

Several microhabitats existed on an island as large as Great Mercury, each with its associated species. Behind the Peach Grove Bay and Whaler Cove beaches, small sand dunes have accumulated, supporting silvery sand grass (*Spinifex hirsutus*), sand sedge (*Carex pumila*) and shore bindweed (*Calystegia soldanella*).

The lower reaches of Peach Grove Stream were tidal, and low, muddy banks within this "estuary" supported march ribbonwood (*Plagianthus divaricatus*) and maritime rushes such as *Juncus maritimus* var. *australiensis* and *Leptocarpus similis*.

On the banks of the Peach Grove Stream was a grove of wild fruit trees from which the place name was derived. Although several scattered young peach (*Prunus persica*) trees were seen, the original grove was of pear (*Pyrus communis*) trees!

Throughout the well-grassed northern part of the island, occasional remnant manuka shrubs occurred, similar to those described from Slipper Island by Coult (1974).

Gorse (*Ulex europaeus*) was a considerable nuisance in several parts of the island (see Fig. 2) although it had fortunately not spread throughout the whole of the southern block.

Although the mangrove (*Avicennia resinifera*) is included in the species list, and an apparently suitable sheltered muddy harbour habitat exists, no adult trees were found. Throughout Huruhi Harbour and on many of the island's beaches, mangrove seedlings (often rooting and with two or three pairs of post-cotyledon leaves) were abundant.

#### VASCULAR PLANT SPECIES LIST

414 species of native, planted and adventive vascular plants are listed for Great Mercury Island, together with their common names. No attempt has been made to include garden plants and planted trees except for two species of gymnosperms suitably identified in the list.

Nomenclature of indigenous plants follows Allan (1961), Moore and Edgar (1970) and Cheeseman (1925) except where otherwise referenced. Adventive plants are named according to various sources, e.g. Clapham *et al* (1962) and New Zealand Weed and Pest Control Society (1969). Where applicable, common names are also taken from New Zealand Weed and Pest Control Society (1969).

Families are ordered according to Volumes I and II of the "Flora of New Zealand", except families not native to New Zealand which are listed alphabetically at the end of each section of the flora. Genera are listed



alphabetically within the families, as are species within genera.

- \* species not native to New Zealand
- \*\* family not native to New Zealand
- † species which have been planted
- AEE additional records of Mr A.E. Esler

**PSILOPSIDA**

Psilotaceae

*Tmesipteris elongata* AEE  
*T. tannensis*

(Chinnock 1975)

**LYCOPSIDA**

Lycopodiaceae

*Lycopodium billardieri*  
*L. cernuum*  
*L. deuterodensum*  
*L. laterale*  
*L. volubile*

iwituna  
creeping clubmoss  
clubmoss  
bog clubmoss  
climbing clubmoss

**FILICOPSIDA**

Schizaeaceae

*Lygodium articulatum*  
*Schizaea bifida*  
*S. fistulosa*  
*Gleichenia circinata* AEE  
*G. microphylla*  
*Loxoma cunninghamii*

mangemange  
comb fern  
swamp umbrella fern  
umbrella fern

**Loxonaceae**

Hymenophyllaceae

*Hymenophyllum densissimum*  
*H. dilatatum*  
*H. flabellatum*  
*H. flexuosum* AEE  
*H. multifidum*  
*H. rarum*  
*H. revolutum*  
*H. sanguinolentum*  
*Trichomanes endlicherianum*  
*T. reniforme*  
*Dicksonia squarrosa*  
*Cyathea dealbata*  
*C. medullaris*  
*Anarthropteris lanceolata*  
*Phymatodes diversifolium*  
*P. scandens*  
*Pyrrhosia serpens*  
*Grammitis billardieri* AEE  
*G. ciliata*  
*Thelypteris pennigera*  
*Hypolepis tenuifolia*  
*Lindsaea linearis*  
*L. viridis*  
*Arthropteris tenella*  
*Paesia scaberula*  
*Pteridium aquilinum* var *esculentum*  
*Pteris comans*  
*P. macilentia*  
*P. tremula*

filmy ferns  
hound's tongue  
pipipi  
kidney fern  
wheki  
ponga  
mamaku

**Polypodaceae**

Dicksoniaceae

Cyatheaceae

**Grammitidaceae**

Thelypteridaceae

Davalliaceae

Pteridaceae

scented fern  
bracken  
turawera

**Asplenaceae**

**Blechnaceae**

**Dryopteridaceae**

**Allyniaceae**

**Adiantaceae**

**SPERMATOPSIDA**  
Podocarpaceae  
Araucariaceae  
Cupressaceae  
Pinaceae

**Lauraceae**  
**Monimiaceae**  
**Ranunculaceae**

**Piperaceae**

**Cruciferae**

**Violaceae**

**Droseraceae**

**Aizoaceae**

*Asplenium falcatum*  
*A. flaccidum*  
*A. lamprophyllum*  
*A. lucidum*  
*Blechnum capense*  
*B. filiforme*  
*B. lanceolatum*  
*B. norfolkianum*  
*Doodia media*  
*Ctenitis decomposita*  
*C. velutina*  
*Polystichum richardii*  
*Rumohra hispida*  
*Athyrium australe* AEE  
*Adiantum aethiopicum*  
*A. cunninghamii*  
*A. diaphanum*  
*A. hispidulum*  
*Chelanthus distans*  
*C. sieberi*  
*Pelaea rotundifolia*  
**GYMNOSPERMAE**  
*Dacrydium cupressinum*†  
*Agathis australis*  
*Cupressus macrocarpa*\*  
*Pinus muricata*\*† AEE  
*P. pinaster*\*  
*P. radiata*\*  
**ANGIOSPERMAE: DICOTYLEDONES**  
*Belischniamedia tawa* AEE  
*Hedyocarya arborea*  
*Clematis paniculata*  
*Ranunculus acutis* AEE  
*R. hirtus* AEE  
*R. parviflorus*\*  
*R. sardous*\*  
*Macropiper excelsum*  
*Peperomia urticellana*  
*Cakile edentula*\*  
*Capsella bursa-pastoris*\* AEE  
*Coronopus didymus*\* AEE  
*Nasturtium officinale*\*  
*Sisymbrium officinale*\* AEE  
*Hymenanthera novae-zealandiae*  
*Melicope macrophyllum*  
*M. ramiiflorus*  
*Drosera auriculata*  
*D. binata* AEE  
*Disphyma australe*  
*Tetragonia tetragonoides* AEE  
*T. trigyna*

makawe  
shining spleenwort  
kiokio  
makaka  
rosy maidenhair  
woolly cloak fern  
tarawera  
rimu  
kauni  
macrocarpa  
maritime pine  
radiata pine  
large-leaved tawa  
pigeonwood  
clematis  
small-flowered buttercup  
hairy buttercup  
kawakawa  
sea rocket  
shepherd's purse  
twin cress  
water cress  
hedge mustard  
large-leaved mahoe  
mahoe  
sundew  
NZ iceplant  
NZ spinach

Caryophyllaceae	<i>Cerastium glomeratum</i> * AEE <i>C. holostroides</i> * AEE <i>Polycarpon tetraphyllum</i> * AEE <i>Sagina procumbens</i> * <i>Silene gallica</i> * AEE <i>Scleranthus biflorus</i> <i>Spergularia arvensis</i> * <i>Stellaria media</i> * AEE <i>Portulaca oleracea</i> * <i>Muehlenbeckia complexa</i> <i>Polygonum decipiens</i> <i>P. persicaria</i> * <i>Rumex acetosella</i> * <i>R. browinii</i> * AEE <i>R. conglomeratus</i> * AEE <i>R. obtusifolius</i> * AEE <i>R. pulcher</i> * AEE <i>Amaranthus hybridus</i> * <i>A. powellii</i> * <i>Atriplex hastata</i> * AEE <i>Beta vulgaris</i> * <i>Chenopodium album</i> * <i>C. allanii</i> <i>C. ambrosioides</i> * AEE <i>C. ambiguum</i> * AEE <i>C. murale</i> * <i>C. pumilio</i> <i>Rhagodia triandra</i> AEE <i>Erodium moschatum</i> * AEE <i>Geranium x hortorum</i> * <i>G. molle</i> * <i>G. solanderi</i> (Carolin 1964) AEE <i>Oxalis corniculata</i> <i>O. incarnata</i> * <i>Linum marginale</i> * AEE <i>L. trgyrium</i> * AEE <i>Haloragis erecta</i> <i>H. incana</i> <i>H. procumbens</i> <i>Myriophyllum elatinooides</i> <i>M. proppinquum</i> AEE <i>Epiobium pallidiflorum</i> ? AEE <i>E. rotundifolium</i> <i>Ludwigia palustris</i> * <i>Callitriche muelleri</i> AEE <i>C. stagnalis</i> <i>Heimerthodendron brunonianum</i> <i>Pimelea prostrata</i> <i>Hakea setacea</i> * <i>Knightsia excelsa</i> <i>Cortaria arborea</i>	annual mouse-ear chickweed mouse-ear chickweed allseed pearwort catchfly spurree chickweed wild portulaca pohuehue swamp willow weed willow weed sheep's sorrel hooked dock clustered dock broad-leaved dock fiddle dock purple amaranth orache silverbeet fathen Mexican tea glaucous goosefoot nettle-leaved fathen	Pitiosporaceae Passifloraceae Cucurbitaceae Myrtaceae	<i>Pitiosporum crassifolium</i> <i>P. tenuifolium</i> AEE <i>R. umbellatum</i> <i>Tetrapanea tetrandra</i> <i>Sicyos angulata</i> <i>Leptospermum ericoides</i> <i>L. scoparium</i> <i>Lophomyrtus bullata</i> <i>Metrosideros carminea</i> <i>M. diffusa</i> AEE <i>M. excelsa</i> <i>M. fulgens</i> <i>M. perforata</i> <i>Hypericum humifusum</i> * <i>H. japonicum</i> <i>Entelea arborescens</i> <i>Maha neglecta</i> * <i>Modiola caroliniana</i> * AEE <i>Plagianthus divaricatus</i> <i>Euphorbia pepplus</i> * <i>Weinmannia sylvicola</i> <i>Acacina anseritifolia</i> <i>Malus sylvestris</i> * <i>Prunus persica</i> * <i>Pyrus communis</i> * <i>Rosa rubiginosa</i> * <i>Rubus cissoides</i> <i>R. fruticosus</i> agg.* <i>Acacia arnata</i> * <i>Carrichtella algera</i> <i>Lotus angustissimus</i> * AEE <i>L. pedunculatus</i> * AEE <i>L. subbilflorus</i> * <i>Lupinus arboreus</i> * <i>Medicago arabica</i> * <i>Sophora microphylla</i> <i>Trifolium cernuum</i> * AEE <i>T. dubium</i> * AEE <i>T. repens</i> * <i>T. subterraneum</i> * AEE <i>Ulex europaeus</i> * <i>Quercus robur</i> * <i>Ficus carica</i> * <i>Paratrophis banksii</i> <i>Parietaria debilis</i> AEE <i>Corynocarpus laevigatus</i> <i>Pomaderris kumeraho</i> AEE <i>P. phyllifolia</i> var <i>ericifolia</i> <i>Melicope ternata</i> <i>Dysoxylum spectabile</i> <i>Dodonaea viscosa</i>	water milfoil water milfoil (tall, in creek) water purslane starwort starwort parapara prostrate native daphne prickly hakea rewarewa tutu	Urticaceae Corynocarpaceae Rhamnaceae Rutaceae Meliaceae Sapindaceae	karō matipo kohia, NZ passionfruit mawhai kanuka manuka carmine rata pohutukawa rata vine chinging rata trailing St John's wort swamp hypericum whau dwarf mallow creeping mallow marsh ribbonwood milkweed lowai pitipiri apple peach pear sweet brier bush lawyer blackberry kangaroo acacia NZ broom lotus major lotus hispidus tree lupin spotted bur medick kowhai suckling clover white clover subterranean clover gorse oak figtree large-leaved milk tree karakā kumarahou tuhinu wharangi kohokohe akeake
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Araliaceae *Pseudopanax arboreus* (Edgar 1973)  
*P. lessorii*  
 Umbelliferae  
*Apium australe*  
*A. filiforme?* AEE  
*A. leptophyllum?* AEE  
*Centella uniflora*  
*Hydrocotyle moschata* AEE  
*Erica lusitanica?* AEE  
*Gaoltheria antipoda*  
*Cyathodes fasciculata*  
*C. fraseri*  
*C. juniperina*  
*Draecophyllum sinclairii*  
*Planchonella novo-zelandica*  
 Sapotaceae  
*Myrsine australis*  
 Oleaceae  
*Ligustrum lucidum?*  
*Olea europaea?*  
 Loganiaceae  
*Geniostoma ligustrifolium*  
*Parsonsia heterophylla*  
 Apocynaceae  
*Vinca major?*  
*Alseuosmia macrophylla*  
 Caprifoliaceae  
*Coprosma australis*  
 Rubiaceae  
*C. lucida*  
*C. macrocarpa*  
*C. propinqua x robusta (C. x cunninghamii)*  
*C. spathulata*  
*C. repens*  
*C. rhamnoides*  
*C. robusta*  
*Gadium aparine?* AEE  
*G. paritsense?* AEE  
*Sherardia arvensis?*  
*Aster subulatus?* AEE  
*Bellis perennis?*  
 Compositae  
*Brachyglottis repanda*  
*Carduus pyrenocephalus?* AEE  
*Cassinia retorta*  
*Centipeda orbicularis?* AEE  
*Cirsium arvense?*  
*C. vulgare?*  
*Cotula australis*  
*C. coronopifolia*  
*C. dioica*  
*Crepis capillaris?*  
*Erechtites atkinsonae?* AEE  
*E. scaberula* AEE  
*E. watraensis*  
*Erigeron floribundus?*  
*Eupatorium adenophorum?*  
*Gnaphalium delicatum?*  
*G. gymnocephalum?* AEE  
*G. kerense*

fivefinger  
 houpara  
 NZ celery  
 slender celery  
 Spanish heath  
 snowberry  
 mingimingi  
 patotara  
 grass tree  
 prickly heath  
 tawapou  
 mapou  
 privet  
 olive  
 hangelange  
 kaiwhiira, NZ jasmine  
 periwinkle  
 NZ honeysuckle  
 raurekau  
 karamu  
 coastal karamu  
 taukata  
 karamu  
 cleavers  
 slender bedstraw  
 field madder  
 sea aster  
 lawn daisy  
 rangiora  
 slender winged thistle  
 dune tathinu  
 sneezeweed  
 Californian thistle  
 Scotch thistle  
 bachelor's button  
 hawkshear  
 Australian fireweed  
 fireweed  
 fireweed  
 broad-leaved fleabane  
 Mexican devil  
 cudweed

*G. luteo-album* agg.  
*G. simpliciale?*  
*G. sphaerica?*  
*G. spicatum?* AEE  
*Hypochaeris radicata?*  
*Lapsana communis?* AEE  
*Leontodon taraxacoides?* AEE  
*Olearia surfuracea*  
*O. rari* AEE  
*Picris echinoides?*  
*Senecio jacobaea?* AEE  
*Sonchus asper?*  
*S. oleraceus?*  
*Taraxacum officinale?*  
*Topis barbata?*  
*Centaurium erythraea?*  
*Anagallis arvensis?*  
*Samolus repens*  
*Plantago hirtella?* AEE  
*P. lanceolata?* AEE  
*P. major?*  
 Campanulaceae  
*Wahlenbergia gracilis*  
 Goodeniaceae  
*Sellera radicans*  
 Lobeliaceae  
*Lobelia anceps*  
 Solanaceae  
*Physalis peruviana?*  
*Solanum nigrum?*  
*S. nodiflorum?* AEE  
*S. sodomum?* AEE  
*Calyptegia sepium*  
 Scrophulariaceae  
*C. solanella*  
*Dichoncha repens*  
*Hebe macrocarpa*  
*H. stricta* var. *stricta*  
*Parentucella viscosa?* AEE  
*Verbascum thapsus?*  
*Veronica plebeia?*  
*Tecomaria capensis?*  
*Rhadorhannum solandri*  
*Myoporum laetum*  
*Verbena bonariensis?*  
*Vitex lucens*  
 Avicenniaceae  
*Avicennia resinifera*  
 Labiatae  
*Mentha pulegium?*  
*Prunella vulgaris?*  
*Stachys arvensis?* AEE  
*Buxus sempervirens?*  
*Fumaria officinalis?* AEE  
*Orobanchaceae?*  
*Orobanchaceae?*  
*Phytolaccaceae?*  
*Vitidaceae?*  
 Zosteraceae  
*Zostera capricorni*  
*Z. muelleri*

Jersey cudweed  
 catsear  
 nipplewort  
 hawkbit  
 akepio  
 heketara  
 oxtongue  
 ragwort  
 prickly sowthistle  
 sowthistle  
 dandelion  
 centaury  
 scarlet pimpernel  
 swamp plantain  
 narrow-leaved plantain  
 plantain  
 NZ harebell  
 renunemu  
 shore lobelia  
 Cape gooseberry  
 black nightshade  
 small-flowered nightshade  
 apple of Sodom  
 greater bindweed  
 shore bindweed  
 Mercury Bay weed  
 koromiko  
 koromiko  
 tarweed  
 woolly mullein  
 Australian speedwell  
 tecoma hedge  
 waiuata  
 ngato  
 purple top  
 puriri  
 mangrove  
 penny royal  
 selfheal  
 stagerweed  
 fumitory  
 broom rape  
 ink weed  
 grapevine  
 seagrass  
 seagrass

Potamogetonaceae	<i>Potamogeton cheesemantii</i>	pondweed
Liliaceae	<i>Arthropodium cirtutum</i>	tenga lily
	<i>Asparagus asparagoides*</i>	similax
	<i>Astelia banksii</i>	wharawhara
	<i>A. solandri</i>	kahakaha
	<i>Colospermum hastatum</i>	kokaha
	<i>Dianella nigra</i>	turutu
Smilacaceae	<i>Ripogonum scandens</i>	supplejack
Agavaceae	<i>Cordyline australis</i>	cabbage tree
	<i>C. pumilio</i>	ti rautiki
	<i>Phormium tenax</i>	NZ flax
Leniaceae	<i>Lemna minor</i>	duckweed
Juncaceae	<i>Juncus articulatus*</i>	jointed rush
	<i>J. australis</i> AEE	rush
	<i>J. bufonius*</i> AEE	toad rush
	<i>J. distegus</i> AEE	rush
	<i>J. effusus*</i> AEE	rush
	<i>J. gregiflorus</i> AEE	rush
	<i>J. maritimus</i> var. <i>australiensis</i>	sea rush
	<i>J. pallidus</i> AEE	rush
	<i>J. planifolius</i>	
	<i>J. tenuis*</i> AEE	
	<i>J. usitatus</i> AEE	rush
Restionaceae	<i>Leptocarpus similis</i>	jointed rush
Typhaceae	<i>Typha orientalis</i>	raupo
Orchidaceae	<i>Actanthus fornicatus</i> var. <i>sinclairii</i>	
	<i>Bulbophyllum pygmaeum</i>	
	<i>Eothena autumnalis</i>	
	<i>Microtis unifolia</i>	
	<i>Orthoceras strictum</i> AEE	
	<i>Prasophyllum nudum</i>	
	<i>Pterostylis trullifolia</i>	
	<i>Thelymitra longifolia</i> AEE	sun orchid
	<i>T. sp</i>	
Cyperaceae	<i>Baumea juncea</i>	
	<i>B. teretifolia</i> AEE	
	<i>Carex breviculmis</i> AEE	
	<i>C. dissita</i> AEE	
	<i>C. divulsa*</i> AEE	
	<i>C. flagellifera</i>	
	<i>C. inversa</i> AEE	
	<i>C. lambertiana</i> AEE	
	<i>C. lessoniana</i> AEE	
	<i>C. pumila</i> AEE	
	<i>C. virgata</i>	
	<i>Cyperus brevifolius*</i>	rautahi
	<i>C. usitatus</i>	sand sedge
	<i>Desmoschoenus spiralis</i>	
	<i>Eleocharis acuta</i>	pingao
	<i>Gahnia lacera</i>	spike rush
	<i>G. pauciflora</i>	
	<i>Lepidosperma australe</i>	square-stemmed sedge

Gramineae	<i>I. laterale</i>	sword sedge
	<i>Moreletia affinis</i> AEE	
	<i>Schoenus apogon</i> AEE	
	<i>S. maccallinus</i>	
	<i>S. tendo</i> AEE	
	<i>Scirpus ceniurus</i>	
	<i>S. chlorostachyus</i> AEE	
	<i>S. inundatus</i> AEE	
	<i>S. lacustris</i>	
	<i>S. nodosus</i>	
	<i>Uncinia banksii</i>	
	<i>U. uncinata</i>	
	<i>Agropyron scabrum*</i> AEE	hooked sedge
	<i>Agrostis tenuis*</i> AEE	blue wheat grass
	<i>Aira caryophyllaea*</i> AEE	browntop
	<i>Ammophila arenaria*</i> AEE	silvery hair grass
	<i>Anthoxanthum odoratum*</i> AEE	marram grass
	<i>Avena barbata*</i> AEE	sweet vernal
	<i>Axonopus affinis*</i> AEE	wild oat
	<i>Briza minor*</i> AEE	narrow-leaved carpet grass
	<i>Bromus pandurus*</i> AEE	shivery grass
	<i>B. mollis*</i> AEE	ripgut bromo
	<i>B. unioloides*</i> AEE	prairie grass
	<i>Cortaderia fulvida?</i>	toetoe
	<i>C. jubata*</i> AEE	purple pampas grass
	<i>C. setoana*</i> AEE	pampas grass
	<i>C. splendens</i> AEE	toetoe
	<i>Cynodon dactylon*</i>	Indian doab
	<i>Dactylis glomerata*</i>	cockfoot
	<i>Deyouxia billardieri</i> AEE	sand wind grass
	<i>D. setifolia?</i> AEE	
	<i>Dichelachne cincta</i> AEE	long-hair plume grass
	<i>Digitaria sanguinalis*</i> AEE	summer grass
	<i>Echinochloa crus-galli*</i> AEE	barnyard grass
	<i>Eleusine indica*</i> AEE	crowfoot grass
	<i>Eragrostis brownii*</i> AEE	bay grass
	<i>Festuca arundinacea*</i>	tall fescue
	<i>Gastridium ventricosum*</i> AEE	nit grass
	<i>Holcus lanatus*</i>	Yorkshire fog
	<i>Hordeum murinum*</i> AEE	barley grass
	<i>Isachne australis</i> AEE	swamp millet
	<i>Lachnagrostis filiformis</i> AEE	NZ wind grass
	<i>Lagurus ovatus*</i>	harestalk
	<i>Lolium perenne*</i>	perennial ryegrass
	<i>Microlaena stipoides</i>	meadow rice grass
	<i>Notodanthonia biamularis</i> AEE	danthonia
	<i>N. gracilis</i> AEE	danthonia
	<i>N. purpurascens</i> AEE	danthonia
	<i>N. racemosa</i> AEE	danthonia
	<i>Oplismenus undulatifolius</i>	
	<i>Paspalum dilatatum*</i>	paspalum
	<i>P. distichum</i>	

<i>P. puspulodes</i> * AEE	mercier grass
<i>Poa anceps</i>	
<i>P. annua</i> *	
<i>Polygogon monspessulimus</i> * AEE	beard grass
<i>Sphifex hirsutus</i>	silvery sand grass
<i>Sporobolus africanus</i> *	ratstail
<i>Stenotaphrum secundatum</i> *	buffalo grass
<i>Vulpia bromoides</i> * AEE	vulpia hair grass
<i>Alcacia macrorhiza</i> *	aloid lily
<i>Arunn italicum</i> *	Italian arum
<i>Colocasia esculentum</i> *	taro
<i>Zantedeschia aethiopica</i> *	arum lily
<i>Hedychium gardnerianum</i> *	wild ginger
Zingiberaceae**	

DISCUSSION

Past vegetation cover

Several indicators of past vegetation covers of the island were found. Local legend claims extensive kauri forest over the southern part of the island up to the mid 17th century. The sometime presence of kauri forest was confirmed by numerous remnants of kauri gum found throughout the southern part of the island during the present survey, and the large amounts of gum removed by gumdiggers during the early 20th century. A small number of kauri trees were still present on the island; the distinctive crown of one of these (seen at a distance) stood well above the surrounding coastal forest trees, with a trunk diameter estimated to be between 0.5 and 1m at breast height. Seedling kauris were never observed, and typical kauri association plants such as kauri grass (*Arctelia trimeria*) were also absent.

Similarly, podocarp and broadleaf species invariably associated with kauri forests were never seen, either as mature trees or seedlings. It is very interesting to note that Hayward (1976) found two important kauri-associates fossilised on the island — tanekaha (*Phyllocladus trichomanoides*) and taraire (*Betischniedia tarairi*). One other plant in his list, toru (*Persoonia toru*) was also not seen on the island during the present survey. Unfortunately the age of the fossil-bearing sample is not known. Despite intensive searching, other important podocarp species such as totara (*Podocarpus totara*) and rimu (*Dacrydium cupressinum*) were not found. Extensive burnoffs, probably over several centuries, have completely removed seed-stocks of these species.

From the fossil evidence and remnants of coastal forest described in this survey, it is not difficult to envisage the vegetation of the southern part of Great Mercury Island prior to man's arrival. This steeply dissected part of the island would most probably have been covered in three merging vegetation types: kauri dominant forest on ridges and uplands; taraire — tawa — tanekaha — totara forest in inland valleys; and kohekohe — towai — rewarewa — pohutukawa forest in extreme coastal regions. It is also likely that several rare coastal species such as lawapou, parapara and the large-leaved milk tree formerly played a more important part in the coastal forest communities than they do today.

	Native	Adventive	TOTALS
Fern Allies	7	—	7
Ferns	56	—	56
Gymnosperms	2	4	6
Monocotyledons	75	45	120
Dicotyledons	113	112	225
TOTALS	253	161	414

Table 3. Distribution of the Vascular Flora of Great Mercury Island according to plant groups and native or adventive status.

Composition of the flora

Despite man's extensive and continuing modification of the vegetation of Great Mercury Island over many centuries, a large and varied flora was still found. The size of the island, providing many microhabitats not usually found on the smaller islands studied by Field Club in the past was mainly responsible for the large flora recorded; at 414 species, it is well over twice as long as any offshore island flora recorded in *Tane*. The effect of man's modification and present farming was also seen in the size of the adventive portion of the flora. Of the total flora, 253 species (61%) are indigenous to New Zealand (Table 3). The presence of such a large fern flora on the island was unexpected. Ferns and fern allies make up almost 25% of the indigenous flora, and include several rare and local species. Perhaps the greatest surprise was the occurrence of *Loxoma cunninghamii* and *Lindsaea viridis*; the former growing in almost the same habitat as *Loxoma* on Great Barrier Island (Bergquist 1960). Together with remnant populations of a large (for an island as altered as Great Mercury) number of filmy-ferns, these ferns indicate former vegetation covers considerably more diverse and mature than those seen on the island today.

Gymnosperms were extremely poorly represented with only one indigenous species, kauri, growing naturally on the island. Even then, only five or six trees are known. Other common mainland species such as totara, tanekaha and rimu were not seen.

Comparison of the number of indigenous flowering plants with those from Little Barrier and Kapiti Islands (Hamilton and Atkinson 1961, p.120) shows an abnormally large ratio of monocots to dicots. As this appears to be mainly due to the very large number of rushes and sedges found by Mr Esler, it can perhaps be concluded that the monocotyledonous element of the flora is more persistent and tolerant to changes than its dicotyledonous counterpart.

The adventive flora of 161 species is almost totally composed of species expected to occur around settlements and in farmed and disturbed areas.

Comparison with other offshore islands and the mainland

Great Mercury Island can be best compared with islands of similar size such as Little Barrier and Kapiti Islands. Despite gross modification of the

vegetation and very small areas of purely native vegetation, Great Mercury Island still possesses a larger indigenous flora than that recorded for Kapiti Island by Cockayne (1907). Even a major mainland forest such as Waipoua has a smaller listed native flora (Cockayne 1908). On the other hand, Little Barrier Island, "one of the only remaining large forested areas retaining primitive vegetation" (Hamilton and Atkinson 1961) has an indigenous flora of 368 species. It is quite easy to see that Great Mercury Island with its comparable size and habitat range, its remnant rare plants, and (even now) large native flora would once have been forested very similarly to lowland areas on Little Barrier Island, with a correspondingly larger and more diverse indigenous flora.

Surprisingly, perhaps, few similarities could be found with nearby mainland forest studied the year before at Whitianga (Wright 1975). The mature vegetation of Great Mercury Island was generally more extreme coastal in nature, and often more luxuriant. This apparent luxuriance is possibly due to climatic factors: residents on the island have described a much warmer climate than that experienced on the mainland, with temperatures almost invariably a few to several degrees higher on the island. Tropical fruit-trees such as mangoes appear to thrive and fruit successfully on the island.

It is also significant that similarities with other, smaller nearby offshore islands are not obvious from the literature, e.g. Red Mercury Island (Lynch *et al* 1972), smaller islands in the Mercury Group (Atkinson 1964) and Shoe Island and the Slipper Island Group (Court 1974; Wright 1974).

The present indigenous flora of Great Mercury Island is essentially a collection of remnant and more persistent plants which originally formed part of a larger and more diverse flora on the island.

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