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NATURAL HISTORY OF CURTIS ISLAND, BASS STRAIT

2. SOILS AND VEGETATION

WITH NOTES ON RODONDO ISLAND

by J.B. Kirkpatrick, J.S. Massey
Geography Department, University of Melbourne

and R.F. Parsons
Botany Department, La Trobe University.

ABSTRACT

The soils of Curtis Island are described and the vegetation of Curtis and Rodondo Islands is described and mapped. The main plant communities on Curtis are *Poa poiformis* tussock grassland, *Disphyma blackii* herbfield, and *Melaleuca armillaris* scrub and forest. These occur on Rodondo too, with *Eucalyptys* aff. *globulus* forest and *Casuarina stricta* forest. The role of salt spray, altitude, fire and biotic factors in determining the distribution of these communities is discussed. Six species recorded are not known from the adjacent mainland and their distribution is discussed in relation to long distance dispersal and former land bridges.

INTRODUCTION AND METHODS

This paper describes the detailed study, by all three authors, of soils and vegetation on Curtis Island. These findings are compared with much less comprehensive data from nearby Rodondo Island following two days work there by one of us (J.B.K.) in December 1970.

On Curtis, soils were sampled by augering and plant species presence and dominance recorded in 36 randomly located circular quadrats (6 metre radius). The rest of the island was closely searched for additional plant species. On Rodondo a rapid survey was made of the vegetation and plant species of much of the island. Both visits were in summer, so some annuals and geophytes may not have been collected. Identification of all vascular plant species was checked by Mr. J.H. Willis, National Herbarium of Victoria.

SOILS ON CURTIS ISLAND

The soils are granitic lithosols and skeletal soils having a sandy to sandy loam texture, black (5 YR 2/1) to a very dusky red (2.5 YR 2/2) colour, and a thin layer of gravel right on the surface. Profiles varying in depth from several cm to a maximum of 70 cm are poorly developed and virtually structureless. In general, upper portions of the profiles include relatively large amounts of organic matter in various states of decomposition and bird droppings. Another result of the large bird population (especially mutton birds) is the existence of burrows and tunnels dug by the birds for nesting purposes in soils approximately 25 cm and deeper. A preliminary analysis of several soil samples using a Hellige-Truog combination soil tester indicates strong to medium-strong acidic reactions, medium to high proportions of phosohorus, very high potassium, medium magnesium, very low to very high nitrate, very high ammonia, very low sulphate, and low to high proportions of chloride. All soil pH determinations showed values around pH5 throughout.

Deep soils (40-70 cm) may be found in isolated localities over most of the island except the extreme northern end and areas where slopes exceed 35°. In general, however, most of the soils are very shallow (2-10 cm) exhibiting very little profile development. For this reason the soils have been grouped into two classes, lithosols and skeletal soils (Corbett 1969) and mapped according to these (fig. 1). The terms *lithosol* and *skeletal soil* may be used synonymously, but in the Curtis situation, where soils reflect parent material to a great extent, there was a need to distinguish shallow soils (skeletal) from deeper soils (lithosol) showing some profile development. Lithosols are mapped only where it is felt that their contiguous distribution exceeds that of skeletal soils. The following descriptions characterize profiles from each class.

Lithosols

Site 8 - southeast side

H_1	0 - 60 cm	black (5 YR 2/1) sand with feldspar and quartz gravel; rather gradual change to:
H_2	60 - 70 cm	dark reddish brown (5YR 2/2) sandy loam; rather sharp change to:
H_3	70 - 75 cm	black (5 YR 2/1) sand with feldspar and quartz gravel (weathered parent material).

Site 15 - north end

H_1	0 - 10 cm	black (5 YR 2/1) loamy sand with feldspar and quartz gravel; abundant organic matter; gradual change to:
H_2	10 - 29 cm	black (5 YR 2/1) sandy loam; less organic matter than H_1; sharp change to:
H_3	29 - 36 cm	black (5 YR 2/1) sandy loam with feldspar and quartz gravel (weathered parent material).

Site 27 - northwest side

H_1	0 - 11 cm	very dusky red (2.5 YR 2/2) loamy sand with quartz and feldspar gravel; abundant organic matter; gradual change to:
H_2	11 - 25 cm	very dusky red (2.5 YR 2/2) loamy sand; sharp change to:
H_3	25 - 40 cm	dark reddish brown (5 YR 2/2) loamy sand with quartz gravel in upper portions; sharp change to:
H_4	40 - 50 cm	black (5 YR 2/1) loamy sand with feldspar and quartz gravel (weathered parent material).

Skeletal Soils

Site 32

H_1	0 - 4 cm	black (5 YR 2/1) sandy loam with feldspar and quartz gravel.

Soil development on Curtis Island is a function of granite weathering in a cool, humid environment, downslope movement of mineral particles, and burrowing and tunnelling of mutton birds in all areas with a relatively thick (25 cm) soil mantle. Soil development may best be understood by studying the relationship of granite outcrops to the surrounding local area. On even the gentlest slopes granite boulders protrude frequently above the soil mantle. Exfoliation and subsequent downslope movement of weathered material from the outcrops as well as weathering of granite *in situ* contribute mineral material (fig. 2). The result of these processes is a generalized soil profile having a thin layer of surface gravel overlying sandy and loamy materials in turn overlying weathered parent material. Only in deeper profiles (25-70 cm) on relatively gentle slopes is there any indication of downward movement of inorganic and organic colloids. In several instances a change in texture with depth from sand to loamy sand to sandy loam was observed.

The development of soils on granite (Ellis 1969) and on granodiorite (Brewer 1955; Green 1966) has been examined by mineralogical and fabric analyses. Essentially, these studies relate weathering to loss of mineral constituents (zircon and others) generally concluding that soils (on granodiorite) have developed *in situ* due to the weathering of

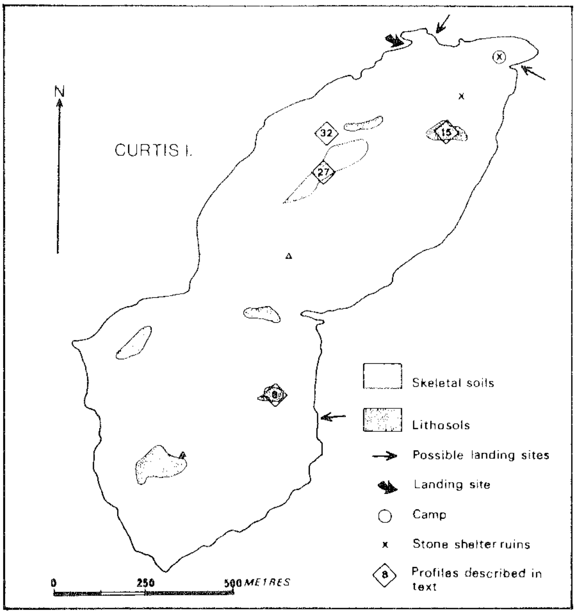

FIG. 1 - Soils and some other features of Curtis Island.

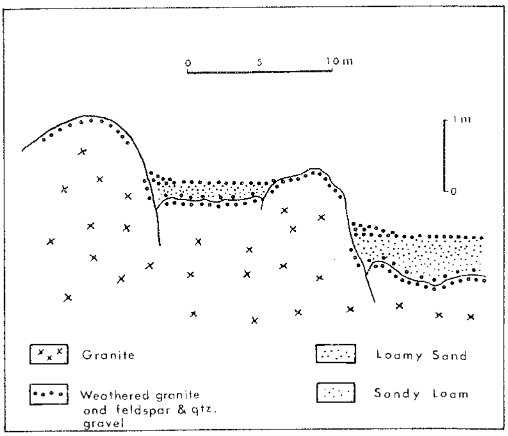

FIG. 2 - Cross section showing granite and associated soils, Curtis Island.

primary minerals. Brewer (1955, pp. 24-25) found little evidence to support illuviation of clay in the lower portions of the soil he was studying. Results of the application of such analyses on the soils of Curtis Island would be difficult to interpret, if not meaningless. Mutton birds inhabit virtually all portions of the island having soils greater than 25 cm depth. Extensive burrowing and tunnelling to a depth of approximately 40 cm has created a thorough mixing of both upper and lower portions of the soil. The birds are a soil-forming factor and their digging activities undoubtedly contribute to the development of the very dark colouration and relatively large amount of partially decomposed organic material throughout most of the deeper soils.

PLANT COMMUNITIES

As this section includes data from Rodondo Island, relevant aspects of the physical environment there are briefly described. Rodondo Island, 9.8 km south of Wilson's Promontory, has an area of 114 hectares and a height of 350 m. Steep cliffs varying from 70 to 200 m ring the island. It is situated towards the high rainfall end of a precipitation gradient running from Wilson's Promontory to Flinders Island. It seems likely that the higher parts of the island receive as much annual rainfall as the Wilson's Promontory lighthouse (979 mm), although the lower parts probably receive less. Soils are predominantly lithosols formed from the same granite as on Curtis Island and Wilson's Promontory. Muttonbirds nest on the island in greater numbers and density than on Curtis although the population of fairy penguins appears to be considerably less. There is active downslope movement of soil in steeper parts of the island, a recent landslip having revealed bare rock in a gully on the northern slopes.

The vegetation map (fig. 3) is based on the quadrat data, field survey and interpretation of black and white aerial photographs for Curtis and field survey and interpretation of colour aerial photographs for Rodondo.

The classification of communities is based primarily on structure (for which nomenclature follows Specht 1970) and dominance in the tallest stratum. A floristic classification using numerical methods proved unsuitable for Curtis.

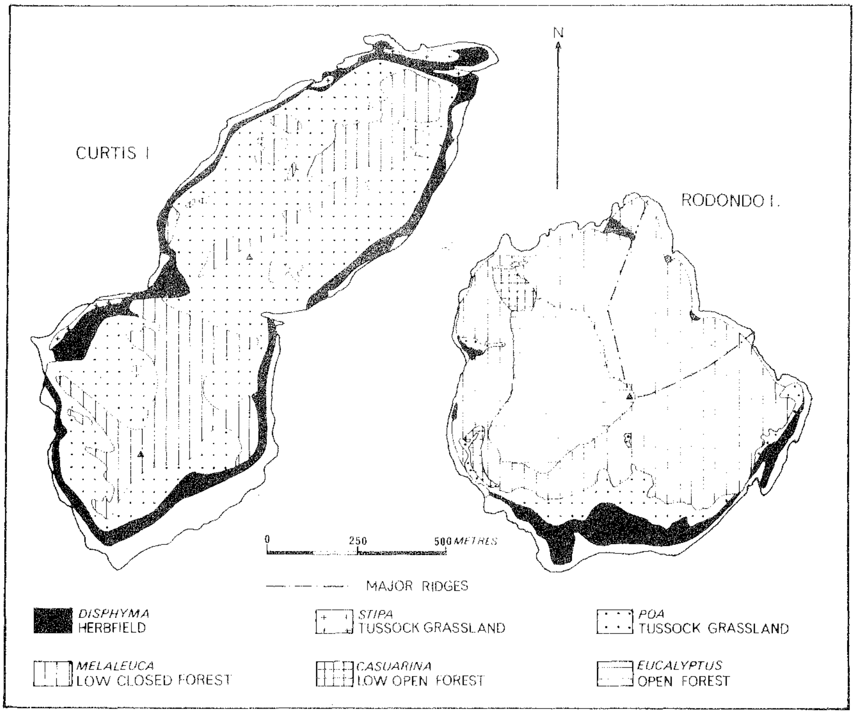

FIG. 3 - Vegetation map of Curtis and Rodondo Islands.

Relatively wide ecotones exist between some of the communities, most notably between *Poa poiformis* tussock grassland and *Melaleuca armillaris* low closed-forest, and between *P. poiformis* tussock grassland and *Disphyma blackii* herbfield. Boundaries tend to be more distinct on Rodondo than on Curtis.

1. *Disphyma blackii* herbfield: The structure of this community varies from an open to a closed herbfield, coverage being inversely related to slope and directly related to soil depth. Swards of the succulent *D. blackii* occur in crevices on the steepest slopes and in the areas most exposed to salt-bearing winds. On deeper soils *Carpobrotus rossii* tends to be dominant. *Apium prostratum, Salicornia quinqueflora, Ixiolaena supina, Distichlis distichophylla, Brachyscome diversifolia* and *Chenopodium glaucum* are almost entirely confined to this community on Curtis, although only the first is at all frequent. On Rodondo *A. prostratum, Lepidium foliosum, S. quinqueflora, Scirpus nodosus* and *Asplenium obtusatum* are restricted to this community. The former two co-dominate with *D. blackii* in a closed herbfield in some areas. The latter two are rare and are confined to the cliffs. *Pelargonium australe, Senecio lautus, Bulbine bulbosa, Tetragonia amplexicoma* and *Rhagodia baccata* are relatively common both within and without this community on both islands.

The occurremce of this coastal herbfield on both islands seems to be controlled by slope and degree of exposure to strong salt-laden winds. Where topographic conditions allow, it is more extensive on the westerly aspects than the easterly and is most extensive on the lower slopes. The associated soils are skeletal to almost non-existent and show gënerally higher chloride concentrations than soils further inland (analyses by Hellige-Truog combination soil tester).

2. *Stipa teretifolia* tussock grassland: This community is more extensive on Curtis than Rodondo. It occupies areas with slightly deeper soils and less exposure than the herbfield. *S. teretifolia* is commonly associated with *C. rossii, D. blackii, A. prostratum* and *T. amplexicoma* (Rawlinson, this volume plate 2).

3. *Poa poiformis* tussock grassland: This includes *P. poiformis*-dominated closed tussock and tussock grassland and smaller areas where *P. poiformis* is subdominant to *Senecio lautus, Helichrysum bracteatum* and *Lavatera plebeia* (plate 1).

PLATE 1 - Lower eastern slopes of Rodondo Island. *Myoporum insulare* in foreground, herbfield dominated by *Lavatera plebeia* and *Helichrysum bracteatum* in middleground, *Melaleuca armillaris* in background.

It is the most extensive community on Curtis, where it is characterized by its very dense coverage and its paucity of species (Rawlinson, this volume plate 2). The only common associates of *P. poiformis* are *Helichrysum bracteatum*, which is most common in relatively moist situations such as the foot of granite sheets and in hollows, *Crassula sieberana*, which is confined to well lit rock outcrops amongst the tussocks, and *Senecio lautus*. *S. lautus* is ubiquitious but very rarely dominant. Where dominant it exhibits considerable dieback, exposing much bare earth. In these areas *P. poiformis* remains healthy.

On Rodondo this community is less widespread but richer floristically. It is found mainly on steep exposed slopes inland from the herbfield, but also occurs in small patches among *Melaleuca armillaris* forest, usually on steep slopes with shallow soil. The major species associated with *P. poiformis* are *S. lautus, H. bracteatum, L. plebeia, C. sieberana, Dianella* spp. and *Pteridium esculentum*. The former three are dominant over limited areas and *P. esculentum* is found only above 200 metres. Coverage is more sparse on Rodondo than on Curtis possibly owing to the greater density of mutton bird burrows on Rodondo.

4. *Melaleuca armillaris* low closed-forest: This community varies from an open-scrub to a closed-forest. It is the most common community on Rodondo and the second most common on Curtis.

On Curtis the area around the summit was formerly a closed-forest with a sparse understory vegetation of *P. poiformis, S. lautus, H. bracteatum* and *Sambucus gaudichaudiana*. However, a recent fire has reduced most of it to a *P. poiformis* sward with sparse regeneration of the *Melaleuca*. Elsewhere on the island the structure of the community varies from a low closed-forest to a low open-forest with *Olearia phlogopappa, Solanum vescum, Acacia stricta, Rhagodia baccata, Tetragonia amplexicoma* and *Sonchus oleraceus* being common associates of *M. armillaris*, apart from those already named. Most of the species found on Curtis occur in this community which is extremely heterogeneous floristically.

All the species occurring in this community on Curtis are also found on Rodondo. There, other associates of *M. armillaris* are *Microsorium diversifolium, Muehlenbeckia adpressa, Clematis microphylla, Wahlenbergia quadrifida* and *Correa backhousiana*. The former species is very common in rock crevices and on the trunks of the *Melaleuca* (plate 2). *M. armillaris* has a height range of 1 to 10 m although most of the community would be classified as a low closed-forest or closed-forest.

On both islands densely shaded ground beneath *Melaleuca* is a favoured site for mutton bird burrows.

5. *Casuarina stricta* low open-forest: This community has a limited distribution on the western slopes of Rodondo and consists of *Casuarina stricta* and a generally bare understory. *C. stricta* is also found to a limited extent associated with *Eucalyptus* aff. *globulus* and *M. armillaris* on the western slopes.

PLATE 2 - Tall *Melaleuca armillaris* with epiphytic *Microsorium diversifolium* on western slopes of Rodondo. *Poa poiformis* in foreground. Figures are 2.6 m tall.

6. Shrubland: This community is too restricted to map, being virtually absent on Curtis and found only on upper cliffs on the northeast of Rodondo. The main shrub present is *Albizia lophantha*, although on Rodondo *Correa alba* and *Myoporum insulare* are reasonably common. It tends to grade into *D. blackii* herbfield on one side and *M. armillaris* low open-forest on the other.

7. *Eucalyptus* aff. *globulus* open-forest: The eucalypts that characterize this community are typically 10 to 15 m tall, apparently even-aged and with some signs of overmaturity, including dead terminal branches (plates 3 and 4). *M. armillaris* forms a ten metre tall understory in some parts. Elsewhere there is a generally scattered shrub layer including *Dodonaea viscosa*, *Pultenaea daphnoides* var. *obcordata*, *Correa backhousiana*, *Pimelea linifolia*, *Leucopogon parviflorus*, *Solanum vescum*, *Cyathodes juniperina*, *Sambucus gaudichaudiana* and *Olearia phlogopappa*. The ground layer is dominated by *P. poiformis* with occasional plants of *Stylidium graminifolium*, *Senecio lautus*, *Helichrysum bracteatum*, *Lepidosperma gladiatum*, *Pteridium esculentum*, *Dianella* spp., *Sonchus oleraceus* and a large-leafed form of *Goodenia ovata*.

The community is confined to the area around the summit and parts of the western slopes of Rodondo. Although the western slopes catch the prevailing winds the concave nature of the slope above the cliff-face provides some shelter.

Discussion.

The two islands display similar patterns of altitudinal zonation (table 1). With increasing altitude the vegetation changes from coastal communities dominated by *D. blackii* and *S. teretifolia* to a tussock grassland dominated by *P. poiformis* and then to a community dominated by *M. armillaris*. On Rodondo the highest slopes are dominated by *E.* aff. *globulus*. This relationship between plant communities and altitude is obscured to some extent by topography and aspect. The primary factors in the zonation are probably degree of exposure to strong salt-bearing winds and availability of moisture. In the coastal communities, high soil chloride levels and low altitude suggest that the boundary between them and the *P. poiformis* tussock grassland is controlled at least partly by degree of exposure to salt spray.

An increase in precipitation with altitude could be expected on these islands due to orographic effects. The eucalypt forest on Rodondo occupies the apparently moister parts of the island. Small outliers of this community are found in sheltered gullies on the eastern part of the island. The boundary between the *P. poiformis* community and the *M. armillaris* community is the most difficult to explain, especially on Curtis.

PLATE 3 - *Eucalyptus* aff. *globulus* open-forest on western slopes of Rodondo.

PLATE 4 - *E.* aff. *globulus* open-forest on Rodondo with dead *E.* aff. *globulus* and *Pteridium esculentum* in gap.

TABLE 1

APPROXIMATE ALTITUDINAL RANGES (METRES) OF THE PLANT COMMUNITIES

	Curtis	Rodondo
Disphyma Herbfield	0-120	0-120
Stipa Tussock Grassland	0-120	70- 80
Poa Tussock Grassland	40-300	100-250
Shrubland	-	80-100
Melaleuca Low Open-Forest	60-335	100-340
Casuarina Low Open-Forest	-	180-210
Eucalyptus Open-Forest	-	200-350

Although the *M. armillaris* community occurs on higher and therefore probably wetter portions of both islands than the *P. poiformis* community, in lower areas their altitudinal ranges overlap (table 1). In these areas dynamic processes of vegetation change to be dealt with later may have been important in deciding the boundary between them.

The greater variety of vegetation on Rodondo may be due to several factors. Although Rodondo has a smaller area than Curtis, its compact shape may mean that some inland parts are effectively more sheltered. It also seems likely that Rodondo receives a higher rainfall than Curtis. This could partially account for the absence of the eucalypt community on Curtis despite its similar altitude. Some vegetation differences may also be accounted for in terms of fire history.

Rodondo Island is thought to have been visited only twice, in 1946 and 1970. The earlier visitors saw no signs of fire apart from one eucalypt which, they postulated, had been struck by lightning. However, there was no indication that this fire had spread (Bechervaise 1947). In 1970 there was again no sign of fire and it can be safely assumed that any fire that has occurred on Rodondo would have been started by lightning.

Curtis is known to have been visited considerably more often than Rodondo (Massey, this volume). In February 1971 there was evidence of an extensive recent fire which must have occurred between that date and December 1964 when aerial photographs were taken of the island. As *M. armillaris* regeneration was one metre tall in 1971 the fire probably occurred within the period 1967-69.

It seems likely that the relative accessibility of Curtis to incendiary man has made it more fire prone than Rodondo, at least since European man was first present in Bass Strait.

The recent fire on Curtis killed all the individuals of *M. armillaris* that it touched. It thus appears that this species has no mechanism such as epicormic shoots or root suckers that enable the individual to survive fire. However, the area of regeneration of *M. armillaris* at least equalled the area of fire-killed trees. Quite commonly the regeneration was not coincident with the old occurrence, the usual pattern being a displacement of regeneration to one side. This suggests that the species is not occupying its potential area on the island. A past occurrence of fires too frequent to allow seed production would account for this. The absence of the *Melaleuca* from the deepest soils on the island may even be partly due to their higher fuel producing capacity. These soils are now occupied by *P. poiformis* tussock grassland, the community which occupies the areas of fire-killed *Melaleuca* where no regeneration took place. Much of this grassland on Curtis may be a fire disclimax.

It appears that there has not been a serious fire on Rodondo for a considerable period. There is also no sign of regeneration of either *M. armillaris* or *E.* aff. *globulus*. In fact, several dead trees of both species were observed (plate 3) and many eucalypts displayed indications of over-maturity, dead terminal branches being quite common. It seems likely that many of the gaps in the eucalypt and *M. armillaris* communities that are now occupied by *P. poiformis* could be the result of dieback of these dominants. Thus some *P. poiformis* tussock grassland could be a disclimax produced by either frequent fires or the absence of fire for a period greater than the lifespan of the tree species. Without fire the seedlings of the tree species may find it impossible to survive in face of the competition for light and/or moisture provided by *P. poiformis*.

The only bare soil available for colonization on the islands is the area most extensively burrowed by mutton birds. Gillham (1960) suggests that the guano deposited by these birds would prove lethal to tree and shrub seedlings, especially in dry weather. Also, the mechanical disturbance of the soil would inhibit seedling establishment. The guano, however, is not lethal to older shrubs and trees, bare soil under *M. armillaris* being especially favoured as a rookery area on both islands. Gillham (1960) believes that much of the *P. poiformis* tussock grassland on the Bass Strait islands is a subclimax produced by the influence of breeding seabirds, and that the *P. poiformis* communities in which there are no rookeries at present are possibly the sites of past rookeries. However it may be that the seabirds nest in the *P. poiformis* grassland as it becomes available, and that it becomes available for other reasons such as fire history. *P. poiformis* grows luxuriantly under the eucalypt canopy on Rodondo where there are no seabirds nesting and has been observed to form communities on recent artificial coastal slopes at Sandringham and Mentone where there is little likelihood of seabird nesting ever having occurred. Thus although seabird rookeries often occur in *P. poiformis* tussock grassland, as a species and sometimes as a community *P. poiformis* is not necessarily linked to rookeries (see also Hope and Thomson 1971).

FLORISTICS

In all, 29 vascular species were collected on Curtis (including 2 introduced species), of which only 10 species had a frequency higher than 10% (Appendix 1). On Rodondo, 56 vascular species were found, including 4 introduced species (Appendix 1). Of the 57 native species found on Rodondo and/or Curtis, 22 occur also in the Archipelago of the Recherche, 2080 km to the west (Willis 1953; Appendix 1). These 22 represent a floristic element widespread across coastal southern Australia from east to west.

Rodondo and Curtis have similar areas and altitudes and both are granitic, carry large seabird breeding grounds and have been isolated from the mainland for almost the same length of time (Rawlinson, this volume). However, Rodondo carries many more vascular plant species than Curtis. Ratios of number of native species to total island area (in acres, for comparison with earlier work) are 1:5 for Rodondo and only 1:15 for Curtis, the lowest ratio recorded for Bass Strait (Gillham 1961; Hope and Thomson 1971). The greater floristic diversity of Rodondo may be partly due to its closeness to the mainland, both making it more sheltered and facilitating seed dispersal from the mainland. A thorough analysis of species-area relationships (as in Raven 1967) must await complete floristic data from other Bass Strait islands.

The lack of disturbance on Rodondo and Curtis is shown by the percentage of introduced vascular species - 7% in both cases, compared to 43% for Cliffy Island (Hope and Thomson 1971) and 40% for the Hogan Group (Scarlett *et al.*, this volume).

There are some puzzling absences from the Curtis and Rodondo floras, like *Leptospermum laevigatum*, which is common on coastal granite both on Wilson's Promontory and islands close to it (Gillham 1960). It is also absent from the Hogan Group (Scarlett *et al.*, this volume).

Of all species collected on Rodondo and Curtis, six are not known from Wilson's Promontory, the nearest continental land (Appendix 1). They are *Correa backhousiana*, *Dodonaea viscosa* (both Rodondo only), *Ixiolaena supina* (Curtis only), *Albizia lophantha*, *Lepidium foliosum* and *Melaleuca armillaris* (both Rodondo and Curtis).

Of these, perhaps the most remarkable is *Melaleuca armillaris*, known elsewhere only from East Gippsland, the nearest record being 312 km to the northeast. Although the known range may be characterized by very maritime and frost free conditions, its absence from other Bass Strait islands at similar latitudes and the size of the disjunction is staggering.

Albizia lophantha is widespread in south-west Western Australia and occurs on 16 islands of the Archipelago of the Recherche at its eastern limit there (Willis 1953). It is also known from a number of coastal and near coastal sites in South Australia and Victoria where it is presumed to be a garden escape (see e.g. Black 1948). Around Bass Strait, *A. lophantha* is now known from Doughboy Island, Corner Inlet (Gillham 1961); Hogan Island (Scarlett *et al.*, this volume); Deal Island (Hope and Hope 1968); Anser, Kanowna, McHugh and Wattle Islands (Dr. D. Dorward, Monash University, pers. comm.); with Curtis and Rodondo making a total of nine. Its occurrence as dense stands on such inaccessible and undisturbed islands as Rodondo raises the possibility of at least some of its Bass Strait island occurrences being natural, in keeping with its importance in similar sites in the Archipelago of the Recherche. Furthermore, it is unlikely to be dispersed by the bird species which visit the Bass Strait islands it grows on (Dr. D. Dorward, Monash University, pers. comm.). The possibility of sea dispersal to Rodondo must be virtually prohibited by steep sea-cliffs there, a minimum of 70 m high. If any *A. lophantha* stands in Bass Strait are natural, they may be 2080 km from the rest of the natural range. Obviously, more work is needed on the habitat of the native and presumed naturalized stands and on the dispersal mechanisms of the species.

The range of *Lepidium foliosum* seems very closely tied to islands; literature and herbarium records (AD, MEL, PERTH) show only 5 mainland occurrences (one Western Australia, two South Australia, two Victoria) despite its occurrence on 37 different islands (20 off Western Australia, 9 off South Australia, and 4 in Bass Strait + 4 others off Victoria). Its range in Tasmania has not been investigated. The ecological reasons for this marked preponderance of island over coastal mainland records are completely obscure; especially in view of the wide latitudinal range of the islands.

Ixiolaena supina is similar and even more anomalous, being most common and widespread on Kangaroo Island, but also occurring on Wright and Pearson Islands and 2 mainland sites, South Australia (Specht 1969; herbarium records); as well as on Hogan and

Curtis Islands and the Kent Group in Bass Strait - a disjunction of 850 km.

Dodonaea viscosa is scattered through much of Australia and the tropics; its absence from Wilson's Promontory is puzzling. It is known from the Kent Group of islands in Bass Strait and Pearson Island (Specht 1969) as well as Rodondo. Its strongly winged capsule and very wide distribution may indicate a capacity for dispersal over relatively long distances.

Finally, *Correa backhousiana* presents a unique and fascinating range, being known only from coastal Tasmania, and Robbins, King, Deal and Rodondo islands.

Of the other species, *Eucalyptus* aff. *globulus*, the only eucalypt on Rodondo, is of particular interest. Although some trees appear morphologically very similar to *E. globulus* trees on Wilson's Promontory, others show unusual features possibly resulting from hybridization between *E. globulus* and some undetermined species. Work on this is in progress.

E. aff. *globulus* and *Correa backhousiana*, with *Cyathodes juniperina*, are the only species found with predominantly Tasmanian distributions at the present time. Of the previous species, *Melaleuca armillaris* is an East Gippsland species reaching its western limit on Rodondo, *Ixiolaena supina* (and *Albizia lophantha* if native) is a western species nearing its eastern limit on Curtis, while the others are more or less widespread.

Apart from all these exceptional species dealt with above, the rest of Curtis and Rodondo flora is common in coastal Victoria and the other Bass Strait islands (Appendix 1). All the plant communities found are common on other small Bass Strait islands like the Hogan and Kent Groups except for *Eucalyptus* aff. *globulus* forest, which makes Rodondo unique, and *Melaleuca armillaris* forest which sets both Rodondo and Curtis apart from the rest.

It is difficult to account for the floristic peculiarities of Rodondo and Curtis. *Melaleuca armillaris*, for example, may have arrived by long distance dispersal. If this is discounted, then lower sea levels in the Last Glacial provided coastal plains linking all present day occurrences (Jennings 1971) which could have allowed continuous distribution between them (this is true of all the disjunct species mentioned above). If Curtis became an island at about 14,000 years B.P. (Rawlinson, this volume), did climatic effects (especially low temperatures, Costin 1971), allow such a distribution to occur? This raises the whole question of whether the Rodondo and Curtis floras are best regarded as mainly remnants of the old land bridge flora or as more recent arrivals by long distance dispersal to islands whose flora was seriously depleted by low temperatures during the Last Glacial. Possibly the former explanation is favoured by the fact that the Curtis and Rodondo floras include not only an eastern element (*Melaleuca armillaris*) but also Tasmanian elements as well as western elements (like *Ixiolaena supina* and possibly *Albizia lophantha*). If long distance dispersal since 14,000 years B.P. was dominant, perhaps one would expect the great majority of species to arrive from nearby land like Wilson's Promontory and to be found there at present. It seems easier to account for the overall present distributions of species like *Ixiolaena supina* and *Correa backhousiana* by regarding them as remnants of the land bridge flora. However, more information is needed both on past climates and the climatic tolerances of the species involved to answer this, and more information on species dispersal mechanisms is needed to discover the relative significance of dispersal, land bridges or combinations of the two.

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APPENDIX 1

Checklist of vascular plants recorded from Rodondo and Curtis Islands

1 - Rodondo, including records of Willis (1947)
2 - Curtis, showing % frequency in the 36 quadrats
3 - whether recorded from Wilson's Promontory by National Parks Authority (1969) and Garnet (1971)
4 - whether recorded from the Hogan Group by Scarlett, Hope and Calder (this volume)
5 - whether recorded from Cliffy Island by Hope and Thomson (1971)
6 - whether recorded from the Archipelago of the Recherche by Willis (1953)

Nomenclature follows Willis (1970) for ferns and monocots and Eichler (1965) for dicots where possible. Specimens of all species are lodged at the National Herbarium of Victoria.

* = naturalized alien

	1	2	3	4	5	6
Dennstaedtiaceae						
Histiopteris incisa (Thunb.) J.Sm.	x	x	x	x		
Pteridium esculentum (Forst.f.) Nakai	x		x	x		
Polypodiaceae						
Microsorium diversifolium (Willd.) Copeland	x		x	x		
Aspleniaceae						
Asplenium obtusatum Forst.f.	x	3	x	x	x	
Poaceae						
**Bromus diandrus* Roth	x		x		x	
Dichelachne crinita (L.f.) Hook.f.	x		x	x		x
Distichlis distichophylla (Labill.) Fassett		6	x			
**Poa annua* L.	x		x	x		
P. poiformis (Labill.) Druce	x	100	x	x	x	
Stipa teretifolia Steud.	x	6	x	x		
Cyperaceae						
Lepidosperma gladiatum Labill.	x		x	x		x
Scirpus nodosus Rottb.	x		x	x		x
Liliaceae						
Bulbine bulbosa (R. Br.) Haw.	x	x	x			
Dianella laevis R. Br.	x		x			
D. ? revoluta R. Br.	x		x	x		x
Orchidaceae						
Thelymitra aristata Lindl.	x		x			x
Casuarinaceae						
Casuarina stricta Ait.	x		x			
Urticaceae						
Parietaria debilis G. Forst.	x		x			x
Polygonaceae						
Muehlenbeckia adpressa (Labill.) Meisn.	x		x	x		x
Chenopodiaceae						
Chenopodium glaucum L.		x	x	x		

	1	2	3	4	5	6
Rhagodia baccata (Labill.) Moq.	x	14	x	x		x
Salicornia quinqueflora Bunge ex Ung.-Sternb.	x	x	x	x	x	x
Aizoaceae						
Carpobrotus rossii (Haw.) Schwantes	x	37	x	x		
Disphyma blackii R.J. Chinnock	x	37	x	x	x	x
Tetragonia amplexicoma (Miq.) Hook.f.	x	11	x	x		x
Portulacaceae						
Calandrinia calyptrata Hook.f.	x	?	x	x	x	x
Caryophyllaceae						
**Cerastium glomeratum* Thuill.		x	x	x		
Ranunculaceae						
Clematis microphylla DC.	x		x	x		x
Brassicaceae						
Lepidium foliosum Desv.	x	x		x		x
Crassulaceae						
Crassula sieberana (Schultes) Druce	x	43	x	x	x	
Rosaceae						
Acaena anserinifolia (Forst.& Forst.f.) Druce	x	x	x			
Mimosaceae						
Acacia stricta (Andr.) Willd.	x	x	x			
Albizia lophantha (Willd.) Benth.	x	3		x		x
Papilionaceae						
Pultenaea daphnoides Wendl.	x		x	x		
Geraniaceae						
Pelargonium australe Willd.	x	3	x	x	x	
Rutaceae						
Correa alba Andr.	x	x	x	x		
C. backhousiana Hook.	x					
Sapindaceae						
Dodonaea viscosa Jacq.	x					
Malvaceae						
Lavatera plebeia Sims	x		x	x	x	x
Thymelaeaceae						
Pimelea linifolia Sm.	x		x	x		
Myrtaceae						
Eucalyptus aff. *globulus* Labill.	x					
Melaleuca armillaris Sm.	x	40				
Apiaceae						
Apium prostratum Labill. ex Vent.	x	9	x	x	x	x
Epacridaceae						
Cyathodes juniperina (Forst.& Forst.f.) Druce	x		x			
Leucopogon parviflorus (Andr.) Lindl.	x		x	x		x
Apocynaceae						
Alyxia buxifolia R. Br.	x		x	x		x
Solanaceae						
Solanum vescum FvM.	x	11	x			
Myoporaceae						
Myoporum insulare R. Br.	x		x	x		x
Rubiaceae						
Coprosma quadrifida (Labill.) Robinson	x		x			
Galium australe DC.	x		x	x		x
Caprifoliaceae						
Sambucus gaudichaudiana DC.	x	x	x			
Campanulaceae						
Wahlenbergia quadrifida (R.Br.) A.DC.	x		x			
Goodeniaceae						
Goodenia ovata Sm.	x		x			
Stylidiaceae						
Stylidium graminifolium Sw. ex Willd.	x		x			

	1	2	3	4	5	6
Asteraceae						
Brachyscome diversifolia (Grah.) Fisch. et Mey. var. *maritima*		3	x	x		
Helichrysum bracteatum (Vent.) Andrews var. *albidum*	x	49	x	x		
Ixiolaena supina FvM.		x	x			
Olearia phlogopappa (Labill.) DC.	x	3	x	x		
Senecio lautus Forst.f. ex Willd. ssp. *dissectifolius*	x	91	x	x	x	x
**Sonchus asper* (L.) Hill	x		x	x	x	x
**S. oleraceus* L.	x	9	x	x	x	x

APPENDIX 2

Checklist of Hepatics and Mosses.
Rodondo collection by J.B. Kirkpatrick (very incomplete).
Curtis collection by R. Filson.
All identification by J.H. Willis, National Herbarium of Victoria, where all specimens are lodged.

* = apparently new record for Bass Strait.

	Rodondo	Curtis
Hepatics		
**Frullania pentapleura*		x
**Jungermannia* sp.		x
Lophocolea semiteres	x	x
Marchantia berteroana		x
Mosses		
Bryum argenteum		x
B. billardieri	x	x
B. campylothecium		x
**B. dichotomum*		x
Campylopus introflexus	x	x
Ceratodon purpureus		x
Funaria hygrometrica		x
Sematophyllum homomallum	x	x
Tortella calycina		x