RECORDS

OF THE

AUCKLAND INSTITUTE AND MUSEUM

Vol. 5, Nos. 1 & 2

Published by Order of the Council:
Gilbert Archey, Director

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A. W. B. Powell, Assistant Director

7th MAY, 1958

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CONTENTS

A Botanical Survey of the Small Islands of the Three Kings Group

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ABSTRACT.

Descriptions are given of the vegetation of North-East I., South-West I., and West I. together with a table which compares their vascular floras with that of Great I. The natural climax throughout the Group is considered to have been a mixed coastal forest rich in small tree species. These were overtopped by an emergent stratum of *Metrosideros excelsa* wherever the terrain was favourable to its persistence by vegetative propagation. This forest is only preserved today on West I. The other three islands are considered to have been completely deforested by Maori settlers, and to exhibit at present stages of a sere in which *Meryta sinclairii* tends to form a persistent subclimax because of the scarcity of seed trees of the climax species.

On the basis of Cheeseman's (1888, 1891)initial discoveries, the Three Kings Islands were recognised by Cockayne (1921, p. 301) as a distinct Botanical District of New Zealand, yet they remain inadequately explored because access is difficult. The Group lies about 35 miles off the North-West extremity of the North Island and consists of one large island (Great I.), three small ones (North-East I., South-West I. and West I.), and a chain of bare or scrub-covered rocks (Princes Rocks). A map of the area has been published in this journal (Vol. 3, 1948, p. 301) together with a preliminary account of the small islands (Buddle, 1948). The description of their vegetation is amplified in this paper and their floras are compared with that of Great I., though they may not be as completely known. A few small pockets of forest isolated on steep faces have not been examined and might well repay a special effort to reach them.

No landings can be made on small islands in the open ocean without suitable boats and equipment, and without a great deal of skill, judgment and perserverance in tackling the nautical aspects of the problem. My great indebtedness to Major Magnus Johnson, from whose yacht "Rosemary" all the pioneer and most of the subsequent landings have been made, will be obvious. The assistance of Mr. Ernie Beaver, who until recently operated the fishing boat "Miss Kaikohe" from Mangonui and Whangaroa, has also been invaluable, and his generosity in twice placing this powerful launch at our disposal is gratefully recorded. Others whose help on occasions has been indispensable are Mr. Murray Green, Mr. Peter Williams, Mr. Jim Fleming and Dr. Peter Brook. Part of the cost of some of these visits has been met by a grant from the Research Fund of the University of New Zealand.

SOUTH-WEST ISLAND.

The landing place used by Cheeseman (1889) beneath the gannet rookery at the south-eastern end of the South-West I. is rarely workable. However the discovery by Mr. Beaver of a secluded boat harbour inside a perforated buttress at the opposite end of the island (Figs. 4 and 5) has made is comparatively easy of access, though a steep face of rock and scrub intervenes between this landing and the forest. No attempt has yet been made to camp ashore since there is no fresh water and the rapidity with which a confused surge can develop across the entrance to the boat harbour would make it necessary to land prepared for an indefinite stay.

South-West I. is by far the largest of the three outlying islands. The area upon it suitable for scrub or forest, though only about one-tenth of that upon Great I., is estimated to be about 70 acres. Much of this slopes gently, but even on the steep west face the forest holds a continuous cover of soil. Considering its height (690 ft.), area, and fertility,* the island has a remarkably small flora (Table II) including less than a quarter of the total species recorded from Great I. and only six of the thirteen endemic in the Three Kings Group. Only fourteen of its woody species appear capable of becoming important components of a forest or scrub community, and five of them are very rare at present.

There are two major plant communities—a coastal scrub dominated by *Myoporum laetum, Coprosma repens* and *Hymenanthera novae-zelandiae* (Fig. 12), and a low forest of puka *(Meryta sinclairii)* (Figs. 6 and 7). The puka seems scarcely less tolerant of exposure and proximity to the sea than the scrub species, and appears in the shrubberies where they have accumulated a stable layer of soil and rock fragments (Fig. 12). On the windswept summit ridge it becomes however a member of the scrub canopy rather than a tree. Of the shrubs *Coprosma repens* is usually the pioneer, forming the margin of most of the woody communities and showing particular tolerance of the guano-rich soil of sea-bird nesting grounds. The burrowing of petrels is harmful to the stability and water retaining power of the soil, and there can be no doubt that several faces immediately above the sea-cliffs which are bare, in herbage, or in scrub, are in this condition because of present or recent use as nesting grounds. At one point close

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* I am indebted to the Director of the Soil Bureau, D.S.I.R., for the following report upon a sample of litter and surface soil from within the puka forest on the southern slope.

"Lab. No. 5954 Horizon: Ao

Loss on Ignition%	60.2	Total Calcium m.e.%	116.0
Acid Insol. Ash%	30.3	,, Magnesium m.e.%	38.0
Carbon%	36.3	,, Potassium m.e.%	3.9
Nitrogen%	1.26	,, Sodium m.e.%	5.6
C/N ratio	29	,, Phosphate m.e.%	48.7
pH	6.1	,, Phosphate%	1.15
Alkalinity of Ash m.e.%	131.0		

True litters are expected to have losses on ignition of about 90% and so it must be realised that the sample in question contains considerable quantities of mineral soil. It is however, very fertile. The phosphate content is extremely high and the content of the bases, especially calcium and magnesium is also very high. The C/N ratio, while showing that the organic matter is still somewhat raw, is relatively low for such an organic soil and this fact together with the high content of bases, results in the relatively higher pH that has been found.

(Sgd.) L. C. BLAKEMORE.

Analyst: G. M. WILL, 14/5/1952."

to Cheeseman's landing gannets are beginning to nest in the margin of puka forest, but there is no clear indication that any sea bird can cause retrogressive succession once forest is established. If they cannot, it would appear that a nesting site that is too long abandoned could not be reoccupied by any bird unable to adapt itself to nesting on a forest floor.

The puka forest has no continuous under-storey or ground cover apart from its rapidly decaying litter (Fig. 10). Here and there cabbage-trees *(Cordyline kaspar)* compete rather feebly for a place in the canopy. *Paratrophis smithii, Hymenanthera novae-zelandiae* and *Macropiper excelsum var. major* may form occasional weak under-shrubs, and the floor may be dotted at intervals with *Carex elingamita* and *Asplenium lucidum.* The distribution of *Colensoa physaloides, Blechnum norfolkianum* and *Pteris comans* is restricted—they occur only near the summit of the steep western face.

Two areas of the forest are not, however, dominated by puka but by pohutukawa *(Metrosideros excelsa).* The chief of these is in the shallow valley that forms the lower part of the southern slope. There is another on the eastern face. The pohutukawa canopy is an open one, and slender puka trees form a second storey beneath it interspersed with occasional attenuated cabbage-trees or *Coprosma macrocarpa.* There is an almost continuous shrubbery of *Macropiper* beneath the puka indicating that it is less exclusive of other species in these circumstances than in pure stands.

South-West I. has no established history of extensive interference either by man or by exotic animals. No Maori artifacts have been found, and the only report of Maori occupation suggests that it was the headquarters of a single family (Buddle, 1947). At the enquiry mentioned by Cheeseman (Native Land Court, Auckland-Northern Minutes, Vol. 4, p. 295) there was reference only to bird collecting on the smaller islands. Yet the puka forest cannot be regarded as a stable climax community. Puka seedlings, though they have shown themselves on Great I. to be substantially tolerant under kanuka *(Leptospermum ericoides),* fail to establish themselves until a complete break has occurred in the puka canopy through the death of one or more trees. Usually these breaks are small (Fig. 8). The largest observed was a triangle with sides approximately 60 ft. long formed by collapse of about eight trees 20-25 feet in height. In this between two and three dozen puka saplings were beginning to make good growth (Fig. 11). In the few places on the island where seed trees of more tolerant species exist this tardy re-establishment is being prevented. Such seed trees are rare as yet since cabbage-trees have somewhat intolerant seedlings and those of pohutukawa are extremely so. But on the eastern forested face there are a few fruiting parapara *(Hiemerliodendron brunoniana)* and karaka *(Corynocarpus laevigata),* and both are obviously invading the ageing puka forest immediately about them by establishing their seedlings on its floor well in advance of those of the puka (Fig. 9). A few karaka seedlings occur near the summit of the western forested face, and a single parapara seedling was noticed in 1951 beneath the pohutukawa-puka canopy that adjoins the gannet rookery.

Though pohutukawa seedlings appear to require open ground for their establishment (Baylis, 1951) this tree seems capable of persisting as a component of a climax forest because its power of re-rooting prolongs its life indefinitely. Large trees whose main limbs have sagged to the ground and become independently rooted trunks are a familiar feature of North Auckland coastal forests, especially on steep or rocky sites. It is significant that only small examples of this occur as yet on South-West I. One near the gannet rookery had spread in two directions for a distance of 25 feet. These older pohutukawas develop a bunchy, discontinuous crown below which probably all the smaller coastal trees are capable of maturing, while at least two—*Paratrophis smithii* and *Macropiper excelsum var. major*—do not appear to thrive without such protection.

If puka forest is seral one might expect some change to have occurred since Cheeseman examined the southern face of the island in 1889. He does mention three species that are no longer there, namely *Leptospermum scoparium, Pteris comans* and *Davallia tasmani.* The two ferns are both stated to have been abundant. To this list *Leptospermum ericoides* might well be added since it is now reduced to one specimen overhanging an escarpment. There is thus evidence of a thickening of the puka canopy during the last 70 years with the elimination of tea-tree *(Leptospermum scoparium* and *L. ericoides)* and two species of ground fern. The tea-tree was evidence of earlier clearings since seedlings of both species require open ground.

NORTH-EAST ISLAND.

On North-East Island the only landing place above which the cliffs can readily be climbed is on the south-eastern extremity (Buddle, 1948, P1.27, Fig. 3) where the surge rarely permits a boat to be taken alongside. Buddle and Johnson, the first European visitors, were fortunate in being able to land here twice in 1947 since the island was to be repeatedly visited over the next eight years before another landing was made. On this occasion Dr. Brook and I were ashore for about three hours.

The area of North-East I. that is suitable for scrub or forest is approximately 20 acres, i.e. about a third of that on South-West I. But the flora is larger by six species. The 30 species common to the two islands include all that are at all plentiful on South-West I. Of the additional ones in the North-East I. list, one—*Pittosporum fairchildii*—is a local endemic and two others—*Pteridium esculentum* and *Ipomoea palmata*—appear to be of ecological significance.

Dominance of puka is less complete than it is on South-West I. There is a substantial area where puka grows alone and there are small areas where puka is sub-dominant beneath pohutukawa. But at the summit of the island on shallow petrel-burrowed soil kanuka dominates with so little competition that seedling replacements have quite recently become established (Fig. 15). Kanuka is also in places a component of the scrub (Fig. 17) which otherwise resembles that on South-West I. There are small clearings in the forest which do not show the fairly prompt colonization by puka that is a feature of the small windthrows on South-West I. They appear to have been occupied for a substantial period by low-growing species. One is filled with bracken (Fig. 16). The remainder are a tangle of trailing plants, namely *Sicyos angulata, Ipomoea palmata, Muehlenbeckia complexa* and *Parsonsia heterophylla*. In one a few kanuka and *Pittosporum fairchildii* were becoming established.

Buddle (1948) was able to recognise man-made walls and terraces on this island, and points out that D'Entrecasteaux saw a fire upon it in 1793. It is the closest of the small islands to Great I., and it appears that a short fixed rope would make it accessible at the less exposed northern end—indeed the difficulty of unaided ascent here may well be due to a recent change in the cliff face. The imperfect preservation of the endemic flora and the dominance of puka and kanuka may accordingly be ascribed to Maori occupation. The bracken patch probably occupies ground on which it was once cultivated as a food plant, and from which it has excluded competing species for more than a century.

WEST ISLAND.

There have been two landings on West Island—the first by Major Johnson alone in January, 1950, the second by Major Johnson and myself a year later. On both occasions the time spent ashore was about five hours. The ascent appears to be practicable only by the ridge which rises from the south-eastern point. Johnson succeeded in making his way onto this from the lip of a cave on its eastern side, but only with much difficulty. It is better to approach directly from the south (Fig. 20), though for the dinghy this is complicated by the proximity of a rock that is partially submerged, so that a perfectly calm sea is necessary. The landing in 1951 was accomplished in a dense fog which made photography impossible, and was depressingly reminiscent of the circumstances primarily responsible for the wreck of the "Elingamite" upon this island about fifty years previously, with much loss of life.

Apart from a narrow strip of scrub across the north-western face, which appears to be inaccessible (Fig. 18), the only area suitable for woody vegetation faces south and probably does not exceed five acres (Fig. 20). It consists entirely of fissured and broken rock, with soil accumulated only in pockets and crevices. Despite this appearance of offering a far less favourable plant environment than North-East I. or South-West I., West I. has a flora richer in woody species and in endemics than either. Outstanding among these is *Elingamita johnsoni* (Baylis, 1951) which has been found nowhere else. West I. is also the only place, apart from Great I., where *Brachyglottis arborescens* occurs. There are in all 17 woody species contributing to the dominant or sub-dominant stratum of the forest or to the canopy of the scrub against 14 on the much larger South-West I. No naturalized species are present.

For about 150 ft. above the landing place the rock is streaked with guano and encrusted with algae. Towards the upper limits of this zone the usual sea-cliff crevice species of the Group appear, namely—*Chenopodium triandrum, Cyperus ustulatus, Deyeuxia filiformis, Disphyma australe, Poa anceps, Salicornia australis, Scirpus cernuus, Spergularia marginata*. The next 100 ft. or more is occupied by a closed community of tall flax—*Phormium tenax*. This is largely replaced about 250 ft. above the sea by forest-scrub in which the trees branch at ground level and form low flat crowns parallel with the steep angle of the face and only 5-8 ft. above it. This forest is rich in tree-species, containing *Brachyglottis arborescens, Coprosma macrocarpa, Corynocarpus laevigata, Elingamita johnsoni, Hiemerliodendron brunoniana, Hymenanthera novae-zelandiae, Melicope ternata, Meryta sinclairii, Pittosporum fairchildii, Metrosideros excelsa, Planchonella costata* var. *austromontana, Pseudopanax lessonii* and *Olea apetela.*

Towards the top of the island (609 ft.) the pohutukawa grows taller with looser crowns, and it is in this shelter that *Paratrophis smithii* and *Macropiper excelsum var. major* principally occur.

On the more exposed ridge crests and faces *Hymenanthera-Myoporum-Coprosma repens* scrub is present.

Even when allowance is made for the enterprise shown by the Maori in establishing himself on North-East I. and, on botanical evidence, on South-West I. also, it is scarcely conceivable that an attempt was ever made to cultivate West Island or, indeed, that much demand was ever made upon it for fuel. Major Johnson informs me that on his first visit he discovered one undoubted burial cairn through which the root of a tree had grown, lifting out the skeleton, a stone axe, and a sharpening stone. His opinion that the island was reserved as the final burial place seems likely to be correct. The botanical evidence certainly suggests that West Island alone preserves a fragment of the original climax forest of the Three Kings Botanical District in an unaltered state.

DISCUSSION.

The exploitation of Great I. by Maori settlers is well established historically (Baylis, 1948). Its present covering of grass and tea-tree is obviously unnatural and is undergoing rapid change now that the island is free of the goats whose depredations followed those of man (Baylis, 1951). The smaller islands on either side of Great I. have never been over-run by browsing animals, and their intensive use by the Maori is less readily credited, nor is there the same historical foundation for it. Complete destruction of the forest of South-West I., which the present ubiquitousness of puka seems to indicate, is probably related to the abundance of fish and birds all along the adjoining Princes Rocks, and the fact that its boat harbour provides the only secure hauling-out place for canoes, apart from those on Great I. Presumably, land that was not cleared for cultivation was eventually cleared by accidental fires or for fuel, since the second growth, in so far as it was puka, would be of little use for firing.

Preservation of the original flora of the Group has been fragmentary, and as two of the local endemics—*Tecomanthe speciosa* and *Plectomirtha baylisiana*—are reduced to a single specimen, it is probable that it has been incomplete. Nevertheless, 40 species of tree or shrub have been recorded which seem capable of contributing to the canopy or second layer of a forest, or of dominating in a closed scrub community. These are indicated by an asterisk in Table II. A sufficient number of them grow close to the sea on the exposed stony face of West I. to indicate that everywhere the climax forest was a mixed forest almost tropical in the variety of its trees and shrubs. Probably the sub-divided crowns of ancient pohutukawas that had long been spreading through the forest vegetatively often formed an emergent stratum, and the variety existed in the composition of a closer canopy of smaller trees beneath. There is nothing to support the opinion expressed in my earlier paper (Baylis, 1948) that puka was permanently dominant on the seaward margin of the forest.

The three exploited islands at present seem to provide a series of stages in the regeneration of this climax which will, of course, be greatly protracted because of the scarcity of seed trees of so many of the species. On Great Island Maori occupation was followed by the browsing of a herd of wild goats, and regeneration only began with their destruction in 1946. The chief dominants at present are kanuka and manuka *(Leptospermum ericoides* and *L. scoparium),* but their displacement by puka is under way (Baylis, 1951). The sharp separation of the *Leptospermum* and puka phases has been the consequence of long delayed establishment of puka owing to its palatability to goats. It is likely that in their absence puka can to some extent establish itself in *Leptospermum* or other shrubland that is somewhat open, in advance of the phase at which the shrubs become arborescent and senile. There is no certainty that the Maoris persisted longer upon North-East I. than they did on South-West I., but North-East I. does seem to be in a condition similar to that of South-West I. when it was described by Cheeseman 67 years ago—there is still considerable kanuka upon it. South-West I. is now at the phase of maximum dominance by puka, and its flora is so reduced that only karaka and parapara are showing any sign of displacing it.

The extent to which nesting birds, particularly burrowing petrels, can delay, halt, or reverse plant succession in the area needs to be taken into consideration. Gillham (1956) has shown in Britain that burrowed soils fluctuate more in moisture content and temperature than unburrowed soils, and become more desiccated in dry weather. The steep slopes immediately above the cliff tops on South-West I. and North-East I. seem quite clearly to be kept in an unforested state by nesting birds. Burrowing seems to be favouring persistence of kanuka on North-East I., and to be responsible for the patch of *Poa anceps* that occupies the summit of South-West I. (Buddle, 1948, Pl. 26, Fig. 3). Undoubtedly, it greatly assists in maintaining a place in the vegetation for such herbs as *Solanum nodiflorum.* But nowhere is there any indication that it can cause collapse of an established forest.

BOTANICAL COLLECTIONS.

Table I.

Date	Collector	Vessel	G. I.	SW. I.	NE. I.	W. I.
1887	T. F. Cheeseman	Stella	X			
1889	T. F. Cheeseman	Hinemoa	X	X		
Dec. 1928	W. M. Fraser	Tutanekai	X			
Feb. 1934	W. R. B. Oliver G. T. S. Baylis E. G. Turbott	Will Watch	X			

Date	Collector	Vessel	G. I.	SW. I.	NE. I.	W. I.
Nov. 1945	G. T. S. Baylis	Arbutus	X			
May, 1946	E. G. Turbott	New Golden Hind	X			
Jan. 1947	G. A. Buddle	Rosemary		X	X	
Dec. 1947	G. A. Buddle	,,			X	
,, ,,	G. T. S. Baylis	,,	X			
Jan. 1950	M. E. Johnson	,,				X
,, ,,	G. T. S. Baylis	,,	X	X		
Jan. 1951	G. T. S. Baylis	,,				X
Jan. 1951	G. T. S. Baylis	Ocean Star	X	X		
Jan. 1952	G. T. S. Baylis	Miss Kaikohe	X	X		
Dec. 1955	G. T. S .Baylis	Rosemary			X	

VASCULAR FLORA OF THE THREE KINGS ISLANDS.

Table II.

The abbreviated dates in this table are those of first collection or of first record for the island concerned. A few records that have not been confirmed by subsequent collection have been ignored as erroneous. The collector may be identified from Table I, and herbarium references to earlier collections will be found in Oliver's (1948) paper on the Flora of the Three Kings Islands. From 1950 onwards the material has been deposited in the Otago University Herbarium. An asterisk (*) denotes a tree or shrub capable of contributing to the canopy or second layer of a forest, or of dominating in a closed scrub community.

Locally Endemic Species.

	G. I.	S-W. I.	N-E. I.	W. I.
**Alectryon grandis* Cheesem.	'89			
**Brachyglottis arborescens* Oliver	'45			'50
Carex elingamita Hamlin	'89	'50	'47	'51
**Coprosma macrocarpa* Cheesem.	'87	'89	'47	'51
**Cordyline kaspar* Oliver	'87	'87	'89	
Davallia tasmani Field	'87	'89	'55	'50
**Elingamita johnsoni* Baylis				'50
Hebe insularis (Cheesem.) Ckn.	'89	'89		
**Paratrophis smithii* Cheesem.	'87	'89	'47	'50
**Pittosporum fairchildii* Cheesem.	'87		'47	'50
**Plectomirtha baylisiana* Oliver	'45			
**Rapanea dentata* Oliver	'34			
Tecomanthe speciosa Oliver	'45			
Totals	10	4	4	6

Other Indigenous Species.

	G. I.	S-W. I.	N-E. I.	W. I.
Acaena anserinaefolia (Forst.) Druce ..	'89			
Acianthus fornicatus R. Br. var. *sinclairii* (Hook f.) Hatch	'87			
Adiantum affine Willd.	'87			
Adiantum hispidulum Swartz	'87			
Agropyrum kirkii Zotov	'47	'51	'55	
Angelica rosaefolia Hook	'87			
Apium prostratum Labill.	'87			
**Aristotelia serrata* (Forst.) Oliver	'89			
Arthropodium cirrhatum R. Br.	'87		'55	'51

	G. I.	S-W. I.	N-E. I.	W. I.
Arthropteris tenella J. Smith	'89			
Arundo kakaho Steud.	'87	'89		'89
Asplenium falcatum (Lam.) Copel.	'89			
Asplenium flaccidum Forst. f.	'87			
Asplenium lucidum Forst. f.		'89	'55	'51
Asplenium obtusatum Forst. f.	'87			
Astelia solandri A. Cunn.				'51
Bidens pilosa L.	'89			
Blechnum norfolkianum Christen.	'87	'52		
Blechnum procerum (Forst. f.) Labill ..	'87			
Caladenia carnea R. Br. var. *minor* (Hook f.) Hatch	'45			
Callitriche muelleri Sond.	'45			
Calystegia sepium (L.) R. Br.	'87			
Calystegia soldanella R. Br.	'51			
Calystegia tuguriorum (Forst. f.) R. Br. ..	'87			
Cardamine heterophylla (Forst. f.) Schultze	'87			
Carex breviculmis R. Br.	'87			
Carex lucida Hook f.	'45			
Carex solandri Hook f.	'89			
Carex ternaria Forst f.	'89			
Carex testacea Boott.	'87			
Carex virgata Hook f.	'87			
Centella asiatica (L.) Urban	'89			
Centipeda orbicularis Lour.	'34			
Cheilanthes sieberi Kze.	'47			
Chenopodium triandrum Forst. f.	'47	'50		'51
Cladium junceum R. Br.	'34			
Cladium teretifolium R. Br.	'87			
Cladium rubiginosum (Forst. f.) Druce ..	'45			
Clematis parviflora A. Cunn.	'87			
Clematis paniculata Gmelin	'87			
Colensoa physaloides Hook f.	'87	'52		
Collospermum hastatum (Col.) Skttsb. ..	'45			
**Coprosma australis* (A. Rich) Robn. ..	'87			
**Coprosma repens* A. Rich	'87	'50	'47	'89
**Coprosma rhamnoides* A. Cunn.	'28			
**Coprosma robusta* Raoul	'87			
**Coriaria arborea* Lindsay	'87			
**Corokia cotoneaster* Raoul	'87			
**Corynocarpus laevigata* Forst.	'89	'50	'47	'50
**Cyathea medullaris* Swartz	'87			
Cyperus ustulatus A. Rich	'89	'47	'55	'50
Cyclosorus pennigera (Forst. f) Copel ..	'34			
Danthonia semiannularis R. Br.	'89			
Daucus glochidiata (Lab.) Finsch	'89			
Deyeuxia billardieri (R. Br.) Kunth. ..	'89			
Deyeuxia crinita (L.) Zotov	'89			
Deyeuxia filiformis (Forst f.) Hook ..	'89		'47	'51
Dianella intermedia Endl.	'87			
Dichondra repens Forst.	'87		'47	
Disphyma australe (Forst. f.) Black ..	'87	'89	'47	'89
Doodia media R. Br.	'87			
Drosera auriculata Planch.	'89			
Echinopogon ovatus (Forst. f.) Beauv. ..	'87			
Eleocharis acuta R. Br.	'45			
**Entelea arborescens* R. Br.	'89			
Epilobium junceum Forst. f.	'89			
Epilobium nummularifolium A. Cunn. ..	'89			
Erechtites arguta (A. Rich.) D.C.	'89			
Erechtites quadridentata (Lab.) D.C. ..	'89			

	G. I.	S-W. I.	N-E. I.	W. I.
Gahnia gahniaeformis (Gaud.) Heller ..	'89			
**Gaultheria antipoda* Forst. f.	'89			
**Geniostoma ligustrifolium* A. Cunn. var. *major* Cheesem.	'89	'50		
Geranium dissectum L. var. *glabratum* Hook f.	'89			
Gnaphalium collinum Lab.	'87			
Gnaphalium japonicum Thunb.	'87			
Gnaphalium luteo-album L.	'89			
Haloragis erecta (Murr.) Schind	'87			
Haloragis procumbens Cheesem.	'87			
**Hedycarya arborea* Forst.	'87			
**Hiemerliodendron brunoniana* (Endl.) Skttsb.	'87	'50		'50
Hierochloe redolens R. Br.	'50			
Hydrocotyle americana L.	'87			
Hydrocotyle novae-zealandiae (Gandog.) Hill	'87			
**Hymenanthera novae-zelandiae* (A. Cunn.) Hemsl.	'87	'89	'47	'50
Hypolepis tenuifolia Bernh.	'89			
Ipomoea palmata Forst.			'47	
Juncus polyanthemus Buch.	'89			
Juncus vaginatus R. Br.	'34			
Lagenophora pumila (Forst. f.) Cheesem. ..	'87			
Lepidium oleraceum Forst. f. var. *frondosum* T. Kirk	'47	'89		
**Leptospermum ericoides* A. Rich.	'87	'89	'47	
**Leptospermum scoparium* Forst.	'87	'89[1]		
**Leucopogon fasciculatus* (Forst. f.) A. Rich	'89			
Leucopogon fraseri A. Cunn.	'87			
Lilaeopsis novae-zealandiae (Gandog.) Hill	'45			
Linum monogynum Forst. f.	'89			
**Litsaea calicaris* (A. Cunn) Hook f. ..	'87			
Lobelia anceps L.	'87		'55	
Luzula campestris D.C.	'89			
Lycopodium volubile Forst. f.	'87			
**Macropiper excelsum* (Forst. f) Miq. var. *major* Cheesem.	'87	'89	'47	'50
Mecodium sanguinolentum (Forst. f.) Presl.	'89			
**Melicope ternata* Forst.	'87	'89	'47	'50
**Melicytus ramiflorus* Forst.	'87			
**Meryta sinclairii* (Hook f.) Seem.	'46	'89	'89	'47
**Metrosideros excelsa* Gaertn.	'87	'50	'89	'47
Metrosideros perforatum (Forst.) Rich. ..	'87			
**Metrosideros robusta* A. Cunn.	'89			
Microlaena stipoides R. Br.	'47			
Microsorium diversifolium (Willd.) Copel ..	'87		'55	
Microtis unifolia (Forst. f.) Reich. ..	'87			
Muehlenbeckia australis (Forst. f.) Meissn.		'89	'47	
Muehlenbeckia complexa (A. Cunn.) Meissn.	'87	'50	'55	'51
**Myoporum laetum* Forst.	'28	'89	'47	'50
Myosotis spathulata Forst. f.	'87			
**Olea apetala* Vahl.	'34			'50
Oplismenus undulatifolius Beauv.	'87		'47	
Oxalis corniculata L.	'87			
Parietaria debilis Forst.	'87		'47	'51
Parsonsia heterophylla A. Cunn.	'45	'89	'47	
Paspalum scrobiculatum L.	'89			
Pelargonium inodorum Willd.	'89			

[1] Not subsequently recorded.

	G. I.	S-W. I.	N-E. I.	W. I.
Pellaea rotundifolia (Forst. f.) Hook ..	'89			
Peperomia urvilleana A. Rich.	'87		'55	
Phormium tenax Forst.	'87	'89	'55	'89
Phormium colensoi Raoul	'89			
Pimelea tomentosa (Forst.) Druce ..	'87			
**Planchonella costata* (D.C.) Lam var. *austro-montana* Lam.	'34		'55	'50
Plantago raoulii D.C.	'34			
Poa anceps Forst. f.	'87	'51	'55	'51
Poa seticulmis Petrie	'45			
Polystichum richardi (Hook f.) Sm. ..	'87			
**Pseudopanax lessonii* (D.C.) Goch.	'89			'50
Pteridium esculentum (Forst. f.) Ckne. ..	'87		'47	
Pteris comans Forst.	'87	'89		
Pteris tremula R. Br.	'87			
Pterostylis trullifolia Hook f.	'48			
Pyrrosia serpens (Forst. f.) Ching. ..	'87		'47	'51
Ranunculus hirtus Forst. f.	'89			
**Rapanea australis* (A. Rich.) Oliver ..	'46			
Rhagodia nutans R. Br.	'34	'89	'47	
Rubus cissoides A. Cunn.	'89			
Salicornia australis Forst. f.	'45	'89	'55	'51
Sarcochilus adversus Hook f.	'51			
Schizaea fistulosa Lab.	'45			
Schoenus foliatus (Hook f.) Blake ..	'89			
Scirpus cernuus Vahl.	'89		'55	'51
Scirpus inundatus (R. Br.) Poir	'45			
Scirpus nodosus Rottb.	'87			
Scleranthus biflorus (Forst.) Hook f. ..	'89			
Senecio lautus Forst. f.	'87	'89	'47	
Sicyos angulata L.	'87	'89	'47	'51
Siegesbeckia orientalis L.	'34			
Solanum aviculare Forst.	'89	'50	'55	'51
Solanum nodiflorum Jacq.	'45		'55	
Spergularia marginata Kittel	'87		'55	'51
Stellaria parviflora Hook f.	'89			
Tetragonia expansa Murr.	'89			
Tetragonia trigyna Hook f.	'89		'47	
Tetrapathaea tetrandra (D.C.) Cheesem. ..	'28			
Thelymitra longifolia Forst.	'87			
Tillaea sieberiana Schultz	'89			
Uncinia uncinata (L.) Kirk	'87			
Veronica plebeia R. Br.	'51			
**Vitex lucens* T. Kirk	'45			
Wahlenbergia gracilis (Forst. f.) Schrad.	'87	'47	'47	
Zoysia matrella (L.) Merrill	'45			
Totals	164	35	41	32

Naturalised Species.

	G. I.	S-W. I.	N-E. I.	W. I.
Aira caryophyllea L.	'34			
Aira praecox L.	'45			
Anagallis arvensis L.	'51			
Bromus catharticus Vahl.	'50			
Bromus mollis L.	'45			
Cerastium caespitosum Gilib.	'45			

	G. I.	S-W. I.	N-E. I.	W. I.
Chloris truncata R. Br.	'47			
Cirsium lanceolatum (L.) Hill	'45			
Cotula australis Sieb. Hook f.	'34			
Erechtites atkinsoniae F. Muell.	'51			
Erigeron canadensis L.	'50	'51		
Hypochaeris radicata Lab.	'34			
Juncus bufonius L.	'89			
Physalis peruviana L.	'47			
Phytolacca octandra L.			'55	
Polypogon monspeliensis	'47			
Solanum nigrum L.	'89	'50	'47	
Solanum nodiflorum Jacq. "var. *indicum*" ..	'55			
Sonchus oleraceus L.	'87			
Taraxacum officinale Weber	'45			
Trifolium glomeratum L.	'51			
Vulpia dertonensis (All.) Volk.	'45			
Totals	21	2	2	0

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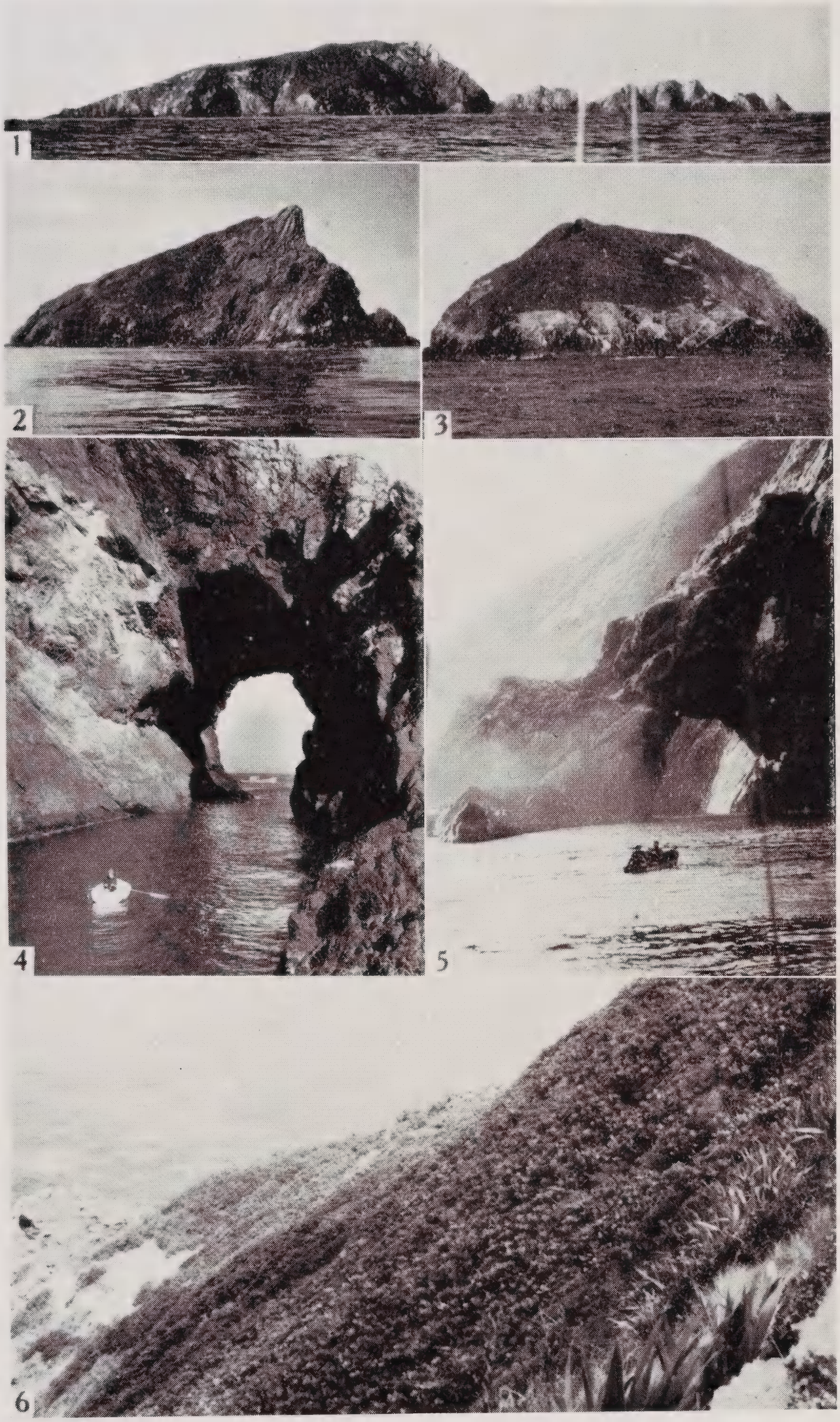

SOUTH-WEST ISLAND.

1. South-West I., Princes Rocks and West I. from the north-east.
2. and 3. South-West I. from the north and from the south-east.
4. and 5. The boat harbour from within and without.
6. Low puka forest on the western face.

SOUTH-WEST ISLAND.

7. Heavy puka forest on the north-east face.
8. Typical small clearing caused by death of puka. Temporary growth of *Solanum aviculare*. Puka seedlings in foreground.
9. A fallen puka is being replaced by a thicket of parapara which is outgrowing a puka seedling (foreground).

SOUTH-WEST ISLAND.

10. Puka forest interior. The floor is almost bare except for fallen leaves.
11. Corner of a relatively large windthrow in puka forest. Dead stems of *Solanum aviculare*, puka seedlings and bushes of *Coprosma macrocarpa*.
12. A puka tree establishing itself in ngaio-*Hymenanthera*-taupata scrub above the boat harbour.

NORTH-EAST ISLAND.

13. and 14. North-East I. from the west and from the south-east.

15. The main area of puka forest. M.-pohutukawa; L.-kanuka.

16. Small clearing in pohutukawa-puka forest occupied by bracken.

17

18

19

20

NORTH-EAST ISLAND AND WEST ISLAND.

17. North-East I. cliff-top vegetation. Mat of *Disphyma australe*, low bushes of kanuka, thicket of taupata, backed by small trees of kanuka and *Pittosporum fairchildii*.

18. and 19. West I. from the north-west and from the south-east.

20. The main area of vegetation on West I. L—landing place.

Pohutukawa x Rata No. 2

Variation in *Metrosideros* (MYRTACEAE) in New Zealand.

By R. C. COOPER,
Auckland Museum.

ABSTRACT.

Hybrid indices have been prepared for samples of pohutukawa *(M. excelsa)* and Rata *(M. robusta)* from seven localities and are compared with indices for herbarium collections. It is suggested that variation in the samples is due to introgressive hybridization. The importance of recent volcanic activity, as well as man and his animals in clearing the land and providing new habitats for plant hybrids, is stressed.

INTRODUCTION.

The Christmas tree or pohutukawa *(Metrosideros excelsa* Sol. ex Gaertn., formerly known as *M. tomentosa* Rich), is common on the coasts of northern New Zealand and so picturesque when in flower at Christmas that it is a feature of all illustrations of coastal scenery. The rata *(M. robusta),* is also very well known because its flowers brighten the forest canopy in both the North and South Islands and its role as a "killer" or "strangler" of the tree on which it begins life as an epiphyte has been described in all popular books on New Zealand plants. Almost every year variation in the time of flowering of pohutukawa is recorded in letters and news items in the press. Sometimes correspondents draw attention to the fact that the colour of the flowers of particular trees is lighter or darker than usual and a comparison of the leaves of a number of pohutukawa trees will show at once that they vary considerably. Less frequently the flowering of the rata is the subject of comment.

MATERIAL STUDIED.

Herbarium specimens of *Metrosideros* were obtained from the principal New Zealand herbaria:

The Cheeseman Herbarium, Auckland Museum (AK)
The Dominion Museum, Wellington (WELT)
The Botany Division, D.S.I.R., Christchurch (CHR).

I am indebted to the Directors of the Dominion Museum and Botany Division, D.S.I.R., Christchurch, for the loan of material.

Mass collections were gathered during the brief flowering season in December-January, and in the winter months of April-June when fruit are ripe. I am grateful to the following for collections: Mrs. P. H. Hynes and Mr. T. Wilson (Mayor Island), Mr. R. Ward (Taupo), and the N.Z. Forest Service (Westport). For each mass collection from Rangitoto Island, Blockhouse Bay and the Bay of Plenty district I gathered 35 specimens which is barely sufficient to show the pattern of variation. I have included the smaller collections from Mayor Island (Mrs. Hynes), Taupo and Westport as they are of great interest. I must also express thanks to Mr. J. Diamond for the loan of old maps and references to the early history of Blockhouse Bay-Te Whau district, and to the Royal Society of New Zealand for a grant from the Hutton Fund for travelling expenses.

The Measurement of Flowering Specimens.

Tables 1-5 below have been prepared for five characters of each flowering specimen. The five characters are defined for purposes of measurement:

1. "Leaf length" is the length of the leaf at the second node below the apex of a mature woody branchlet bearing the flowering shoot.
2. "Leaf width" is the width of the leaf measured for length.
3. "Internode length" refers to the third internode of the shoot.
4. "Stamen length" refers to the length of the stamens of a fully-open flower in the centre of a cyme.
5. "Calyx-tube length" refers to the length of the calyx of the flower measured for stamen length.

DISTRIBUTION OF VALUES FOR LEAF LENGTH.

Table I.

Numerical index cm.	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0+
Index value	1	1	2	2	3	3	4	4
HERBARIUM SPECIMENS:								
M. excelsa ..		1		4	8	4	2	1
x. *subtomentosa*		7	9	4				
M. robusta ..	7	14	6					
var. *retusa* ..	2							
MASS COLLECTIONS:								
Rangitoto Is.								
(Southern slope)		1	2	6	13	11	1	1
(Eastern slope)		3	5	5	10	9	2	1
Blockhouse Bay				6	14	11	4	
Mayor Is. ..						6	2	
Bay of Plenty			2	6	7	15	4	1
Taupo ..	1	3	6	3	1			
Westport ..	2	7	3					

DISTRIBUTION OF VALUES FOR LEAF WIDTH.

Table II.

Numerical index cm.	.6–1.0	1.1–1.5	1.6–2.0	2.1–2.5	2.6–3.0	3.1–3.5	3.6+
Index value ..	1	1	2	3	3	4	4
HERBARIUM SPECIMENS:							
M. excelsa ..			1	10	8	1	
x. *subtomentosa* ..		5	12	3			
M. robusta	4	19	4				
var. *retusa*			2				

MASS COLLECTIONS:							
Rangitoto Is.							
(Southern slope) ..		1	10	13	11		
(Eastern slope) ..		1	12	15	7		
Blockhouse Bay ..			2	16	15	2	
Mayor Is.			1	5	2		
Bay of Plenty ..			3	8	12	8	4
Taupo		5	8	1			
Westport	1	11					

DISTRIBUTION OF VALUES FOR INTERNODE LENGTH.

Table III.

Numerical index cm.	–.9	1.0–1.1	1.2–1.3	1.4–1.5	1.6–1.7	1.8–1.9	2.0–2.1	2.2–2.3	2.4+
Index value	1	1	2	2	3	3	4	4	4
HERBARIUM SPECIMENS:									
M. excelsa ..	1	1	1	3	5	3		2	4
x *subtomentosa*	3	4	6	1	1	3			2
M. robusta ..	4	4	9	6	2	2			
var. *retusa* ..							1	1	
MASS COLLECTIONS:									
Rangitoto Is.									
(Southern slope)	5	11	11	6	2				
(Eastern slope)	14	10	8	1	1	1			
Blockhouse Bay		3	6	8	7	6	5		
Mayor Is. ..					1	5	2		
Bay of Plenty		1	2	9	7	6	4	3	3
Taupo ..	2	4	5	2	1				
Westport ..	3	4	2	2		1			

DISTRIBUTION OF VALUES FOR STAMEN LENGTH.

Table IV.

Numerical index cm.	– .8	.9–1.2	1.3–1.6	1.7–2.0	2.1–2.4	2.5–2.8	2.9–3.2	3.3+
Index value	1	1	2	2	3	3	4	4
HERBARIUM SPECIMENS:								
M. excelsa ..			3	3	6	8		
x *subtomentosa*		5	9	6				
M. robusta ..	6	18	3					
var. *retusa* ..		2						
MASS COLLECTIONS:								
Rangitoto Is.								
(Southern slope)				2	7	18	8	
(Eastern slope)		2	2	3	6	13	9	
Blockhouse Bay				6	10	11	6	2
Mayor Is. ..					1	7		
Bay of Plenty				9	14	10	2	
Taupo ..		3	7	4				
Westport ..	6	6						

DISTRIBUTION OF VALUES FOR CALYX LENGTH.

Table V.

Numerical index cm.	.5	.6	.7	.8	.9	1.0	1.1	1.2+
Index value	1	1	2	2	3	3	4	4
HERBARIUM SPECIMENS:								
M. excelsa ..			2	5	6	5	2	
x. *subtomentosa*	1	5	10	4				
M. robusta ..	4	13	7	3				
var. *retusa* ..			2					
MASS COLLECTIONS:								
Rangitoto Is.								
(Southern slope)			1	1	6	18	7	2
(Eastern slope)	2	2	3	6	11	9	2	
Blockhouse Bay			1	8	8	11	4	3
Mayor Is. ..					1	6	1	
Bay of Plenty			1	5	5	11	11	2
Taupo ..	1	4	3	2	3	1		
Westport ..	1	8	3					

The Measurement of Fruiting Specimens.

Tables 6-10 below show the distribution of values for five similar characters of the fruiting specimens. The characters are defined:

1–3 "Leaf length," "Leaf width" and "Internode length," as in the flowering material.

4. "Capsule length" is the length of a ripe capsule, including the calyx and pedicel, in the centre of a mature fruiting branch.

5. "Capsule width" is the width of the same capsule measured at the calyx lobes.

DISTRIBUTION OF VALUES FOR LEAF LENGTH.

Table VI.

Numerical index cm.	2.0–2.9	3.0–3.9	4.0–4.9	5.0–5.9	6.0–6.9	7.0–7.9	8.0–8.9	9.0+
Index value	1	1	2	2	3	3	4	4
HERBARIUM SPECIMENS:								
M. excelsa ..				2	3	2	1	
x *subtomentosa*			1	1				
M. robusta ..	6	14						
MASS COLLECTIONS:								
Rangitoto Is.								
(Southern slope)			4	5	9	13	3	1
(Eastern slope)		2	5	15	9	3	1	
Blockhouse Bay				4	12	10	7	2
Mayor Is.								
(Hynes collection)				1	2	3	4	
(Wilson „)					7	14	10	4
Bay of Plenty				5	13	13	3	1
Taupo ..		2	3	1	1			
Westport ..	1	6	3					

DISTRIBUTION OF VALUES FOR LEAF WIDTH.

Table VII.

Numerical index cm.	.6–1.0	1.1–1.5	1.6–2.0	2.1–2.5	2.6–3.0	3.1–3.5	3.6+
Index value	1	1	2	3	3	4	4
HERBARIUM SPECIMENS:							
M. excelsa			1	2	5		
x *subtomentosa* . .		1	1				
M. robusta	7	13					
MASS COLLECTIONS:							
Rangitoto Is.							
(Southern slope) . .			9	15	6	5	
(Eastern slope) . .		4	7	14	8	1	1
Blockhouse Bay . .			1	15	12	6	1
Mayor Is.							
(Hynes collection) . .				4	4	2	
(Wilson „) . .				5	10	7	13
Bay of Plenty . .			1	13	15	6	
Taupo		4	3				
Westport	1	8	1				

DISTRIBUTION OF VALUES FOR INTERNODE LENGTH.

Table VIII.

Numerical index cm.	–.9	1.0–1.1	1.2–1.3	1.4–1.5	1.6–1.7	1.8–1.9	2.0–2.1	2.2–2.3	2.4+
Index value	1	1	2	2	3	3	4	4	4
HERBARIUM SPECIMENS:									
M. *excelsa* . .			1	1	2	2	1		1
x *subtomentosa*				2					
M. robusta . .	4	4	5	5	2				
MASS COLLECTIONS:									
Rangitoto Is.									
(Southern slope)	1	6	7	6	6	5	3		1
(Eastern slope)	3	4	15	8	4		1		
Blockhouse Bay				12	11	5	4		3
Mayor Is.									
(Hynes collection)				4	1	2	2	1	
(Wilson „)			3	6	5	3	3	3	12
Bay of Plenty			2	5	8	5	6	2	7
Taupo . .		2	3	2					
Westport . .	1	3	4	1		1			

DISTRIBUTION OF VALUES FOR CAPSULE LENGTH.

Table IX.

Numerical index cm.	.6–.7	.8–.9	1.0–1.1	1.2–1.3	1.4–1.5	1.6+
Index value	1	1	2	3	4	4
HERBARIUM SPECIMENS:						
M. excelsa			4	4		
x *subtomentosa*				2		
M. robusta	5	14	1			

MASS COLLECTIONS:						
Rangitoto Is.						
(Southern slope)		4	9	16	4	2
(Eastern slope)		4	17	12	2	
Blockhouse Bay		4	8	20	3	
Mayor Is.						
(Hynes collection)			2	4	4	
(Wilson „)				8	11	16
Bay of Plenty			12	16	5	2
Taupo	2	5				
Westport	2	4	4			

DISTRIBUTION OF VALUES FOR CAPSULE WIDTH.

Table X.

Numerical index cm.	.3–.4	.5–.6	.7–.8	.9–1.0	1.1–1.2	1.3+
Index value	1	1	2	3	4	4
HERBARIUM SPECIMENS:						
M. excelsa			2	4	2	
x *subtomentosa*			2			
M. robusta	13	7				
MASS COLLECTIONS:						
Rangitoto Is.						
(Southern slope)		1	4	15	15	
(Eastern slope)		1	6	20	7	1
Blockhouse Bay			3	10	18	4
Mayor Is.						
(Hynes collection)				1	8	1
(Wilson „)				3	28	4
Bay of Plenty				22	13	
Taupo	1	2	4			
Westport	9	1				

THE HYBRID INDICES.

The technique of preparing an index was described by Anderson (1949) and Sibley (1950), and has been discussed by Sibley (1954), Stebbins (1950, 1956) and others. Readers are referred to these papers for a description of the technique and a discussion of its value. For each of the characters measured four gradations have been indicated by the numbers 1, 2, 3 and 4. Any character expressed as fully as in rata is scored as "1," one expressed fully as in pohutukawa is scored as "4." Intermediates between the putative parents are scored either as "2" or "3." With five characters, each with a possible variation from 1 to 4, the summation of the characters of each specimen will fall between 5 and 20. Average hybrid numbers, being the mean of the index numbers, have then been calculated. In Fig. 1 the hybrid indices of flowering and fruiting specimens have been plotted as frequency diagrams and the average hybrid numbers are linked by vertical lines.

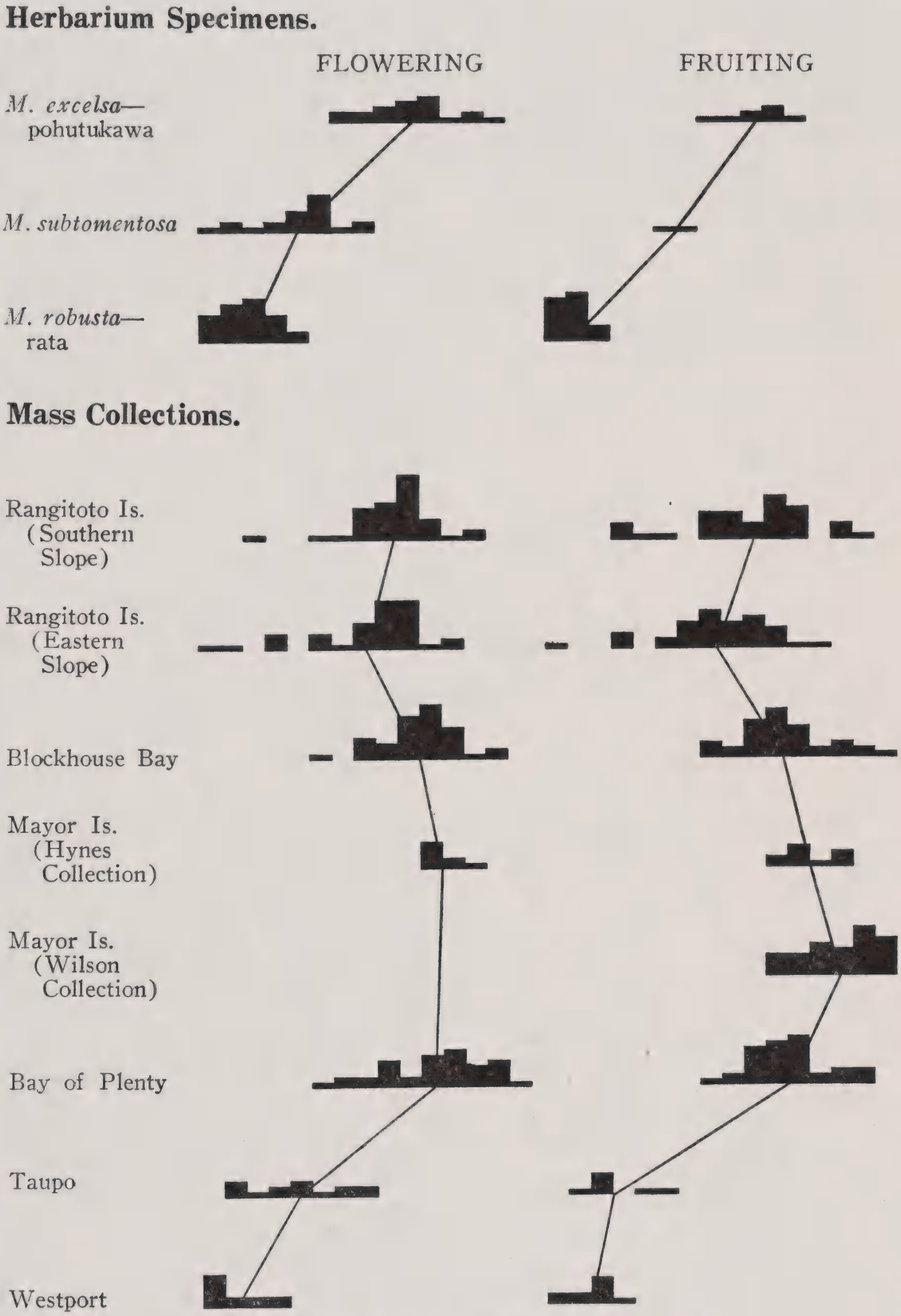

Fig. 1 Hybrid indices of Metrosideros.

HERBARIUM COLLECTIONS.

Most of the herbarium specimens which I have measured in this paper were identified by Kirk, Cheeseman, Cockayne, Petrie, Carse and Oliver, the leading New Zealand botanists of the past eighty years. These men recognised three main taxa: Pohutukawa *(M. excelsa,* formerly *M. tomentosa)*, rata *(M. robusta)*, and intermediates between these two species, now known as *M.* x *subtomentosa.* It is evident that they held almost similar views on the boundaries of the three taxa. Kirk labelled some specimens as "intermediates" which seem to belong to rata, but he was a keen observer who noted and drew attention to minor differences.

The range of the hybrid index numbers for the specimens is:

M. excelsa,	flowering specimens	11–18	
	fruiting specimens	12–16	
M. x *subtomentosa,*	flowering specimens	5–12	
	fruiting specimens	10–11	(only 2 sheets)
M. robusta,	flowering specimens	5–9	
	fruiting specimens	5–7	
var. *retusa*		10	(only 2 sheets)

The average hybrid index numbers are:

M. excelsa,	flowering specimens	14.2	
	fruiting specimens	14.2	
M. x *subtomentosa,*	flowering specimens	9	
	fruiting specimens	10.5	(only 2 sheets)
M. robusta,	flowering specimens	6.7	
	fruiting specimens	5.7	
var. *retusa*	flowering specimens	10	(only 2 sheets)

In the lists of specimens measured, appended to this paper, a specimen of *Metrosideros* has been included from the Three Kings Islands. Cheeseman (1891:421) recorded both *M. excelsa* and *M. robusta* from the group and remarked (ibid:418) that "pohutukawas are seen all round the island, but in small numbers, and dwarfed and stunted compared with their usual size on the mainland." The single collection from this population is included in the flowering specimens of *M. excelsa* as the stamen and calyx measurements are high. It has an index value of only eleven however and is dwarfed in leaf size. The other specimen of pohutukawa in this index with a value of eleven is from a cultivated plant at Rangaunu Harbour. It is most remarkable in possessing yellow flowers. If these two aberrant plants are eliminated, the obvious gap between the ranges of *M. excelsa* and *M. robusta* is widened by a further unit.

In the lists of specimens measured only two fruiting specimens of *M.* x *subtomentosa* have been included. In preparing the tables of measurements however I omitted several collections from Rangitoto Island, labelled as intermediates, as they appeared to be duplicates taken from the same plant. In the lists only one specimen of *Metrosideros* has been included from the West Coast of the North Island of New Zealand. Although it is well known that *M. excelsa* is common in many localities on the West Coast, there are no other herbarium collections. The existing herbarium material does not support the distribution of *M. excelsa* given by Cheeseman (1925:594) and does not indicate the variation present in different populations. With increasing land settlement and urban spread the remaining areas of indigenous vegetation are being reduced and modified very rapidly and there is an urgent need for the collection and preservation of representative samples of local plant populations.

MASS COLLECTIONS.

Rangitoto Island.—In a previous paper (Cooper 1954a:205) I mentioned that Rangitoto Island is a circular volcanic cone in the Hauraki Gulf at the entrance to Auckland Harbour. Cheeseman (1922:20) gives the following excellent description of the island: . . . "The whole of the island, except the cinder cone with its wonderfully well-preserved crater, consists of lava-streams with an average inclination of from 4° to 6°. Of the 5,600 acres which make up its area, more than 5,000 are occupied by these streams. Their surface is everywhere rough and difficult to traverse, being composed of masses of basalt of all sizes and shapes, rough and sharp-edged, and piled into ridges separated by irregular depressions or chasm-like holes. That the lava is comparatively recent is evident; and good judges have estimated that not more than five hundred or six hundred years have elapsed since the close of volcanic activity. No streams of water exist nor could such be expected, as the heaviest rainfall is at once absorbed by the porous surface. Seen from the distance the greater part of the island appears to be covered with a low scrubby forest, but once on shore it is found that there are considerable areas almost bare of vegetation except a few lichens and mosses . . ."

"The most abundant tree is the 'Christmas tree' or pohutukawa [*Metrosideros excelsa*] which probably constitutes four-fifths of the ligneous vegetation. . . ."

Millener (1953:17) has described the pohutukawa forest as follows:

"There are still large areas of broken lava separating rather well-defined 'islands' of vegetation. These 'islands' are coalescing and most are actively growing. . . . New 'islands' are constantly forming and provided the past rate of progress is maintained another century would see almost all of the bare areas on Rangitoto covered. . . ." He has counted up to 130 rings in cross-sections of old specimens of *M. excelsa* and considers that 150-200 years may be taken as the maximum age of any tree on the island. He has listed a considerable amount of evidence to support his thesis that the present vegetation is little more than two hundred years old.

Of the trees themselves Kirk (1879:450) has written as follows: "On the clay cliffs of the adjacent islands *Metrosideros tomentosa* attains a height of from fifty to eighty feet, with a trunk from two to three feet in diameter; in its natural condition it rarely flowers before attaining the height of from twenty to thirty feet, but on Rangitoto compact charming specimens one to three feet high were covered with brilliant flowers; scarcely a plant was to be seen over twelve feet in height, but nearly all were splendidly in flower. Near the base of the cone I observed two specimens of a peculiar form of this species, with the leaves and flowers of smaller size than in the typical form; the leaves glabrous and coriaceous, closely approaching *M. polymorpha* . . . .*Metrosideros robusta* was less common than its close ally but occasionally attained a greater size. . . ."

From these quotations the ecological conditions, age and dynamics of the vegetations may be glimpsed.

Local patterns of variation were noted in my previous paper on *Metrosideros* (Cooper 1954a:208) and I remarked that the prevalence of individuals closely resembling pohutukawa was greater in the sample of flowering specimens from the southern slope of the island than it is in the sample from the eastern side. In the sample from the eastern side of the island there are more individuals resembling rata. The same pattern of distribution is seen in mass collections of fruiting material. The ranges of the index numbers are:

	Southern slope	*Eastern slope*
Flowering specimens	7–17	5–16
Fruiting specimens	8–19	5–17

The average hybrid index numbers are:

	Southern slope	*Eastern slope*
Flowering specimens	13.4	12.1
Fruiting specimens	14	12.3

Forest still covered parts of Motuihe and Motutapu as recently as 1870 and it is probable that the parents of *M. excelsa* and *M. robusta* on Rangitoto Island came from these two adjoining islands.

Blockhouse Bay.—This name includes collections made between Wattle Bay and Te Whau Point on the northern coast of the Manukau Harbour. Colenso (1844:58) recorded his impressions of this district in February 1842 as follows:

". . . we left Otahuhu in a small canoe . . . and paddling down the Bay about four miles, landed on the northern side of the harbour, and continued our course by the muddy winding shores of Te Wau, a little cove, where the path leading to Kaipara commenced. . . . Continuing our journey, I found, in ascending the first clayey hill from the sea-side, a handsome shrubby *Dracophyllum*. . . . We travelled on, over open and barren heaths, in a northerly direction, till sunset, but saw nothing new in these dreary and sterile wilds, save the *Dracophyllum* already noticed. Bivouacked for the night in a little dell, nestling among the close growing *Leptospermum;* not a stick being anywhere within ken large enough to serve as a tent-pole. Next morning we recommenced our journey in rain, the country for several miles being much the same as yesterday. About noon we passed some forests of *Dammara,* which were burning fiercely; some person or persons who had lately gone that way having set fire to the brushwood, which soon caught the forests. This is a very common occurrence in New Zealand, and often thoughtlessly done by the natives on purpose to cause a blaze by which means many a noble forest of Pines has been entirely consumed. . . ."

Old Land Claim 321, being a plan of lands situated at Titirangi in the County of Eden, Parish of Titirangi, belonging to W. F. Porter et al, surveyed by J. B. O'Mealy and dated 15th September, 1846, shows the Titirangi forest margin on the land claimed by Miss Alice Porter, near Oatoru, about two miles west of Te Whau Point, and running westwards close to the present-day position of the forest margin in Glen Eden Valley.

From the quotation, the survey plan, and the abundance of kauri gum in the soil at Blockhouse Bay, it is evident that kauri forest covered the land around Te Whau Point sometime prior to 1842. It is also evident that most of the forest was cleared, probably by fire, before 1842. The land remained in scrub until recent times, and I have been unable to find any specimens of rata *(M. robusta)* in the remnants of coastal forest preserved at Waikokowhai Domain and Duck Creek reserve. Rata is usually a forest tree, beginning life as an epiphyte, and the destruction of the forest prior to 1842 accounts for its absence.

The specimens of pohutukawa *(M. excelsa)* collected for this study were obtained from the trees which cling precariously to the crumbling cliffs of sandstone which form the northern boundary of the Manukau Harbour.

Their range in the hybrid index is:

Flowering specimens	10-18
Fruiting specimens	12-20

The average hybrid index number is:

Flowering specimens	14.5
Fruiting specimens	15.3

Clearly they are close to pohutukawa and show less variation than the collections from Rangitoto Island.

Carse (1927:92) described hybrids between pohutukawa and rata as *M.* x *subtomentosa* from specimens collected at the "Bank of Whau (tidal creek)," Titirangi, and Lake Taupo. From the herbarium labels it seems that Carse found a single tree in 1925 on the Waitemata side of the Whau portage, several miles from Blockhouse Bay, on an inlet running towards Glen Eden. Colenso's description indicates that the kauri forest (which would include rata, *M. robusta*), was cleared from this district prior to 1842, and the persistence of an obvious hybrid nearly a century later is remarkable. It is significant that Carse commented that the Whau plant was nearer to *M. tomentosa* (pohutukawa = *M. excelsa*) while the Taupo plant was closer to *M. robusta.*

Bay of Plenty.—Kirk (1897:512), in a description of the road from Opotiki to Gisborne in 1897, wrote that "between Hawai and the Motu River . . . the shingle beach is the only road. . . . About the beach rise cliffs and hills, the former almost or quite perpendicular. To these cliffs the pohutukawa clings with wonderful persistency. . . . From the Motu there is again a bridle track skirting generally the tops of the cliffs, and running through forests of pohutukawa. . . . [About Te Kaha] the numbers and warlike habits of the old populations are constantly recalled to mind by deep trenches and banks cutting off all suitable points of land as fortifications. In many of the trenches pohutukawas a foot or more in diameter are now growing. . . ."

Today a good motor road follows the coastline through land cleared and grassed for sheep and dairy farming but in many places remnants of the original mixed forest persist on the hills and a narrow belt of pohutukawa forest fringes the shore. Although rata, *M. robusta,* is present in the mixed forest on the hills, few intermediates between it and pohutukawa are found and the variation present in the samples is very similar to that seen in the collections from Blockhouse Bay.

The range of variation is:

Flowering specimens	10-19
Fruiting specimens	12-19

The average hybrid index number is:

Flowering specimens	15.1
Fruiting specimens	15.6

Mayor Island.—Thomson (1926:210) has described Mayor Island, a volcanic cone 1,274 ft. in height situated in the Bay of Plenty about 23 miles north-west of Tauranga. Recent age is evidenced by the structure of the island, the presence of hot springs and the specific character of the lavas. The pohutukawa, *Metrosideros excelsa,* dominates the areas of forest on the island, except in the valley bottoms where mixed forest prevails. Atkinson and Percy (1956:29) have published a map of the island vegetation and a description of the plant communities. From their discussion of the history of the vegetation the following extracts are taken. ". . . Embedded high up in the south-eastern crater wall are the charred remains of logs. These have been buried by an eruption of pumice and subsequently compressed by a more recent lava flow. . . . The presence of the logs shows that Mayor Island was colonized by vegetation at least once, and possibly several times, between periods of volcanic activity. . . ."

"That most of the vegetation of the island's outer slopes is less than 150 years in age seems certain. Gold-Smith (1884) giving a general description of the island's vegetation, says: 'Common fern, tutu, tea-tree (very thick), koromiko and a little grass, form the ordinary vegetation, whilst the few clumps of trees consist of pohutukawa, mapou, manuka, rewarewa, akeake, whau or corkwood, pukapuka, and a few puriri, which, however, is of little value being very scattered and ruined by fire.' The occurrence of extensive fires in the past is also suggested by the wide distribution of the *Leptospermum/* emergent *Knightia* vegetation type which is characteristic of vegetational succession after fires on the mainland. This secondary status of the vegetation is not surprising, since the island is thought to have been densely settled by the Maori. . . . A more recent fire (after 1900) is mentioned by Bell (1914) who records that a large area of the western portion of the island was swept by fire which, however, did not enter the crater. . . ."

"Within the crater the *Leptospermum* vegetation of the eastern floor may be a regeneration stage after fire. . . . Elsewhere in the crater there is evidence of widespread fire. Charred stumps and pieces of charcoal are to be found at many widely scattered points through the forest. . . . Tissue macerations . . . of better preserved logs showed fibres similar to those of pohutukawa. Ring counts of *Leptospermum, Weinmannia* and pohutukawa taken at widely distributed points on the lower tholoid flows indicated ages between 40 and 70 years. The previous vegetation was therefore probably a pohutukawa forest, much of which was damaged or destroyed by a fire or fires which occurred at least 80 to 100 years ago. . . ."

From the excellent account of Atkinson and Percy it is clear that the pohutukawa forests of Mayor Island have been partly cleared away on a number of occasions by volcanic activity, Maori occupation, and more recent firing. The *Metrosideros* population is identified without hesitation however as *M. excelsa* (pohutukawa) and no other species of the genus has been recorded from the island.

The range of the index numbers of the collection gathered by Mrs. Hynes is:

Flowering specimens	15-17
Fruiting specimens	15-18

Average hybrid index numbers are:

Flowering specimens	15.5
Fruiting specimens	16.5

The range of index numbers in the collection made by Mr. T. Wilson is:

Fruiting specimens	15-20

The average hybrid index number is 17.9.

This material seems to represent pohutukawa *(M. excelsa)* growing under nearly optimum conditions. The absence of intermediate or hybrid forms is noteworthy and probably it is related to the absence of rata.

There is the possibility that the larger size and relative uniformity of the population is due to some climatic or edaphic factor peculiar to northern coastal islands. Cranwell and Moore (1935:310) remark that "there has been much speculation as to the significance of leaves of great dimensions and thick texture of several coastal islands," and consider that in some instances there is fairly definite correlation with environment while in at least one case genetical differences may be involved. Two or more species of *Metrosideros,* including always pohutukawa, are present on Little Barrier, Great Barrier, Hen and Chickens, Poor Knights and possibly the Three Kings Islands. The specimens of pohutukawa from these islands show some thickening of the leaves, but there is no obvious increase in leaf size. A few specimens appear to be typical hybrid intermediates between pohutukawa and rata. Only a few collections have been made however and most of the specimens lack flowers and fruits. It would be worthwhile to compare mass collections from these islands with similar population samples from Mayor and White Islands where only one species of *Metrosideros,* pohutukawa, has been collected.

Lake Taupo.—Hochstetter (1867:384) recorded that Motutaiko Island was said to be the only place in the Taupo district where the pohutukawa tree *(M. excelsa)* was still found. The island is halfway between the south and north ends of the lake and situated about a mile from the eastern shore. It has a long history of Maori occupation.

More recently further trees of the Taupo form of pohutukawa have been collected from the western shore of the lake at a locality known as Pohutukawa Bluff about two miles west of Te Karaka and Rangatira Point.

Hill (1905:458) describes Motutaiko as follows:

"The island . . . rises about 320 ft. above the present level of the lake. It is made up of some curious ropy lavas. . . . Capping the whole of the higher portion of the island is a deposit of pumice in places more than 60 ft. in thickness. . . . Along the beach further to the north-east of the island there are traces of submergence, for large timber trees can be seen in the water with their roots still fixed in the ground."

Kerry-Nicholls (1884:305) explored the Western Taupo in 1883 and found that a broad, open tableland, averaging in height from 1700 to 2200 feet above sea level, extended far inland along the whole western shore of Lake Taupo. Much of this tableland was covered with native grasses, save the lower hills, which were mostly clothed with fern. In the map appended to the narrative of his journey the country about Te Karaka and Rangatira Point is noted as "fern ridges."

Fletcher (1915:71) recorded that ". . . within the memory of men still living the old forests extended over a much greater area than at present. There is an old Maori now living at Oruanui who remembers the time when the Oruanui Forest extended right on to the edge of the Taupo Lake at Rangatira. The proof of this was to be seen all over that portion of the country up to the last few years. The remains of the burnt logs, mostly *Podocarpus totara,* were collected by the European residents of Taupo and used as firewood. . . ." Fletcher considered that the former large forests were destroyed by fires set by the Maori people to stimulate the growth of fern root, one of their staple foods in pre-European times.

Ward (1922:280) recorded old totara tree stumps submerged in varying depths of water, in all the bays on the North Shore of Lake Taupo, and considered that they had been brought there by comparatively recent subsidence along the shore. He was writing of the 1922 earthquakes which were connected with a subsidence of fully 12 feet in the strand-line of Whakaipo and Whangamata Bays (Grange 1932:141). These bays lie immediately west of Pohutukawa Cliffs.

From these quotations it is evident that both Motutaiko and Pokutukawa Cliffs have been subject to interference by man and by natural forces in recent times.

The range of index numbers is as follows:

Flowering specimens	6-12
Fruiting specimens	6-10

The average hybrid index number is:

Flowering specimens	8.9
Fruiting specimens	7.6

Clearly the population is very close to rata *(M. robusta)*, and would be included in that species if the specimens did not show such marked variations in size and the occasional presence of tomentum on the underside of the leaves. Large leaves and white tomentum beneath the leaves are two distinguishing characters of adult pohutukawa *(M. excelsa)*.

Westport.—The specimens in this collection were gathered at Te Kuha, Island Creek, Birchfield and Reefton. Te Kuha is situated on the lower Buller Gorge, six miles from Westport. It was a small Maori settlement until about 1890. Island Creek enters the Buller River on the south bank a short distance downstream from Te Kuha. Birchfield is a settlement 13 miles north of Westport near the coast. Reefton is situated on the Inangahua River, a tributary of the Buller. All these localities have a history of gold mining and sawmilling since European settlement began about 1860. The range of variation in the hybrid index is:

Flowering specimens	5-8
Fruiting specimens	5-8

The hybrid index numbers are:

Flowering specimens	6
Fruiting specimens	6.5

These values are the lowest obtained from the mass collections and match those for herbarium specimens of rata, *M. robusta*. The southern limits of the pohutukawa, *M. excelsa*, are as follows:

West Coast of the North Island—"mouth of the Mimi River" (Kirk 1889:238).

East Coast—"A headland north of Anaura Bay" (Moore—personal communication).

Kirk (1889:238) wrote that he had been assured "that this species is plentiful between Riwaka and Waitapu, on the southern side of Cook Strait . . . and that one or two trees are to be found on a point between Takaka mud-flats and Collingwood." There is a single sterile representative of this South Island population in the herbarium of the Dominion Museum, Wellington (Kirk No. 1023), and its measurements fall within the range of variation of herbarium collections of *M. robusta*. Can the Westport collection be regarded as typical *M. robusta?* Pohutukawa has reached its southern limit far to the north and its influence is absent. It is noticeable however that in several of the specimens in the collection the calyx tube is markedly elongated. This is a character of *M. lucida*, the southern rata, which is abundant from sea level to 2000 feet in the Westport district (Townson 1907:409). *Metrosideros robusta* has a similar distribution and it is possible that the collections include hybrids between the two but insufficient material is available for study.

DISCUSSION.

It would be difficult to demonstrate that the variation in the samples from Rangitoto Island is due to hybridization by direct genetic experiments as the time which elapses from seed to flowering for both pohutukawa and rata is more than a decade. It has been suggested to me that this difficulty could be overcome by raising seedlings and determining the proportions of pohutukawa and rata present from leaf characters. De Berg (1945:64) considered that most of the seed of the Rangitoto plants was fertile. Kirk (1889:237) recorded however that the leaves of young pohutukawas are perfectly smooth and closely resemble those of *M. robusta*, and De Berg (ibid:42) was unable to distinguish juvenile plants of pohutukawa from rata until they were about four years of age. Then the pohutukawas developed larger leaves with white tomentum on the underside. The rata leaves remained smaller and glabrous.

Efforts to obtain chromosome numbers have not been successful and possibly the numbers would not throw any light on the problem. This was our experience with *Pittosporum* where Rattenbury (personal communication) obtained the same chromosome number for all the species. For these reasons other methods have been used to study and describe the variation in the population.

In a previous paper on the *Metrosideros* of Rangitoto Island (Cooper 1954a) I presented pictorialized scatter diagrams which were similar in appearance to those of known hybrid populations. This confirmed the views of Cockayne, De Berg and others that pohutukawa and rata have crossed freely to produce the present population. In the tables and indices of this paper the measurements and values of reproductive characters are very similar to those for vegetative characters. For example the values for stamen length or capsule width in each population are similar in distribution to the values for leaf length. If the values for stamen length have a wide range those for leaf length also have a wide range. If the values for stamen length are low in the possible scale those for leaf length also approach the rata end of the distribution. In the circumstances I consider that dwarfing due to severe habitat conditions is not an important cause of the variation in the samples. A possible exception to this is seen in the herbarium material where a single specimen of pohutukawa from Great Island in the Three Kings group has the large flowers which are characteristic of *M. excelsa* and small leaves typical of an intermediate form. In the discussion of this collection however I mentioned that Cheeseman described the pohutukawa trees on the island as stunted and dwarfed.

Before considering the results obtained it must be emphasized that the hybrid index is a very crude device. One very serious fault of the index is that it is based on the measurements of comparatively small specimens which may not represent the individual trees from which they are taken. In some of the sampling a deliberate choice was made of the specimen to represent each tree but in other cases any scrap that could be gathered was taken. Another fault is that equal value is given to each character but it has been impossible to devise a system of weighting. I have been unable to decide whether a character such as internode length or leaf width is of greater or lesser value than calyx length.

The index enables only qualitative or verbal comparison to be made, but further definition of the properties of the frequency distributions does not seem worthwhile in view of the faults mentioned.

Despite these deficiencies, the classification of the measurements has made them comprehensible. The indices for the flowering specimens show definite patterns of variation and these are repeated in the diagrams of fruiting material.

The extent to which further samples should be drawn from each population is a problem that I have been unable to decide. The Rangitoto population has been sampled on the southern and eastern slopes of the island and local patterns of variation have been found. Further sampling of the population in the same localities has confirmed these patterns. They are sufficiently alike to give a picture of the variation on the island and further sampling of the population does not seem necessary for the purpose of this paper.

There are many more intermediates of hybrid origin in the samples from Rangitoto Island than in those from Blockhouse Bay and there seems to be a relationship between this and the history of the two populations. In the absence of rata any intermediates there may have been at Blockhouse Bay have backcrossed to pohutukawa with consequent loss of rata characteristics or have left no progeny.

Both Rangitoto and Mayor Islands are recent volcanic cones and both have a history of recent volcanic activity, fires and human interference, but there is a marked difference in the patterns of variation of the samples from each population. The absence of rata from Mayor Island seems to be the explanation of these differences.

At Taupo the population commonly called "pohutukawa" is very close to rata. Possibly the present appearance of the plants is due to a past cross between rata and pohutukawa and subsequent backcrossing to rata. The nearest population of typical pohutukawa is that at the Rotorua lakes and apparent intermediate forms have been collected at Lake Tarawera between Rotorua and Taupo. Past plantings by Maoris may be a factor in the present distribution.

The Bay of Plenty population has few intermediates although pohutukawa forest and mixed forest containing rata adjoin in many places. The absence of intermediates here is remarkable but the pohutukawa forest fringing the coast is relatively undisturbed and the areas cleared by Maori and pakeha settlement have been maintained in grassland.

Anderson (1953:289) has pointed out that the presence of hybrids and their significance in evolution is closely connected with the history of the land. He remarks that "the dependence upon suitable ecological niches, if hybridization is to have any important evolutionary consequence, has been demonstrated in various field studies. . . ." "All the evidence from sympatric introgression shows that such species are kept apart by ecological and internal barriers of various kinds. In old, well-established floras, until the ecological barriers are broken down, there will be little or no introgression no matter how weak the internal barriers because there are few intermediate niches for the first generation hybrids and virtually no niches for the various new recombinations produced in the second generation and in backcrosses. When man 'hybridizes the habitat,' as by burning, ditching, pasturing, tilling the soil, he produces new, and frequently relatively unoccupied niches in which introgressants are at a selective advantage. It is significant that most of the earlier field studies of hybridization were made at places where the ecological pattern of the environment had been grossly disturbed by man and his domesticated animals. This is particularly true of New Zealand, where the frequency of hybridization is so high as to have led to extensive studies by various naturalists (see Allan, 1937, for a review of the literature). The situation there may be briefly interpreted as follows: New Zealand had essentially an island flora which had evolved not only in the absence of man, but essentially in the absence of any higher vertebrates. The arrival of the Maori in the fourteenth century brought in fire, which they used deliberately in clearing fields for cultivation. These burns were usually deserted after a few years and abandoned to the native vegetation which moved in. White colonists arrived five hundred years later, bringing with them pigs, horses, chickens, cattle and sheep, and increasingly intensive methods of cultivation. Whenever a pig first rooted in the forest, whenever a piece of forest land was first burned over by the Maori, whenever a herd of cattle were loosed in a semi-wooded area, they were attacking a flora which not only had no association with such marauders throughout its history, but had even had no experience of much milder vertebrates. When pigs rooted in the turf, when cattle browsed upon vegetation, when trees were felled, new ecological niches were created which were outside the evolutionary experience of the entire New Zealand flora. Hybrids which had previously been spawned with a low frequency now had strange new habitats in which they and their variable backcrosses could grow without intense competition."

The extent of hybridism in the New Zealand flora is not known but a casual glance at the literature shows that there is much truth in Anderson's remarks. For example, the discovery of beech hybrids was made by Cockayne in 1921 when in the forest between Elfin Bay and Rere Lake (near the head of Lake Wakatipu), he "found everywhere such extreme diversity amongst adult trees, saplings and seedlings of the beeches . . . that the idea of excessive hybridization was at once suggested" (Cockayne 1926:10). In an introduction to Lotsy's lectures on evolution (Lotsy 1925:v) Cockayne described the find again as follows:

"It was in April 1921 that I had the good fortune while sauntering one evening in the beautiful forest near Elfin Bay, Lake Wakatipu, to accidentally find as the new growth, where certain trees had been burnt, a most diverse assemblage of sapling and seedling southern beeches (*Nothofagus*), few of which were alike, the great majority matching no known species. This at once suggested hybridization. . . ." The significant part of this story is that hybrids were found *where trees had been burnt*. While the role played by fire and human and animal interference in clearing the vegetation from the land and providing new and varied ecological niches can be substantiated, I think that this study indicates that recent geological change may be an important factor. If after land is cleared by volcanic eruption or other cause two potential parent species are present a diverse hybrid progeny may be expected. This is obviously the history of the pohutukawa x rata swarm on Rangitoto. It is also, I think, the history of the puzzling abundance of hybrid forms of *Dracophyllum* and *Gaultheria* on the central volcanic plateau.

In southern localities of New Zealand, where there has been no recent volcanic activity, the periglacial zone, described by Willett (1950:18), may have provided new habitats for plants of hybrid origin.

Table I.

Flowering Specimens of *Metrosideros* in New Zealand Herbaria.

Column 1. Leaf length, 2. Leaf width, 3. Internode length, 4. Stamen length, 5. Calyx length, 6. Hybrid index number.

M. excelsa Sol. ex Gaertn. ("Pohutukawa")

Herbarium	Collector	Locality	1	2	3	4	5	6
AK	Banks & Solander, —.		8.5	2.8	3.3	2.8	1.0	17
AK	Baylis, 22811.	Great Is., Three Kings Group	3.2	1.8	1.6	2.5	.8	11
AK	Lieth, 23335.	Rangiputa	5.6	2.5	2.6	2.4	.8	14
AK	Matthews, 5583.	Rangaunu Harbour	6.1	2.3	.9	1.4	.7	11
CHR	Zotov, 85008,	Paihia	6.0	2.3	1.7	2.7	.9	15
AK	Moore & Cranwell, —.	Tunnel Is., Poor Knights Group	5.6	2.6	1.7	2.4	.9	14
WELT	Kirk, 1013.	Blind Bay, Great Barrier Island	6.5	2.4	1.9	2.2	1.0	15
WELT	ex Col. Mus. herb., —.	Kawau	6.5	2.6	2.3	1.9	1.0	15
WELT	Mrs. Petrie, 5575.	Motutapu	9.2	2.7	1.5	2.8	.9	15
AK	Kirk, 184.	Waitemata	7.7	2.8	2.5	2.6	1.1	17
WELT	Kirk, —.	"	6.3	2.9	3.6	2.2	.9	16
WELT	Kirk, —.	"	7.2	2.6	1.2	2.4	.9	14
WELT	Petrie, —.	Rangitoto Is.	6.5	2.4	1.0	2.2	1.0	13
WELT	Petrie, —.	"	7.7	2.2	1.7	1.6	.7	13
AK	Cheeseman, 5584.	Orakei	6.1	2.9	1.9	2.7	1.0	15
WELT	Petrie, —.	Auckland	5.8	2.5	1.7	1.8	.8	12
AK	Cooper, 36092.	Blockhouse Bay	8.3	3.2	1.8	2.8	1.1	18
WELT	Petrie, —.	Ruth's Is., Firth of Thames	5.7	2.5	2.2	2.0	.8	13
WELT	Petrie, —.	Thames	7.5	2.5	1.5	2.7	.9	14
WELT	Oliver, —.	Kawhia	6.6	2.5	1.5	1.6	.8	12

M. x *subtomentosa* Carse

Herbarium	Collector	Locality	1	2	3	4	5	6
WELT	Kirk, 1011.	Great Omaha	5.1	2.0	1.2	1.6	.7	10
CHR	Hutson, 59816.	Hills above Port Charles	4.9	1.7	1.2	1.8	.7	10
AK	Cheeseman, 5574.	Rangitoto Is.	3.4	1.6	1.8	1.3	.7	10
AK	Cheeseman, 5575.	,,	3.2	1.5	2.4	1.2	.8	9
AK	Cheeseman, 5576.	,,	3.4	1.4	.7	1.2	.7	6
WELT	Cheeseman, —.	,,	4.8	1.9	1.8	1.6	.8	11
AK	Cranwell, a.	,,	5.2	1.8	1.5	1.3	.7	10
AK	Cranwell, b.	,,	3.6	1.7	1.2	1.6	.7	9
AK	Cranwell, c.	,,	5.2	2.4	2.4	1.8	.6	12
AK	Cranwell, d.	,,	4.5	1.7	1.3	1.7	.7	10
AK	Kirk, 5593.	,,	4.2	1.6	.6	1.5	.7	9
AK	Kirk, 29481.	,,	3.5	1.4	1.0	1.2	.5	5
WELT	Kirk, 1022.	,,	3.4	1.4	.8	1.5	.6	6
WELT	Carse, —.	Tidal Creek, Whau River	4.1	2.2	1.8	1.9	.8	12
WELT	Aston, —.	Mt. Tarawera	4.6	1.3	1.7	1.4	.7	10
WELT	Aston, —.	,,	4.6	1.9	1.1	1.2	.8	8
CHR	Hill, 11565.	Rocky shores of Lake Taupo	4.3	1.6	1.2	1.5	.6	9
CHR	Hill, —.	,,	3.9	2.1	1.3	2.0	.7	10
WELT	Petrie, —.	Shores of Lake Taupo	5.4	1.9	1.1	1.2	.6	7
AK	Cheeseman, 5585.1.	Motutaiko Is.	4.9	1.6	1.1	1.8	.6	8

M. robusta A. Cunn. ("Rata")

Herbarium	Collector	Locality	1	2	3	4	5	6
AK	Matthews, 2531.	Ahipara	2.6	1.1	1.7	1.1	.5	7
AK	Matthews, 524.	Kaitaia	3.5	1.4	1.9	1.3	.7	9
WELT	Kirk, 159	Whangaroa	3.6	1.2	1.2	1.0	.7	7
WELT	Kirk, 1019.	Bay of Islands	2.8	1.1	1.1	.8	.5	5
WELT	Petrie, 5580.	8 miles north of Opanaki, Kaihu-Taheke Rd.	2.7	.9	1.4	.7	.6	6
WELT	Petrie, —.	Kaihu, north of Dargaville, c. 1000 ft.	2.7	1.0	1.4	.8	.6	6
AK	Kirk, 183.	Mahurangi	3.5	1.3	.8	1.0	.7	6
AK	Kirk, 11448.	,,	4.4	1.3	1.2	1.3	.7	9
WELT	Kirk, —.	,,	4.3	1.3	1.2	1.1	.7	8
WELT	Kirk, 1014.	,,	4.4	1.3	1.2	.8	.6	7
WELT	Petrie, 13.	near Auckland	3.0	1.2	1.2	1.0	.7	7
WELT	Petrie, 5587.	Rangitoto Is.	3.6	1.4	.8	1.1	.5	5
WELT	Petrie, —.	,,	4.1	1.4	1.2	1.2	.7	8
WELT	Cheeseman, —.	,,	3.4	1.6	1.3	1.0	.6	7
WELT	Cheeseman, —.	Waitakerei	3.2	1.3	.8	1.0	.6	5
AK	Petrie, 5578.	Opaheke	2.5	.9	1.3	.8	.6	6
WELT	———	Mt. Karioi	3.4	1.6	1.5	.6	.5	7
CHR	Zotov, 4201.	Waingawa River	3.8	1.7	1.5	1.2	.6	7
WELT	Hurie, —.	Mt. Matthews	3.6	1.7	1.1	.9	.6	6
WELT	Aston, —.	Kapiti Is.	3.0	1.3	1.0	1.1	.6	5
CHR	Atkinson, 11557.	York Bay, Wellington	2.4	.8	.6	1.0	.6	5
CHR	Poole, 68486.	Hills above Eastbourne	4.0	1.2	1.5	1.1	.8	8
WELT	Buchanan, —.	Wellington	3.6	1.2	1.2	.9	.8	7
WELT	Kirk, 1018.	,,	3.1	1.4	1.6	1.1	.8	8
WELT	Kirk, —.	North Is.	3.5	1.4	1.8	1.3	.6	8
WELT	Kirk, 5586.	,,	2.8	1.1	1.5	1.2	.6	6
CHR	Mackay, 60065.	New River, 8 miles south of Greymouth	4.0	1.5	1.0	1.2	.6	6

M. robusta A. Cunn. var *retusa* T. Kirk

Herbarium	Collector	Locality	1	2	3	4	5	6
AK	Kirk, 5582.	Lowry Bay	2.6	1.6	2.3	1.1	.7	10
WELT	Kirk, 1021.	,,	2.4	1.6	2.1	1.2	.7	10

Table II.

Collection of flowering specimens from the southern slope of Rangitoto Island between reference points 377666 and 375674 of the N.Z. Lands and Survey Motutapu map of 1943 (1:25,000 series).

The measurements for leaf length, leaf width, internode length, stamen length and calyx length of this collection were published in my first paper on *Pohutukawa* x *Rata* in *Rec. Auck. Inst. Mus.* 4(4):210, 1954. The hybrid index numbers for the specimens are:

No.	Hybrid Index Number	No.	Hybrid Index Number	No.	Hybrid Index Number
1	.. 13	13	.. 17	25	.. 13
2	.. 15	14	.. 13	26	.. 14
3	.. 14	15	.. 14	27	.. 13
4	.. 12	16	.. 17	28	.. 13
5	.. 14	17	.. 14	29	.. 12
6	.. 14	18	.. 14	30	.. 13
7	.. 15	19	.. 16	31	.. 14
8	.. 12	20	.. 15	32	.. 10
9	.. 7	21	.. 13	33	.. 14
10	.. 12	22	.. 12	34	.. 11
11	.. 14	23	.. 14	35	.. 15
12	.. 12	24	.. 14		

Table III.

Collection of flowering specimens from the eastern slope of Rangitoto Island between reference points 382688 and 394692 on the N.Z. Lands and Survey Motutapu map of 1943 (1:25,000 series).

The measurements for leaf length, leaf width, internode length, stamen length and calyx length of this collection were published in *Rec. Auck. Inst. Mus.* 4(4):211, 1954. The hybrid index numbers are:

No.	Hybrid Index Number	No.	Hybrid Index Number	No.	Hybrid Index Number
41	.. 14	53	.. 13	65	.. 16
42	.. 5	54	.. 16	66	.. 13
43	.. 13	55	.. 14	67	.. 14
44	.. 8	56	.. 6	68	.. 14
45	.. 10	57	.. 14	69	.. 14
46	.. 12	58	.. 14	70	.. 12
47	.. 13	59	.. 15	71	.. 14
48	.. 13	60	.. 14	72	.. 10
49	.. 8	61	.. 13	73	.. 12
50	.. 13	62	.. 10	74	.. 12
51	.. 12	63	.. 8	75	.. 11
52	.. 13	64	.. 13		

Table IV.

Collection of flowering specimens from Blockhouse Bay between reference points 245503 (Wattle Bay) and 224508 (Te Whau Pt.) on the N.Z. Lands and Survey Titirangi map of 1944 (1:25,000 series).

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Stamen length
5. Calyx length
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
81 ..	6.7	2.1	2.1	2.3	.9	16	83 ..	8.1	2.6	1.6	3.3	1.2	18
82 ..	5.7	2.3	1.5	2.3	.8	12	84 ..	7.1	2.6	1.6	2.4	1.0	15

85	6.4	3.0	1.3	3.3	.9	15	101	6.5	3.0	1.7	2.0	1.0	14
86	7.3	2.5	1.4	2.7	1.0	14	102	7.4	2.9	1.2	2.8	.9	14
87	5.7	2.8	1.5	3.0	1.0	14	103	7.3	2.4	1.8	2.3	.9	15
88	5.0	2.9	1.3	3.1	1.1	15	104	7.1	2.6	1.5	2.3	.8	13
89	8.1	3.1	1.8	2.6	.8	16	105	7.3	2.9	1.7	2.7	.9	15
90	8.9	3.0	1.6	2.7	1.0	16	106	6.0	2.3	1.3	1.7	.8	12
91	7.2	2.2	2.0	3.1	1.0	17	107	7.0	2.0	1.1	1.9	.8	10
92	7.1	2.5	2.0	2.9	1.1	18	108	6.5	3.5	1.8	2.5	1.0	16
93	6.8	2.5	1.4	2.6	1.1	15	109	6.1	2.8	2.1	2.1	1.0	16
94	6.6	2.3	1.0	2.9	.9	14	110	7.4	2.5	2.0	2.3	.8	15
95	6.4	1.8	1.9	2.9	1.2	16	111	6.9	2.6	1.8	2.8	1.0	15
96	5.1	2.3	1.7	2.5	.9	14	112	6.5	2.9	1.4	2.3	1.1	15
97	5.7	2.1	1.6	2.1	1.0	14	113	6.6	2.5	1.2	2.0	.7	12
98	6.0	2.3	1.1	2.4	.9	13	114	7.4	2.6	1.4	2.0	.8	12
99	6.8	2.3	1.3	2.5	1.2	15	115	5.0	2.4	1.9	2.6	1.0	14
100	8.0	2.7	1.4	1.8	.8	13							

Table V.

Collection of flowering specimens gathered by Mrs. P. Hynes on Mayor Island.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Stamen length
5. Calyx length
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
121	7.7	2.2	2.1	2.7	1.0	16	125	8.3	2.9	2.1	2.5	1.0	17
122	7.8	2.2	1.9	2.5	1.0	15	126	7.6	2.3	1.7	2.3	.9	15
123	7.4	2.0	1.8	2.8	1.1	15	127	8.2	2.6	1.9	2.6	1.0	16
124	7.7	2.3	1.8	2.7	1.0	15	128	7.8	2.2	1.8	2.6	1.0	15

Table VI.

Collection of flowering specimens from the Bay of Plenty between reference points N46-6521 (Opotiki Beach) and N52-2359 (Whanarua Bay) on the N.Z. Lands and Survey four-mile sheet No. 7, 1942.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Stamen length
5. Calyx length
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
131	7.4	3.0	1.4	2.3	1.1	15	149	7.6	3.6	2.5	2.0	1.1	17
132	5.9	2.4	1.5	2.2	1.0	13	150	8.1	3.0	2.2	2.1	1.1	18
133	4.1	2.0	1.3	1.8	.8	10	151	6.7	2.7	1.4	2.2	1.0	14
134	7.3	2.6	2.0	2.6	1.0	16	152	6.8	2.3	1.6	2.1	.9	15
135	8.3	2.6	1.7	2.7	1.2	17	153	5.5	2.9	1.3	2.6	.9	13
136	5.8	2.3	1.9	1.9	1.1	14	154	6.7	2.5	1.4	2.0	.9	13
137	6.8	2.3	1.7	2.2	1.0	15	155	5.8	2.6	1.8	1.9	.9	13
138	7.5	3.1	2.7	2.4	1.0	17	156	7.2	3.2	2.3	2.2	1.2	18
139	4.1	2.2	1.1	2.1	.8	11	157	7.9	3.9	1.5	2.7	1.1	16
140	6.2	3.4	1.7	2.6	1.0	16	158	8.2	3.1	2.2	2.9	1.0	19
141	5.3	2.0	1.4	2.7	.8	11	159	7.1	3.1	1.9	3.0	1.1	18
142	7.3	2.9	2.1	2.5	1.0	16	160	7.1	3.1	2.1	2.0	.9	16
143	6.8	3.4	1.5	2.3	1.0	15	161	7.2	2.4	1.9	2.0	1.1	15
144	7.6	1.9	1.6	2.0	.8	12	162	8.7	3.0	1.4	2.7	1.1	16
145	5.5	2.5	1.8	2.4	.7	13	163	6.9	3.3	1.6	2.4	1.1	17
146	9.8	3.6	2.0	2.5	1.0	18	164	7.9	2.6	1.9	2.2	1.0	15
147	7.9	2.9	1.4	1.9	.8	12	165	7.9	3.8	3.6	2.7	1.1	18
148	7.7	3.0	1.6	2.3	1.1	16							

Table VII.

Collection of flowering specimens gathered by Mr. R. H. Ward at Lake Taupo.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Stamen length
5. Calyx length
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
171 ..	4.6	1.6	1.3	1.2	.6	8	178 ..	4.4	1.6	1.6	1.8	.9	12
172 ..	2.5	1.1	1.0	1.0	.7	6	179 ..	4.3	1.7	1.3	2.0	1.0	11
173 ..	5.2	1.8	.9	1.6	.7	9	180 ..	5.6	2.0	1.2	2.0	.9	11
174 ..	4.7	1.6	1.3	1.5	.6	9	181 ..	6.4	1.9	1.1	1.5	.7	10
175 ..	3.4	1.3	1.4	1.1	.6	6	182 ..	3.5	1.2	1.4	1.5	.8	8
176 ..	4.1	1.2	.9	1.3	.5	7	183 ..	5.4	2.5	1.3	1.9	.9	12
177 ..	3.4	1.3	1.0	1.6	.6	6	184 ..	4.3	1.8	1.1	1.6	.8	9

Table VIII.

Collection of flowering specimens gathered by the N.Z. Forest Service near Westport.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Stamen length
5. Calyx length
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
191 ..	3.2	1.3	1.1	.7	.5	5	197 ..	4.3	1.5	1.4	1.0	.6	7
192 ..	3.8	1.5	1.9	.9	.7	8	198 ..	3.9	1.3	.9	.8	.6	5
193 ..	3.9	1.3	1.4	1.0	.7	7	199 ..	2.9	1.1	1.0	.8	.6	5
194 ..	4.0	1.4	1.1	1.1	.6	6	200 ..	3.6	1.4	.7	.7	.6	5
195 ..	3.1	1.3	1.3	.8	.6	6	201 ..	4.1	1.5	1.3	1.2	.7	8
196 ..	2.2	1.0	1.1	.8	.6	5	202 ..	3.2	1.2	.8	1.0	.6	5

Table IX.

Fruiting specimens of *Metrosideros* in New Zealand herbaria.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

M. excelsa Sol. ex Gaertn. ("Pohutukawa")

Herbarium	Collector	Locality	1	2	3	4	5	6
AK	Banks & Solander, —.		8.1	2.6	2.1	1.1	.8	15
WELT	ex Col. Mus. Herb.	Kawau Is.	7.0	2.5	1.2	1.0	1.0	13
WELT	Petrie, —.	Rangitoto Is.	6.4	2.7	1.8	1.2	1.1	16
CHR	Petrie, 11562.	,,	7.1	3.0	3.7	1.3	.8	15
WELT	Petrie, —.	Orakei Point	6.3	2.6	1.9	1.1	.9	14
WELT	Kirk, 1012.	Auckland	6.3	2.0	1.6	1.2	.9	14
WELT	———	Hals garden, Thames River	5.7	2.2	1.5	1.1	1.0	12
WELT	———	Tauranga	5.5	2.6	1.6	1.2	1.1	15

M. x *subtomentosa* Carse

Herbarium	Collector	Locality	1	2	3	4	5	6
WELT	Petrie, —.	Rangitoto Is.	5.6	1.8	1.4	1.2	.7	11
WELT	Petrie, 5595.	,,	4.2	1.5	1.5	1.3	.7	10

M. robusta A. Cunn. ("Rata")

WELT	Kirk, 1015.	Whangaroa Harbour	3.4	1.0	1.6	.8	.5	7
WELT	Petrie, —.	8 miles north of Opanake, Taiheke Rd. near Kaihu, c. 1000 ft.	2.9	1.0	1.3	.7	.3	6
WELT	Petrie, —.		3.0	.9	1.2	.8	.4	6
WELT	Kirk, 1014.	Mahurangi	2.9	1.2	1.5	1.0	.5	7
WELT	Cheeseman, —.	Rangitoto Is.	3.1	1.5	1.3	.9	.5	6
WELT	Kirk, 1016.	"	2.9	1.0	1.5	.8	.5	6
WELT	Petrie, —.	"	3.7	1.4	1.4	.7	.5	6
WELT	Kirk, 294.	Thames	3.4	1.0	1.0	.8	.4	5
WELT	Kirk, 1017.	Thames goldfields	3.2	1.3	1.0	.7	.4	5
CHR	Zotov, 84209	Te Mara, Tararuas	2.8	1.1	.7	.8	.4	5
CHR	Zotov, 48702.	Education Reserve, Mt. Bruce	3.9	1.2	1.1	.8	.4	5
CHR	Zotov, 6462.	Tokomaru Falls, Tararuas	2.7	1.2	1.3	.7	.3	6
CHR	Poole, 63705.	Wairongomai Valley	3.5	1.0	.9	.9	.4	5
CHR	Mason, 64070.	Mt. Hawtrey, behind Eastbourne	2.4	.8	.7	.8	.4	5
CHR	Atkinson, 11557.	York Bay	3.5	1.3	1.4	.9	.4	6
WELT	Aston, —.	South Karori	3.1	1.4	1.6	.8	.4	7
AK	Matthews, 5579.	West Wanganui, Nelson	3.3	1.2	1.0	.7	.4	5
WELT	Matthews, —.	" " "	3.3	1.2	.8	.9	.5	5
AK	Townson, 5580-1.	Near Westport	3.4	1.3	1.3	.9	.5	6
CHR	Mackay, 60065.	New River, 8 miles south of Greymouth	3.5	1.3	1.4	.9	.4	6

Table X.

Collection of fruiting specimens from the southern slope of Rangitoto Island between reference points 377666 and 375674 of the N.Z. Lands and Survey Motutapu map of 1943 (1:25,000 series).

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
211 ..	7.9	3.1	2.5	1.6	1.2	19	229 ..	7.1	2.2	1.6	1.2	1.1	16
212 ..	6.7	2.0	1.6	1.1	1.0	13	230 ..	4.6	1.6	1.1	1.0	.8	9
213 ..	6.6	1.9	1.6	.9	1.0	12	231 ..	7.4	2.7	1.4	1.4	1.1	16
214 ..	4.8	2.1	1.1	1.4	1.0	13	232 ..	6.7	2.2	1.2	.9	.9	12
215 ..	9.3	3.4	1.4	1.3	1.0	16	233 ..	7.4	2.4	1.5	1.2	1.1	15
216 ..	8.4	3.1	1.9	1.3	1.2	18	234 ..	6.0	2.0	1.0	1.3	1.0	12
217 ..	5.2	2.4	1.4	1.4	1.1	15	235 ..	7.8	2.5	1.0	1.3	1.1	14
218 ..	6.1	2.2	1.2	.9	.9	12	236 ..	7.9	2.6	1.2	1.3	1.1	15
219 ..	5.6	2.0	1.1	.9	.7	8	237 ..	8.1	3.3	1.8	1.3	1.1	18
220 ..	6.3	2.7	2.0	1.0	1.0	15	238 ..	5.7	2.5	1.4	1.1	1.0	12
221 ..	6.8	2.0	1.2	1.3	1.2	14	239 ..	6.9	2.8	2.0	1.2	1.0	16
222 ..	7.6	2.8	1.8	1.1	.9	14	240 ..	8.8	3.1	1.5	1.0	1.0	15
223 ..	5.5	1.9	1.7	1.2	.9	13	241 ..	7.7	2.3	2.1	1.6	1.1	18
224 ..	7.0	2.2	1.3	1.2	1.1	15	242 ..	7.9	2.4	1.9	1.2	1.0	15
225 ..	5.5	3.0	1.3	1.1	1.1	13	243 ..	6.7	2.4	1.6	1.3	1.1	16
226 ..	4.6	1.6	1.1	1.0	.5	8	244 ..	7.7	2.5	1.9	1.2	1.0	15
227 ..	7.1	2.5	1.7	1.1	.8	13	245 ..	4.8	1.7	.7	1.2	.8	10
228 ..	7.4	2.6	1.2	1.4	1.1	16							

Table XI.

Collection of fruiting specimens from the eastern slope of Rangitoto Island between reference points 382688 and 394692 on the N.Z. Lands and Survey Motutapu map of 1943 (1:25,000 series).

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6
251 ..	3.9	1.6	1.2	.9	.8	8
252 ..	5.4	1.5	1.7	1.1	1.0	11
253 ..	5.9	2.7	1.0	1.1	1.0	11
254 ..	4.8	2.2	1.2	1.1	.9	12
255 ..	4.8	2.6	1.3	1.1	1.1	13
256 ..	5.1	1.5	1.1	1.1	.8	8
257 ..	5.2	1.7	1.0	1.2	.7	10
258 ..	4.4	1.5	1.1	1.1	.8	8
259 ..	4.8	1.8	1.2	.9	.9	10
260 ..	6.3	2.5	1.4	1.2	1.1	15
261 ..	5.4	1.8	1.6	1.2	.8	12
262 ..	6.8	2.5	1.2	1.1	1.1	14
263 ..	5.5	2.3	1.2	1.1	1.0	12
264 ..	6.6	2.8	1.5	1.3	1.0	14
265 ..	5.9	2.1	1.2	1.4	.9	14
266 ..	5.7	2.1	.9	1.1	1.0	11
267 ..	5.6	2.2	1.3	1.3	1.0	13
268 ..	5.5	2.2	1.3	1.0	1.0	12
269 ..	6.3	2.8	1.2	1.0	1.1	14
270 ..	5.9	2.4	1.3	1.2	1.0	13
271 ..	5.1	2.0	2.1	1.2	.7	13
272 ..	7.0	2.9	1.2	1.3	1.1	15
273 ..	5.1	2.4	1.2	1.1	.9	12
274 ..	6.1	2.6	1.4	1.1	1.1	14
275 ..	4.4	2.0	1.4	1.1	.9	11
276 ..	7.2	2.8	1.5	1.3	1.1	15
277 ..	7.5	3.5	1.6	1.3	1.0	16
278 ..	6.8	2.2	1.3	1.4	1.0	15
279 ..	6.3	2.6	1.2	1.1	1.0	13
280 ..	5.1	2.1	1.5	1.0	1.0	12
281 ..	6.1	2.5	1.5	.9	1.0	12
282 ..	5.6	1.9	.9	1.2	1.0	11
283 ..	8.7	3.6	1.5	1.3	1.3	17
284 ..	6.6	2.1	1.7	1.0	1.0	14
285 ..	3.3	1.2	.6	.9	.5	5

Table XII.

Collection of fruiting specimens from Blockhouse Bay between reference points 245503 (Wattle Bay) and 224508 (Te Whau Pt.) on the N.Z. Lands and Survey Titirangi map of 1944 (1:25,000 series).

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6
291 ..	6.9	2.6	1.6	.9	.9	13
292 ..	7.9	2.8	1.6	1.3	1.1	16
293 ..	8.5	3.2	1.7	1.3	1.1	18
294 ..	8.2	2.6	1.6	1.2	1.3	17
295 ..	6.7	2.5	1.9	1.3	1.0	15
296 ..	8.2	3.3	2.1	1.4	1.2	20
297 ..	6.2	2.4	1.7	1.1	1.2	15
298 ..	5.7	2.0	2.7	1.2	1.1	15
299 ..	8.8	3.0	2.1	1.4	1.1	19
300 ..	7.6	3.2	1.7	.9	1.0	14
301 ..	10.9	3.4	1.5	1.0	.8	14
302 ..	6.9	2.2	1.8	1.2	1.1	16
303 ..	6.4	2.4	1.4	1.2	1.2	15
304 ..	6.4	2.2	1.7	1.1	1.2	15
305 ..	5.9	2.2	2.1	1.2	1.1	16
306 ..	6.9	2.3	1.9	1.1	.8	13
307 ..	7.9	2.9	1.6	.9	.8	12
308 ..	7.1	2.2	1.5	1.0	1.1	14
309 ..	6.0	2.4	1.6	1.2	1.1	16
310 ..	6.5	2.6	1.4	.9	1.0	12
311 ..	5.6	2.2	1.5	1.1	1.0	12
312 ..	6.5	2.4	1.5	1.3	1.0	14
313 ..	7.6	2.8	2.1	1.4	1.3	18
314 ..	7.7	2.2	1.8	1.2	1.0	15
315 ..	7.6	2.3	1.4	1.2	1.2	15
316 ..	7.9	2.5	1.6	1.2	1.3	16
317 ..	7.8	2.9	1.4	1.3	1.2	15
318 ..	7.2	2.4	1.4	1.2	1.0	14
319 ..	6.2	2.6	1.5	1.2	1.0	14
320 ..	10.7	3.8	2.7	1.3	1.3	19
321 ..	8.8	3.2	1.8	1.2	1.1	18
322 ..	6.8	2.6	1.7	1.3	1.2	16
323 ..	8.3	2.7	1.5	1.1	1.1	15
324 ..	8.0	3.1	1.5	1.3	1.1	17
325 ..	5.5	2.8	2.6	1.1	1.0	14

Table XIII.

Collection of fruiting specimens gathered by Mrs. P. Hynes on Mayor Island.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
331	6.0	2.4	1.5	1.2	1.2	15	336	7.1	2.6	1.4	1.4	1.1	16
332	8.0	2.3	1.9	1.3	1.1	17	337	7.7	3.2	1.4	1.2	1.3	16
333	6.0	2.7	2.1	1.4	1.1	18	338	7.2	2.8	2.1	1.4	1.2	18
334	5.8	2.4	1.4	1.4	1.1	15	339	8.9	3.4	2.2	1.1	1.1	18
335	8.0	2.4	1.7	1.3	1.0	16	340	8.1	3.0	1.8	1.1	1.1	16

Table XIV.

Collection of fruiting specimens gathered by Mr. T. Wilson on Mayor Island.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
341	9.1	3.3	1.5	1.4	1.0	17	359	8.0	2.4	1.6	1.3	1.1	17
342	7.3	2.8	1.7	1.4	1.1	17	360	7.9	3.8	2.1	1.5	1.2	19
343	8.0	3.6	1.5	1.6	1.1	18	361	8.7	2.5	1.4	1.4	1.2	17
344	7.4	2.4	1.2	1.5	1.1	16	362	7.7	3.0	1.2	1.2	1.1	15
345	7.1	2.7	1.6	1.5	1.0	16	363	7.1	2.3	1.6	1.3	1.2	16
346	7.0	3.5	3.5	1.8	1.2	19	364	8.9	3.9	2.4	1.6	1.1	20
347	6.9	3.3	2.3	1.8	1.3	19	365	6.4	2.7	1.8	1.3	1.0	15
348	9.2	3.9	1.9	1.7	1.1	19	366	7.6	3.7	2.2	1.7	1.3	19
349	7.3	3.4	3.0	1.7	1.2	19	367	9.5	4.4	2.4	1.6	1.1	20
350	8.0	3.8	2.5	1.5	1.1	20	368	7.8	3.4	1.4	1.3	1.2	16
351	6.6	3.4	2.8	1.6	1.3	19	369	6.1	2.6	1.3	1.2	1.2	15
352	8.8	4.4	2.5	1.6	1.1	20	370	8.0	3.8	2.6	1.6	1.2	20
353	7.9	4.0	3.5	1.7	1.2	19	371	6.5	2.9	2.5	1.6	1.2	18
354	8.4	4.1	2.8	1.7	1.1	20	372	8.2	4.1	2.1	1.6	1.1	20
355	7.0	2.8	1.5	1.3	1.3	15	373	7.6	3.8	1.4	1.5	1.2	17
356	7.0	2.7	2.3	1.3	1.1	17	374	6.5	3.3	2.6	1.5	1.1	19
357	9.3	2.7	1.8	1.5	1.1	18	375	8.0	2.2	1.7	1.7	1.1	18
358	6.9	2.9	2.1	1.4	1.1	18							

Table XV.

Collection of fruiting specimens from the Bay of Plenty between reference points N46-6521 (Opotiki Beach) and N52-2359 (Whanarua Bay) on the N.Z. Lands and Survey four-mile sheet No. 7, 1942.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.	1	2	3	4	5	6	No.	1	2	3	4	5	6
381	5.7	2.3	1.3	1.4	1.0	14	390	7.1	2.3	2.1	1.1	1.1	16
382	6.1	2.8	1.3	1.1	.9	13	391	6.1	2.9	2.5	1.1	.9	15
383	7.8	2.4	1.7	1.3	1.1	16	392	5.9	2.4	1.8	1.9	1.0	15
384	7.9	2.7	1.9	1.1	1.0	14	393	8.8	2.9	1.7	1.2	1.0	16
385	5.7	2.3	1.7	1.3	1.0	14	394	6.6	2.4	1.8	1.6	1.0	16
386	6.0	2.7	2.0	1.3	1.1	17	395	7.5	2.9	2.3	1.4	1.2	18
387	7.3	2.7	2.1	1.2	1.0	16	396	6.0	1.9	1.6	1.3	1.0	14
388	6.8	3.1	2.1	1.2	1.2	18	397	7.1	2.9	2.4	1.3	1.1	17
389	7.1	3.0	2.7	1.1	1.1	16	398	5.7	2.7	2.1	1.3	1.0	15

399	..	7.5	3.0	1.4	1.1	1.1	14	408	..	9.0	3.3	2.4	1.3	1.0	18
400	..	6.3	2.5	1.8	1.2	1.0	15	409	..	6.2	2.7	1.7	1.1	1.0	14
401	..	6.5	2.5	1.7	1.3	1.1	16	410	..	6.8	2.4	1.7	1.2	1.2	16
402	..	7.1	3.1	2.4	1.4	1.1	19	411	..	6.2	2.2	2.0	1.1	1.0	15
403	..	6.5	2.6	1.8	1.2	1.0	15	412	..	8.2	2.5	1.7	1.0	1.0	15
404	..	7.0	3.1	1.4	1.4	1.0	16	413	..	7.0	2.7	1.4	1.1	1.0	13
405	..	7.0	2.7	2.5	1.1	1.0	15	414	..	6.3	2.4	1.5	1.2	1.0	14
406	..	8.2	3.2	2.5	1.2	1.1	19	415	..	7.2	3.2	2.3	1.4	1.1	19
407	..	5.4	2.3	1.5	1.0	1.0	12								

Table XVI.

Collection of fruiting specimens gathered by Mr. R. H. Ward at Lake Taupo.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.		1	2	3	4	5	6	No.		1	2	3	4	5	6
421	..	4.2	1.5	1.5	.8	.5	7	425	..	6.2	1.9	1.3	.9	.7	10
422	..	3.4	1.6	1.2	.8	.4	7	426	..	4.6	1.4	1.1	.6	.6	6
423	..	3.6	1.3	1.2	.9	.7	7	427	..	4.2	1.5	1.1	.9	.7	7
424	..	5.9	1.9	1.4	.6	.7	9								

Table XVII.

Collection of fruiting specimens gathered by the N.Z. Forest Service near Westport.

Column 1. Leaf length
2. Leaf width
3. Internode length

Column 4. Capsule length
5. Capsule width
6. Hybrid index number

No.		1	2	3	4	5	6	No.		1	2	3	4	5	6
431	..	2.7	1.2	1.5	.8	.4	6	436	..	3.4	.9	1.3	1.0	.4	7
432	..	4.3	1.4	1.8	.7	.4	8	437	..	3.3	1.3	1.2	.9	.4	6
433	..	4.3	1.2	.9	1.0	.5	7	438	..	3.6	1.2	1.0	.8	.4	5
434	..	3.1	1.3	1.1	.8	.4	5	439	..	3.0	1.4	1.2	1.0	.4	7
435	..	3.3	1.3	1.3	1.0	.4	7	440	..	4.0	1.6	1.1	.7	.3	7

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Additional Notes on Tecomanthe speciosa W. R. B. Oliver (Bignoniaceae) from the Three Kings Islands, New Zealand

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ABSTRACT.

Observations on flowers, fruit, seed, and germination of *T. speciosa* are recorded. The fruit has not been described previously.

When the late Dr. W. R. B. Oliver described *T. speciosa* in 1948 he had not seen seed, but forecast that in common with other members of the genus they would be winged. Fruit has now been obtained from a plant growing under cultivation. The object of this note is to describe the fruit and give additional information about a specimen growing at Plant Diseases Division, Mount Albert.

The plant was propagated from material brought back by Professor Baylis in 1951. Planted out during 1952 it flowered in May 1954. The period of flowering lasts until late July or early August, inflorescences tending to develop on the younger wood towards the end of the flowering season, as distinct from the cauliflory common at the beginning. Hand pollination was practised towards the end of the first flowering season and during that of 1955 and 1956, but it was not until July 1956 that fertilization was obtained and five fruits set. The development of fruits by December 1956 is shown in Fig. 1. The capsules took eight months to mature, and the following description has been prepared by Dr. R. C. Cooper, Botanist to the Museum.

"The fruit is a siliquiform capsule (opening by two valves which split from below upwards). (Fig. 2.) The valves are oblong, acuminate, 16.7 cm. long, 3.3 cm. broad (in the specimen examined), slightly curved, smooth, dark green without, light yellow ochre within, woody. The vertical septum, attached to the centre of each boat-shaped valve until dehiscence, is broad and thickened and carries many densely-packed seeds. The seeds are heart-shaped, flattened, with wings extended laterally. 253 seeds were formed in the specimen examined. In a number the cotyledons had developed sufficiently to tear the seed-coat and extended beyond it. The fruit examined was grown by Mr. J. Hunter at the Plant Diseases Division of the Department of Scientific and Industrial Research, Mount Albert, New Zealand (Auck. Herb. No. 47770). There seems to be little known regarding the fruit of *Tecomanthe*, and most of the species are based on flowering specimens. In the only descriptions of fruiting specimens that I have seen, the measurements are smaller than those given above for the capsule of *Tecomanthe speciosa* (i.e. *T. nitida* is only 14 cm. long, *T. hillii* 3.75 cm.)."

Fig. 2 depicts two capsules. In one the manner of dehiscence is illustrated, in the other the contents are shown. Two seeds have been removed to show their details.

Seed sown on 28/3/57 germinated in fourteen days producing seedlings with kidney-shaped cotyledons. Later the first ovate, simple, coarsely serrate seedling leaves developed. These are quite distinct from the compound leaves of the mature plant. Fig. 3 illustrates a seedling 18 days after germination. The shape of cotyledons and first seedling leaves is clearly shown, as also is the persistent winged seed-coat at soil level.

Dr. Oliver stated that there are 4 stamens and a short staminodium in the flower. This has been reported by several authors as a common feature of Bignoniaceae. Fig. 4, however, shows a range in *T. speciosa* from the usual short staminodium to a fifth stamen. All intermediate stages between these extremes occur although the staminodial condition is most common.

In Fig. 5 the usual form of the style is illustrated. Rarely is the style straight and there may be some relation between the irregularity shown and the rare occurence of fruit.

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Fig. 1. Fruit of *Tecomanthe speciosa* W. R. B. Oliver.
Fig. 2. Capsule of *Tecomanthe speciosa*, half natural size.

Fig. 3. Seedling of *Tecomanthe speciosa.*

Fig. 4. Staminodial variation of *Tecomanthe speciosa.*

Fig. 5. Bisected flower of *Tecomanthe speciosa.*

Further explanation in text.

Dermaptera from the Three Kings Islands, New Zealand, with the Description of a New Species of *Brachylabis* Dohrn (Labiduridae)

By E. T. GILES,
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ABSTRACT.

A new species of *Brachylabis* Dohrn, 1864 from the Three Kings Islands is described. There is some variation in specimens of *Anisolabis littorea* (White) 1846 from the Islands by comparison with mainland material. An adult ♀ cannot be placed within the genus *Anisolabis* Fieber, 1853. The problem of the isolation of the Three Kings Islands is discussed briefly.

INTRODUCTION.

The Three Kings Islands are about 35 miles north west of Cape Maria van Dieman, northernmost New Zealand. The group consists of one large island—Great Island, and three smaller ones—North East Island, South West Island and West Island together with a number of islets and rocks. All rise sheer out of 20-30 fathoms of water. The topography and vegetation of the islands are described in a series of papers in the "Records of the Auckland Institute and Museum" commencing in Volume 3, Pt. 4 (1948).

The Dermaptera dealt with here were taken on Great, North East and South West Islands on four visits to the group: The 1946 Autumn Expedition of the Wild Life Branch of the Department of Internal Affairs, the 1947 January trip by Major G. A. Buddle and Major M. E. Johnson, the 1951 January Expedition of the Auckland Institute and Museum and the 1952-53 Summer Expedition of the Auckland Institute and Museum. As far as can be ascertained no other collections of Dermaptera have been made on the islands. The most extensive series comes from Great Island. The amount of material available is only small and doubtless further visits will yield greater numbers of species and of individuals. It is hoped that male earwigs (particularly from the smaller islands) will be sought in future.

Acknowledgments.

The writer wishes to thank Dr. G. Archey, Director of the Auckland Institute and Museum, for the loan of material. Mr. E. G. Turbott, Ornithologist and Entomologist at the Museum, kindly brought the collection to the writer's notice and Dr. A. W. B. Powell has given help with the problem of the isolation of the islands based on his experience with Mollusca. Mr. J. S. Edwards made the initial sorting of the leaf mould material. The accompanying drawings are the work of Miss V. Richardson, South Australian Museum.

SYSTEMATIC.

Family LABIDURIDAE Verhoeff.

Labiduridae Verhoeff, 1902, *Zool. Anz.* **665**:189.

Subfamily BRACHYLABINAE Burr.

Brachylabinae Burr, 1909, *Dtsch. ent. Z.*, **1909**:324; Burr, 1910, *Trans. ent. Soc. Lond.* **1910**:188; Burr, 1911, *Genera Insectorum* **122**:40; Burr, 1915, *J. R. micr. Soc.*, **1915**:446; Hincks, 1938, *J.F.M.S.Mus.*, **18**:306. *Isolabidae* Verhoeff, 1904, *S. B. Ges. naturf. Fr. Berl.*, **1904**:119. *Brachylabidae* Burr, 1908, *Ann. Mag. nat. Hist.* (8), **2**:247; Zacher, 1911, *Zool. Jb.*, **30**:386.

Genus BRACHYLABIS Dohrn.

Brachylabis Dohrn, 1864, *Stettin. ent. Ztg.*, **15**:292; Burr, 1910, *Trans. ent. Soc. Lond.* **1910**:191; Zacher, 1911, *Zool. Jb.*, **30**:388; Burr, 1911, *Genera Insectorum*, **122**:41; Hincks, 1938, *J.F.M.S.Mus.*, **18**:306.

Brachylabis manawatawhi n. sp. Figs. 1-4.

Of average size for the genus. Apterous. Stout.

Male: *Colour* uniformly dark brown, dull; head darker; legs, antennae and palpi lighter; dorsum finely pubescent except head, legs and prothorax; venter more strongly pubescent with a few bristles on posterior margins of sclerites. *Head* small, somewhat elongate; ecdysial suture T-shaped, fine; eyes small, oval, finely facetted, shorter then scape; tentorial maculae just mesad of dorsal angle of eyes; caudal margin nearly straight; antennae missing from ♂ holotype. *Pronotum* as wide as long; narrower cephalad than caudad; anterior and posterior margins truncate; laterally, very slightly sinuate, markedly carinate; caudal angles blunt; ecdysial line distinct. *Mesonotum* short; wider cephalad than caudad; posterior margin slightly concave; sides carinate; caudal angles sharp; ecdysial line faint. *Metanotum* transverse; deeply concave caudad; caudal angles rounded; ecdysial line faint. *Prosternum* rectangular. *Mesosternum* short; sides nearly parallel posteriorly; caudal margin convex. *Metasternum* short; sides divergent cephalad; caudal angles sharp; caudal margin slightly concave. *Abdomen* widest at segments 4 and 5; terga 1 to 8 with narrow cream zone on middle third of caudal margin; posterior edges of terga 3 and 4 notched laterad, the latter the more deeply; tergum 5 with oval finely punctured areas cephalad corresponding with notches of preceding segment; ultimate tergum with blunt lobe above each forceps base, caudal margin concave; terga 1 to 9 bluntly rounded laterally; penultimate sternum ample, with median emargination; manubrium strong, wide, shorter than sclerite. *Pygidium* not prominent, subquadrate, deflexed. *Forceps* symmetrical, non-contiguous, strong basally, tapering to apex, arcuate. *Legs* simple, femora non-carinate, second tarsal segment long. *Genitalia* double; parameres, flattened, slender, acute, with delicate process distally; penes double; virgae short, stout, with bulb near base.

Length—12.5 mm., incl. forceps; forceps 3.5 mm.

Female: Agrees with male except that caudal margin of ultimate tergum has sharp tooth above forceps bases with deep excavation between; forceps symmetrical, simple, nearly contiguous, strong basally, tapering sharply at first and then gradually, inner edge sharp and roughened; penultimate sternum ample, caudal margin broadly pointed *Antennae* 16-jointed, segments cylindrical; lengths in mm., commencing from scape: I, 0.9; II, 0.1; III, O.35; IV, 0.25; V, O.3; VI, 0.35; VII, 0.4; VIII, 0.45; IX, 0.5; X, O.5; XI, 0.5; XII, 0.55; XIII, 0.6; XIV, 0.6; XV, 0.55; XVI, 0.5.

Length—16 mm., incl. forceps; forceps 2.3 mm.

Holotype male: South West Island, Three Kings Islands, N.Z., 13 January 1951, in forest near summit under stones and leaf mould *(E. G. Turbott).* ALLOTYPE female: With same data. Both specimens in the collection of the Auckland Institute and Museum. PARATYPE females: Great Island, Three Kings Islands, N.Z., 15 January 1951, under grove of trees below rock face E. of saddle, per Berlese funnel *(E. G. Turbott);* in the collection of the South Australian Museum, Reg. No. 120.087. Great Island, Three Kings Islands, N.Z., 26 April 1946, E. division in teatree *(E. G. Turbott);* in the collection of the Auckland Institute and Museum.

The material available to the writer comprises the above specimens together with a female bearing the same data as the ♂ holotype, 2 ♀♀ from Great Island, January 1953 *(J. S. Edwards),* and two young nymphs from South West Island, 13 January 1951 *(E. G. Turbott).* It is unfortunate that only a single male has been taken.

This species bears the Maori name for the Three Kings Islands. It clearly belongs to the genus *Brachylabis* Dohrn, 1864 on the basis of the keys and discussion given in Burr (1910). The type of the genus is *B. chilensis* (Blanchard), 1851 from Chile. *B. chilensis* has a transverse sulcus on the pronotum and in the ♂ the posterior abdominal terga are angled laterally, becoming progressively drawn out to a blunt tubercle. The pronotum of *B. coriacea* Burr, 1910 from Brazil is about 1½ times longer than broad and the mesosternum as broad as long. *B. scotti* Burr, 1910 from the Seychelles Islands is half the length of *B. manawatawhi,* the keel on the mesonotum dies out before the posterior margin is reached and the forceps in the ♂ are asymmetrical—the left being nearly straight and the right only feebly arcuate. *B. canaca* Burr, 1914 from New Caledonia is patterned on the dorsum with fawn stripes, the posterior margin of the pronotum is convex, the sides of the abdominal terga are pointed and the forceps of the male are slightly arcuate. The ♂ genitalia of *B. canaca,* as figured and described by Burr (1915) show some differences: there is only a single virga which apparently lacks the ovoid swelling and the parameres differ in outline and proportions. The Natal species *B. traegaordhi* Burr, 1913 is smaller and the ♂ genitalia (figured in Burr, 1915) differ in the wider parameres and the finer, bulb-less virgae. *B. manawatawhi* alone has the narrow cream band along the posterior edge of the abdominal terga.

The genus *Brachylabis* has not yet been recorded from the mainland of New Zealand.

Subfamily CARCINOPHORINAE Hincks

Carcinophorinae Hincks, 1947, *Ark. Zool.*, **39A** :4. *Psalinae* Burr, 1909, *Dtsch. ent. Z.*, **1909** :325.

Genus ANISOLABIS Fieber

Anisolabis Fieber, 1853 *Lotos*, **3** :257.

Anisolabis littorea (White).

1846, *Forficula littorea* White, *Voy. Erebus and Terror, Ins.*, **2** :24, pl. 6, figs. 4, 5. 1881, *Forficesila littorea* (White) Hutton, *Cat. N.Z. Dipt., Orthopt., Hymenopt.* :93. 1876, *Anisolabis littorea* (White) Scudder, *Proc. Boston Soc. nat. Hist.*, **18** :303. 1904, Hutton, *Index Faunae N.Z.* (London) :234. 1911, Burr, *Genera Insectorum*, **122** :29; 1915, Burr, *J. R. micr. Soc.*, **1915** :534; 1938, Hincks *J. F. M. S. Mus.*, **18** :303. A more complete synonymic list is given by Giles (1953).

The species is represented in the collection by one adult male and four nymphs. The assessment of the developmental stage of the nymphs is based upon an earlier paper (Giles, 1952); this depends on the width of the head capsule (at the widest part behind the eyes) and the numbers of segments in the three regions of the antennae, as detailed there. In some respects the specimens differ from the general facies of mainland individuals. Because of this and the isolated environment it is proposed to deal with each separately. A no less important reason for this procedure is the well-known systematic confusion within the subfamily Carcinophorinae (Hincks 1938: 1954). *Adult Male*—Tasman Valley, Great Island, in kanuka, 18 April 1946 *(E. G. Turbott)*.

Head capsule width: 3.5 mm.
Antennal segment counts. Right: 2 + 17
Left: 2 + 17 + 1

This is a most interesting specimen. It is large and somewhat darker than average, but not more so than some the author has examined. It is noteworthy that concerning another island population, Lysaght (1925) records that two ♂♂, six ♀♀ and two nymphs from the Chatham Islands were all "much darker than those of the mainland, the body being completely dark brown."

The appearance of the forceps with their large teeth on the inner edge is immediately noticeable (Fig. 5). This character is exhibited by two specimens the author has examined from Spirits Bay (northernmost New Zealand). One of these, in the collections of the Dominion Museum, Wellington, is figured here (Fig. 6). Generally, mainland specimens have smoother forceps (Fig. 7).

The genitalia of the Three Kings ♂ are identical with mainland specimens. In view of this, and despite the other variations, there is no justification for separating this specimen from *A. littorea*.

Fifth Instar Nymph.

Tasman Stream, Great Island, Three Kings, 5 January 1953 *(J. S. Edwards).*

Head capsule width: 2.95 mm.
Antennal segment counts: Right: 2 + 14 + 3
Left: 2 + 14 + 2

Although the head width is outside the observed range for mainland specimens, it is within the calculated range. The antennal segment count is normal. Its colour is paler, more closely resembling that of mainland specimens. The forceps teeth are unusually strong for a nymph.

Fifth Instar Nymph.

Tasman Valley, Great Island, Three Kings, 5 January 1953 *(J. S. Edwards).*

Head capsule width: 3.15 mm.
Antennal segment counts: Right: 2 + 15 + 2
Left: 2 + 15 + 3

The head width here is outside the calculated range for mainland specimens, but the antennal segment count is normal. This nymph is dark and the forceps are strongly toothed. On the basis of the 10 abdominal segments and the head width, this specimen might be taken for one of the rare instances of an adult male with female-type forceps (Giles, 1953). The number of antennal annuli, however, preclude this possibility.

Fifth Instar Nymph.

Tasman Valley, Great Island, Three Kings, 5 January 1953 *(J. S. Edwards).*

Head capsule width: 2.1 mm.
Antennal segment counts: Right: 2 + 15 + 1
Left: 2 + 14 + 1

The head width is within the calculated range for mainland specimens, but is smaller than the observed range. The antennal segment count is normal. This is of paler colour and has nearly smooth forceps.

Third Instar Nymph.

South West Island, Three Kings, under low scrub on N.E. slope, per Berlese funnel, 13 January 1951 *(E. G. Turbott).*

Head capsule width: 1.65 mm.
Antennal segment counts: Right: 2 + 9 + 5
Left: 2 + 9 + 5

The head width and antennal counts lie within the third instar range, but the specimen is darker and has stronger teeth on the forceps than mainland specimens.

First Instar Nymph.

Great Island, Three Kings, E. division in teatree, 27 April 1946 *(E. G. Turbott).*

Head capsule width: 1.2 mm.
Antennae missing.

The forceps are noticeably strong and crenulate.

Anisolabis sp.

North East Island, Three Kings Is., 4 January 1947 *(G. A. Buddle and M. E. Johnson).*

This specimen unfortunately is a female. Certain features, particularly in respect of the forceps, set it apart from females of *A. littorea,* but it would be most unwise in this genus to erect a new species for its reception until a male is collected. The points of divergence are no greater than those shown by the Great Island male dealt with on Page 46; there the genitalia gave the clue to relationships.

The specimens all differ slightly from their mainland equivalents. Although it is probable that earwigs could survive the 35 miles' sea crossing, the precipitous shoreline, and the effect of winds and sea currents in the area would make a successful landing improbable at best. The islands have been cut off since about the early Tertiary and conditions are undoubtedly favourable for the operation of the Sewall Wright effect of genetic "drift" in small populations.

The North Cape block is joined to the North Island by a post-Pleistocene sand tombolo. Males of *A. littorea* from Great Island and North Cape with similar forceps distinct from other mainland examples might indicate that the populations developed on the common land mass, or that one area was colonised from the other after separation—which seems less likely. The possibility of convergence cannot, of course, be overlooked.

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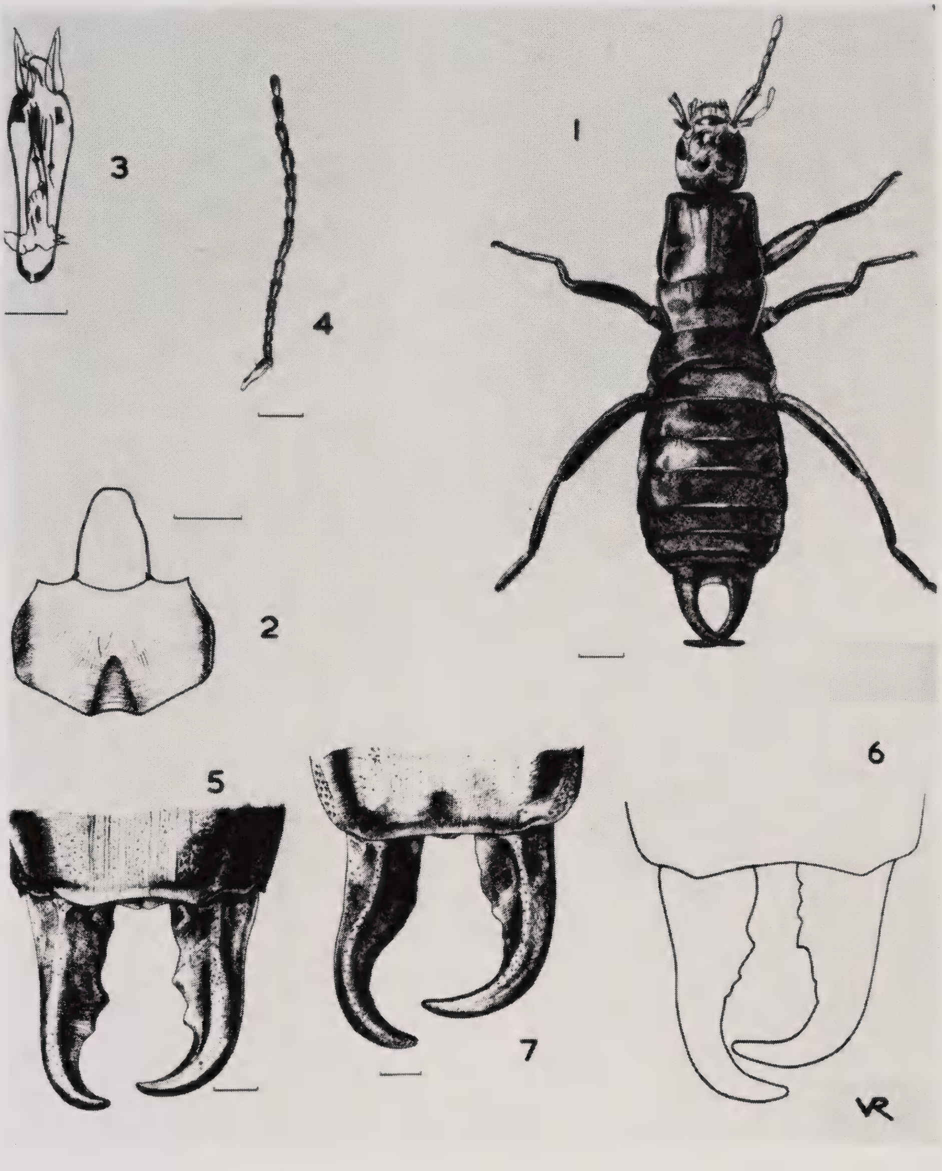

Fig. 1 *Brachylabis manawatawhi* n. sp., holotype ♂.
Fig. 2. *B. manawatawhi* n. sp., penultimate sternum and manubrium of holotype ♂.
Fig. 3. *B. manawatawhi* n. sp., genitalia of holotype ♂.
Fig. 4. *B. manawatawhi* n. sp., antenna of allotype ♀.
Fig. 5. *Anisolabis littorea* (White), forceps of Great Island ♂.
Fig. 6. *A littorea*, outline of forceps of Spirits Bay ♂.
Fig. 7. *A littorea*, forceps of Auckland ♂.

All scale lines represent 1 mm.

Trichoptera of New Zealand

I. A CATALOGUE OF THE AUCKLAND MUSEUM COLLECTION WITH DESCRIPTIONS OF NEW GENERA AND NEW SPECIES.

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ABSTRACT

This collection is largely the C. E. Clarke collection which was presented to the Museum in 1929. Specimens have been collected from various parts of New Zealand, but mostly in the south.

From 121 specimens listed, 2 new genera and 12 new species are described. Except for Helicophidae, all families hitherto recorded for New Zealand are represented.

The presence of lateral abdominal processes is recorded for the Tribe *Oeconesini* (Family *Sericostomatidae*). The Family *Beraeidae* is extended to include *Alloecentrella* n.g. in which a discoidal cell is present in the anterior wing. In *Neobiosella* n.g. (Family *Philopotamidae*) apical fork 1 is absent from both anterior and posterior wings: this is a new character for this family. The sub-family *Ecnominae* (Family *Psychomyidae*) and the genus *Ecnomina* Kimmins are recorded in New Zealand for the first time.

INTRODUCTION

This paper deals with the Trichoptera collection of the Auckland Museum. The basis of this collection is the C. E. Clarke collection which was donated to the Museum in 1929. Additional specimens have mainly been collected by A. Philpott and E. G. Turbott.

Dr. G. Archey, Director, and Mr. E. C. Turbott, Ornithologist and Entomologist, Auckland Museum, have kindly made the collection available to the author.

From the 121 specimens examined 2 new genera and 12 new species are described, and 1 genus is recorded in New Zealand for the first time. These, in addition to genera and species recorded by Mosely and Kimmins (1953) and McFarlane (1956), bring the totals for New Zealand to 39 genera and 107 species.

The Subfamily *Ecnominae* (Family *Psychomyidae*) is recorded in New Zealand for the first time.

All specimens, including types, remain in the Auckland Museum. On the back of each of the author's identification labels is the author's specimen number. These numbers will serve to correlate prepared genitalia in alcohol with the pinned adult specimens from which they came.

Unless otherwise stated all specimens have been collected by C. E. Clarke.

FAMILY SERICOSTOMATIDAE

Pycnocentria funerea McLachlan.

1866—*Pycnocentria funerea* McLachlan, *Trans. ent. Soc. Lond.*, 5:252.

Raurimu: 16.1.1919, 1♀. Waimarino: 26.1.1919, 1♂. Kauri Gully: 9.1.1919, 1♀; 12.1.1919, 1♂; 13.1.1919, 1♀.

Beraeoptera roria Mosely

1953—*Beraeoptera roria* Mosely, *Trichoptera of Australia and New Zealand,* p. 53.

Waitati: 2.X11.1917, 1♂ (genitalia in alcohol).

Pycnocentrodes chiltoni Tillyard

1924—*Pycnocentrodes chiltoni* Tillyard, *Trans. N.Z. Inst.*, 55:309. Waitomo: 25:XII:1916, 1♂. Pembroke: 22:III:1923, 1♂. Ohakune: 24:XII:1916, 1♀.

Pycnocentrodes aeris n. sp. **Fig. 1.**

ANTERIOR WING almost colourless, markings pale testaceous being two elongate transverse dots near base and two parallel transverse lines arising where Sc and R_1 meet the costa and finishing at two-thirds where they join abruptly and continue as a single line almost to the dorsum just before the tornus. POSTERIOR WING almost colourless. WING VENATION. Differs mainly from *P. aureola* (McLachlan) in the posterior wing where R_2 and R_3 arise separately, as in *P. chiltoni* Tillyard, and from *P. chiltoni* in the anterior wing where apical fork 3 is fully formed, as in *P. aureola.*

Length of anterior wing, 7-10 mm.

Genitalia ♂. Very close to *P. aureola* except that the spurs of the penis arise from its apex which is truncate and slightly bifid above. The spurs are moderately long, straight, and lie along each side of the penis.

Holotype ♂. Kinloch: 15.1.1926 (genitalia in alcohol).

Paratypes. Leith: 15.X1.1916, 1♂; 30.X1.1916, 1♂. Waitati: 25.X1.1917, 1♂.

A very pale species which is mainly separated from *P. aureola* and *P. chiltoni* by the colour and pattern of the anterior wings.

Pycnocentrodes unicolor n. sp. **Fig. 2.**

ANTERIOR WING and POSTERIOR WING uniform fuliginous, without markings.

Length of anterior wing, 7 mm.

Genitalia ♂. Very close to *P. aureola* (McLachlan) except that the spurs of the penis arise from its apex which is truncate. The spurs are short, curved, and point upwards and outwards.

Holotype ♂. Hump Mt., 2.1.1922 (genitalia in alcohol).

A dark species which is mainly separated from other species by the colour and lack of pattern in the anterior wing.

Tribe Oeconesini.

On all males of various species of *Oeconesus, Pseudoeconesus,* and *Zelandopsyche,* seen by the author, there are a pair of lateral processes at the base of the fifth abdominal segment. This character has not previously been recorded for any species of these genera. In addition to the species recorded below this character is now recorded for *Oeconesus maori* McLachlan and *Zelandopsyche ingens* Tillyard.

Oeconesus lobatus n. sp. **Fig. 3.**

Length of anterior wing, 13 mm.

Abdomen ♂. Fifth abdominal segment with a pair of lateral processes.

Genitalia ♂. Dorsal margin of ninth segment produced in two large rounded lobes with a slight transverse ridge across their bases. Beneath each lobe is a narrower process directed slightly upwards. Upper penis-cover large, produced upwards, narrowly excised to form two forks lying parallel and very close together, these forks being truncate in dorsal view. Inferior appendages three-jointed, a stout basal joint with two terminal joints arising from its inner surface, one membranous and finger-shaped, the other more strongly chitinised, sharply excised ventrally towards the apex, directed inwards, and with a small tooth at apex. Penis membranous, expanded at apex with a chitinised process on each side pointing latero-ventrally, and with some chitinisation at the opening of the ejaculatory duct.

Holotype ♂. Raurimu: 16.1.1919 (genitalia in alcohol).

Differs little from *O. maori* McLachlan except in the genitalia. Mosely (Mosely and Kimmins 1953, p. 98) considered that venation should be used for the separation of species in *Oeconesus* but in this species there are sufficient differences in the genitalia to warrant its separation from other described species.

Oeconesus similis Mosely

1953—*Oeconesus similis* Mosely, *Trichoptera of Australia and New Zealand,* p. 103.

Mt. Arthur: Flora creek, 18.1.1920, 1♂ (genitalia in alcohol), *(G. V. Hudson).*

This specimen was collected from the type locality at the same time as the holotype specimen.

Oeconesus sp.

Dunedin: Opoho, 3:XII:1918, 1♀.

This specimen cannot be specifically determined, as females of all species of *Oeconesus* are not yet known. It differs from known females in that apical fork 3 of the posterior wing is absent.

Pseudoeconesus stramineus McLachlan

1894—*Pseudoeconesus stramineus* McLachlan, *Ent. Mon. Mag.,* 30:240.

Hump Mt.: 2.1.1922, 1♂ 1♀.

Pseudoeconesus bistirpis n. sp. Fig. 4.

Testaceous; ANTERIOR WINGS closely irrorated with rows of almost colourless spots between the veins. WING VENATION. Apical forks of anterior wing sessile. Apical forks 1 and 3 of posterior wing stalked. Sc and R_1 of posterior wing folded together for most of their lengths.

Abdomen♂. Fifth abdominal segment with a pair of lateral processes.

Length of anterior wing, ♂ 10 mm. ♀ 15 mm.

Holotype♂. Tongariro: 16.1.1930 (genitalia in alcohol) *(A. Philpott)*.

Paratype♀. Tongariro: 16.1.1930, *(A. Philpott)*.

The ♂ genitalia cannot be differentiated from that of *P. stramineus* McLachlan and the following species. Mosely (Mosely and Kimmins, 1953, p. 108) considered that venation should be used to separate species in *Pseudoeconesus* and this species is separated on that basis.

Pseudoeconesus tristirpis n. sp. Fig. 5.

Pale testaceous; ANTERIOR WINGS closely irrorated with rows of almost colourless spots between the veins. WING VENATION. Apical fork 3 of anterior wing stalked. Apical forks 1 and 3 of posterior wing stalked.

Abdomen♂. Fifth abdominal segment with a pair of lateral processes.

Length of anterior wing, 11 mm.

Holotype♂. Tongariro: 16.1.1930 (genitalia in alcohol) *(A. Philpott)*.

The ♂ genitalia cannot be differentiated from that of *P. stramineus* McLachlan or *P. bistirpis*.

Olinga feredayi (McLachlan)

1868—*Olinx feredayi* McLachlan, *J. Linn. Soc. (Zool.), London*, 10:198-199.

Nelson: 21:X:1923, 1♂ *(A. Philpott)*; 14:XI:1926, 1♀, *(W. Heighway)*; 11:XI:1927, 1♂ 1♀. Waitati: 11:XII:1914, 1♂; 25:XII:1915, 2♂♂.

It should be noted that McLachlan (1868) recorded the spur formula as 2.2.4 which is misquoted by Mosely and Kimmins (1953) as 2.4.4. All specimens of this species seen by the author bear spurs to the formula of 2.2.4.

Olinga fumosa n. sp. Fig. 6.

ANTERIOR WING fuscous; scales of longitudinal fold and sub-terminal furrow ochreous. Membranes of both anterior and posterior wings fumose.

Spurs 2.2.4.

Length of anterior wing, 8 mm.

Genitalia♂. Margin of ninth segment with a pair of long dorsal processes with a wart on each side and a pencil of hairs below the wart.

Dorsal portion of ninth segment produced downwards posteriorly with upper penis-cover in form of two short processes arising distally below. Penis membranous. Inferior appendages broad at the base and twisted over dorsally towards the apex, each with a long, sinuous, pointed spine arising from its extreme base. These spines pass on each side of the penis and terminate above it between the penis-cover processes.

Seventh sternite with a short, broad process.

Holotype ♂. Waitati: 28.XI.1917 (genitalia in alcohol).

Similar to *Olinga feredayi* (McLachlan) but smaller and darker and with differences in the genitalia and process of the seventh sternite.

FAMILY PHILANISIDAE

Philanisus plebeius Walker

1852—*Philanisus plebeius* Walker, *Cat. Neur. Ins. Brit. Mus.*, 1, p. 116.

Three Kings Islands: Great Island, at light, 26.IV.1946, 1♂; 27.IV.1946, 2♂♂, *(E. G. Turbott)*: Great Island, Castaway Valley, at light, 30.XII.1952, 1♂ *(J. S. Edwards)*. Little Barrier Island: at light, 27:XI:1954, 2♂♂ 1♀ *(K. A. J. Wise)* (in alcohol).

Specimens taken at Little Barrier Island were previously recorded by Wise (1956).

FAMILY BERAEIDAE

Alloecentrella n. gen.

ANTERIOR WING. Discoidal cell closed. Apical forks 1, 2, 3 present. Cubitus, and consequently apical fork 5, entirely absent. POSTERIOR WING. Venation much reduced. Radial sector entirely absent. Only apical fork 5 present.

Both wings with a short fold near base of Sc and R.

Spurs 2.2.4.

Type species. *Alloecentrella magnicornis* n. sp.

The type species is of Beraeid form and the genus is included in this family despite the presence of discoidal cell in the anterior wing. Because of this character the species could be placed in the Family Helicophidae Mosely (Mosely and Kimmins, 1953) but not in either of the two existing genera of that family. However other characters place the species in the Family Beraeidae. In both the Beraeidae and the Helicophidae the venation is extremely variable and the ♂ genitalia are similar in general form. The presence of the discoidal cell in the anterior wing of the type species may indicate an affinity between the two families. This character separates the genus from all others in the family and requires an extension of the family definition.

Alloecentrella magnicornis n. sp. Figs. 7, 8.

HEAD. Below and behind each eye an elongate wart with black hairs. A wart bearing long blackish setae behind each antenna. A wart bearing a short brush tuft of fuscous hairs in front of each antenna and between these a similar brush tuft of fuscous hairs arises. ANTENNAE. First joint slightly longer than head with moderately long fuscous and fulvous hairs. Remaining joints with ochreous hairs —not annulated. MAXILLARY PALPI five-jointed, the two short basal joints with moderately long ochreous hairs, apical joints with short ochreous pubescence. THORAX black, shining. WINGS. Hairs of both wings uniform fuscous—no pattern. ABDOMEN blackish, each tergite pale posteriorly.

Length of anterior wing, 5 mm.

Genitalia ♂. Ninth segment produced in a bifid dorsal plate, each arm being excised dorsally towards the apex, the upper angle before the excision bearing a long bristle. Below is what appears to be a compound penis-cover surrounding the penis. Basally it arises from the dorsal plate above and spreads out in two flaps, one on each side of apical portion of plate, to become trough-like, U-shaped in cross-section, at the apex. In caudal and ventral views it is seen to be entire below. Inferior appendages large, bifurcate, the upper arm being twisted inwards at the apex, the lower branch turned sharply inwards near the apex. Base of each inferior appendage produced inwards ventrally in a rounded plate. Eighth segment bears a pair of warts dorsally. Seventh sternite without process.

Holotype ♂. Waitakere: 28.X.1934 (genitalia in alcohol) *(Anon.)*.

The genitalia is of similar form to that of *Alloecella warneri* Mosely and the penis is obscure as in that species.

Pycnocentrella eruensis Mosely

1953—*Pycnocentrella eruensis* Mosely, *Trichoptera of Australia and New Zealand,* p. 145.

Rangataua: 6.1.1919, 1 ♂ (genitalia in alcohol).

FAMILY PHILORHEITHRIDAE

Philorheithrus agilis (Hudson)

1904—*Pseudoeconesus (?) agilis* Hudson, *New Zealand Neuroptera,* pp. 64-65.

Wainuiomata: Over creek above reservoir in dense forest, 24-25.X1.1898, 1 spec. (posterior wings and abdomen missing) *(G. V. Hudson).*

This specimen only bears a label "58b" in G. V. Hudson's handwriting. The above data is taken from Hudson's catalogue. Specimens 58a and 58c in his collection have the same data in the catalogue.

FAMILY LEPTOCERIDAE

Subfamily TRIPLECTIDINAE

Triplectides cephalotes (Walker).

1852—*Leptocerus cephalotes* Walker, *Cat. Neur. Brit. Mus.*, 1:73.

No data, 1 ♂.

Triplectides obsoleta (McLachlan)

1862—*Pseudonema obsoleta* McLachlan, *Trans. ent. Soc. Lond.*, 1:305-6.

Rotorua: 28.XII.1916, 1♀. New Plymouth: 1.X.1916, 1♂. Dunedin: Opoho, 10:XII:1918, 1♀; Lake Moana: 16, 21:XII:1925, 1♀ *(A. Tonnoir)*.

Triplectidina oreolimnetes (Tillyard)

1924—*Triplectides oreolimnetes* Tillyard, *Trans. N.Z. Inst.*, 55:306-7.

Tongariri: 16.1.1930, 1♂, *(A Philpott)*.

Hudsonema amabilis (McLachlan)

1868—*Tetracentron amabile* McLachlan, *J. Linn. Soc. (Zool.), London*, 10:201-2.

Whangarei: Waikaraka Valley, 16:I:1927, 1♀. Waitati: 2:XII:1917, 1♂. Dunedin: Opoho, 6.X.1917, 1♂ (genitalia in alcohol). Routeburn R.: 20:I:1926, 1♂ (abdomen missing). Takahe Valley: 17:II:1953, 3 ♂♂ 1♀ *(E. G. Turbott)*.

Hudsonema species A.

L. Wanaka: Minaret Pk., 30.XII.1923, 1♂ (genitalia in alcohol).

This specimen is unicolorous on the forewings as are two males described and figured by Mosely and Kimmins (1953) as *H. aliena* (McLachlan). It also appears conspecific with them in the ventral view of the genitalia (Mosely and Kimmins, 1953, fig. 165d) and the size, shape, and positioning of the two membraneous processes arising from the dorsal margin of the ninth segment (Mosely and Kimmins, 1953, fig. 165c). However, the inferior appendages are as described and figured by Mosely and Kimmins (1953, p. 244, fig. 167b) as a variation in the species *H. amabilis* (McLachlan). On account of these overlapping characters and because of the provisional nature of the determination of the males of *H. aliena* (see Mosely and Kimmins, 1953, p. 240) it is thought best to keep the present specimen as a separate entity until further material is available.

Subfamily LEPTOCERINAE

Oecetis unicolor (McLachlan)

1868—*Setodes unicolor* McLachlan, *J. Linn. Soc. (Zool.), London*, 10:203-204, 213.

Queenstown: 1:XI:1917, 1♂. L. Te Anau: W. Sth. Arm, 28:XII.1924, 1♂. L. Manapouri: Hope Arm, 2:I:1923, 1♂. Rotorua: street, ?:IV:1949, 1♀ *(E. G. Turbott)*.

FAMILY HYDROPSYCHIDAE

Subfamily HYDROPSYCHINAE

Hydropsyche fimbriata McLachlan

1862—*Hydropsyche fimbriata* McLachlan, *Trans. ent. Soc. Lond.*, 1:309.

Kaeo: 12.1.1927, 1♀. Waitomo: 25.XII.1916, 1♀. No data, 1♀.

Hydropsyche colonica McLachlan

1871—*Hydropsyche colonica* McLachlan, *J. Linn. Soc. (Zool.), London,* 11:131.

Tongariro River, at light, hatcheries, 21.X.1949, 1♂ *(E. G. Turbott).* Leith: 7.X1.1916, 1♂ 1♀; 12.X1.1916, 7♂♂ 2♀♀ (1♂ 1♀ genitalia in alcohol); 15.X1.1916, 2♀♀; 30.X1.1916, 1♂. Waitati: 5.X1.1916, 1♂. Dunedin. Woodhaugh, 26.X.1916, 1♂.

Hydropsyche tepoka Mosely

1953—*Hydropsyche tepoka* Mosely, *Trichoptera of Australia and New Zealand,* p. 320.

Tongariro River: at light, hatcheries, 21.X.1949, 2♂♂ 2♀♀ (1♂ genitalia in alcohol).

Hydropsyche sp.

Te Anau: South Arm, 29.X11.1924, 2♀♀.

These females do not belong to any known species.

Diplectrona bulla n. sp. Fig. 9.

HEAD black with two large, lighter-coloured warts posteriorly. PALPI and LEGS pale castaneous. ANTENNAE blackish, serrate along inner margin. ANTERIOR WING blackish, uniform in colour; two cross-veins present between costa and sub-costa.

Length of anterior wing, 7 mm.

Genitalia ♂. Ninth dorsal segment slightly concave. Dorsal plate with centre of its basal margin membranous, the lateral basal margins fused to the ninth segment. It is formed by a pair of elongate rounded lobes, separated by a broadened excision, which bear bristles apically. Penis stout, with paired elongate penis-sheaths. Lower penis-cover in form of two outwardly curved pieces which, seen from the side, broaden sharply at their apices. Apical portion of penis with paired longitudinal flanges above, a blister-like sac below, and, on each side, with an anteriorly-directed elongate hook which is dilated before its apex. Inferior appendages long, slender, curved; two-jointed, apical joint short, stout, and blunt.

Abdomen with two pairs of internal reticulated sacs and a pair of short, blunt, external filaments. In the holotype specimen the body was damaged and, when treated, the two sacs on one side were loosened and are now lost.

Holotype ♂. Waimarino: 27.1.1919 (genitalia in alcohol).

This species is similar to the other New Zealand species *D. zealandensis* Mosely but the genitalia, particularly the penis are more complex and serve to separate the species from all others in the genus.

FAMILY POLYCENTROPODIDAE

Polyplectropus aurifusca McFarlane

1956—*Polyplectropus aurifusca* McFarlane, *Rec. Cant. Mus.,* 7:34-36.

Waimarino: 27.1.1919, 1♂ 1♀ (♂ genitalia in alcohol).

Polyplectropus penicillus n. sp. Fig. 10.

Length of anterior wing, 8 mm.

Penis straight, not bent down. Apex divided into two long lobes with a short rounded median lobe between. Lateral lobes each with a pencil of hairs apically. Ventral flap with straight posterior margin.

Holotype♂. Dunedin: 22.XI.1916 (genitalia in alcohol).

Paratypes. Waitati: 10.XII.1916, 1♂ (genitalia in alcohol). Dunedin: Woodhaugh, 12.X.1915, 1♂. Kauri Gully: 12.1.1919, 1♂.

This species is very close to *P. puerilis* (McLachlan) from which it differs mainly in the form of the penis.

FAMILY PSYCHOMYIDAE

Subfamily ECNOMINAE

Ecnomina zealandica n. sp. Fig. 11.

HEAD fuscous; ANTENNAE ochraceous. THORAX fuscous. LEGS ochraceous . ANTERIOR WING light fuscous, fringe darker. VENATION. In anterior wing apical forks 3 and 4 sessile, the median cell extending between them. In posterior wing apical fork 3 about as long as its footstalk.

Length of anterior wing, 3.5 mm.

Genitalia♀. Terminal segments modified to form an ovipositor.

Holotype♀. Kauri Gully: 13.1.1919 (genitalia in alcohol).

The genus and sub-family are here recorded in New Zealand for the first time. The species differs from Australian species in that apical forks 3 and 4 of the anterior wing are both sessile, not stalked.

Subfamily PSYCHOMYINAE

Zelomyia trulla McFarlane

1956—*Zelomyia trulla* McFarlane, *Rec. Cant. Mus.*, 7:37-38.

North Auckland: Mangamuka Mts., 8.1.1927, 1♂ 1♀.

FAMILY PHILOPOTAMIDAE

Hydrobiosella stenocerca Tillyard

1924—*Hydrobiosella stenocerca* Tillyard, *Trans. N.Z. Inst.*, 55:289-290.

Waitati: 12.XI.1916, 1♂; 7.I.1917, 1♀; 21.III.1920, 1♀.

NEOBIOSELLA n. gen.

ANTERIOR WING short, broad, and well-rounded at apex. Apical forks 2, 3, 4, and 5 present. Discoidal cell present. Additional costal cross-vein and additional basal cross-vein between Sc and R present. POSTERIOR WING narrower than anterior wing. Apical forks 2, 3, and 5 present. Discoidal cell present.

Spurs 2.4.4.

Type species. *Neobiosella irrorata* n. sp.

The type species is characteristic of the Family Philopotamidae except for the absence of apical fork 1 in both wings. This character has not previously been recorded in this family and it distinguishes the genus from others in the family.

Neobiosella irrorata n. sp. Fig. 12.

HEAD fuscous; ANTENNAE testaceous, each segment annulated with fuscous basally. THORAX fuscous; LEGS testaceous. ANTERIOR WING light testaceous strongly irrorated with fuscous.

Length of anterior wing, 6 mm.

Genitalia♀. Abdomen terminates in a long, stout, ovipositor.

Holotype♀. Whangarei: 7.1.1927.

FAMILY RHYACOPHILIDAE

Subfamily HYDROBIOSINAE

Hydrobiosis parumbripennis McFarlane

1951—*Hydrobiosis parumbripennis* McFarlane, *Rec. Cant. Mus.*, 5:256.

National Park: Chateau, at light, 20.X.1949, 1♂ *(E. G. Turbott).*

Hydrobiosis falcis n. sp. Fig 13.

HEAD fuscous; ANTENNAE fuscous. THORAX fuscous; LEGS dark ochreous. ANTERIOR WINGS dark testaceous.

Length of anterior wing, 12 mm.

Genitalia♂. Apical margin of eighth tergite with a membranous centre and bordered with tufts of hair. Margin of ninth tergite produced in a semi-transparent upwardly turned plate with a pair of setose processes near the base on the dorsal surface. Superior appendages long, slightly sinuous, slightly dilated before middle and at apex. Upper penis-cover in form of a pair of processes each narrowing sharply from base then slightly up-turned; apices set with short spines. Penis coiled at base with duct down-curved before apex and with various long processes. Inferior appendages branched; inner branch short, pointed, covered with small teeth on its inner surface; outer branch long, slightly sinuate in dorsal and ventral views, sickle-shaped in lateral view, with short spines on inner margin.

Holotype♂. Whakapapanui Stm.: 3,500 ft., at light, 19.X.1949, (genitalia in alcohol) *(E. G. Turbott).*

Very close to *H. umbripennis* McLachlan and *H. parumbripennis* McFarlane. The ♂ genitalia of the three species differ from those of the other species in the genus in the form of the inferior appendages. In the present species the inner arm of each inferior appendage is much shorter, in comparison with the outer arm, than in the other two species.

Hydrobiosis harpidiosa McFarlane

1951—*Hydrobiosis harpidiosa* McFarlane, *Rec. Cant. Mus.*, 5:257.

Whakapapanui Stm.: 3,500 ft., at light, 19.X.1949, 1♂ (genitalia in alcohol) *(E. G. Turbott)*.

Hydrobiosis spp.

Tongariro R.: hatcheries, at light, 21.X.1949, 1♀ *(E. G. Turbott)*. Arthurs Pass: 2.II,1919, 1♀.

These specimens cannot be specifically identified at present as females of some species have not been described.

Psilochorema mimicum McLachlan

1866—*Psilochorema mimicum* McLachlan, *Trans. ent. Soc. Lond.*, 5:274.

Waimarino: 18.1.1919, 1♂.

Psilochorema leptoharpax McFarlane

1951—*Psilochorema leptoharpax* McFarlane, *Rec. Cant. Mus.*, 5:261.

Hoon Hay Valley: 7.II.1923, 1♂.

Synchorema zelandica Mosely

1953—*Synchorema zelandica* Mosely, *Trichoptera of Australia and New Zealand*, p. 464-5.

Otira R.: 31.1.1922, 1♂ (genitalia in alcohol).

Neurochorema armstrongi McFarlane

1951—*Neurochorema armstrongi* McFarlane, *Rec. Cant. Mus.*, 5:254.

Tongariro R.: hatcheries, at light, 21.X.1949, 1♂ *(E. G. Turbott)*.

Costachorema xanthoptera McFarlane

1939—*Costachorema xanthoptera* McFarlane, *Trans. roy. Soc. N.Z.*, 69:336-7.

Tongariro R.: hatcheries, at light, 21.X.1949, 1♂ 2♀♀ *(E. G. Turbott)*. Dunedin: Up. Leith, 13.XII.1912, 1♂ (genitalia in alcohol).

Costachorema psaroptera McFarlane

1939—*Costachorema psaroptera* McFarlane, *Trans. roy. Soc. N.Z.*, 69:335-6.

Arthurs Pass: 1.II.1922, 1♂ (genitalia in alcohol).

Costachorema sp.

Whakapapanui Stm.: 3,500 ft., at light, 19.X.1949, 3♀♀ *(E. G. Turbott)*.

Until females of all species of the genus are described these specimens cannot be specifically determined.

FAMILY HYDROPTILIDAE

Oxyethira albiceps (McLachlan)

1862—*Hydroptila albiceps* McLachlan, *Trans. ent. Soc. Lond.*, 1:304.

Auckland: 21.VII.1929, 1♂ *(A. Philpott)*. Dunedin: 9.X.1916, 1♂ 1♀. Leith: 7.X.1916, 1 spec. (abdomen missing); 7.XI.1916, 1♂.

TEXT FIG. A.

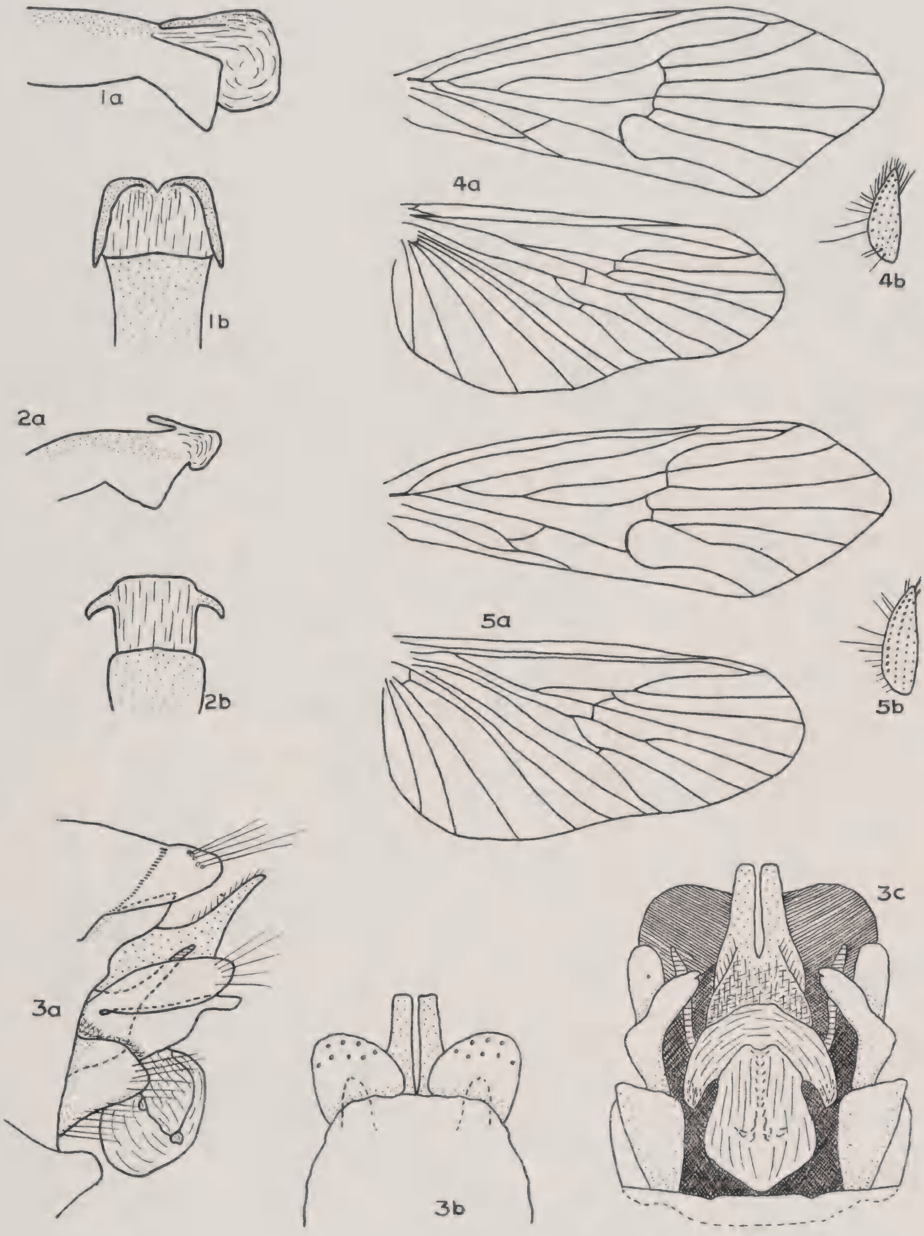

Fig. 1. *Pycnocentrodes aeris* n. sp., ♂ a. apex of penis lateral. b. apex of penis, dorsal.
Fig. 2. *Pycnocentrodes unicolor* n. sp., ♂ a.apex of penis, lateral. b. apex of penis, dorsal.
Fig. 3. *Oeconesus lobatus* n. sp., ♂ a. genitalia, lateral. b. genitalia, dorsal. c. genitalia, ventral.
Fig. 4. *Pseudoeconesus bistirpis* n. sp., ♂ a. wings, venation. b. right maxillary palp, anterior.
Fig. 5. *Pseudoeconesus tristirpis* n. sp., ♂ a. wings, venation. b. right maxillary palp, anterior.

TEXT FIG. B.

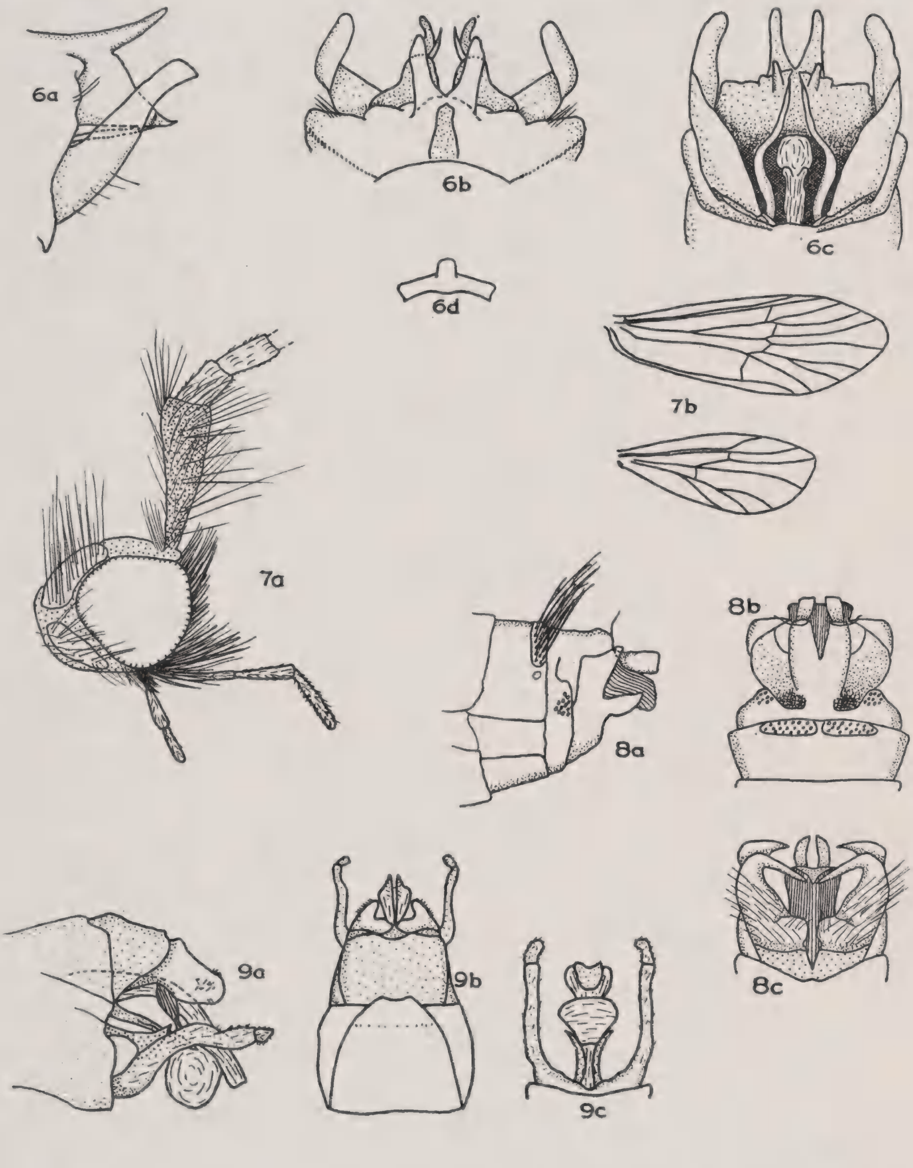

Fig. 6. *Olinga fumosa* n. sp. ♂ a. genitalia, lateral. b. genitalia, dorsal. c. genitalia, ventral. d. sternite of seventh abdominal segment.

Fig. 7. *Alloecentrella magnicornis* n. sp. ♂ a. head. b. wings, venation.

Fig. 8. *Alloecentrella magnicornis* n. sp. ♂ a. genitalia, lateral. b. genitalia, dorsal. c. genitalia, ventral.

Fig. 9. *Diplectrona bulla* n. sp., ♂ a. genitalia, lateral. b. genitalia, dorsal. c. genitalia, ventral.

TEXT FIG. C.

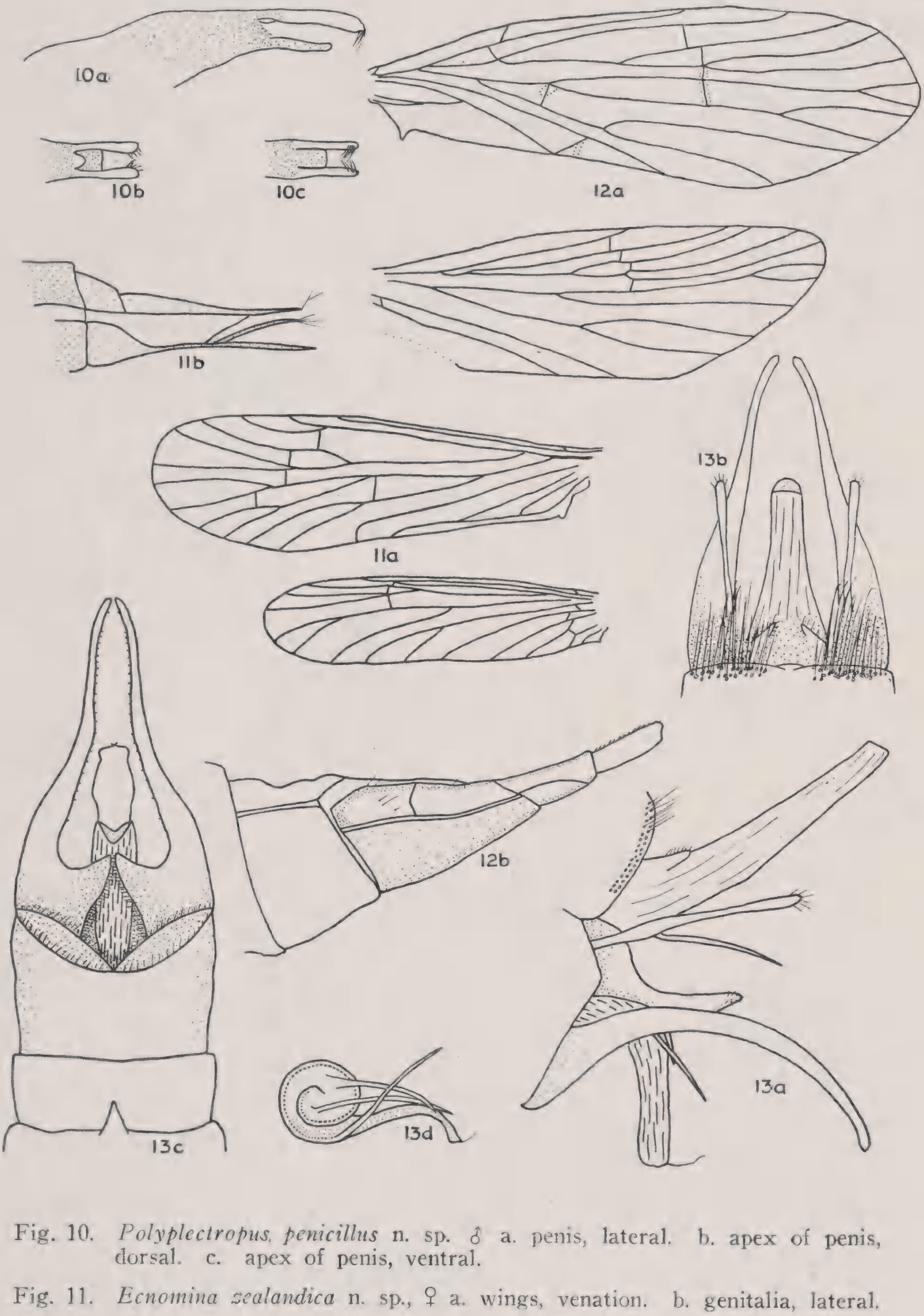

Fig. 10. *Polyplectropus penicillus* n. sp. ♂ a. penis, lateral. b. apex of penis, dorsal. c. apex of penis, ventral.

Fig. 11. *Ecnomina zealandica* n. sp., ♀ a. wings, venation. b. genitalia, lateral.

Fig. 12. *Neobiosella irrorata* n. sp. ♂ a. wings, venation. b. genitalia *(in situ)*, lateral.

Fig. 13. *Hydrobiosis falcis* n. sp., ♂ a. genitalia, lateral. b. genitalia, dorsal. c. genitalia, ventral. d. penis, lateral.

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Mollusca of the Kermadec Islands

PART I.

By A. W. B. POWELL, Auckland Museum.

ABSTRACT.

The material upon which this paper is based was dredged by the Royal Danish Research Ship Galathea in shallow water, 58-85 metres off Raoul or Sunday Island, Kermadecs, on March 3rd, 1952.

The paper contains descriptions of two new genera, a new subgenus, fourteen new species, two new subspecies, records of four described species new to the fauna and three revised identifications of previous records.

The Kermadecs are subtropical, marginal only to the Indo-Pacific Region and their molluscan fauna is a mixture of Indo-Pacific, East Australian, Norfolk Island and New Zealand elements. The present paper increases the Indo-Pacific and East Australian percentages.

Nanism is apparent in several pelecypod species which normally reach much greater size in the warmer waters of the Indo-Pacific proper.

The Kermadec Islands are situated in latitude 29° 15′ south and longitude 177° 59′ west, about midway between New Zealand and the Tongan Group.

The last major work on the Kermadec mollusca was a comprehensive paper by the late Dr. W. R. B. Oliver, "The Mollusca of the Kermadec Islands," which appeared in 1915 in the Transactions of the New Zealand Institute, volume 47.

Oliver's paper was based upon material collected during an expedition to the Islands in 1908 augmented by two collections formed by Mr. R. S. Bell during 1909 and 1910 respectively, one of which is in the Auckland Museum.

The present paper is based upon dredgings by the "Galathea" Expedition off Raoul Islands in 58-85 metres on a coarse shell-sand and gravel bottom and it was found to be rich in both new species and records new to the fauna.

In subsequent parts the remainder of the "Galathea" material will be described, followed by a check-list of the Kermadec molluscan fauna incorporating results of shore collecting by Mr. J. H. Sorensen during 1944.

The most spectacular shells from the "Galathea" dredgings are a handsome member of the tropical Cassid genus *Oniscidia*, a sculptured *Conus* representing a new subgenus, an elaborately sculptured new genus of the *Sanguinolariidae* and three new members of the *Pectinidae*. Two pelecypods, *Nemocardium (Pratulum) probatum* Iredale and *Pitarina* cf. *affinis* (Gmelin) are abundant in the "Galathea" dredgings, but they attain less than half the size reached by these species in warmer waters of the Pacific. They indicate dwarf races induced by less favourable conditions.

Rec. Auck. Inst. Mus. Vol. 5, No. 1 & 2, p.p. 65-85, 14th May, 1958

Another probable instance of nanism is shown by an abundant small pelecypod, *Asaphis nana* n. sp. which is the most temperate occurrence of this otherwise tropical genus so far known.

A surprise addition to the fauna is *Hawaiarca alia* Dall, Bartsch and Rehder, known previously only from the Hawaiian Islands.

I am indebted to Dr. Anton F. Bruun, leader of the Galathea Expedition, who established the Kermadec shallow water stations at my request.

The types of the new species described in this paper are, unless otherwise stated, in the Zoological Museum, Copenhagen, Denmark.

Family ARCIDAE

Genus HAWAIARCA Dall, Bartsch & Rehder, 1938.

Type (o.d.): *Hawaiarca rectangula* D. B. & R.

Hawaiarca alia Dall, Bartsch & Rehder, 1938.

1938—*Hawaiarca alia* Dall, Bartsch & Rehder, Bishop Museum Bulletin No. 153, p. 28, Pl. III, Figs. 7-10.

Type Locality: Northeast coast of Hawaii, 26-50 fathoms. Galathea St. 674, 29° 15′ S., 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

This is a small, solid, inflated ovate-quadrate white Arcid with numerous relatively strong radial ribs beaded by almost equally strong concentric ribs. The radials number 46 in the Hawaiian holotype, which is 5 mm. in length but increase by intercolation to about 82 in a Kermadec shell of a length of 10.7 mm. The hinge is narrow, toothed throughout its length and these which number 24 in the holotype range according to the size of the shell from 20-27 in Kermadec material. A feature of the genus is the narrow ligamented area, most of which is posterior to the beaks. It is sculptured with from four to six long ligamental grooves which are almost horizontal and subparallel to the hinge line.

Kermadec examples of comparable size appear to be indistinguishable from the Hawaiian holotype, which is fully described and well figured.

It is likely that this species will be found in other shallow water stations in the South West Pacific.

This is a new record for the Kermadecs and is not "*Arca reticulata*" of Oliver, 1915, which is probably *Acar dubia kerma* Iredale, 1939 (Great Barrier Reef Exped. Moll. 1, p. 262).

Family PECTINIDAE

Genus PECTEN, Mueller, 1776.

Type (s.d. Children, 1823): *Ostrea maxima* Linn.

In the New Zealand Geological Survey Paleontological Bulletin, No. 26, "The Genus Pecten in New Zealand" (1957) Dr. C. A. Fleming gave a very comprehensive account of the Pacific invasion by the Mediterranean Pecten groups, *jacobaeus* and *benedictus*. He visualised geographic fluctuations for the derivatives of the cool water *jacobaeus* group and the warmer water *benedictus* group corelated in the Austro-Neozelanic area with Pleistocene-Recent climatic variation.

I am indebted to Dr. Fleming for his opinion regarding the Kermadec scallop described below, which he considers belongs to the *jacobaeus* group, not the *benedictus* group which includes the Eastern Australian *fumatus*. Like the New Zealand Castlecliffian *tainui* and the New Zealand Recent *novaezelandiae*, the Kermadec shell has lost almost all traces of secondary radial sculpture. It seems to be closest to *tainui*, differing only in rib profile and in its high swollen beak.

A similar, but even more recent, origin seems to be indicated for the large New Zealand benthic gastropod *Ranella multinodosa* (Bucknill). This is very close to, in fact almost identical with, the type of the genus, the Mediterranean Recent *Ranella gigantea* Lamarck, yet the genus is neither known from the New Zealand Pliocene-Pleistocene nor from intermediate Recent geographical areas.

Pecten raoulensis n. sp. Plate 10, Figs. 1, 2.

1915—*Pecten medius*: Oliver (non Lamarck, 1819), Trans. N.Z. Inst. 47, p. 553.

Shell very close to the New Zealand Castlecliffian *tainui* but smaller, more convex (right valve) and with a higher, more swollen beak. The radial ribs are broad with deeply channelled narrow interspaces but their edges are slightly rounded not sharp as in *tainui*. These ribs number 17-18 in *raoulensis* but only 14-15 in *tainui*. Those towards the anterior and posterior ends are bisected by a deeply incised groove and obsolescent multiple grooving is faintly indicated on most of the ribs.

The intercostal spaces are densely concentrically lamellate. The left valve is distinctly concave with rather narrowly rounded radial ribs and the whole surface is crowded with dense concentric lamellae.

The right valve is white tessellated with pinkish-brown at the beak. The left valve is dull pink with brownish maculations and white chevrons towards the umbo. The interior is white diffused with faint pinkish-brown at the margins.

Length, 83 mm.; height, 76 mm.; inflation 29 mm. (Holotype).

Locality: Galathea St. 674 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

Genus **AEQUIPECTEN** Fischer, 1887.

Subgenus **CORYMBICHLAMYS** Iredale, 1939.

Type (o.d.): *Chlamys corymbiatus* Hedley.

This genus was proposed for an elaborately sculptured tropical Queensland shell of suborbicular outline, subequivalve and almost equilateral, with both valves strongly convex. The sculpture consists of elevated strong radial ribs each bearing three radial series of scales connected laterally by thin lamellae. Interstices densely latticed by thin produced lamellae. The most distinctive feature of the shell is the elevated and distinctly grooved, or denticulate cardinal crura.

The species described below makes a second member of this interesting genus previously known only from the Queensland coast.

The Kermadec shell attains a far greater size and is not nearly so inflated but it has the same denticulate crura and comparable but even more elaborate sculpture, the intercostal spaces bearing radial series of prominently elevated scales.

Aequipecten (Corymbichlamys) iredalei n. sp. Plate 11, Figs 1, 2; Text Fig. 2.

Shell of medium size and rather feeble inflation, moderately solid, length slightly greater than height, Subequivalve, right valve of slightly the greater convexity, subequilateral, the shell produced a little more posteriorly. Suborbicular except for well developed ears and a flat to slightly concave outline to the antero-dorsal and postero-dorsal margins, which show a divergence of from about 102° for medium sized shells to about 114° for the largest example.

Radials, strong broad corrugations with deeply channelled interspaces which vary between half and equal width of the radials. Seventeen radials, fourteen of them prominent and wide spaced, three marginal ones, crowded, one antero-dorsal and two postero-dorsal. Ears large, subequal. Surface sculpture very elaborate. Each primary rib bears seven narrow riblets, centre one most prominent, the whole crossed by dense concavely arcuate lamellae, continuous but produced into crisp scales where they cross the riblets; best developed at the flanks. Intercostal spaces bearing three radial series of closely packed prominent imbricating scales. Anterior ear bearing six radials in the right valve, which are rendered densely squamose by concentric lamellae. Posterior ear with eight to twelve similarly sculptured radials. Byssal sinus narrow, or moderate depth; ctenolium short with only four small teeth. Hinge line straight with a deep narrowly triangulate resilial pit and a pair of cardinal crura on each side of the resilifier. The outermost crura are long and parallel to the dorsal margin, in the left valve but slightly divergent to it in the right valve. A second still more divergent but very short pair of crura coalesce with the upper extremities of the provinculum. Both pairs of crura bear distinct crowded vertical taxodont-like grooves which have almost the magnitude of interlocking teeth. Colour of right valve pale orange-buff, broadly and irregularly blotched with pale orange-brown, left valve similarly patterned but in bright salmon-pink. Interior of right valve yellowish-buff turning to deep orange-brown at the dorsal edges, hinge plate and ears; left valve similarly coloured at the margins but diffused with deep carmine-pink over the central area, except where lightened with callus. Large examples have the interior more uniformly salmon-pink.

Height, 33 mm.; length, 35 mm.; thickness (2 valves) 10.7 mm. (Holotype).
Height, 58 mm.; lenght, 65 mm.; thickness (left valve) 11.0 (St. 674).
Height, 75 mm.; length, 84.5 mm.; thickness (right valve) 13.5 mm. (St. 674).

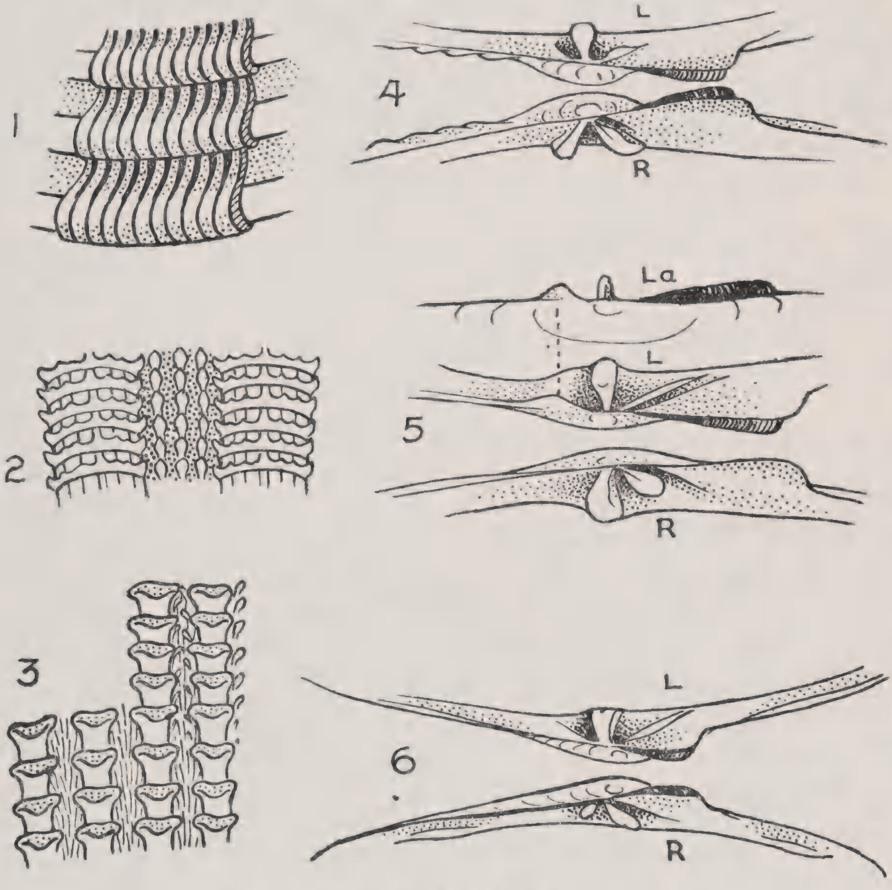
Locality: Galathea St. 675, 29° 13.5′ S.; 177° 57′ W., off Raoul Island Kermadecs, 58-60 metres, 3:3:1952 (Holotype, one live shell); St. 674, 29° 15′ S,; 177° 57′ W., off Raoul Island, 75-85 metres (gravel bottom; many dead shells); ½ mile east of Philip Island, Norfolk Island, 33 fathoms (N.Z. Oceanographic Institute, Wellington) (valves).

I am indebted to Mr. Tom Iredale of Sydney for the suggested relationship of this species with *Corymbichlamys corymbiatus* Hedley. Iredale's genus however, is quite similar to *Aequipecten* Fischer, 1887 based upon the European *opercularis* Linnaeus, it also shows vertical crural striations but they do not persist in the adults. Only the elaborate sculptural development is wanting in *opercularis* although the lamellar arrangement is there in incipient form.

The relationship of the Kermadec shell is probably better expressed by retaining *Corymbichlamys* as a subgenus of *Aequipecten* for deeply corrugated species exhibiting the complex sculptural detail described above, plus a marked development of the crural striations throughout all stages of growth.

An evidently related species is the Hawaiian deep-water shell named *Cryptopecten alli,* gen. and sp. nov. by Dall, Bartsch and Rehder, 1938. This has even more elaborate sculpture than *Corymbichlamys,* with the rib lamellae fused into series of hollow blisters. The hinge bears distinct cardinal crura also.

I have not seen the Hawaiian shell so should Hedley's *Chlamys corymbiatus* and Dall, Bartsch and Rehder's species prove to be congeneric then *Cryptopecten* will replace *Corymbichlamys* for the Queensland and the Kermadec species.



TEXT FIGURE A.

Details of sculpture: 1. *Kermadysmea galatheae* n. sp. 2. *Aequipecten (Corymbichlamys) iredalei* n. sp. 3. *Chlamys (Mimachlamys) asperrimoides* n. sp. Hinge structures. 4. *Kermadysmea galatheae* n. sp. 5. *Dysmea occidens* (Gmelin) New Caledonia. (La = left valve from above showing lunular projection.) 6. *Asaphis nana* n. sp.

Genus **CHLAMYS** Roeding, 1798.

Subgenus **MIMACHLAMYS** Iredale, 1929.

Type (o.d.): *Pecten asperrimus* Lamarck.

Chlamys (Mimachlamys) asperrimoides n. sp. Plate 11, Figs. 3, 4; Text Fig. 3.

Shell of medium size (30-45 mm.), moderately inflated, very like the Southern Australian *asperrimus* in shape but with fewer more narrowly rounded radial ribs, studded with closely spaced lamellate scales but no secondary radials apart from occasional margining weakly spinose radials developed only in large examples and only towards the margin.

Outline ovate, taller than wide, slightly oblique, with the anterior auricle much the larger. Sculptured with 27 narrowly rounded sharply raised tubular radials densely imbricated with conspicuous spoon-shaped lamellate scales. Radial ribs otherwise smooth, but the interstices are crowded with microscopic *Camptonectes* radial striations. Anterior auricle of the left valve sculptured with nine spinose radials that of right valve with seven spinose radials. Six distinct teeth associated with the ctenolium which is deep, square ended and has strong transverse lamellae in the deep-set byssal groove. Colour dull brownish red, paler towards the umbos. Interior dull pinkish-grey tinged with brownish-red at the margins.

Height, 20.2 mm.; length, 18.0 mm.; thickness (both valves) 6.8 mm. (Holotype).
Height, 30.6 mm,; length, 27.15 mm,; thickness (one valve) 6.0 mm. (Galathea St. 674).
Height, 42.5 mm.; length, 39.3 mm.; thickness (one valve) 10.0 mm. (40-50 fathoms, Norfolk Is.).

Localities: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island Kermadecs, 75-85 metres (one valve only); from cable 45-50, fathoms to south of Norfolk Island (W. Foster, C. S. "Recorder," 1931, holotype); ½ mile east of Philip Is., Norfolk Island, 33 fathoms (N.Z. Oceanographic Institute, Wellington).

Holotype: Auckland Museum.

Genus **CHLAMYDELLA** Iredale, 1929.

Type (o.d.): *Cyclopecten favus* Hedley.

Chlamydella favus lemchei n. subsp. Plate 9, Figs. 7, 8.

Shell small thin suborbicular, right valve larger and slightly more convex than the left. Sculpture discrepant, that of the left valve the stronger, consisting of a microscopic dense linear spaced cover of divergent meandering weakly squamose rounded threads crossed over the early growth stages by crisply regularly spaced concentric lamellae which rapidly diminish and become obsolete; that of the right valve, visible only under high magnification, shows a very dense surface network pattern resolving into narrow hexagonal spaces arranged in radial series.

Left valve with the umbo sharp and projecting beyond hinge line, right valve with umbo smaller and not extending beyond hinge line.

Auricles unequal, the anterior narrow and produced, sculptured with ten crisp radials latticed by lammellae. Colour of left valve yellowish-brown diffused with light reddish-brown which sometimes resolves into a radiate or even a chevroned pattern.

Right valve with a well defined byssal sulcus but not ctenolium.

Length, 4.5 mm.; height, 4.5 mm. (Holotype—left valve).
Length, 5.9 mm.; height, 5.5 mm. (Paratype—right valve).
Locality: Galathea St. 674, 29° 15′ S.; 177° 5′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

The Kermadec shell appears to be very closely allied to the New South Wales *favus* Hedley, differing only in the rapid obsolescence of the concentric lamellae in the left valve, with a compensating stronger development of the radial sculpture.

Family LIMIDAE

Genus **LIMATULA** Searles Wood, 1839.

Type (Gray, 1847): *Pecten subauriculata* Montagu.

Limatula oliveri n. sp. Plate 9, Fig. 4.

This is no doubt the species Oliver recorded from the Kermadecs in 1915 under *Lima bullata* (Born) but at that time the species name applied to shells from both New Zealand and Australia. Since then Finlay (1926, p. 454) quoted Hedley's preference for *strangei* Sowerby for the East Australian shell on the grounds that Born's *bullata* was a West Indian shell, and at the same time Finlay recognized the New Zealand shell as distinct in shape and sculpture from the Australian shells and separated the former under a new name *maoria*.

Later (1939, p. 390) Iredale proposed a new genus *Stabilima* for these shells, but there do not seem to be valid reasons for discontinuing the use of *Limatula* S. Wood based upon the English *Lima subauriculata* Montagu.

Specifically the Kermadec shells fit neither *strangei* nor *maoria*, but are somewhat nearer to the Australian than to the New Zealand shells.

The Kermadec species is therefore here described as new and its differentiating characteristics are narrow form with a short hinge line and strong narrowly crested radials, forming in end profile a regular zigzag with the troughs of the interspaces as narrow as the crests of the ribs.

Shell small, white, thin, elongate-oval constricted to a very short hinge line. About 32 narrowly angulate radial ribs, as described above, crossed by dense concentric lamellae more prominent in the grooves than on the radials.

Height, 7.0 mm.; length, 4.2 mm.; diameter (one valve), 2 mm. (holotype).
Locality: Galathea St. 674, 29° 15′ S; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

This is the second species of *Limatula* from the Kermadecs; the other, *L. insularis* Oliver, 1915, is a very small shell, 3.5 mm. in height, and it is broad with very few strong broadly rounded radials.

Genus **DIVARILIMA** n. gen.

Type: *Lima sydneyensis* Hedley.

The species *Lima sydneyensis* has been long considered an anomalous form and as recently as 1956 Dell (p. 26) reiterated this, but preferred to retain the species in *Lima* (s.l.) until the already published generic names in the family are satisfactorily evaluated.

However, *Lima sydneyensis* is a very distinctive member known so far only from Sydney, New South Wales, Northland, New Zealand, and now from off Raoul Island, Kermadecs.

Briefly it is a miniature *Lima* with a *Ctenoides* sculptural pattern of divaricating threads. It resembles the typical species except that a mature stage of arrested growth is reached at a small size, corresponding with the early post-larval stages in *Lima* typical.

Divarilima sydneyensis Hedley.

1901—*Lima brunnea* Hedley, Proc. Linn. Soc. N.S.W., 26, p. 21, Pl. II, Figs. 7, 8.

1904—*Lima sydneyensis* Hedley n. nom. for *brunnea* Hedley, 1901 (non Cooke 1886) Proc. Linn. Soc. N.S.W. 26, p. 200.

Type Locality: Within Sydney Heads, 8 fathoms, New South Wales (living); Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres (a number of bleached valves).

Dell (1956, p. 26) after examining a single topotypic valve of *sydneyensis* in the Suter collection (N.Z. Geological Survey) confirmed Suter's reference of New Zealand occurrences to this species.

Comparing this same topotype with the Kermadec material I can see no differences, but the New Zealand specimens are a trifle narrower, with a slightly longer posterior slope, and the anterior slope is a flatter curve not produced forwards to the same extent.

The New Zealand form has a littoral habitat, attached to undersides of stones at low tide, but the Australian form has been taken alive only by shallow dredging. My Discovery II record of the New Zealand shell from 260 metres off the Three Kings Islands is based upon bleached valves evidently washed down from shallower water. The living habitat of the Kermadec shells is not known, but may well prove to be from shallower water also.

The apparent slight variation in the shape of the New Zealand examples cannot be confirmed until a series of topotypes is available.

Family CRASSATELLIDAE

Genus **SALAPUTIUM** Iredale, 1924.

Type (o.d.): *Crassatella fulvida* Angas.

Salaputium iredalei n. sp. **Plate 9, Fig. 6.**

Shell small, solid, obliquely ovate-trigonal, strongly convex, sculptured with heavy rounded concentric ribs; colour cinnamon to pale reddish-brown externally, irregularly splashed and chevroned with dark reddish-brown. Interior shining, reddish-brown. Umbos situated medially, smooth, rounded and projecting like a minute pin-head. Anterior slope concave, steeply descending and narrowly rounded at lower third of height. Posterior slope convex, narrowly rounded above middle height, then somewhat flattened to about lower fifth of height. Ventral margin evenly strongly arcuate. Concentric ribs broadly rounded, about 17 in the adult, with interspaces about half the width of the ribs. Surface crowded with very fine crisp radial threads, more distinct in the interspaces. Hinge plate deep, very oblique. Right valve with a single long narrow arcuate forwardly directed cardinal and a broadly triangular resilifer behind it. Left valve with two closely spaced arcuate, forwardly directed cardinals anterior to the resilifer, the innermost narrow and margining the resilifer, the other larger and much thickened below. A long anterior and a long posterior lateral in each valve. Ventral margin finely crenulated within. Well marked smooth lunule and escutcheon. Anterior and posterior adductors small, subequal, pallial line entire. The holotype and the majority of examples have in addition to odd splashes of reddish-brown a single large clearly marked inverted chevron occupying the lower half of each valve.

Height, 5.0 mm.; length, 6.0 mm.; diameter (both valves) 3.4 mm (Holotype).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

The species closely resembles the group of East and South Australian members of this genus but has a much greater convexity.

The presence of the genus at the Kermadecs was recorded by Mr. Tom Iredale in 1924 (Proc. Linn. Soc. N.S.W., vol. 49, p. 204) so I now have pleasure in naming it in his honour.

This shell was the most abundant species in the "Galathea" Kermadec dredgings.

Family SANGUINOLARIIDAE

Genus KERMADYSMEA n. gen.

Type: *Kermadysmea galatheae* n. sp.

A new genus is essential for the reception of the elaborately sculptured Kermadec Garid described below. It is apparently closest to *Dysmea* Dall, Bartsch and Rehder, 1938, based upon *Solen occidens* Gmelin, but lacks the lunular marginal projection of the left valve, which is characteristic of that genus.

In *Kermadysmea* (Text Fig. 4) the cardinals of the right valve are widely divergent as in *Gari* but with the posterior cardinal much the stronger. In *Dysmea occidens* (Text Fig. 5) the anterior cardinal is much the stronger and is situated vertically beneath the umbo, with the posterior cardinal at 45° behind it.

The outline of the shell of the Kermadec genus is similar to that of *Dysmea*, even to the flexed and slightly gaping posterior end but the broad deep pallial sinus slopes upwards at about 30° to the ventral margin, not parallel to the ventral margin as in *Dysmea*.

A thin fragile shell, heavily and elaborately sculptured with numerous concentric folds crossed by a dense surface pattern of radial threads further characterizes this remarkable genus.

Kermadysmea galatheae n. sp. Plate 10, Fig. 4; Text Fig. 1 and 4.

Shell, large, thin, fragile, elongate-rectangularly ovate, pale pinkish-buff irregularly radially rayed with salmon-pink. Dorsal margin slighlty curved, with the umbones situated a little nearer to the anterior end which is narrowly rounded with the point of greatest convexity above middle height. Posterior end slightly gaping and flexed with a bias to the left, broadly rounded with the point of greatest convexity below middle height. Ventral margin straight. Sculpture of numerous rounded concentric ribs crossed by a dense surface pattern of linear-spaced radial threads which curve over the concentric ribs, giving a dense comb-like effect (Text Fig. 1). Interior of shell smooth, only slightly corrugated by the external ridges. Posterior muscle scar large almost twice the size of the anterior one. Pallial sinus deep, reaching the middle of the shell, broad non tapered with a bluntly rounded apex and set at about 30° to the ventral margin. Ventral margin smooth within but densely cusped externally by the radial threads which slightly overhang the margin. Hinge plate narrow, without laterals. Right valve with two divergent cardinals, posterior one the stronger. Left valve with two cardinals, a heavy triangulate one immediately below the umbo and a thin short lamellate one parallel with the hinge plate and situated posteriorly. Nymph broad and short extending above the dorsal margin. Lunule very long and narrow.

Height, 21.0 mm; length, 44.0 mm.; diameter (both valves) 11.7 mm. (Holotype).

Locality: Galathea St. 676, 29° 13′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 83 metres.

Genus ASAPHIS Modeer, 1793.

Type (monotypy): *Venus deflorata* Linn.

One of the most abundant bivalves from the Kermadec dredgings is a very small *Asaphis*, at first sight likely to be mistaken for the juvenile stage of the common, widely distributed, large, Indo-West Pacific *Asaphis dichotoma* (Anton, 1839) (= *tahitensis* Reeve) commonly misnamed *deflorata* Linn., which name should be restricted to the closely allied West Indian species.

The Kermadec shell is probably an adult, for it has rather numerous rest stages despite its small size for the genus. Compared with juvenile stages in *dichotoma* the Kermadec shells are much more elongate and have the concentric sculpture rather than the radial element the stronger.

Although *dichotoma* has an extensive Indo-West Pacific range it is essentially a tropical species apparently reaching its northern limit in the Ryukyu Islands, 24°-26° N. and its apparent southern limit at Mauritius, 20° S., for the Indian Ocean, Tonga and Cook Islands, 20°-21° S. for the South West Pacific and to about 24° S. down the Queensland coast. It is not recorded from the Hawaiian group, 18°-28° N.

The latitude of Raoul Island, Kermadecs is 29° 15′ S., presumably out of bounds for *dichotoma* but it is likely that the Kermadec species originated as a mutant at some time from assumed repeated spat-falls of that species drifted down from warmer northern waters. Lower temperatures and different ecological station could account for a dwarf derivative of this species. Under normal conditions *dichotoma* lives deeply buried in coarse coral sand and gravel in the intertidal zone.

It is significant that all the Kermadec shells attain a uniform small size and that there are no records of large *dichotoma* valves in beach drift.

The phenomenon of nanism in Kermadec bivalves is shown also in *Nemocardium (Pratulum) probatum* and *Pitarina* cf. *affinis*.

Asaphis nana n. sp. Plate 9, Fig. 5; Text Fig. 6.

Shell very small for the genus, beaks median, elongate-ovate, rather thin with dense concentric sculpture and well developed radials at the sides. Concentric ridges prominent, numerous, narrow and rounded but not lamellate, crossed by about forty radials which are obsolescent medially but relatively strong laterally, especially over the posterior end. Weakly gemmate at the point of intersection between the concentrics and the more prominent radials. Both ends of shell broadly rounded, anterior dorsal slope and ventral margin rather straight, posterior dorsal slope convexly arcuate. Hinge typical; right valve with a small short oblique anterior cardinal and a moderately large very oblique posterior cardinal; left valve with a rather large triangular cardinal set vertically beneath the umbo and a relatively long oblique narrow cardinal, set obliquely behind it. Both the anterior right valve cardinal and the posterior left valve cardinal have a weak bifid tendency. Pallial sinus broad and deep extending to directly beneath the umbo. Colour buff irregularly and sparingly maculated and obscurely radially banded in pale yellowish-brown. Interior pale buff with the external maculation and banding showing through. Little variation in colour except for occasional uniformly canary yellow examples.

Height, 5.6 mm.; length, 9.8 mm.; thickness (two valves) 3.3 mm. (Holotype).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres (numerous, alive).

Family VENERIDAE

Genus PITARINA Jukes-Browne, 1913.

Type (o.d.): *Cytherea citrina* Larmarck.

Pitarina cf. affinis Gmelin, 1790.

1790—*Venus affinis* (Gmelin, 1790). Syst. Nat. (Ed. 13), p. 3278.

1954—*Pitar* (*Pitarina*) *affine*: Kira, Coloured Illus. Shells of Japan, Pl. LVII, Fig. 10.

This is another instance of a widespread tropical Indo-West Pacific shell which does not appear to reach maturity in Kermadec waters although it was abundant both alive and dead in the Galathea dredging.

Since the Kermadec material is small the identification is not claimed with certainty. The largest of the odd valves measures only 13.75 mm. in height by 18.20 mm. in breadth. The colour pattern is sparse consisting of a few irregular markings in light reddish-brown as in Kira's figure.

Height, 8.4 mm.; breadth, 11.0 mm.; thickness (two valves) 5.7 mm.

Height, 11.4 mm:; breadth, 14.4 mm.; thickness (two valves) 8.0 mm.

Height, 13.75 mm.; breadth, 18.20 mm. (one valve).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres.

The genus is a new record for the Kermadec fauna.

Family CARDIIDAE

Genus **TRACHYCARDIUM** Moerch, 1853.

Subgenus **VASTICARDIUM** Iredale, 1929.

Type (o.d.): *Cochlea nebulosa* Martyn.

Trachycardium (Vasticardium) sorenseni n. sp. **Plate 11, Figs. 6, 7.**

Shell small for the genus (25-45 mm), subcircular, almost equilateral, little inflated. Beaks acute, flattened and incurved. Sculpture consisting of 54 flat-topped radial ribs sharply defined by deeply channelled linear interspaces crenulate at the sides. Anterior and ventral margins delicately corrugated, posterior margin strongly digitate. Posterior area of ribbing bearing chevron shaped concentric ridges mostly developed into bluntly pointed spines. Hinge plate short and strongly arched. Right valve with one prominent narrowly triangulate vertical cardinal, two strong anterior laterals, fused at their proximal ends, and one short, ill-defined posterior lateral.

Colour (young fresh example) pinkish-white heavily blotched with orange-pink. Interior with the external colour pattern showing through. The holotype, a faded beach shell, shows a sparsely speckled pattern on a pale ground.

Height, 20.5 mm.; length, 20.0 mm.; thickness (one valve) 5.0 mm. (Sta. 674).
Height, 26.5 mm.; length, 25.0 mm.; thickness (one valve) 7.5 mm. (Sta. 674).
Height, 42.25 mm.; length, 40.5 mm.; thickness (one valve) 12.5 mm. (Holotype).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, 75-85 metres (valves only); Denham Bay, Raoul Island (odd valves) J. H. Sorensen (Holotype).

Holotype: Auckland Museum.

This species belongs to the *arenicola-cygnorum* group, nearer to the latter, but differs from both in its finer and denser ribbing and more circular outline. They belong to the subfamily *Trachycardiinae* which is characterised by a short hinge, digitate posterior margin and rib sculpture usually in the form of spines or scales along the posterior sides of the ribs.

These shells plus several other Indo-Pacific species differ from the massive *Trachycardium* and *Vasticardium* in their lighter build, smaller size and acute flattened beaks, but they are here retained in *Vasticardium* pending a better understanding of the tropical Pacific species.

Two valves from a New Zealand Oceanographic Institute station, ½ m. E. of Philip Is., Norfolk Island, 33 fathoms are similar to the Kermadec species in sculpture but are of oblique-ovate outline. These probably represent a further new species. Following is a rib count for the three related species: *cygnorum* Deshayes, 40-43; n. sp.? Norfolk Island, 48-50; *sorenseni* n. sp., 54.

Genus NEMOCARDIUM.

Subgenus PRATULUM Iredale, 1924.

Type (o.d.): *Cardium thetidis* Hedley.

Nemocardium (Pratulum) probatum Iredale, 1927.

1915—*Protocardia pulchella*: Oliver, Trans N.Z. Inst. 47, p. 556 (not of Gray).

1904—*Cardium bechei*: Hedley, Proc. Linn. Soc. N.S.W., p. 195 (not of Reeve).

1927—*Pratulum probatum*: Iredale, Austr. Zoologist 4 (6) p. 333, Pl. XLVI, Fig. 8.

Type Locality (probatum): Trial Bay, New South Wales, Height, 28 mm.; breadth, 30 mm.

I have not seen the specimens from 30 metres off Meyer Island, Kermadecs upon which Oliver's record of the New Zealand *pulchellum* is based but they will almost certainly prove to be identical with the "Galathea" material which is a dwarf form of the widely distributed eastern Australian *probatum*, formerly recorded from there under the name of *bechei*, a Philippine species.

The largest of the Kermadec shells is only 14.7 mm. in height but Australian examples frequently attain three times that size and one from New South Wales recorded by Iredale (1927, p. 334) is 78 mm. in height.

I have not been able to examine Kermadec and Australian material of comparable size, for the largest Kermadec specimen I have is smaller than any Australian specimen available to me.

The following table of measurements shows the Kermadec shells to be proportionately broader than high and the larger Australian examples to have these two dimensions equal or nearly so but this slight proportional difference is probably consistent with a normal growth gradient.

The Kermadec shells are either a dwarf race, an ecological form induced by the nature of the habitat or the true station for fully matured adults has not yet been located.

Height 10.00 mm.; breadth, 11.10 mm.; Kermadecs, St. 674.
Height, 10.60 mm.; breadth, 13.75 mm.; Kermadecs, St. 674.
Height, 12.90 mm.; breadth, 14.20 mm.; Kermadecs, St. 674.
Height, 13.00 mm.; breadth, 14.10 mm.; Kermadecs, St. 674.
Height, 13.80 mm.; breadth, 15.10 mm.; Kermadecs, St. 674.
Height, 14.10 mm.; breadth, 15.30 mm.; Kermadecs, St. 674.
Height, 14.70 mm.; breadth, 15.40 mm.; Kermadecs, St. 674.
Height, 16.20 mm.; breadth, 16.25 mm.; Darwin.
Height, 27.70 mm.; breadth, 29.70 mm.; New Caledonia.
Height, 44.00 mm.; breadth, 46.00 mm.; Percy Island.
Height, 69.00 mm.; breadth, 69.50 mm.; Noosa, Queensland.
Height, 78.00 mm.; breadth, 81.00 mm.; New South Wales.

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres; ½ mile East of Philip Is., Norfolk Island, 33 fathoms (N.Z. Oceanographic Institute, Wellington).

Family CUSPIDARIIDAE

Genus AUSTRONEAERA Powell, 1937.

Type (o.d.) : *Austroneaera brevirostris* Powell.

Austroneaera raoulensis n. sp. Plate 9, Fig. 9.

Shell small, thin, white, semitransparent, ovate-trigonal, almost equilateral; rostrum short, truncated. The species is very similar to *Austroneaera brevirostris* Powell, 1937, from 260 metres off the Three Kings Islands, New Zealand. It differs only in having more bluntly rounded beaks and much more prominent anterior and posterior hinge teeth in the right valve. The left valve has anterior and posterior thickened hinge margins the former commencing with a slight boss which is probably the basal support for a lithodesma as in *A. wellmani* Fleming, 1948, from Dusky Sound in 18 fathoms, New Zealand.

Length, 3.75 mm. ; height, 2.6 mm. ; thickness (one valve) 1.0 mm. (Holotpe, right valve).

Locality: Galathea St. 674, 29° 15′ S.; 177° 51′ W., off Raoul Island, Kermadecs, 75-85 metres (odd valves only).

Family TROCHIDAE

Subfamily CALLIOSTOMATINAE

Genus FAUTOR Iredale, 1924.

Type (o.d.) : *Zizyphinus comptus* A. Ad.

Fautor consobrinus n. sp. Plate 9, Fig. 2.

Shell small, imperforate, biangulate, narrowly conical, 'thin, subnacreous. Spire turreted, with two prominent spiral keels per whorl, the upper strongly gemmate the lower gemmate at first but smooth over the lower two whorls. The suture is margined by a rounded spiral thread and there are two other smooth spiral intermediate threads, one between the suture and the upper keel and the other between the two keels. Whorls seven including a minute protoconch of one whorl, abruptly terminated by a rounded varix, globular and obliquely somewhat immersed at the tip, shining but sculptured with two spiral cords crossed over the latter half by minute crisp radial threads.

The base is flattened, and bears nine strong sharply raised flat-topped spiral cords, outermost much stronger than the rest and forming a third keel to the body-whorl emergent at the suture over the last half-whorl. Aperture rhomboidal, pillar oblique but almost straight. Colour pale pinkish buff, the spirals maculated with alternate white and dull pink spots.

Height, 6.3 mm. ; diameter 5.0 mm. (Holotype).

Locality: Galathea St. 674. 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

The species seems to be quite well placed in the Austro-Neozelanic Calliostomid genus *Fautor,* members of which have a very small paucispiral protoconch marked off by a terminal varix and with the nuclear lip somewhat immersed.

The protoconch of the Kermadec species is almost identical with that of Odhner's *onustus* from Cape Maria van Diemen, New Zealand, in 50 fathoms.

The Australian members have a similarly shaped protoconch but the sculptural detail varies considerably with the species.

In the type species, *comptus* (A. Adams) it is faintly malleated, in *allporti* (Tenison-Woods) it is malleated also but develops spirals and axials over the latter half of the whorl and in *legrandi* (Tenison-Woods) the whole protoconch is deeply pitted in honeycomb fashion.

Family CYPRAEIDAE

Genus **RAVITRONA** Iredale, 1930.

Type (o.d.) : *Cypraea caputserpentis* Linn., 1758.

Ravitrona tomlini kermadecensis n. subsp. Plate. 10, Fig. 5.

1915—*Cypraea flaveola*: Oliver, Trans. N.Z. Inst. 47, p. 526 (non Linn., 1758).
1939—*Erosaria tomlini*: Iredale, Austr. Zool. 9 (3) pp. 299 & 307 (non Schilder 1930).
1956—*Ravitrona tomlini prodiga*: Allan, Cowry Shells of World Seas, Georgian House, Melbourne, p. 94 (non Iredale, 1939).

This shell was first recorded from beach specimens cast up on Sunday Island (Oliver, l.c.) but the name *flaveola* is now considered to be indeterminate (Allan l.c. p. 92).

The Kermadec shell belongs to the group of *tomlini-cernica,* and is best expressed as a subspecies of *tomlini;* the type locality for which is New Caledonia. The species *cernica* comes from Mauritius. Miss Allan (1956 l.c.) includes the Kermadec shells in the subspecies *prodiga,* the type of which is from Newcastle, New South Wales.

After examining the Australian Museum material, which includes all the above mentioned subspecies, I found a constant differentiating character in the parietal labial teeth which serves to readily distinguish the Kermadec race.

In *tomlini tomlini* the parietal teeth are long at the posterior end but short over the anterior end, not graded but suddenly stepped just posterior to the middle.

In *cernica* there is this same stepped arrangement but the shell is more broadly ovate. In *tomlini prodiga* the teeth are short and evenly graded throughout. The Kermadec subspecies has evenly graded teeth also but they are long, extending medially almost a third of the way across the basal callus.

Shell shining but not highly polished. Dorsum dull orange marked with evenly distributed but irregularly sized white spots. Sides, base, teeth and interior porcellanous white. Margins coarsely pitted, a few dark reddish-brown spots in the anterior and posterior series of pits and others sparsely and irregularly distributed along the sides, more numerous along the labial side.

Labial teeth 19, columellar teeth, 18, exclusive of the anterior and posterior ridges and two strong denticles on the fossula.

Length, 24 mm.; breadth, 15 mm.; dorso-ventral 11.75 mm. (Holotype).

The type is a crassate adult but Iredale (1939, p. 307) records a Kermadec example 31 mm. in length.

Locality: Galathea St. 675, 29° 13.5′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 58-60 metres, 3:3:1952.

Family CASSIDIDAE

Genus **ONISCIDIA** Swainson, 1840.

Type (Wenz, 1941): *Oniscia cancellatum* Sowerby

Oniscidia bruuni n. sp. Plate 11, Fig. 5.

Shell of moderate size for the genus, pyriform with low spire, massive internally denticulate labial varix and adult sculpture of prominent rounded axials coronated at the shoulder. The whole surface, including the axials, crowded with vertical sharply raised threads. Spiral sculpture of weak rather widely spaced low rounded cords, distinct only over the lower part of the base. Whorls 7 including a smooth conical protoconch of three lightly convex whorls with a supramargined suture and terminated abruptly with a thin concave varix; apex small and erect. Spire whorls sharply angled and coronated above the middle and with a second weak spiral ridge just above the suture on the penultimate. Spire about one sixth height of aperture, angle 95°, axials broadly rounded 15 to 16 per whorl, coronated as sharp upcurved spines at the shoulder and continued to the suture as thin lamellae. Nine regularly spaced obsolescent rounded spiral cords between the shoulder and the fasciole on the body-whorl. Fasciole with five weak spiral threads crossed by numerous axial growth lines. Outer lip massive, smooth, recurved and sharp edged on the outside, bearing 16 denticles on its inner face. Parietal callus spread more than halfway across the front of the body-whorl and with a sharp raised edge. Parietal wall with 13 denticles, those above more elongated, as entering lamellae and a few weak tubercles over lower part of the pillar. Anterior canal short, recurved, with a rather deep rounded sinus. Posterior canal a well defined groove. Colour pale pinkish-brown with four spiral zones of light reddish-brown on the body-whorl; uppermost occupies the shoulder and lowest is immediately above the fasciole. Each zone terminates on the labial varix in a scattering of dark brown speckles. Apertural callus white but diffused with dark reddish-brown on the parietal whorl.

Height, 32.5 mm.; diameter, 21 mm. (Holotype).
Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

This species is not closely allied to any of the described recent species. In shape it resembles *exquisita* Adams and Reeve from the

Sooloo Archipelago but that species has heavy spiral ridges dominating the axials. The New Zealand lower Miocene (Altonian) *finlayi* Laws, 1932, is probably of the same lineage as *bruuni* for it has the pyriform shape and dense vertical surface lamellae but the spiral sculpture is almost as strong as the axial.

This unique very handsome specimen is named in honour of the leader of the "Galathea" Expedition, my esteemed friend Dr. Anton F. Bruun.

Family XENOPHORIDAE

Genus XENOPHORA G. Fischer, 1807.

Type (Gray, 1847) : *Trochus conchyliophorus* Born.

Xenophora neozelanica Suter.

1907—*Xenophora neozelanica* Suter, Trans. N.Z. Inst. 40, p. 346.
1915—*Xenophora corrugata*: Oliver, Trans N.Z. Inst. 47, p. 524.

This species, under the name *corrugata* (Reeve), was recorded by Oliver (l.c.) alive in 30 metres near Meyer Island, Kermadecs. Several adult dead shells from "Galathea" St. 674, off Raoul Island, confirm the identity of the species with the northern New Zealand *neozelanica* Suter, 1908.

Family MITRIDAE

Genus MITROPIFEX Iredale, 1929.

Type (monotypy) : *M. quasillus* Iredale.

Mitropifex iredalei n. sp. Plate 11, Fig. 3.

Shell (12-15 mm.) elongate-fusiform. Spire tall, slightly more than half height of shell. Spire-whorls lightly convex, body-whorl with flattened sides, suddenly contracted to the neck. Whorls $10\frac{1}{2}$ to 11 including a small polygyrate shining smooth cylindrical protoconch of $3\frac{1}{2}$ whorls, the tip low dome-shaped. Post-nuclear sculpture of sharply raised, closely spaced, erect but slightly flexuous, narrowly rounded axials, 27 to 29 per whorl, and interstitial spiral cords as strong as, or even stronger than, the axials, increasing from four to seven on the spire-whorls and 15 on the body-whorl plus two stronger cords on the neck, followed by six weak ones on the fasciole. The rectangular sculptural interspaces are wider than high, those on the base mostly three times as wide as their height. Although the spirals do not cross the axials the interstitial grooves over the base and neck connect series of notches across the axials, resulting there in weak to moderate gemmulation.

Aperture narrow, produced into a moderate flexed and recurved canal with a distinct sinus, oblique to the axis. Outer lip thin. Columella bearing four plaits, uppermost very strong, diminishing proportionately to the fourth which is very weak.

Ground colour pale fawn, spirally zoned with pale reddish-brown. There is a broad zone over the middle area of the spire-whorls, a narrow one masked by the suture and another broad one on the base. The pattern is variable and may consist, as in the holotype, of only spots and splashes, but still arranged in zones.

Height, 14.7 mm.; diameter, 5.4 mm. (Holotype).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

The type of the genus is a New South Wales shell ca. 31 mm. in height. The Australian species has fewer axials (20 per whorl) and the coloration is reddish-brown with a white band encircling the periphery.

Iredale does not state how his genus differs from Swainson's *Costellaria* which is of very similar facies. However until more work is done on the systematics of this extensive and difficult family it is preferable to preserve the undoubted close relationship between the Australian and Kermadec species by using Iredale's genus.

It is noted that Cotton, 1957, in No. 12, Family *Mitridae* (Royal Society of South Australia, Malacological Section) includes in *Mitropifex* the following species: *sculptilis* Reeve, 1845, Cape York, Queensland, *obeliscus* Reeve, 1845, Queensland, and *escharoides* Tate, 1889. Victorian Miocene.

Another apparently related genus is *Arenimitra* Iredale, 1929, proposed with *arenosa* Lamarck as type and including the *exasperata-torulosa* series. These shells are distinctly shouldered and have prominent lyrate axials crossed by lesser spiral cords. In *Mitropifex* the axials and spirals are about equal, producing a clathrate appearance and the shoulder is slight.

Family CONIDAE

A satisfactory division of the *Conidae* into generic and subgeneric groups still remains to be achieved, but pending a revision of the entire family upon morphological lines, which is going to be a long and tedious task for someone, it would seem to be useful to continue to employ the existing divisions, but conservatively, as subgenera, until they can be properly evaluated.

Several recent workers (Clench, 1942, the Genus *Conus* in the Western Atlantic, Johnsonia Vol. 1, No. 6, and Abbott, 1953, American Seashells), have completely disregarded all published names in the *Conidae* other than the type genus *Conus*.

On the other hand, Cotton (1945, A Catalogue of the Cone Shells *(Conidae)* in the South Australian Museum, Records of the South Australian Museum, Vol. 8, No. 2) made a very creditable attempt to fit the cones of the world into the existing nomenclature with the addition of several new names.

Most of Cotton's groups appear to be natural, but a few such as *Asprella* Schaufuss, 1869, savour strongly of a convenient dumping ground for all strongly spirally sculptured cones. The type of *Asprella* is the moderately large and heavy, low-spired and broadly conic oriental *sulcatus* Bruguière. With it are included the small tall-spired, biconic sculptured cones such as the well known West Indian *verrucosus*

Hwass, but strangely the rather similar *jaspideus* Gmelin, also West Indian, is referred by Cotton to *Leptoconus* Swainson, 1840.

It would seem that the sculptured cones require at least the segregation of the small biconic members from those grouped around the type of *Asprella*.

Genus **CONUS** Linnaeus, 1758.

Subgenus **KERMASPRELLA** n. subgen.

Type: *Conus raoulensis* n. sp.

Shell small, slender, biconic with a moderately deep sutural sinus and sculptured with prominent gemmate spiral cords. Protoconch polygyrate and smooth, with a papillate tip.

Conus (Kermasprella) raoulensis n. sp. **Plate 9, Fig. 1.**

Shell small (16 mm.-18 mm.), narrow, biconic with tabulated spire; periphery nodulose, body-whorl strongly sculptured with numerous rounded spiral cords regularly thickened into vertically compressed gemmules. Colour salmon with the peripheral nodules picked out in white. Three bands of irregular rectangular white patches on the body-whorl. Interior of aperture pale pink. Whorls about 10, including the protoconch which is eroded in the holotype and all available adult samples. A juvenile exhibits a polygyrate narrowly conic smooth erect protoconch of four whorls with a papillate tip. Spire stepped by a nodulose carina immediately above the suture, which is adpressed and cusped between the nodules. Peripheral nodules strong, vertically compressed, 16 to 17 per whorl. Shoulder concave, sculptured with dense crisp concavely arcuate threads. Body whorl sculptured with about 25 irregularly developed spiral cords, seven of which are primary and the rest intermediate. Most of the cords bear vertically compressed gemmules. Aperture narrow, oblique of approximately even width throughout. Sinus sutural, moderately deep.

Height, 18.0 mm.; diameter, 9.4 mm. (Holotype).

Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

Subgenus **DAUCICONUS** Cotton, 1945.

Type (o.d.): *Conus daucus* Brug.

Only one endemic Kermadec cone (*Conus kermadecensis* Iredale, 1912) was known prior to the "Galathea" expedition. This is a littoral species allied to the widely distributed Indo-West Pacific *planorbis* Born, 1780.

The Galathea dredgings produced a large living example of typical *planorbis* and a series of a new species of the same group. Oliver (1915, pp. 541, 542) recorded the following well known tropical Pacific cones as odd beach shells from Raoul (Sunday) Island. They were *vermiculatus* Larmarck, *minimus* Gmelin, *maculosus* Sowerby and *virgo* Gmelin, but none of these have been found living at the Kermadecs. The islands are almost out of range for cones, which are mostly confined to the tropics, but it appears that *planorbis* has become a successful immigrant and in doing so is in the process of diverging to fill the ecological niches of its newly acquired territory.

The differentiating characters of the three Kermadec cones of the *planorbis* series are best shown in key form as follows:

Spire low (115°-135°)
  Shoulder carina greatest shell width
    Body-whorl straight-sided
      Sculpture: spire, 1-3 spiral cords
        body-whorl, spiral epidermal processes on narrow colour lines . . . . *planorbis*

Spire taller (93°-100°)
  Shoulder carina not greatest shell width
    Body-whorl evenly convex
      Sculpture: spire, obsolete
        body-whorl, obsolete except for a few basal spirals
    Colour uniform except for central pale band . . . *kermadecensis*
    Body-whorl convex above, concave below.
      Sculpture: Spire, 6-8 spiral cords
        body-whorl, spiral epidermal processes on weak spiral threads.
    Colour pattern of three irregular reddish-brown spiral zones . . . *bruuni*, n. sp.

Conus (Dauciconus) bruuni n. sp. Plate 10, Fig. 3.

Shell of moderate size (40-45 mm.), rather slender, with narrowly conic spire (93°-100°). Carinate at shoulder which is not the greatest width of the shell. Below the carina the body-whorl swells slightly and then rapidly contracts below with straight to very slightly concave outlines. Above the carina, which is a strong rounded fold, the spire whorls are sculptured with 6-8 crisp threads between suture and carina. Body-whorl below the carina sculptured with about 30 weak but distinct spiral threads, four of which are crowded upon the slight fasciole. Lower threads stronger and irregularly weakly beaded. The whole shell covered with a thin buff vertically striated epidermis produced into numerous short tufts along the spiral threads. Colour pattern of three irregular zones of reddish-brown with darker blotches on a ground of mauve-pink. Ground colour of the body-whorl formed into two narrow interzone bands above and a broad area below. Spire tessellated with dark reddish-brown on a variegated ground of mauve-pink, diffused with light reddish-brown. Interior of apperture mauve-pink.

Height, 43.6 mm.; diameter, 21.0 mm. Spire 95° (Holotype).
Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

Conus (Dauciconus) planorbis Born, 1780.

Height, 61.0 mm.; diameter, 33.0 mm. Spire 125° (St. 674).
Locality: Galathea St. 674, 29° 15′ S.; 177° 57′ W., off Raoul Island, Kermadecs, 75-85 metres, 3:3:1952.

The species is known from Queensland, Fiji, New Caledonia and the Philippines.

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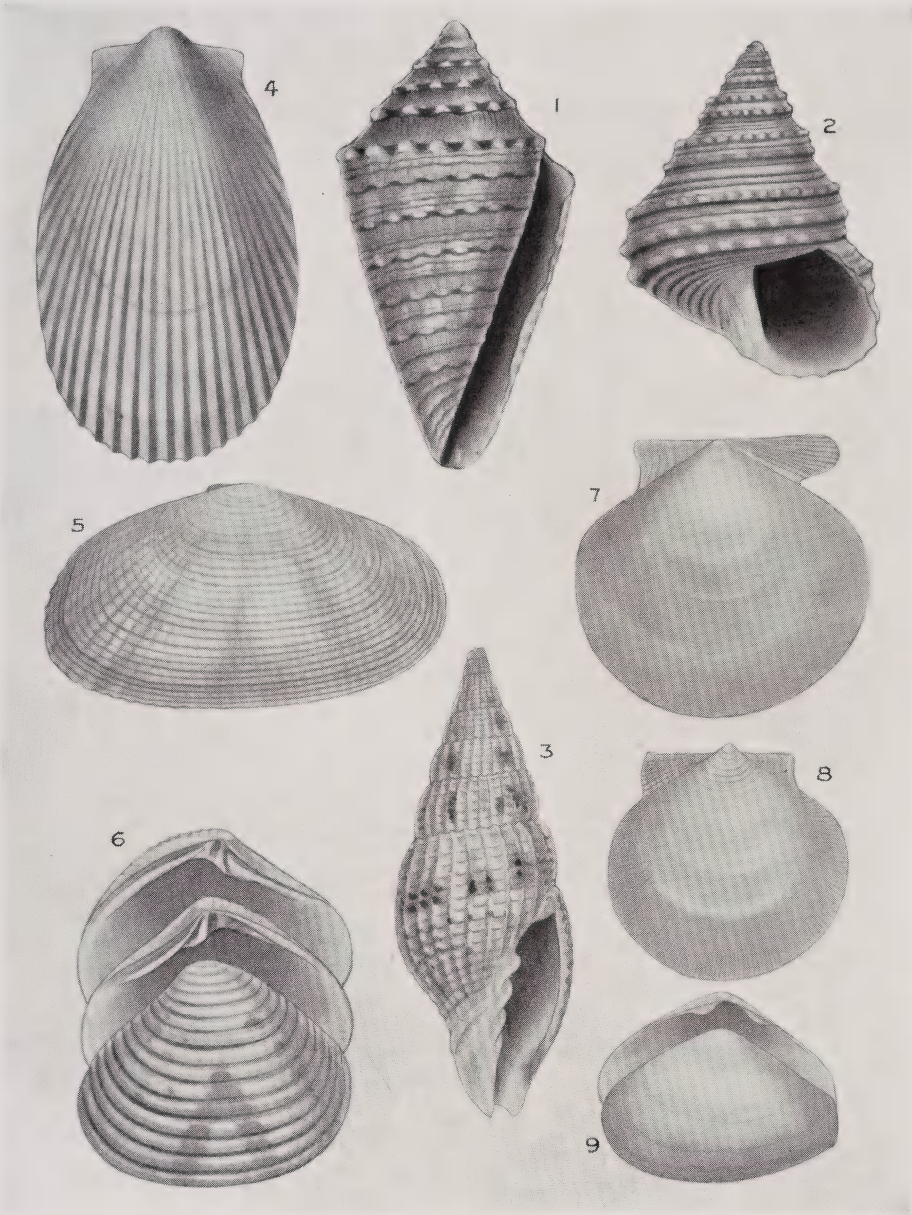


Fig. 1 *Conus (Kermasprella) raoulensis* n. subgen. and n. sp. Holotype. 18 mm. x 9.4 mm.

Fig. 2. *Fautor consobrinus* n. sp. Holotype. 6.3 mm. x 5 mm.

Fig. 3. *Mitropifex iredalei* n. sp. Holotype. 14.7 mm. x 5.4 mm.

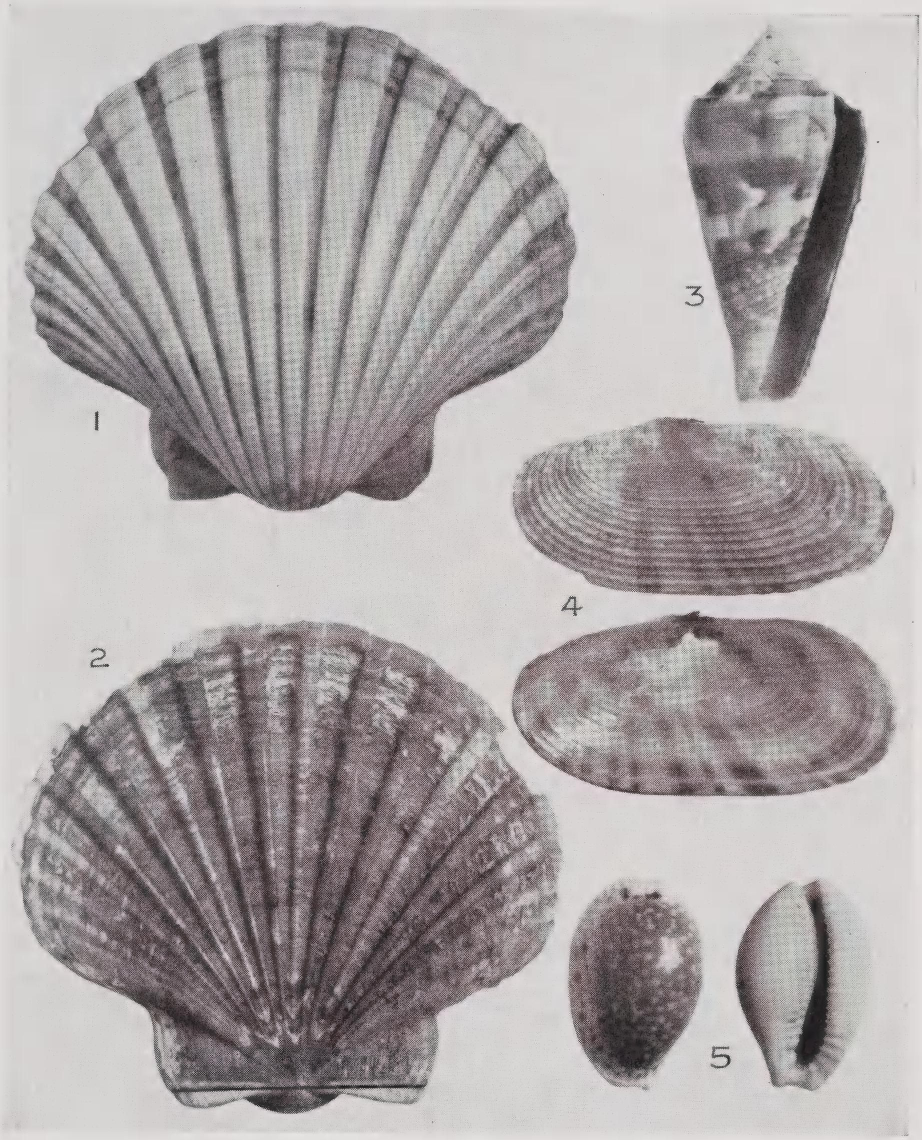
Fig. 4. *Limatula oliveri* n. sp. Holotype. 7.0 mm. x 4.2 mm.

Fig. 5. *Asaphis nana* n. sp. Holotype. 5.6 mm. x 9.8 mm.

Fig. 6. *Salaputium iredalei* n. sp. Holotype. 5 mm. x 6 mm.

Figs. 7, 8. *Chlamydella favus lemchei* n. subsp. (7, right valve, 5.9 mm. x 5.5 mm.) (8, left valve, Holotype, 4.5 mm. x 4.5 mm.).

Fig. 9. *Austroncaera raoulensis* n. sp. Holotype. 3.75 mm. x. 2.6 mm.



Figs. 1, 2. *Pecten raoulensis* n. sp. Holotype. 83 mm. x. 76 mm. x 29 mm.

Fig. 3. *Conus (Dauciconus) bruuni* n. sp. Holotype. 43.6 mm. x 21 mm.

Fig. 4. *Kermadysmea galatheae* n. gen. and n. sp. Holotype. 21 mm. x 44 mm.

Fig. 5. *Ravitrona tomlini kermadecensis* n. subsp. Holotype, 24 mm. x 15 mm.

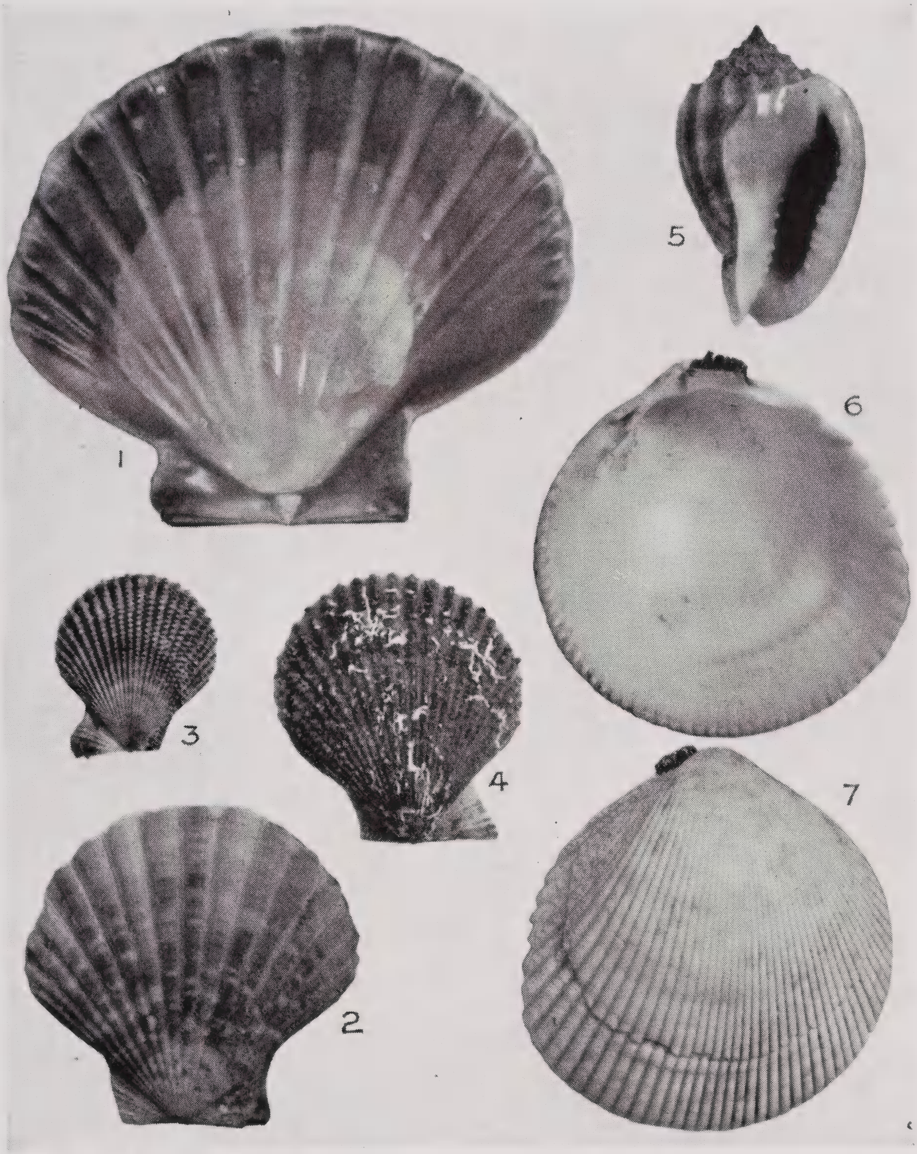


Fig. 1. *Aequipecten (Corymbichlamys) iredalei* n. sp. Paratype. 72 mm. x 82.5 mm.

Fig. 2. *Aequipecten (Corymbichlamys) iredalei* n. sp. Holotype. 33 mm. x. 35 mm.

Fig. 3. *Chlamys (Mimachlamys) asperrimoides* n. sp. Holotype (Norfolk Island). 20.2 mm. x 18.0 mm.

Fig. 4. *Chlamys (Mimachlamys) asperrimoides* n. sp. (Galathea St. 674). 30.6 mm. x 27.15 mm.

Fig. 5. *Oniscidia bruuni* n. sp. Holotype, 32.5 mm. x 21 mm.

Figs. 6, 7. *Trachycardium (Vasticardium) sorenseni* n. sp. Holotype. 42.25 mm. x 40.5 mm.

New Zealand Molluscan Systematics with Descriptions of New Species, Part 3

By A. W. B. POWELL, Auckland Museum.

Family MYTILIDAE

Genus MYTILUS Linnaeus, 1758.

Type: (Gray, 1847) : *Mytilus edulis* Linn, 1758.

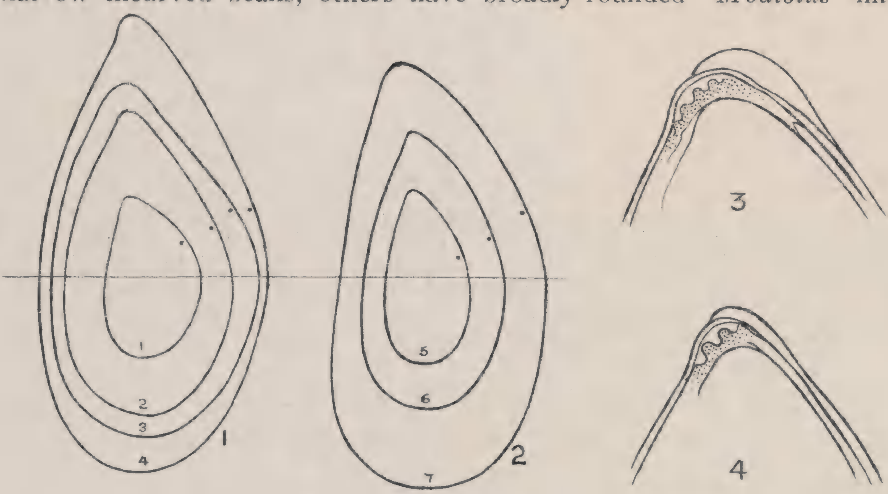
Mytilus aoteanus n. sp. Plate 12, Fig. 5.

1913—*Mytilus edulis*: Suter (not of Linne) Man. N.Z. Moll., p. 862.
1923—*Mytilus planulatus*: Oliver Proc. Malac. Soc. Lond. 15, p. 181.
1955—*Mytilus* cf. *planulatus*: Powell, Cape Exped. Bull. No. 15, D.S.I.R., Wellington, p. 22.

Oliver (1923, l.c.) introduced the name *planulatus* to the New Zealand fauna in replacement of *edulis* Auct. (not of Linnaeus) but this shell which is wide-spread in the South of New Zealand and only of sporadic occurrence in the North has long been considered doubtfully identical with the Australian species.

The type locality for Lamarck's *planulatus* is King George Sound, Western Australia and the species ranges eastward to New South Wales and Tasmania.

There is considerable variation in Australian shells; some have narrow incurved beaks, others have broadly-rounded "*Modiolus*"-like



TEXT FIG. A.

Fig. 1. *Mytilus planulatus* Lamarck (1 and 2), Bellerive, Tasmania; (3 and 4), Semaphore, South Australia.
Fig. 2. *Mytilus aoteanus* n. sp. (5), Greymouth; (6), New Brighton; (7), Campbell Island, New Zealand.
Fig. 3. *Mytilus planulatus* Lamarck, Semaphore (hinge teeth).
Fig. 4. *Mytilus aoteanus* n. sp. Campbell Island (hinge teeth).

beaks but two features separate the Australian species from the New Zealand "*planulatus*." One of these features is the much longer dorsal slope in the Australian species which places the posterior-dorsal angle well below the middle (see Text fig. A1). This shows outlines of four Australian shells compared with outlines for three New Zealand shells (Text fig. A2) which have the angle at about the middle.

The second feature is a marked difference in the hinge teeth of Australian and New Zealand shells. In true *planulatus* these teeth, when normally developed, number five (text fig. A3) unless they are obscured by callus. In New Zealand shells the teeth never exceed three (Text fig. A4).

Another Southern mussel which seems to be related to this group is the Kerguelen Island *Mytilus desolationis* Lamy, 1936 (= *M. kerguelensis* Fletcher, 1938). This species has an even shorter dorsal slope than in New Zealand shells, which places the posterior dorsal angle well above the middle, the hinge teeth number from 4 to 7 and the epidermus is shining black rather than violet black.

The relationship between these three widely separated *Mytilus* populations is obscure for it is difficult to say which of any one of them is nearer allied in respect to the other two. They may represent regional subspecies of a wide ranging mussel but for the present it seems best to regard each of the three as separate species.

From Banks Peninsula to Dunedin albinos or partial albinos (i.e. minus the violet black pigment) are frequently seen. This tendency has not been observed in Northern populations nor in those from the Southern Islands of New Zealand. It has not been recorded either in Australian *planulatus* or observed in the Kerguelen *desolationis*.

Holotype: Auckland Museum, a specimen from Rona Bay, Wellington Harbour, Height 76 mm.; length 42 mm.; inflation 25 mm.

Anterior-post	25 mm.;	dorso-ventral	50 mm.;	thickness	19.5 mm.	(Sumner, Albino).
„ „	28 mm.;	„ „	50 mm.;	„	18.5 mm.	(Sumner).
„ „	41 mm.;	„ „	69 mm.;	„	22.0 mm.	(Pohara, Nelson).
„ „	42 mm.;	„ „	76 mm.;	„	25.0 mm.	(Holotype).
„ „	55 mm.;	„ „	93 mm.;	„	34.5 mm.	(Auckland Is.)
„ „	63 mm.;	„ „	119 mm.;	„	51.0 mm.	(Stewart Is.)

Localities: Perseverance Harbour, Campbell Island (Cape Exped.); Auckland Islands (Capt. J. Bollons); Owenga, Chatham Islands (A.W.B.P. 1933); Stewart Island (Powell coll.); Timaru (A. E. Brookes coll.); Greymouth (Powell coll.); Sumner, Canterbury (Auck. Mus.); Pohara, Golden Bay, Nelson (A.W.B.P. Dec. 1927); Rona Bay, Wellington (Auck. Mus.); Onetangi, Waiheke Island, Auckland (Auck. Mus.); Port Fitzroy, Great Barrier Island (A. E. Brookes coll.); Whangarei Heads (Auck. Mus.); Bay of Island (A. E. Brookes coll.).

Genus **AULACOMYA** Moerch, 1853.

Type (Ihering 1900): *Mytilus magellanicus* Lamarck.

Aulacomya maoriana (Iredale). Plate 12, Figs. 6-9.

1913—*Mytilus magellanicus*: Suter (not of Lamarck) Man. N.Z. Moll.
1915—*Mytilus maorianus*: Iredale, Trans. N.Z. Inst. 47, p 484.
1955—*Aulacomya maoriana*: Powell Cape Exped. Bull. No. 15, D.S.I.R., Wellington, p. 23.

Iredale (l.c.) proposed *Mytilus maorianus* for the species described by Suter under *Mytilus magellanieus* Lamarck, 1819, and since a specimen from Stewart Island in the Suter collection, now in the New Zealand Geological Survey, Wellington, can be matched with Suter's figure (Man. N.Z. Mollusca, Atlas of Plates, 1915, Pl. 56, Fig. 6) then in the absence of any designated specimen this shell must be considered the holotype of Iredale's species.

It has long been surmised that there are two regional subspecies of *maorianus,* the typical Southern shell with coarse sparse ribbing and a Cookian form with finer and more numerous ribs.

While there is some indication of this geographic pattern in a general way there are too many exceptions to warrant a hard and fast separation by subspecific nomination.

Even after allowing a fairly wide and loose area of integration and taking into account anomalies, possibly attributable to up-welling, the sculptural variation appears to be merely haphazard.

A table was prepared showing rib counts at 10 mm., 25 mm., 50 mm. and 75 mm. respectively for material covering both Southern and Northern localities. At 10 mm. the variation was small, 7-10 ribs, increasing to 13-28 at 25 mm., 18-45 at 50 mm. and 33-68 at 75 mm. The point of incidence for dichotomy of the ribbing decides whether the adult resolves into a coarsely or a finely ribbed shell and the table certainly showed that this point of incidence was very fluid even in examples from a single population.

In the figures (Plate 12) figure 9, a Nelson shell exhibited dichotomy at a very early stage, figure 7 a Timaru shell exhibits dichotomy quite late in development and figure 8, a Lyall Bay shell shows an intermediate state. The issue is further confused by a large Stewart Island example comparable with the figured Nelson shell in its sculptural density and early incidence of dichotomy.

Family TROCHIDAE

(*Trochus (Clanculus) takapunaensis* Webster, 1906)

This species was described from shell sand taken at Takapuna Auckland and in addition to the holotype now in the Auckland Museum, there was supposed to be a co-type in the Australian Museum, Sydney, but this specimen cannot now be located.

Webster (1906, T.N.Z.I., vol. 38, p. 310) quoted an opinion on this shell from Hedley as follows: "Your shell has a close resemblance to the Victorian *C. plebejus.* I believe that the transverse fold on the columella, and the absence of a biplicate tooth at that point, separated this shell from *C. plebejus.*"

The holotype of Webster's species is a dead shell but it is fairly well preserved and is undoubtedly a *Mesoclanculus,* so close to the South Australian-Victorian genotype, *plebejus* that it could be that species.

The differences claimed by Hedley, whose remarks probably referred only to the co-type, do not apply to the holotype which lacks a transverse fold but does bear a biplicate tooth on the columella. The latter feature, however, is not adequately shown in Webster's figure.

Compared with a series from Corny Point, South Australia, the Takapuna shell is rather more depressed but the sculptural detail is identical.

Webster's species could be based upon an accidentally dropped shell for in my opinion the slight differences shown are not greater than could be expected in a range of specimens from several Australian localities.

Since *takapunaensis* has not been collected subsequent to Webster's original find this is a good additional reason why this species should be relegated to a suspense list.

Family HIPPONICIDAE

Genus SABIA Gray, 1841

Syn. Cont. Brit. Mus. ed. 43, p. 126.

Type (Gray, 1847): *Amalthea conica* Schumacher.

(= *Amalthea* Schumacher, 1817, non Rafinesque, 1815).

Sabia wyattae n. sp. Plate 12, Figs. 3, 4.

Shell similar to the Southern Australian *Hipponix australis* Quoy & Gaimard, 1835, and the Indo-Pacific *Amalthea conica* Schumacher, 1817, but more sparsely ribbed. The New Zealand shells are not fully grown but dichotomy of the radials has already developed towards the margins. A primary rib count for the three species shows 21-24 radials for *wyattae*, 25-32 for Japanese shells ascribed to *conica* and 29-35 for *australis*.

Shell small cap-shaped irregularly ovate with apex near to or projecting beyond the margin, sculptured with 21-24 irregular flexuous broad flat-topped primary radials separated by deep linear grooves. Towards the margins most of the primary radials increase by dichotomy. Margins weakly crenulated, external colour dull-white, the apex showing reddish brown, due to erosion of the outer layer. Internal colour reddish-brown, generally diffused over the middle and fading to almost white at the margins. Very small reddish-brown dots occur here and there in the troughs of the marginal crenulations. The interior is glazed and exhibits the characteristic large well marked horseshoe-shaped muscle scar. Protoconch of a smooth helicoid spiral the nucleus set almost at right angles to the long axis of the shell, followed by a greatly accelerated flattened smooth half whorl.

Length 16 mm.; breadth 12.65 mm.; height 5.7 mm. (holotype).

Locality: Tutukaka, Northland, attached to a dead shell of *Penion adusta* (Philippi) in beach drift (Mrs. J. Wyatt, 1957).

Holotype: Presented to the Auckland Museum by Mrs. Wyatt.

The New Zealand species resembles *australis* in the brown centrally clouded interior but differs in having far fewer radial nibs and a marginal to overhanging position for the apex. Japanese shells ascribed to *conica* have the brownish colour strongest as a margining band with only a small clouded area in the interior. They resemble the New

Zealand species in having a marginal tendency for the apex but the radials are again more numerous but fewer than in *australis*.

This makes the first undoubted record of a Hipponicid for the New Zealand recent fauna. Two previous records have since been rejected. They were *Hipponix hexagonus* Suter 1906 which proved to be an irregular form of *Gadinalea nivea* (Hutton, 1878) (Powell, 1924, p. 282) and *Hipponyx inexpectata* Mestayer, 1929, which is not a mollusc but a plug from a Polychaet worm (Dell 1956, p. 72).

Family BUCCINULIDAE

Genus **AENEATOR** Finlay, 1927.

Type (o.d.): *Verconella marshalli* Murdoch.

Aeneator galatheae n. sp. Plate 12, Figs. 1, 2.

Shell rather small (38-41 mm.) solid elongate-fusiform, strongly sculptured with numerous axial folds crossed by equally numerous narrow sharply raised spiral cords. Whorls 6½ plus a small smooth dome-shaped protoconch of about two whorls which is followed by half a whorl of closely spaced brephic axials. Whorl outlines strongly convex medially but becoming slightly concave above over the shoulder area to a weakly developed adpressed suture. Axial folds well defined, 14 to 15 per whorl, concavely arcuate, extending from suture to suture on spire whorls but obsolete over the base, the whole shell, axials included crossed by narrowly rounded crisp spiral cords, increasing from 6 to 8 on the spire and about 21 on the body-whorl including the base and neck. In addition there are about eight weak spiral threads on the fasciole. Two of the spirals on the shoulder are weaker than the others and the strongest spirals are on the upper part of the base; these have an intermediate thread. The whole surface of the shell is striated by dense axial lines of growth. Spire less than height of aperture plus the canal which is relatively long, oblique and strongly recurved at the tip. Aperture narrowly ovate. Outer lip thickened by a low rounded varix and sculptured within the aperture by twelve narrow but distinct spiral ridges which alternate with the external spirals. Parietal callus heavy, not very wide, with clearly defined edge and bearing odd tubercules below and two or three entering folds above. Colour of shell dull white with three spiral zones of pale yellowish-brown on the body-whorl and the fasciole similarly coloured. Interior of aperture and parietal callus white, porcellanous. Operculun horny, dark-brown, leaf-shaped, with a terminal nucleus.

Height 41 mm.; diameter 16 mm. (Holotype).

Locality: Galathea St. 616 44° 37′ S.; 167° 53′ E., Milford Sound, 290 metres, 19:1:1952.

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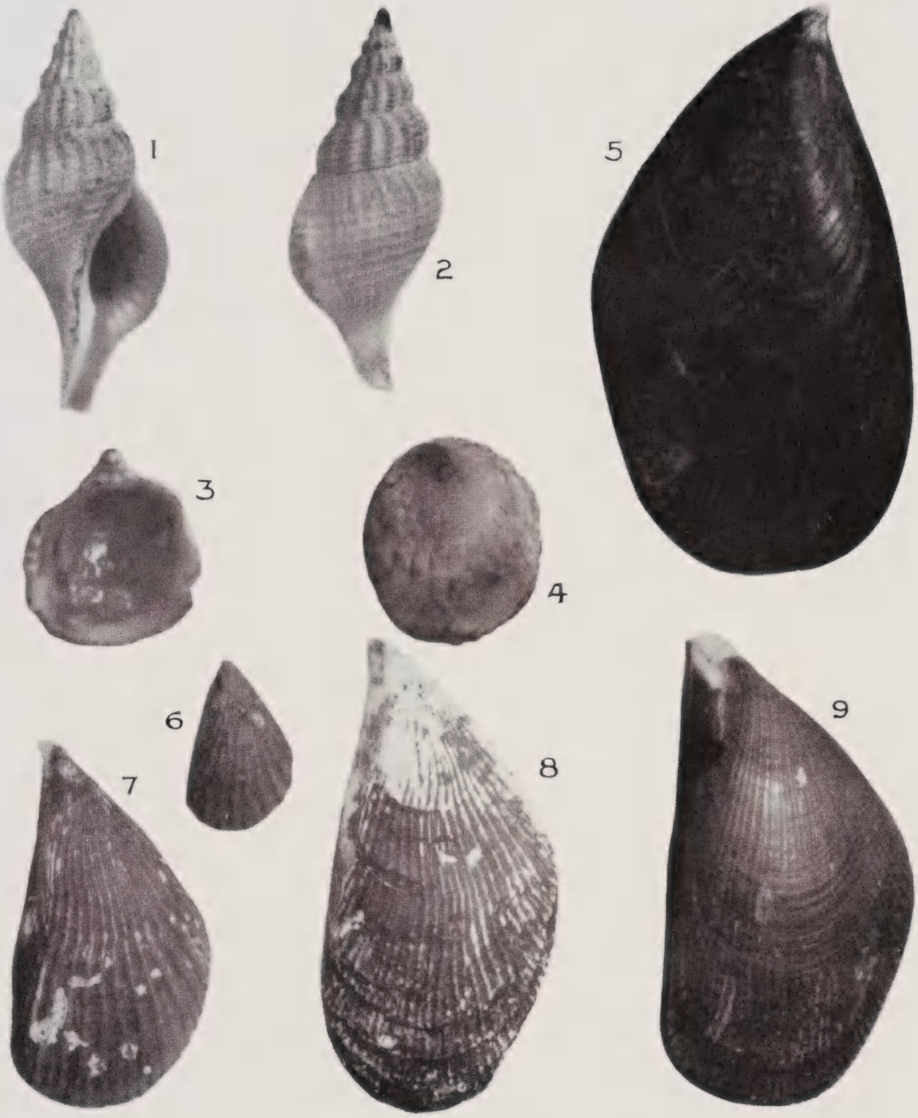


Fig. 1. *Aeneator galatheae* n. sp. Holotype 41 mm. x 16 mm.

Fig. 2. *Aeneator galatheae* n. sp. Paratype.

Figs. 3, 4. *Sabia wyattae* n. sp. Holotype (Fig. 4.) 16 mm. x 12.65 mm. x 5.7 mm.

Fig. 5. *Mytilus aoteanus* n. sp. Holotype 42 mm. x 76 mm. x 25 mm.

Figs. 6-9. *Aulacomya maoriana* (Iredale, 1913): Halfmoon Bay, Stewart Island (Fig. 6.); Timaru breakwater (Fig. 7.); Lyall Bay, Wellington (Fig. 8.) and Nelson (Fig. 9.).

Tiki and Pou: Free Sculpture and Applied

By GILBERT ARCHEY

The impression one receives from the frequently made comparison between Polynesian art as rectilinear and Maori art as curvilinear is of a dominance in both of pattern. Undoubtedly pattern comprises an important part of Maori art, but it is by no means the whole. Of that other form of wood-carving, figure-sculpture, a good number of examples have found homes in museums; there might possibly have been more but for the vulnerability of "heathen idols" to destruction when they ceased to hold the *mana* of religious significance, or when as in New Zealand inter-tribal wars ensued with the possession of fire-arms. On the other hand the very elegance of decorative pattern has been reason for its preservation, largely through acquisition by Europeans, and, accordingly, for its appearing today as the greater part of Maori art.

The present paper is on Maori sculpture. Our third detailed account of a single aspect of Maori wood-carving, it should, more logically than "*Tau rapa*: the canoe sternpost" (1938), or "*Tau ihu*: the canoe prow" (1956), have been the first, for it deals with what is obviously the least complex form of Maori carving and one that we have ourselves put forward (1955) as the base and starting place of its development. This paper, like the others, is mainly descriptive; while it may offer some interpretative comments, it will perhaps trend more towards appreciation of the aesthetic qualities manifested in this stone tool endeavour and of the design concept of its craftsmen revealed even in the early stage of applied sculpture.

The most directly naturalistic carvings we present (Plate 13) reveal some of the limitations common in primitive sculpture; restraint for example, or, rather, restriction in form and attitude due in some measure no doubt to the form and proportion of the tree trunk from which it was carved; also a general absence of finer modelling and details of form, features generally regarded as difficult to achieve with blunt stone tools. Nevertheless the Bay of Plenty sculpture shown on Plate 13 Fig. 1 has a clear expression, of almost portrait quality, generic, maybe, rather than particular. Although we have no means or warrant for judging it as a likeness, we feel that at least it has within it the serenity and dignity the Maori expected to find in the *rangatira*, the leader. Even its hands, mutilated though they now are, bespeak a degree of firmness and poise. We would hardly say so much for the other carving on this plate, until, by covering the uncertain and ambiguous legs, we see again a head of character above a firmly stanced torso.

Other images and carved figures that we shall mention have personal names; no doubt the two just described stood for known individuals and this is the purpose for all Maori figure carving—

Rec. Auck. Inst. Mus. Vol. 5, No. 1 & 2, p.p. 93-109, 14th May, 1958

commemoration of a contemporary notable or of a past ancestor. Maori religion had its general Polynesian gods who also were persons, or personifications of nature: Tane, god of the earth and all that grows thereon; Tangaroa, of the sea; Tu, of war; but no images of gods are known, only of men. Similarly in Polynesia the great nature gods seem very seldom, if ever, to have been made in graven image. Being regarded as spirits they would, on invocation, descend into or abide within objects of many kinds, animate and inanimate—great sennit bundles or wrappings of *tapa*. When images are known they seem to have been of a lowlier status, or of a more domestic nature, fetishes almost as in the case of Rarotonga fishermen's gods. While, as will be recalled Captain Cook saw "a very extraordinary creature call'd Mahuwe" (Journal, Hakluyt Soc. 1955, ed. J. C. Beaglehole, p. 111), a figure of a man made in basket-work 7½ feet high, here again, as Katherine Luomala (1955, p. 94) reminds us, Maui was only a demi-god, a malformed child of the gods who suffered mischance during one of his thousand mischievous tricks and lost his immortality. Thus he was an ancestor rather than a god. It would appear that in African sculpture also men only and not gods are represented; could it be that among primitive people the image maker required a model or at least a subject not too far distant in memory or too remote in physical concept?

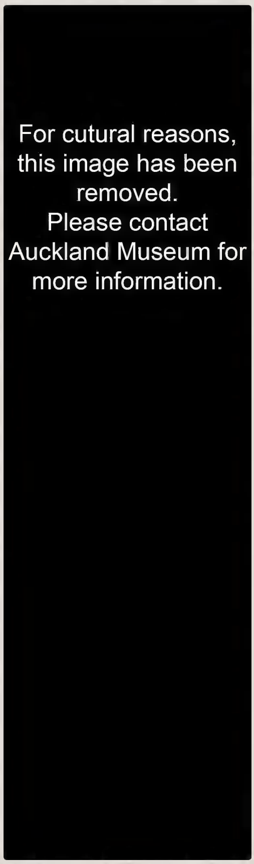
We have mentioned free sculpture, but the figures of Plate 14, although they stand singly, are not quite free sculpture; neither is that of Plate 15 nor the massive Pukaki of Plate 16. All of these figures are broad across and shallow in depth, as if they were relief carvings that had become separated from their background. This characteristic recalls Roger Fry's suggestion that the statue may not have been originally free-standing at all but had developed from bas-relief (Vision and Design, 1937, Pelican; pp. 88-89). Polynesian sculptures do not, however, exhibit this feature, or only very rarely.

No restriction in respect to the available material would have prevented the Maori from giving full natural depth to his sculptures; it could be, therefore, that the frequent setting up of these figures in front of or alongside buildings as described by early travellers, or their incorporation in broad palisade gateways, had influenced the proportions.

That there is essentially something of the relief sculpture in them is suggested by the typical arrangement of their limbs which, whenever they are at all free from the body are almost invariably in line with the front of the figure; they seldom project forward as in Hawaiian images.

This may be observed in the great palisade gateway Rangitakaroro (Plate 14, Fig. 1) from the northern end of Lake Okataina. Each of the two surmounting figures has a width greater than natural and less depth, the arms being aligned with the front surface as we have mentioned. It will also be noticed that the pose of the arms, although natural, is already assuming the order or character of a design. The "top-hat" these figures appear to wear is merely the carver's representation of the customary binding of the hair into a top-knot clipped short above the binding. In a later illustration (Plate 20) we shall see this natural feature take on a stylized, decorative form.

Figure 2 of Plate 14 is a *pou rahui,* a post set up to mark a *tapu* area. In 1846 a landslide from the cliffs under which nestled Te Heuheu's settlement at Te Rapa near Tokaanu buried the village and for two years this figure marked as *tapu* the site of the tragedy. Some time after 1848 when the *tapu* had been raised, the carving was erected in the Tokaanu churchyard remaining there until 1926 when the tribes concerned, accepting the suggestion of Te Rangi Hiroa, placed it in the Auckland Museum.



1. Carved figure (68.5 cm.); the god Rongo, from Rarotonga. British Museum.

(The measure is the height of figure only, excluding base or support.)

Both this *rahui* carving and the statue Pukaki disclose the naturalistic beginning of a very commonly rendered, one might almost say stereotyped, form of decorative design * on wall panels or *pou.* This is a group of people. They are not presented, however, as a portrait group, nor yet in the narrative form of a Nottingham alabaster religious group, but instead as a main figure bearing on its front the subsidiary figures in relief.

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* Described below, p. 100.

In the Te Rapa *rahui* the chieftain, or husband, stands erect, his wife in inverted position is below, with the children in relief on her body. In Pukaki (Plate 16), a massive figure group from Te Ngae, Lake Rotorua, the wife again is below (the bottom of the carving had decayed before it was removed from the ground) and the children are carved on the father's body. Children, or so we suppose them to be, are also carved on the parent in Plate 15, and Plate 17, Fig. 1.

This grouping or composition is not peculiar to New Zealand. The British Museum possesses a wooden image (Text fig. 1) from Rarotonga bearing small figures on its breast and arms, while from Rurutu in the Austral Group comes a large wooden figure with no less than twenty subsidiary body figures, the head bearing another ten arranged to indicate features. (Edge-Partington Album, First ser. 20; cf. also Hewicker and Tischner, 1954, pls. 80-82.)

In Pukaki the eyes are indicated only by shadow from the eyebrows, an unusual device, followed, it will be remembered in the Rano-rarakau statues of Easter Island (Metreaux 1957), and also in the small black stone pendant from Waitotara in this museum (see Hamilton, Maori Art, pl. LVI, fig. 4; Archey, 1949, South Sea Folk, fig. 24).

Sculpture Style in Polynesia.

Mention has been made of the fixed stance of Maori sculpture; it must be admitted that its figures lack vigour of pose either in body or limbs. The same can be said of figure carving throughout central and southern Polynesia *; its greatest achievement is massive grandeur, nor is there any great range in variety in facial expression, the extremes being the grand inscrutability of Easter Island statues and the glaring defiance of the Maori; but again, the latter all too soon becomes pattern. We have to look towards the north-eastern and northern fringe of Polynesia to find full-figure attitudes of strength and movement, expressed vigorously in Hawaii and less so in the Marquesas. While the chief elaboration in Hawaii is in the extensions of the feathered head-dress, there is undoubted strength of attitude in figure sculpture and vigorous almost acrobatic bodily movement in the grouped figures which support food bowls or drums.

We have become used to seeing, in African figures, surfaces so clear-cut as to intensify the volume-expression of the sculpture, and while this is by no means the only technique in African carving we do feel, in finding it so strongly developed, that it expresses a conscious awareness of a relation between surface and contained form. It could of course be no more than the technique-outcome of the iron blade; but if this were so one would not expect to find comparable surface-rendering by stone-tool craftsmen.

Such are found however: in Hawaiian sculpture for example, and also, although in a lesser degree, in Marquesan. So sharply defined do surfaces and their edges appear in certain Hawaiian pieces as to raise the question of their age and the possibility of their being steel carved. Dr. Kenneth Emory to whom I referred the point considers that

* Western and Central Polynesian carved figures have been well documented and described by P. H. Buck (1935).

the British Museum figure in Hewicker and Tischner's Oceanic Art, Plate 88 (an idol from the heiau of Hale-o-Keawe at the Puihonua or "City of Refuge," Honaunau, Hawaii), and two similar ones in the Bishop Museum could be steel cut, although, he adds, they have been so polished as to make it difficult to tell. But the clear cut facets I have in mind are those revealed in Hewicker's Plate 83, and on this example Dr. Emory points to the short shallow cuts as probably indicating stone-tool work rather than steel.

At all events this latter figure and the Marquesan figure of Hewicker's Plate 91 clearly point to tool-conciousness, at least on behalf of surface-texture, and to the effective results obtainable even with stone chisels. As to iron, we agree with Dr. Emory that its introduction must have been too late to have influenced the major form in these figures. In other words the basic modelling of Hawaiian sculpture was manifestly the outcome of clear form-consciousness combined with the technical skill to achieve it even with primitive tools; it is indeed a creative art.

Maori carvers however, although possessed of the finest tools of greenstone, do not in their figures realize such sharply defined sculptural form; it would appear that their interest inclined more towards formalism of design in posture and a surface texture of decorative overlay. Occasionally, in small undecorated figures we do observe muscular form and volume clearly developed. Such are text figure 2, and figure 1 of Plate 20, the latter a beautifully finished and altogether charming little piece. In large and massive sculpture the expanded surfaces have proved a temptation to decorate, not merely so far as would produce a surface-texture, but frequently so strongly as to compete for attention with the figure itself. (Plate 21.)

In view, then, of the high quality of the greenstone chisels the Maori had for his work, and of his sure command of elaboration in design and intricacy in decoration, we should, perhaps, turn from attributing limited modelling to the poor quality of tools, and realize instead that it was not incompetence that lessened his achievement but another interest that guided it in a different direction.

Stylized Tiki.

Although naturalistic human figures are not uncommon in Maori carving, they are I think outnumbered by those of stylized form. We have already seen, in the two realistic figures of Plates 15 and 16, what might be termed a first degree of formalization of features, though of an expression somewhat stolid; when, however, really vigorous facial emotion is intended, it seems always to be expressed by staring eyes, wide open mouth and protruding tongue rendered in conventionalized manner (Plate 19). One can well imagine these enlarged features, introduced as a means of attaining a certain facial expression, themselves soon coming to engage the interest of the carver, providing him with an opportunity to extend and expand them further and further, and, with added ornament, bringing him in time to the conventional mask that is now so constant a feature of Maori carving. Interest in design and decoration would seem to have become dominant and to have prevailed over portrayal of emotion, sometimes even reducing the mask elements, notwithstanding that they arose originally as defiance, to a stereotyped formula. The inclination towards decoration appears on the body also as we see in text figures 3 to 5, incipiently in the hands of figure 4 and more fully in 5 where the

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Fig. 2. Fig. 3. Fig. 4. Fig. 5.

2. *Poito*: wooden net float (26 cm.), Lake Rotoiti. A.M. 40.
3. *Tiki* (82 cm.) from the top of a *pa* post. Opotiki, A.M. 5167.
4. *Tiki* (88 cm).
5. *Tiki* (94 cm.) from a *pa* post. Locality unknown. A.M. 9835.

hands, now transformed into a pair of *manaia* faces, become a patterned decoration for the front of the body. These three figures show, both in hands and faces, the Maori change of mood from realism towards stylized decoration, moods that can lead to either of the two aspects of applied sculpture—on the one hand to the relief decoration of a broad plank and on the other to the incorporation of the *tiki* within the centre-pole support for a building.

Applied Sculpture.

Maori wood carving is in large part, perhaps in major part, an art of architecture; sculpture and house-building are linked in the one act of commemoration, or personification. The carved meeting house, *whare-runanga,* did not merely receive the name of the tribal canoe ancestor, it stood for him, as the named wall-posts stood for and were the whole family of tribal forefathers. The Maori way of thinking about the ancestors of his house appears in characteristic expression in Te Rangihiroa's concluding remarks on houses in "The Coming of the Maori" (p. 136). "The scattering of village life leaves some of the carved houses standing lone and dejected as if their souls had fled. But when tribal custom assembles the people under the ancestral roof again the soul returns. The guests can still recline at ease as they listen to the oratory of welcome and reply which the passing years have not dulled. To those who can feel the stirring and throbbing of the past, the graven features of the ancestors standing along the walls look down and relax into a smile."

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Text Fig. 6. Text Fig. 7. Text Fig. 8.

6. *Amo* (187 cm.): front verandah post of a carved house. Locality unknown. A.M. 22050.2.
7. *Amo*: (182 cm.). Rotorua district. A.M. 6183.
8. House plank, from near Auckland. Wanganui Museum.

In incorporating the human figures *(tiki)* into posts *(pou)* the Maori had better success with broad planks than with narrow posts. Perhaps it would be fairer to say that he was disinclined to elongate his ancestor unduly in order to fuse and blend him into a slender upright. The examples we illustrate (Plate 17, Fig. 2 and text figures 6 and 7) are about as far as he went in this direction. Apparently he thought that a better way to meet this particular problem in applied sculpture was to carve two figures, or three or more, one above the other: so we find *amo* (uprights of a house front) with two *tiki* (Plate 18) and *ngawaewae* (door posts) with several (Plate 26, Fig. 3). It will be noted that, in both of these exterior structures the super-imposed figures are of the same size; later we shall see some variety here in *interior* house carvings. It will also be observed in the next section on *pou*, and in an example given here, text figure 8, that there was no hesitation in lengthening a figure to make of it a *design.*

Pou.

William's Dictionary (VI ed.) gives *pou,* a post, pole; and *poupou,* upright slabs forming the solid frame-work of the walls of a *whare.* We have seen the *tiki* absorbed into the tall slender post *pou;* the six figures of Plate 20 show the human figure in as many stages of broadening and sinking back in relief to form, in the last two, the standard decoration of the *poupou,* the "ancestors standing along the walls" of Te Rangi Hiroa's remark quoted above.

These are not, however, placed together here merely to illustrate an evolutionary series, though I have no doubt they do, for it is difficult to suppose such a progression not to have occurred. What is more important to realize is that any one carver at, say, the time of Cook's voyages could have carved his ancestor in any one of the degrees of stylization and relief here shown. The art was versatile; stylization was not fixed at a stage. The carver envisaged his figures in any one form or degree of stylization or relief, and elected to work in the manner and style he judged most appropriate to the task before him. Part of the enjoyment of Maori art is this very versatility, this infinite variety, and in saying this I mean that the enjoyment was equally shared by carver and observer.

Almost inevitably an overlay of decoration followed (Plate 21) where every enlarged anatomical feature became a field of lively spirals, spirals that on the four great limb bosses of this *pou* almost dominate the central figure, robust and dynamic though it be.

Attention was drawn above (p. 96) to the family group composed of the ancestor, his wife, and the children carved in relief on his body, and to a similar family presentation in the Cook and Austral Islands. In New Zealand this theme also appeared in stylized decorative version. The two *poupou* of Plate 22 show, first in Fig. 1, a large *tiki* in relief with an elongated figure curving across the body upwards and outwards until it reaches the narrow space at the left side of the tiki's head. Here the head becomes stretched in profile manner to fill this space completely. Another subsidiary figure, full-face but with body and limbs in stance, fills the corresponding space to the right of the face. So the *poupou* carries an ancestor and at least two children, decoratively here as naturalistically before. Figure 2 is a balanced composition with the same portrayal, only this time with a pair of almost identical superimposed *manaia,* carried vertically *on* the body; here again each of the elongated heads occupies the margin alongside the face. Plate 23 shows two further examples, though with the subsidiary figures no longer on the body but reduced to a pair of much stylized elongated *manaia* faces, filling the same narrow space as before.

These stylized *pou* frequently include also another figure (the mother?) immediately below the main *tiki.* This figure is a reptile in Plate 23, Fig. 2, a carving done in the 1860's.

It is seldom that we are vouchsafed information as to the subject matter of a composition and even here we can only infer that what we see is the symbolic representation of the family group; it is a kind of formalism as in heraldry, and we could have missed its meaning had it not sometimes appeared in a more natural manner.

While the Maori could readily present the human figure in lively naturalism (Fig. 9), we encounter this form only in relief and as part

Text Fig. 9.

9. Naturalistic figure (56 cm.) from door-lintel. Patetonga. A.M. 6189.

of a composition, where it is the arrangement or succession of figures that becomes the rhythm. A single figure in an attitude of movement is always stylized and in relief, and can be so aptly organized as to express in the rhythm of its own parts the form and proportions of the plank or panel that carries it. This is well marked in figure 1 of Plate 24. In figure 2 the figure-attitude is static, the rhythm being taken up by the strongly developed surface decoration. This *poupou* carries a curious medley with the quaintness of the design enhanced by the clarity of the carving.

The carver's disinclination to elongate the single figure embodied in a post is illustrated in Plate 25, Fig. 1 where the two superimposed, albeit squat, figures seem the better fitted to give strength and support. The neighbouring figure 2 presents the same combination in low relief and with a design or arrangement that recognizes the principle of establishing simple uprightness of form in the lower, basic half of a tall slab, and moving towards variety and lightness above. The third (fig. 3) almost echoes the classic orders of architecture in its progression from the solidarity of naturalism below, through smaller, lighter, mask-faced decorative form in the middle course, to the still smaller, livelier contorted uppermost *manaia*. This is by no means an isolated example that had as it were happened upon this satisfactory order. The arrangement appears often enough to assure us that the Maori clearly understood this particular canon of decorative art. The *tohunga,* in his teaching of apprentices, may even have enunciated the principle; but the opportunity of our ascertaining this is long past.

Still another theme of decoration appears in Plate 26 where figure 1 is relatively simple, comprising a broad profile figure below surmounted by a full face *tiki;* a point worth noting is the neck of each entering the mouth, a frequent fancy in lively designs. Figure 2 is a further intricacy which it is easier almost to invite you to unravel yourselves than to explain. The two main figures and their several supplementaries might possibly be an involved Laocoön-like version of the family group already described.

Plate 27 tells its own story, or perhaps fails to; it leaves one curious to know what the Maori community made of, or did with, the local Picasso.

Other Forms.

The Moriori of the Chatham Islands ventured into the representation of the human figure in two very different directions—that of incised outlines on the bark of trees and that of figure sculpture. While the former were numerous, exhibiting a great variety of stylized designs (Jefferson, 1955), the latter is known from only two examples, a squat pumice figure in the Pitt Rivers Museum, Oxford, and a slender wooden carving, 105 cm. high, in this museum. From the illustration of these two in Plate 28 their common feature, the emphasized representation of ribs, is immediately apparent, recalling the emaciated looking rib exposure of the small *toromiro* wood carvings from Easter Island.

While there are other resemblances between the Chatham and Easter Island figures, they are not exact parallels; they are also accompanied by differences such as the Moriori carving's horizontal eyebrows, small ears, rib-less thorax, i.e. ribs only on loins. The Easter wood figures have a small carved tufted beard; in the Chatham Island carving there are holes in the chin, presumably for insertion of hair tufts.

Rib-carving does not occur elsewhere in Polynesia; the similarity might betoken a genetic relationship between the two areas; on the other hand the ribs could possibly indicate emaciation associated with two similar but quite independent episodes in the history of the two peoples. Both of them doubtless made long and probably very hungry journeys as near-castaways before finding their final home. The representation of a considerably excess number of ribs in the wooden figure can, we think, be noted as a typical instance of decorative extension.

For the resemblances to indicate an art relationship one would expect the examples to be very early in the history of the two peoples. The Chatham Island carving looks old, but this raises the question as to the length of time a carving in soft wood could survive in the damp, wind-driven conditions of the Chatham Islands. But doubts and questions such as these notwithstanding, the two Chatham Island figures remain an intriguing and suggestive problem.

The inclusion of text figure 10 may be somewhat anomalous, because this central figure from the Kaitaia lintel is neither *tiki* nor *pou* as understood in this paper. It is, however, a presentation of the

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Text Fig. 10.

10. Central figure (17 cm.) of the Kaitaia carving, A.M. 6341.

human figure, though one very different in expression and form from other New Zealand *tiki*.

Its squat stance may not unreasonably be attributed to its being restricted to fit into the composition; in a way it is a design stylization. It is very unlike other Maori figure representations in features and attitude and especially in the purposeful placing of the hands. The tongue as a straight bar also appears in the Waitotara pendant referred to earlier, but the eyes in the latter are quite different, being reduced to indication by shadow. The Whangamumu chevroned pendant (Skinner 1934, fig. 125; Archey 1936, pl. 7, fig. 2) also has a tongue of like style, but again the eyes are different. The general form of the Waitotara pendant is that of the chevroned amulet, its notching along the edges being in all likelihood a reduced chevron pattern. It is interesting to find these three, related as their chevrons show them to be, differing so markedly in the representation of the head and face.

The curious carving, unfortunately of unknown locality, decribed by Kenneth P. Emory (1931, 253) displays suggestive resemblances to the Kaitaia carving, but it also exhibits as many differences even in the representation of the face.

That the Maori sculptor could become interested in a form or a surface in its own right is, we think, testified to in the "face" of figure 11. It is the head of a palisade post, one of the many that were

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Fig. 12.

Fig. 11.

11. Top of palisade post: (81 cm.). Locality unknown. A.M. 5483.
12. Bone chest: (66 cm.). Hokianga district. A.M. 19458.

roughed out casually and with no need for or intention of giving them features; their purpose was no more than to proclaim to an approaching enemy "We are here in strength." In spite of its being cracked and split by exposure it still speaks of the care with which the carver fashioned just an oval, and of his sense of design in the cleanly cut recess for the stylized hand.

The same sense of sheer, smooth form confronts us in the coffin box from Northland (fig. 12). Like the central figure of the Kaitaia lintel it is somewhat foreign to an essay on *tiki* and *pou*, except that it also is a human image, albeit part abstract, or should we say part relief; moreover it shows again how an independent creative idea of form itself could move the Maori figure sculptor.

Although the examples included in this paper illustrate the general trends of expression in the Maori carving of *tiki* and *pou,* they do not by any means exhaust the variety and versatility manifested throughout this particular field of Maori wood sculpture. The examples have been chosen for the most part from our own collection, partly because they were readily to hand for photographing and partly as a kind of illustrated catalogue whereby they are made available to other students. I think my New Zealand colleagues would agree that despite the many years of outflow of Maori carving to other countries, the greater number, at all events of large carvings, remain in this country, mostly in our museums. Many which stand in houses built during the nineteenth century have been well recorded by Phillipps (1952, 1955, 1956). Today we have growing a new body of carving in the great social houses commissioned by Maori communities during the past quarter century. Present day Maori carving, which was as it were reborn by the establishment of the School of Maori Art in 1925, is exercised almost entirely on house panels, at present the only source of demand. We hope the demand may extend and that the art may develop with a vigour and versatility comparable to the virile, enterprising art that existed in this country in the eighteenth century. It was an art well able to stand alongside the like arts of Polynesia even if rather more successfully in the decorative branches of wood carving than in figure sculpture.

Discussion.

While the New Zealand Maori is at one with the rest of Polynesia in practising figure sculpture, and for the same purpose of commemoration, the style and manner of his work are not seen to be closely related to that of any other Polynesian group; each of these, indeed, displays its own characteristics. The wooden figures of Hawaii (Text fig. 13) present an active pose with freedom of limbs and a crisp rendering of planes and their conjunctions that gives clarity to sculptural expression. Faces may be carved in patternized exaggeration of features, but they do not thereby fall away from their avowed portrayal of violence or defiance. The elaborate crestings, a treatment in wood of hair and beard or of feathered head-dress, are also robust and clear-cut. The Hawaiians were the most sculpturally aware of the Polynesians, at least in wood; the available stone, being coarsely vesicular, was intractable, and work in it was correspondingly stolid.

Marquesan sculpture stands close to Hawaiian; it, too, displays postural vigour, though less strongly, tending more towards the decorative stylization of attitude and features. Stone figures in this manner reached a high development in Hivaoa where a compact grey tuff was available. Mangarevan wooden images are the most naturalistic both in form and in bodily proportions; but it may be unsafe to generalize here because so few remain to us, and one of the few is quite stylized in outline. (Buck, 1939.)

It is in Raivavae that we find the clearest sculptural formalism; as least we observe this in two striking examples, the Oldman collection figure in wood now in this museum (Fig. 14) and the stone figure in the Pitt-Rivers at Oxford (Fig. 15). Both of these display an interrelation of planes so clearly realized that it must, we feel, have been consciously striven for. The same intention is manifest in the formalized figures of Tahiti fan-handles. (Fig. 16.)

There are other High Island statues of lesser accomplishment, some that appear only as vague surface carving on coarse rock (Routledge, 1921); nevertheless Raivavae's largest statues (Buck, Vikings of the Sunrise, frontispiece) confront us with eight to twelve feet of massive, clearly stated sculptural strength. Although Raivavae sculptures are not by any means Easter Island statues for size or grandeur, they do seem to be treading the same path.

There were wooden images in other of the Austral Islands, but they became fuel for the gesture of religious renunciation many years ago and only the lare Rurutu box-figure (Edge Partington Album, first ser., pl. 20; Hewicker and Tischner, 1954, pl. 82) with its multiplicity of godlets has survived.

The Cook and Society Islands, notwithstanding undoubted differences in their figure representations, do betray a common relationship, for example in the disposal of arms and the clear shoulder-ridge or plane across the back. Several Austral examples also have this ridge. It is a loss to our knowledge that the great Mangaiian image O-rongo (Gill, 1880) should have been broken up for building stone, with no descriptive record of it save that of its size. Superimposed human figures are reported from both the Society and the Cook Islands.

For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

Fig. 13. Fig. 14.

13. Hawaiian carved figure (105 cm.). Bishop Museum.
14. Wooden figure from Raivavae (64.5 cm.). Oldman Collection. A.M. 31499.

For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

Fig. 16.

Fig. 15.

15. Stone figure from Raivavae (94.4 cm.) on pedestal. Pitt Rivers Museum, Oxford, P.R. 126 (H.).
16. Fly whisk handle (10 cm.). Tahiti. A.M. 14509.

Tonga with three small wood sculptures known to us and Samoa with its single, Tonga-inspired example, form a region apart: these very similar figures, although their contours are smooth-surfaced, present powerfully developed volume. The Tongan ivory figurines, treated in the same style, being rather small for the adequate expression of volume, remain doll-like.

The fewness of Tongan figure sculptures and their possibly complete absence from Samoa stands in marked contrast to the variety recorded from eastern Polynesia and, particularly, from Hawaii. It can scarcely be attributed to a lack, in these richly endowed high islands, of material for sculpture; the poor quality of tools may be a likelier cause. Samoa is indeed a barren area in respect to wood-carving of any sort, sculpture or decorative pattern, and there seems to be no outstanding compensatory achievement, as for instance in lashing patterns or textiles.

Such resemblances as there may appear to be between the figures of New Zealand and the other areas should at least be noted, but with reserve in suggesting genetic relationship. There is in fact not much more to it than that features are formalized in Rarotonga and patternized in the Marquesas. Neither of them, however, really resembles the Maori mask; each area has worked out its own facial formula and its own manner of figure stylization and ornament.

If however we find, as I think we well might, a more likely relationship or alliance in the family group in relief, presented naturalistically in New Zealand, Rarotonga and Rurutu, and also in stylized decorative manner in New Zealand, the significance of this common feature occurring as a basic composition in their respective arts will not be overlooked. Here we may also recall that Rarotonga and New Zealand carving compositions alike present a basic rhythm of full-face *tiki* alternating with figures in profile. (Archey, 1956, p. 379.)

In general therefore we see the carving of free-standing human figures as common to the arts of all the Polynesian peoples, but with such clear-cut differences as to bespeak for them long periods of separation and independence.

In looking at the wood-carvers of Polynesia as practising craftsmen we see that it is our Maori who has handled body, limbs and features in the most freely stylized manner, and has bent them, all three, most thoroughly and successfully to decorative purpose. The frequency with which even free-standing figures carry a pose of ordered design indicates how deep seated has been this interest and influence in Maori art. The illustrations in this paper will have shown in what variety and with what versatility the Maori carver created full-figure sculpture, even within the compass of his interest in formal design.

This last comment does, however, bring us to thinking of the quality and status of the art we have been reviewing. We have heard the opinion expressed that Maori art is, or was at the time of European discovery, decadent, meaning we suppose that it was past its heyday and would not have developed new forms of expression even had it continued uninterrupted by European intrusion.

It is, indeed, part of the nature of things that the highly specialized —and Maori decorative art is undoubtedly that—should be the full flowering of any form, either in natural evolution or in human endeavour. New forms and the vigour of new growth spring from the rootstock or the basic stem. Thinking of this in respect to Maori wood-carving we recall that, although specialized, it was not merely an art of one single stereotyped style; it had created no less than five, two of which ran in quite different directions—towards highly involved curvilinear complexity on the one hand and to refined simplification, almost austere abstraction, on the other. Moreover it was still exhibiting enterprise and ingenuity in its basic compositions, that is in the grouping and design arrangement of almost naturalistic figures.

A thought aside at this point is that today's endeavour to revive Maori art might find quicker success through natural figure sculpture than through perpetuating the well-tried patterns of the past. But, returning to the question of the primary vigour and achievement of Maori sculpture as we know it, there is still the relevant point to which we have just drawn attention, namely, that already within the naturalism of its figure-rendering we see arising the first stages of formalism. In its incipient relief form it reveals a naturalism not free and untrammelled; in its manner of expressing facial emotion we see thus early a kind of decorative symbolism instead of natural emotional expression.

Are these tendencies, then, what our carvers could not help, or are they what they were aware of, were interested in, and intended? Were they, are they, the seeds of development or of decadence? It is a long standing question of art discussion and will probably be answered here as hitherto: *Quot homines tot sententiae.*

ACKNOWLEDGMENT AND REFERENCES.

I have pleasure in thanking Miss Dorothy Kempin for the drawings of text figures 2 to 5, 7, and 10 to 16.

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For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

1. 2.

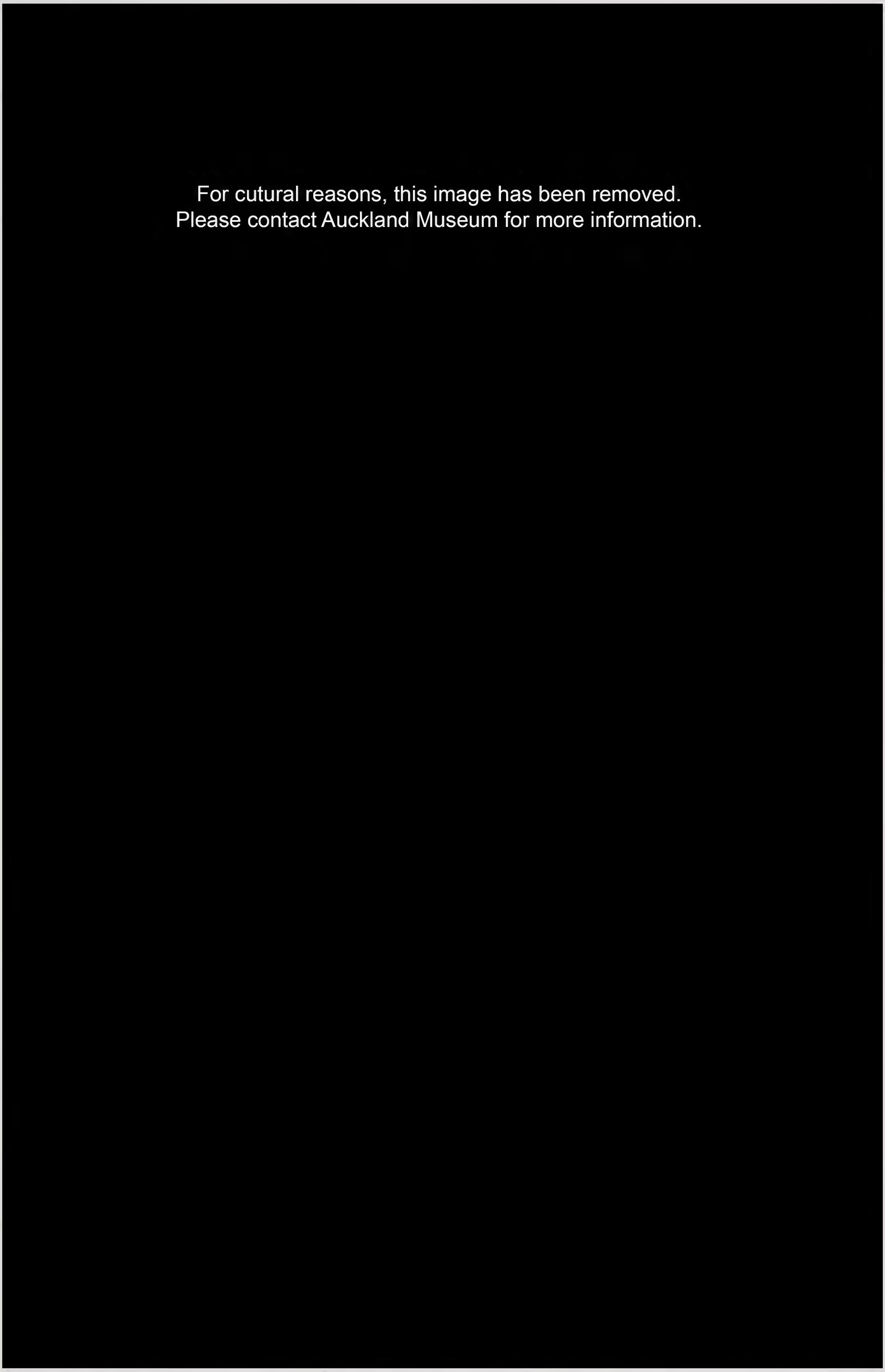
(The measurement is the height of figure only, excluding base or support.)

1. Wooden figure (108 cm.); Opotiki District, A.M. 5167.
2. Wooden figure (95 cm.); locality unknown, probably northern Auckland province, A.M. 22737.

For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

1 2

1. *Waharoa* or palisade gateway (610 cm.); named Rangitakaroro (for the upper figure—lower is his brother Tapora); northern end of Lake Okataina, A.M. 6022.
2. *Pou rahui* (421 cm.); erected to mark the *tapu* area of the landslide (1846) that buried Te Heuheu Tukino I and his village, Tokaanu, Lake Taupo. A.M. 22051.



Palisade post (172 cm.); vicinity of Lake Rotorua, A.M. 172.

Pukaki, an Arawa ancestor with his wife and children. Massive wooden figure (198 cm., originally considerably higher), Te Ngae, Lake Rotorua, A.M. 161.

PLATE 17.

For cultural reasons, these images have been removed.
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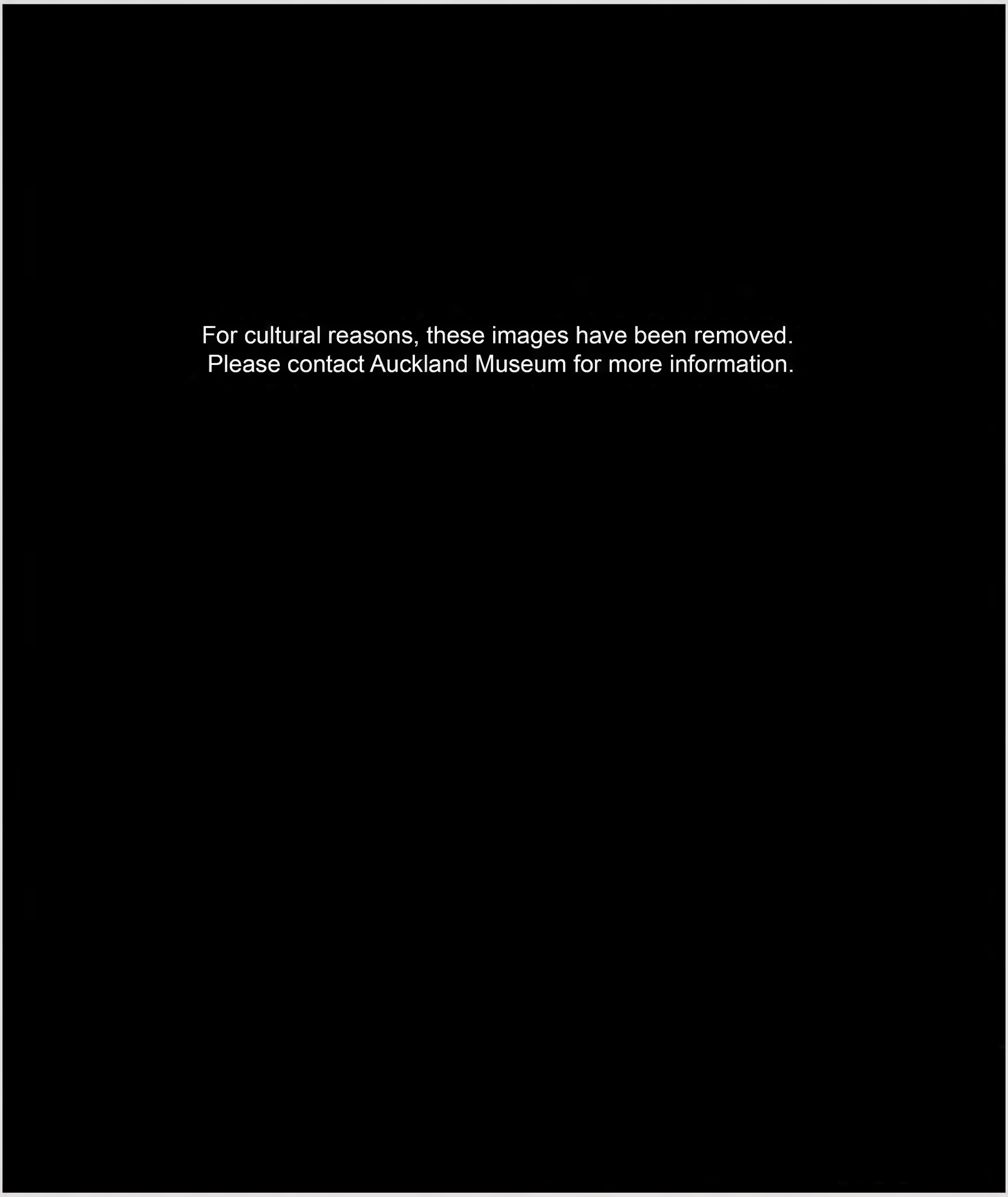
1 2

1. Palisade gateway (357 cm.); Pukeroa *pa,* Rotorua, A.M. 160.
2. *Tiki* (167 cm.); Wellington district, A.M. 18426.2.

1. *Amo* (343 cm.) of verandah of carved meeting house named Hotunui, Parawai, Thames, A.M.



1 2

Two carved *tiki*: 1. Tolaga Bay (180 cm.), A.M. 769.
2. East Cape district (170 cm.), A. M. 154.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information

1. 2. 3.

4 5 6

Tiki and *pou*, a series showing degrees of natural and stylized rendering; note in 2 and 3 the hair binding treated in stylized, decorative manner. 1. Small figure (35 cm.), British Museum. 2. Basal figure of verandah support, *pou tokomanawa* (115 cm.); East Cape district, A.M. 163. 3. *pou tokomanawa* (109 cm.) of house Turanga, Dominion Museum. 4. Lower (93 cm.) of superimposed figures; locality unknown. A.M. 22070.2. 5. *poupou* (138.5 cm.) locality unknown, A.M. 13988.1. 6. *poupou* (97 cm.) from Arawa house Rangitihi, Rotorua; A.M. 5152.

PLATE 21.

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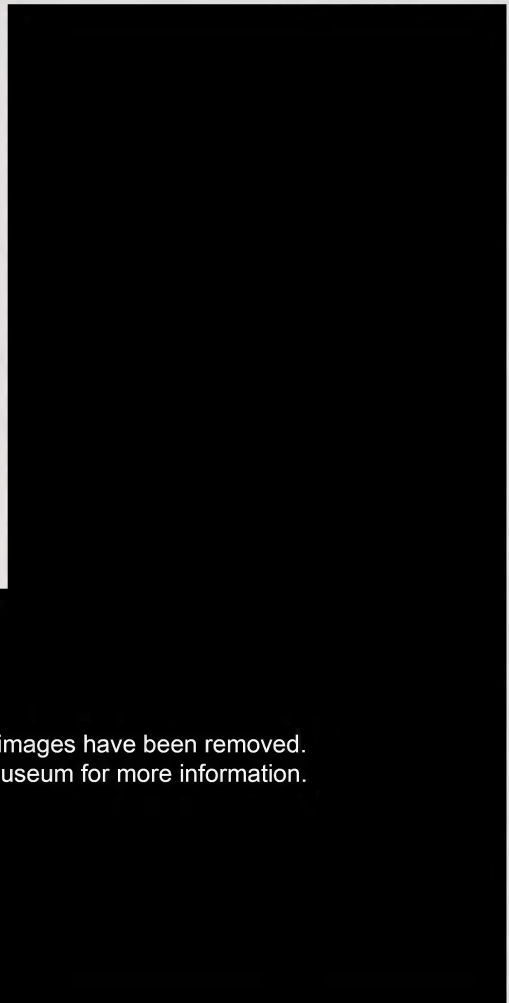
Please contact Auckland Museum for more information

Poupou (68.6 cm.) ; Turanga house, Gisborne. Dominion Museum.



2

1

1. *Poupou* (136 cm.), Taupo district; A.M. 4717.
2. *Poupou* (190 cm.) from house Rangitihi, Rotorua. A.M. 5152.

1 2

1 and 2. *Poupou* (190 cm.) from house Rangitihi, Rotorua. A.M. 5152.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

1 2

1. *Pou* (90 cm.) from gable end of a house; locality unknown. A.M. 9895.
2. *Pou* (— cm.) from gable end of house, Rangitihi, Rotoru. A.M. 5152.

For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

1 2 3

1. Superimposed *tiki* (167 cm.); locality unknown. A.M. 22070.2.
2. *Pou* (279 cm.) from end of house Rangitihi, Rotorua. A.M. 5152.
3. *Pou* (333 cm.) from end of house Rangitihi.

For cutural reasons, these images have been removed.
Please contact Auckland Museum for more information.

1 2 3

Pou with superimposed figures. 1. (245 cm.); locality unknown. A.M. 22069.2. 2. (237 cm.) from house Rangitihi. A.M. 5152. 3. *Ngawaewae* (110 cm.) doorway from East Coast district. A.M. 184.

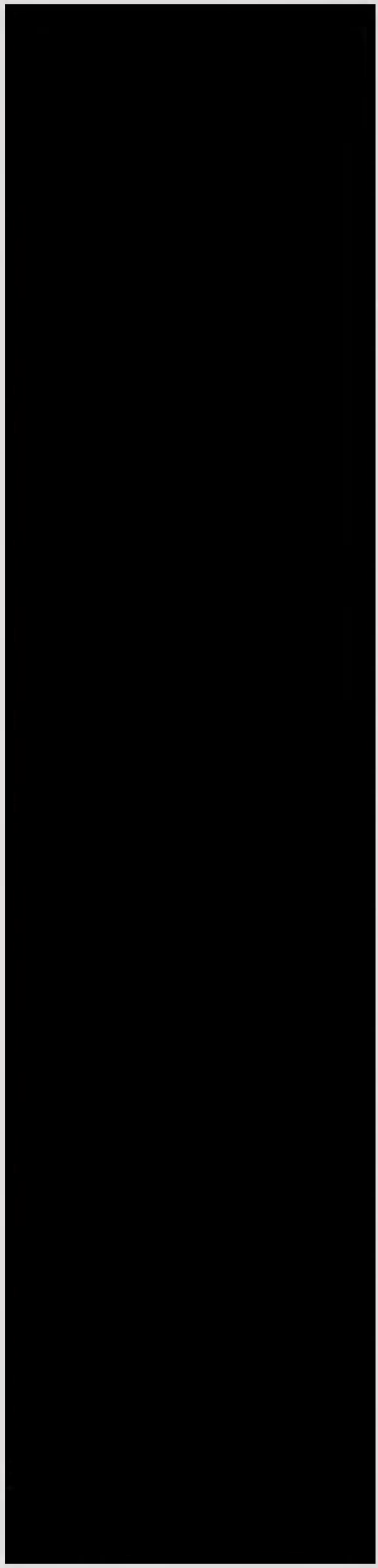
For cutural reasons, this image has been removed.
Please contact Auckland Museum for more information.

Pou with complexity of figures: Locality Auckland (*teste* Hamilton's Maori Art p. 162). Present location unknown.

PLATE 28.

CHATHAM ISLAND CARVINGS

Tiki carved in stone. Pitt Rivers Museum, Oxford. P.R.219(Q).



Tiki carved in wood. Auckland Museum, No. 1867.

The Canoes of Geelvink Bay, Dutch New Guinea

By A. W. B. POWELL, Auckland Museum.

This account of certain New Guinea native canoes and their construction is compiled from field notes made from mid January to early March, 1956, during the "Gloria-Maris" expedition to Geelvink Bay, Dutch New Guinea.

The primary purpose of this expedition, which was sponsored by Mr. A. J. Ostheimer of Philadelphia, for the Academy of Natural Sciences of Philadelphia, was to make a survey of the molluscan fauna of the area, and although this objective proved to be almost a full time occupation, opportunity was afforded from time to time, to observe and make notes in other fields of enquiry.

I am most grateful to Mr. Ostheimer, not only for the invitation to join this expedition, but also for his interest in an ethnographical diversion, which I introduced and which he greatly assisted, by personally organizing trading transactions with the natives, thereby acquiring a representative series of canoe prows, accessory ornaments, sternposts and paddles, which he generously donated to the Auckland Museum.

The expedition worked entirely within Geelvink Bay, which forms the "back of the neck" of the "New Guinea bird." Geelvink Bay is about 200 miles across its greatest width and runs in for approximately 170 miles. Across the entrance lie the Schouten Islands comprising the practically joined high islands of Biak and Soepiori with a combined length of 75 miles. Further in and to the east lies the even larger high island of Japen, with a length of about 115 miles.

The observations made cover these three large islands, the Padeaido group of atolls and small islands at the north east entrance to the Bay and the Mios Aoeri group in the south west area of the Bay.

Geelvink Bay lies from 1° to 3° south of the equator; it is relatively land locked and is not influenced by any major currents. For the most part sea conditions are calm except for sudden storms of short duration and brief unsettled periods associated with seasonal changes. These relatively easy conditions have influenced the development of canoes of light construction with a primitive sail plan suited only for light steady winds. However, provision for more rigorous conditions likely to be encountered on long journeys far from land is made by a simple process of building up the height of the gunwale with multiple wash strakes of sago-palm mid-ribs.

The canoes of the area mostly fall into one or another of the following three categories.

A. Simple dugout of 9 to 10 feet in length with a single outrigger and minus attached bow-cover, prow or stern piece.

Rec. Auck. Inst. Mus. Vol. 5, No. 1 & 2, p.p. 111-115, 14th. May, 1958.

B. Larger canoes up to 15 feet in length with an attached carved bow-cover of two sides connected transversely. Single or double outriggers. Detachable tripod mast and square palm-leaf sail usually carried.

C. Still larger canoes up to 25 feet in length with, in addition to the double sided attached bow-cover, an elaborate forwardly raked prow carrying accessory detachable fret-work ornaments. Two detachable tripod masts carrying square palm-leaf sails and between the masts a low canopy, with thatched roof erected on low uprights, the whole freely detachable to serve as a temporary shelter ashore when required.

A. THE SIMPLE DUGOUT.

This canoe is 9 or 10 feet in length, hollowed out of a single log, and lacks ornamental prow, bow-cover or stern attachments. It is fitted with a single outrigger and carries one or two persons.

In the hollowing out of the hull an evenly spaced series of horizontal projecting lugs is left about four to six inches down from the gunwale. Each of these lugs is drilled to hold a spike of wood which impales a prepared midrib of a sago-palm leaf to give height and smoothness to the gunwale and act as a wash strake. The spikes protrude through this wash strake so that other similar wash strakes may be added when more freeboard is required. The convex outer and concave inner surfaces of these palm midribs makes them admirably suited for the purpose. The outrigger beams check against pairs of the gunwale spikes and are held firmly by rattan lashings connecting the beams with pairs of transverse pieces of wood down in the hull. These transverse pieces grip both the top and bottom faces of the lugs in the hull in vice-like fashion.

The single, soft-wood outrigger is spiked to the beam by a small branch with a naturally attached twig. The branch goes through a hole in the outrigger beam and the twig is lashed to the top of the beam to prevent rise and fall of the branch in the hole.

This very simple yet quite effective construction is shown in detail in Text Figure 1 a-d.

B. THE SMALL SAILING CANOE.

This canoe has the same basic construction as the small dugout, but runs to about fifteen feet in length. It differs from the small canoe in having an attached double bow cover, and usually carries a detachable tripod mast and rectangular sail of sewn palm leaves. It may have a single outrigger, but is usually fitted with double outriggers when mast and sail are added. The bow-cover is double with a transverse connecting member, all carved from a single piece of wood and lashed to the hull. Sometimes a low covering piece, shaped as a seat for the steersman, is lashed to the stern, but more often the hull terminates in a bluntly projecting tang drilled to take a trailing length of rattan which serves for mooring and anchoring.

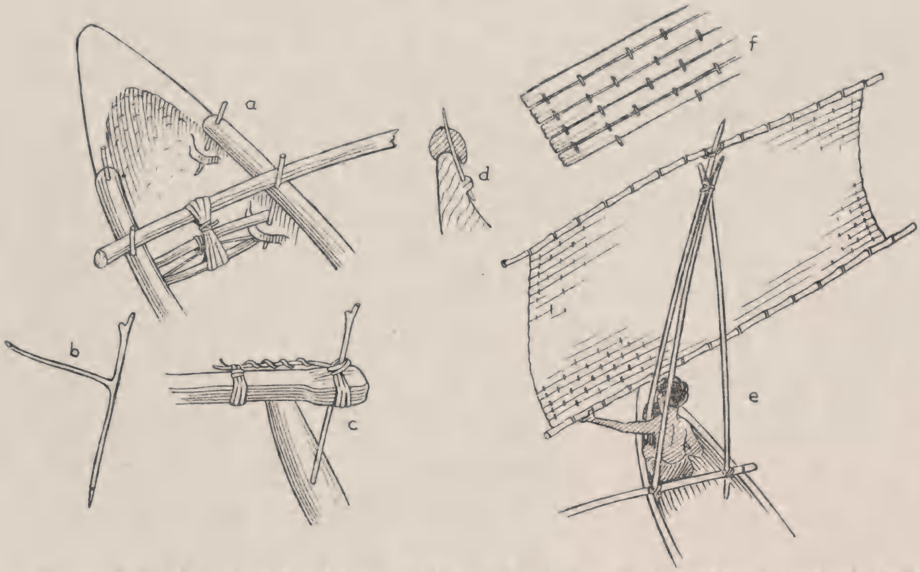


Fig. 1. (a) Method of lashing outrigger to small canoe; (b) natural forked twig for fastening outrigger float to beam; (c) method of lashing same; (d) cross section showing spiking on of wash-strake; (e) tripod mast and sail of sewn strips of sago-palm leaves; (f) detail of sail.

The tripod mast when not in use is carried on one outrigger and the furled sail on the other. The mast has one member a foot or more longer than the other two and it is upon this longer member that the sail is hung or pivoted. Two of the feet of the tripod are lashed to the forward outrigger beam, splayed, one on each side of the hull and the third foot is wedged or lashed in the bow.

The rectangular sail is made of two-inch strips of sago-palm leaves sewn together, the whole lashed to top and bottom bamboo poles. At the middle of the upper bamboo pole there is a loop of rattan for hooking the sail in place on the projecting member of the mast.

The sail has no other lashings and is simply held in operation by hand. Erecting the mast and setting the sail is done awkwardly by a man standing in the canoe. It is doubtful if the sail is used in this sized canoe in anything but light steady winds.

Frequently in lieu of a sail for running before the wind a single green coconut palm leaf is erected vertically and lashed below to the forward outrigger beam. It is almost as effective as the properly fashioned sail.

It is a common practice for natives to cook their fish at sea. The fire is made upon a sheet of flat iron, usually the top of a forty-gallon drum and placed across two of the outrigger beams.

C. THE LARGER SEA-GOING CANOE.

This canoe has the same basic construction as the other two but has more beam and attains 25 feet or more in length. It always has two outriggers and usually two masts with a thatched deck house in between.

The most interesting feature of this canoe is the rakish highly ornate fretwork prow with accessory ornaments for ceremonial occasions. This follows the gunwale sheer and emerges from between the front projections of the double bow-cover (Text Figure 2).

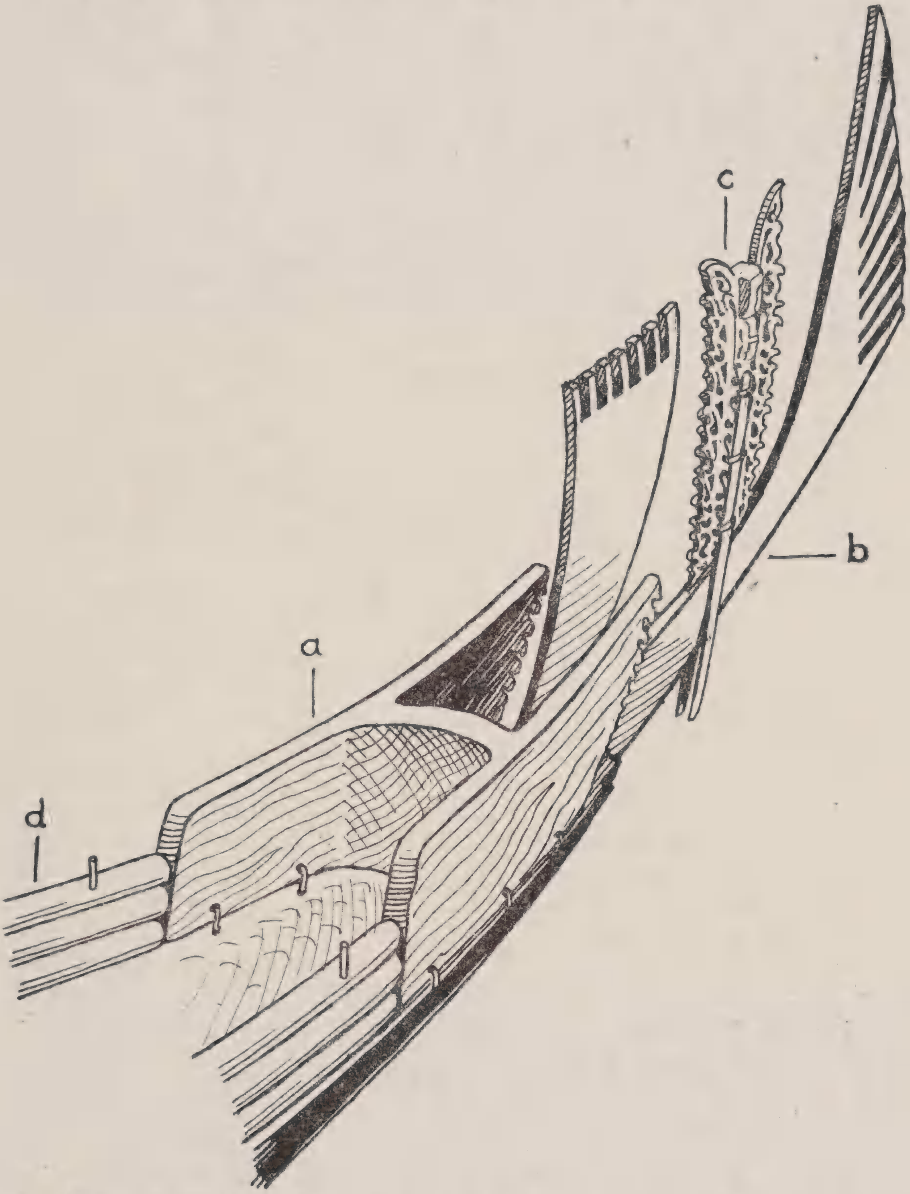


Fig. 2. Bow assembly of Type C Canoe, showing (a) double bow-cover carved from a single piece; (b) raked double prow; (c) accessory pegged fretted ornament; (d) multiple wash strakes.

The fixed part of the prow is formed into two forward raked carved members, one behind the other but with a free space between them. Into this space, upon special occasions, one or two accessory ornamental pieces are often placed. These frail, elaborately fretwork carved accessory pieces have a strip of bamboo lashed upon each side, which provides a clothes-peg-like mode of attachment to the prow proper. When not in use these accessory pieces are carefully stored in their houses.

Often the fretwork carving is differentially marked out in colours, usually Indian red, blue and white. Tufts of black cassowary feathers add to the effect.

The shelter or deck house is long and narrow with a thatched gabled roof supported by a number of three-feet high posts. The structure is designed so that it can be taken ashore in its entirety and used as a bivouac.

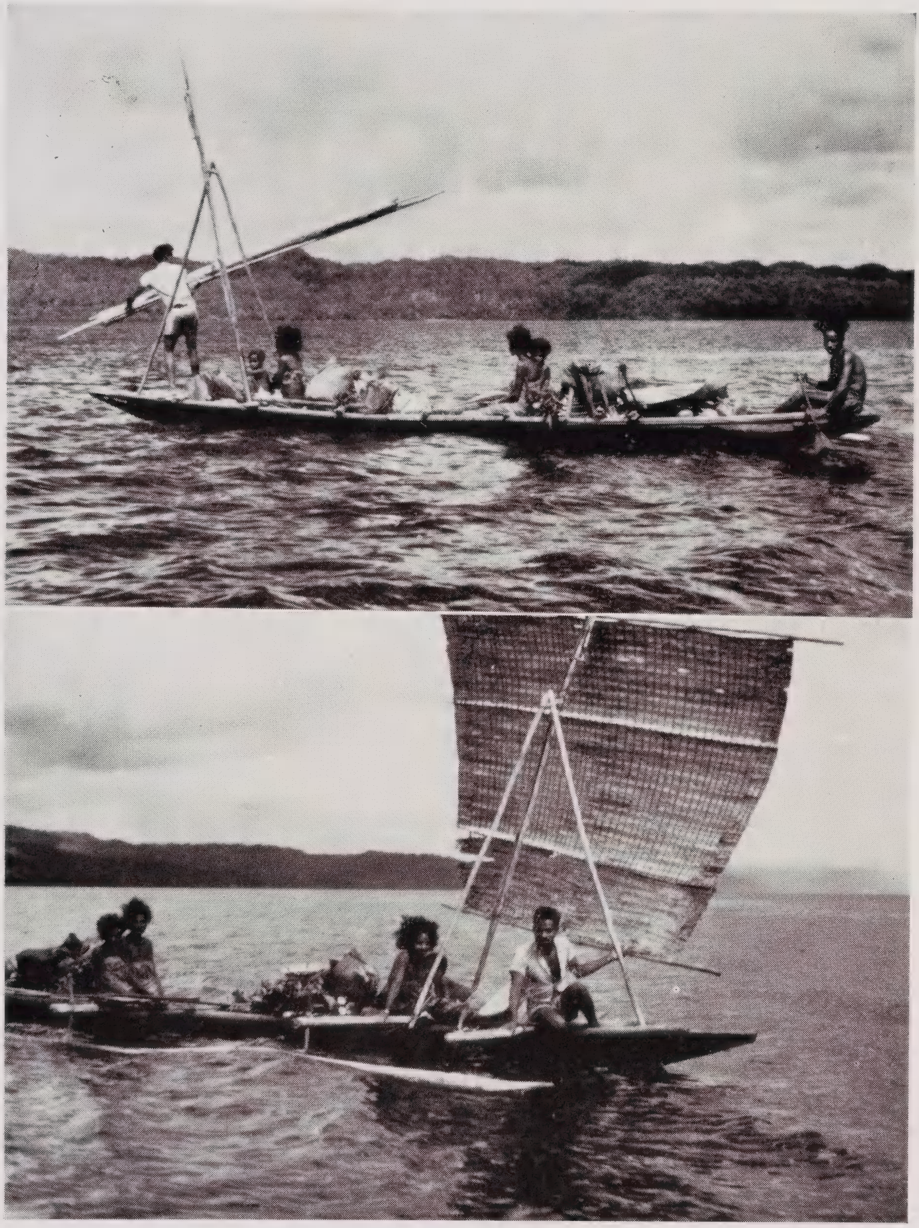
Other large canoes had more elaborate permanent shelters and it was evident that whole families lived on them for considerable periods. Pigs, fowls, dogs, parrots, opossums and even a Victoria Crowned Pigeon were observed aboard this type of craft. The pigs and the pigeon were housed in pyramid shaped crates made of thick bamboo crossed at the corners.

Most of the houses in the area are strongly constructed of stout hewn timber with thatched roofs, and they are built on piles over water in estuaries or shallow bays. Many of the houses had a "lean-to" annex at floor level where finishing work on even larger canoes was in progress. The rough hewing and hollowing out of the hull was done ashore and all the tools used were of home manufacture.

These people are quite expert metal workers and many of the homes possessed a forge of simple yet effective design. It consisted of a pair of hollow wooden cylinders of about four inches in diameter and about 30 inches in height, connected below by a "T"-shaped metal tube which delivered a continuous blast to the furnace. The circular pistons were of wood edged with feathers to give an air seal and the plungers were operated alternately by hand.

It was interesting to note that the blades of the adzes used in hollowing out the canoes were of hand wrought steel, yet they were still reminiscent of the old stone adze in shape and thickness. Even the manner of hafting was in some instances similar to that used for the original stone tool.

Plate 31 shows a characteristic fretwork style prow with pegged accessory ornaments, and Plate 32 the carved blade and handle of an ironwood ceremonial steer oar from the Ambai Group, Island of Japen. This was obtained from a headman on his inflexible terms of twenty shirts.



Miss Virginia Orr, Photos.

TYPE B CANOE.

Showing (above) tripod mast and awkward method of hoisting the sail; (below) showing the same canoe under sail. The sail carries no ropes and is merely held by hand. Wooi Bay, Japen Island.

Miss Virginia Orr, Photos.

TYPE C CANOES.

1. Crocodile hunters at Roemwaken Island, Mios Aoeri Group, South West, Geelvink Bay. Note the four tiers of sago palm mid-rib wash-strakes. The thatched deck house had been already detached and erected ashore.
2. Showing (foreground) double outriggers, two tripod masts with furled sails and double bow-cover minus prow; (background) second canoe with double bow-cover and double prow, but minus pegged accessory ornaments. Ambai Group, Japen Island.
3. Canoe prow of unusual design with deeply incised but not fretted carving, picked out in colours. Biak Island.

Canoe prow with accessory pegged fretted ornaments. The dark tufts are cassowary feathers. Ambai Group, South Coast, Japen.

Ceremonial steer-oar of iron-wood. Blade (19 inches) and carved handle end, human figure motif (36 inches). The whole oar is 10 ft. 9½ inches in length and the carving on the handle is set at right angles to the blade. Ambai Group, South Coast, Japen.

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CONTENTS

ANTARCTIC AND SUBANTARCTIC MOLLUSCA

By A. W. B. POWELL, Auckland Museum.

INTRODUCTION

The aim of this catalogue is to provide a comprehensive inventory of Antarctic and Subantarctic marine mollusca, accompanied by key references, a bibliography and the distributional data for each species.

The terms Antarctic and Subantarctic relevant to the coverage of this catalogue requires explanation.

Deacon (1937, pp. 1-152) in his "Hydrology of the Southern Ocean" gives (Fig. 4, p. 18) a clear indication of the approximate positions of both the Antarctic and the Sub-tropical convergences.

Thus in theory these divisions, as faunal boundaries, appear to be straightforward—i.e. Antarctic fauna from the Antarctic Convergence southward and Subantarctic fauna from the area between the two convergences but the solution is not as simple as that.

The Antarctic Convergence marks a more or less definite boundary where ice diluted cold dense water of the Antarctic, 300 to 800 feet in depth meets the warmer but more saline, therefore lighter water of the Subantarctic zone. At this line of contact the Antarctic water sinks abruptly beneath the warmer Subantarctic water and continues to flow north as a deeper intermediate layer.

Further north at approximately 40° S latitude a similar but less pronounced phenomenon occurs at what is termed the Sub-tropical Convergence.

The Antarctic Convergence presents no difficulty as a faunal division but the less pronounced Sub-tropical Convergence sweeps far to the northward where it comes in contact with both the South American and New Zealand land masses, resulting in a more complicated situation.

A considerable percentage of mainland Magellanic molluscs owe their presence in that province to gradual infiltration southward along continental shores, assisted by the protection afforded by innumerable sheltered waterways, whilst other temperature tolerant species have persisted from past warmer climates.

Conversely a considerable proportion of the Magellanic fauna extends northwards up the west coast of South America even as far as Peru, assisted by the phenomenon of upwelling cold water.

I have shown (1955) that the Southern Islands of New Zealand, with the exception of Macquarie Island, have a basic fauna of relict New Zealand mainland origin with a superimposed Subantarctic drift element which is little more than an influence.

A rather arbitary boundary is here employed in respect to the Magellanic Province, which includes the Falklands in the Subantarctic proper but excludes from full entry the mainland fauna of the Magellanic Region. Reference however is made to all the truly Magellanic (mainland) species as footnotes under relevant family headings.

Thus the Subantarctic faunal coverage in this paper includes all insular locations between the two convergences but excludes Patagonia, Tierra del Fuego and the New Zealand Region apart from Macquarie Island.

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CHARACTERISTICS OF THE FAUNAL AREAS OF ANTARCTIC AND SUBANTARCTIC WATERS

Falkland Islands

The Falklands are a group of two large and many small islands lying along the very extensive East Patagonian Continental Shelf but almost severed from it by the transverse Falkland Trough, 150-200 metres in depth. The Falklands lie within the Subantarctic Zone of surface waters (isotherms 6°-12° C.) and are outside the northern limit of pack-ice.

They are strongly influenced by the Cape Horn Current, composed largely of water of Pacific origin which is swept through Drake Strait by the West Wind Drift and then turns northwards between the Falklands and Patagonia as the Falkland Current. The West Wind Drift proper passes well to the south of the Falklands.

Owing to its position within the Patagonian Shelf the Falkland marine molluscan fauna is predominantly Magellanic and the former land link with that region is indicated by the few land and freshwater molluscs found in these islands.

Burdwood Bank

This is a large shoal of from 80 to 150 metres in depth situated south of the Falklands and separated from them by deep water, 500-2000 metres. The shoal lies east of Tierra del Fuego and it is now generally accepted that the line of folding represented by the Andes and their former continuity in what is now termed the Scotia Arc passed through the Burdwood Bank and not the Falkland Islands. A trough of moderately deep water, 250-500 metres severs the bank from Tierra del Fuego and the ridge connecting it to the eastward with Shag Rocks and South Georgia varies between 1000 and 2000 metres, severed in several places by deeper water of between 3000 and 4000 metres.

The fauna is almost entirely Magellanic.

South Georgia and Shag Rocks

This very distinctive biogeographic unit lies from 12° to 20° east of the Burdwood Bank and is part of the Scotia Arc, although it is surrounded by deep water, 3000 metres. South Georgia is located in only slightly higher latitudes (54°-55° S.) than the Falklands (51°-52° 30′ S.) yet the contrast in both their physical conditions and their respective faunas is profound.

The Falklands are situated on the Patagonian Shelf, not the Scotia Arc and the surrounding waters are ice free. South Georgia on the other hand is an isolated area in a region of deep water, entirely within the influence of the cold West Wind Drift, and even land conditions are glacial. Partially resolving upon these conditions the bottom sediments are mainly tenacious blue muds, in contrast to the sandy deposits of the Falkland area, and the coarse sandy and often volcanic debris of the South Sandwich-South Shetland section of the Scotia Arc.

Owing to the far southward extension of the South American land mass the Antarctic Convergence is deflected below its average latitude, with the result that the Falklands lie in the Subantarctic and South Georgia since it is well to the eastward, comes within the Antarctic zone of surface waters.

The molluscan fauna has scarcely any species common to the Falklands but on the other hand Kerguelen and Ross Sea elements are present but their significance is partly ecological in that the muds of South Georgia are more comparable with those of both the Kerguelen and Ross Sea areas.

The South Georgian molluscan fauna is a rich one with a considerable endemic development and a strong representation of eastern Antarctic and some eastern Subantarctic genera.

South Sandwich Islands and Remainder of Scotia Arc

As already pointed out this area is characterized by coarse sandy and often volcanic debris in contrast to the blue muds of South Georgia.

The molluscan fauna is Antarctic with South Georgian and eastern Antarctic influences. The role of the Scotia Arc is apparent as a former and even a present route of entry for wide ranging stenothermic deep water genera and there are others that indicate infiltration from the deep basins of the South Atlantic.

Antarctic Continent

The continental Antarctic molluscan fauna is incompletely known as instanced by the fact that many species are still on record only from the type locality. My recently published results of the B.A.N.Z.A.R.E. mollusca (Powell, 1958), largely from Enderby Land to Adelie Land has greatly extended the range both geographic and bathymetric of some of the species previously known only from either the German Gauss Station or the Ross Sea.

Large sections of the continent are still unknown from a faunistic standpoint, especially the coast between the Bellingshausen and Ross Seas.

Indications are that when the continental fauna is more completely known a much larger percentage of the species will be found to be of circum-Antarctic range.

The Ross Sea certainly appears to have a rather meagre fauna compared with other Antarctic areas but this is probably due to the adverse physical conditions resultant from the proximity of the great ice-barrier and does not indicate the development there of a biogeographic province.

Worthy of note is the fact that the whole of the shoreline of Antarctica is ice-bound for most of the year and that only in a few places is a littoral fauna present.

Kerguelen Island

This island, situated in the Enderby Quadrant, lies on the extensive Kerguelen-Gaussberg Ridge which connects radially with Antarctica, separating the Atlantic-Antarctic Basin from the Australian-Antarctic Basin. The Antarctic Convergence is just south of the island but Heard

Island to the south east is within the Antarctic zone. To the west, on the Atlantic-Indian Cross Ridge the Crozets, Marion and Prince Edward Islands, which have some faunal characteristics in common with Kerguelen, are situated within the Subantarctic.

The Kerguelen molluscan fauna is a rich one of approximately 145 species, which results from several factors, the sheltered waters afforded by Royal Sound with its extensive islets and channels, the situation between two zones of surface waters, the underwater continuity with the Antarctic Continent and the lateral proximity of cross ridges extending westward to the vicinty of the Scotia Arc and eastwards towards Macquarie Island.

The shallow water molluscs are mostly of Subantarctic character but the deep water ones are mainly of Antarctic affinity, which is to be expected with a location almost at the Antarctic Convergence.

Macquarie Island

Macquarie Island is situated just within the Subantarctic, to the south of the southern islands of New Zealand (Auckland, Campbell, Antipodes and Bounty Islands) for which I designated the faunal province Antipodean (Powell, 1955, p. 6).

The molluscan fauna is a sparse one of only 54 species, including one land snail. The shores of the island are rugged without inlets or shelter.

Endemism is high and the Subantarctic element shows relationship with the Kerguelen fauna, to which province I have provisionally assigned it (Powell, 1955, p. 6).

There is however a well marked relict New Zealand mainland influence shown by the presence of the gastropod genera *Notoacmea, Actinoleuca Plumbelenchus* and *Maurea,* the pelecypods *Tawera* and *Chlamys* (*Zygochlamys*) and the land snail *Phrixgnathus.*

BIOGEOGRAPHIC PROVINCES

For reasons given above it is considered inadvisable at the present stage of our knowledge to subdivide the Antarctic fauna apart from the segregation of South Georgia which has a distinctive faunal assemblage.

My divisions for the Subantarctic (Powell, 1951, p. 67) and later modified (Powell, 1955, p. 7) may be continued provisionally.

(1) Magellanic. Patagonia from Chiloe Island (west coast) and Cape Blanco (east coast), Tierra del Fuego, East Patagonian Continental Shelf, including Falkland Islands and Burdwood Bank.

(2) Georgian. South Georgia and Shag Rocks.

(3) Kerguelenian. Kerguelen Island, Crozets, Marian and Prince Edward Islands, Macquarie Island and possibly Heard and Bouvet Islands.

FAUNAL DISCUSSION

Soot-Ryen (1951, pp. 37-43) in reviewing the Antarctic pelecypods considers that there is evidence of an early Antarctic fauna from a time of more genial climatic conditions that still constitutes an element in the Recent fauna. He instances the Pectinid, *Adamussium colbecki, Laternula elliptica* and *Thracia meridionalis.*

The genus *Laternula* is widely distributed in the tropical Indo-Pacific and ranges southward to Southern Australia and Tasmania but there are no living members of the genus in South America, South Africa or New Zealand.

Among the gastropods, *Perissodonta* stands out as a constituent of this relict fauna, shown by the Cretaceo-Tertiary ancestry of the Struthiolarids in both Patagonia and New Zealand. The Volutes *Guivillea* and *Provocator* are probably further members of the older fauna.

Large Marginellids are usually characteristic of the tropics but two species from the Magellanic Region, *dozei* and *warrenii,* have the size, bright coloration and enamel of their warm water relatives. Ancestors of these could have entered the Subantarctic during former warmer climatic periods by a gradual extension of their normal range, down the east coast of South America.

Another moderately large Marginellid, *ealesae,* although thin-shelled and colourless, comes from the Antarctic, i.e. Enderby Land to the Ross Sea, again suggesting entry during a past period considerably warmer than at present.

Soot-Ryen (1951, pp. 42-43) also points out that nearly all the shallow water Antarctic pelecypods that may be considered descendants of the older fauna of that region are ovoviviparous, retaining their young within the mantle cavity. This applies to the *Gaimardiidae, Cyamiidae, Philobryidae* many of the *Leptonacea,* the *Carditidae* and *Laternula.*

Also he quotes Thorson (1936) who has shown with Arctic pelecypods that the eggs are large with a great amount of yolk and that the embryos develop without or with a very short pelagic larval stage, which enables them to survive unfavourable climatic conditions.

A large number of both the pelecypod and gastropod genera are cold stenothermal, able to select the required conditions by going deeper when littoral conditions become untenable.

Many Antarctic and Subantarctic pelecypods are byssiferous, fastened to seaweed and sponges. Such species form colonies with the young developing along with the adults and their only means of dispersal involving distance, is by the wrenching free and drift of the materials to which the colonies are attached.

This accounts for the wide distribution in the Subantarctic of the *Philobryidae* and *Gaimardiidae* but local endemism in these families as in other molluscs concerned with drift suggests that such mode of dispersal is of occasional rather than of regular occurrence.

Many of the Antarctic species have been taken at considerable depths and their relatives are often to be looked for in the deep basins connected with the Atlantic, Indian and Pacific Oceans.

It has been shown that the northward flowing cold Antarctic waters plunge deeply at the Antarctic Convergence, proceeding thence beneath the warmer Subantarctic waters, eventually reaching the abyssal depths even in the equatorial zone. Thus an existing highway of approximately even coldness is available for the entry of certain wide ranging deep-water genera.

In this way can be explained the presence of *Leucosyrinx* and *Pleurotomella* in the deep waters of the Caribbean, the Subantarctic and Antarctic of the American Quadrant, thence spreading to the Enderby Quadrant.

Another genus attributable to this mode of entry is *Pontiothauma,* a large Turrid, otherwise known only from 753-1,250 fathoms in the Bay of Bengal.

In the past the southward extending masses of South America, Australia plus New Zealand and to a lesser extent South Africa must have been the chief colonizing routes for the Antarctic. Of these the Americas combined still operate as a means of entry, especially the west coast of the Americas which is strongly influenced almost throughout by the phenomenon of upwelling cold water.

I have shown (Powell, 1951, pp. 63-66) how the genera *Aforia, Fusitriton* and *Puncturella* achieve a vast connected range from the Arctic to the Subantarctic and Antarctic simply by going deep over the tropical and subtropical belts.

It was this close similarity between the more striking constituents of both the Arctic and Antarctic faunas that gave rise during early investigations to the then inexplicable concept of "bipolarity".

A noticeable feature of Subantarctic and Antarctic faunas is the comparatively few families represented relevant to the rather large number of genera.

In the gastropoda a few families, notably the *Patellidae, Trochidae, Littorinidae, Naticidae, Muricidae, Buccinulidae-Neptuniidae, Volutidae* and *Turridae* combined make up almost 28% of the fauna—i.e. seventy-five genera comprising 245 species. The total of species and subspecies for the Antarctic and Subantarctic (as here defined) is 875.

This adaptive radiation of the more vigorous and plastic families of the gastropoda points to a fairly recent colonization of a region that must certainly have been rendered sparse of life during the rigors of the comparatively recent ice-ages.

Summarized the present Antarctic fauna can be viewed as being in an active stage of colonization effected by the proximity of the South American continent continued through the islands and archipelagos of the Scotia Arc to the Antarctic Continent at Grahamsland.

The Subantarctic west-wind drift affords means of dispersal in that zone to the westward and around the Antarctic continent the prevailing east-wind drift operates in a reverse direction.

As already mentioned the deep basins afford yet another means of entry to the region and in the Subantarctic cross ridges and connecting basins provide means for lateral dispersal.

All this is superimposed upon an older fauna of few surviving members.

The richest area of the Antarctic for molluscs is, as one would expect, the American Quadrant, since it has long been the main colonizing route and has a greater extent of bays, channels and waterways of comparative shelter. Conversely, the poorest fauna is that of the Ross Sea, no doubt on account of the unfavourable conditions associated with the great ice-barrier.

From the exploration angle the most collecting has been done in the American Quadrant and the least known area is that part of Antarctica which extends to the east of the Ross Sea and to the south of the south-eastern Pacific.

The systematic catalogue of Antarctic and Subantarctic molluscs which follows is by no means a critical evaluation of these faunas.

It is an attempt to bring together in systematic classification all the records from a large number of scientific expeditions and individual collections spread over more than a century.

The only previous attempt to list these faunas was that of Thiele, 1912, but he covered the pelecypoda and gastropoda only, his Subantarctic coverage was incomplete and a large number of additions has since been made.

Many of the species described from the early expeditions were either insufficiently described or inadequately figured and access to type specimens of these is essential for accurate determination.

These early collections were widely scattered among European Museums and private collections and it is doubtful if some types or recorded specimens are either readily available or even extant in some cases.

Nevertheless I have been able upon the published evidence to make many adjustments and feel confident that in bringing this mass of references together the path for future workers upon Antarctic and Subantarctic molluscs will at least be smoothed.

Doubtless there are many synonyms and doubtful determinations still encumbering the present catalogue but these can only be evaluated by those with ready access to the type or original material.

The following catalogue is exclusively marine but for completeness the few Subantarctic land and freshwater molluscan records are collated as follows—

LAND AND FRESHWATER MOLLUSCA

Land and freshwater molluscs are represented by a few species in the Subantarctic only, at the Falklands, Kerguelen Island and Macquarie Island.

The Falklands have six species of freshwater gastropods one freshwater pelecypod and one land snail, Kerguelen Island and Macquarie Island each has an indigenous land snail.

The recorded species are as follows:—Falklands *Chilina falklandica* Cooper & Preston, 1910, p. 111, *C. fluviatilis* Gray, 1874 and *C. subcylindrica* Sowerby, 1874 (Melvill & Standen, 1914, p. 126), *Limnaea brunneoflavida* Cooper & Preston, 1910, p. 110, *L. diaphana* King, 1832 and *L. patagonica* Strebel, 1907 (Melvill & Standen, 1914, p. 126), *Sphaerium vallentinianum* Melvill & Standen, 1914, p. 130 and *Patula michaelseni* Strebel, 1907 (Melvill & Standen, 1914, p. 125). Kerguelen Island: *Notodiscus hookeri* (Reeve, 1854) (Powell, 1957, p. 138). Macquarie Island: *Phrixgnathus hamiltoni* (Suter, 1896).

The Falkland terrestrial fauna is closely akin to that of Patagonia which is what one would expect since these islands are contained within the Patagonian Shelf. The Kerguelen *Notodiscus* is probably a remnant from a former widespread Subantarctic snail distribution with which the Patagonian *Amphidoxa* is doubtless allied. The Macquarie Island *Phrixgnathus* clearly suggests former near continuity with the New Zealand mainland.

ACKNOWLEDGEMENTS

My contributions to Antarctic and Subantarctic molluscan systematics would have been difficult of accomplishment by one situated so far away from the libraries and collections associated with the larger and older scientific centres, but for the fortunate chance that the R.R.S. 'Discovery II' refitted in Auckland during August, 1932.

Through the kindness of the scientific staff under Dr. Dilwyn John, I was privileged to refer to the extensive library of Antarctic reports in the ship's laboratory and during the six weeks of the vessel's stay in Auckland worked constantly, typing relevant sections of text and photographing plates.

A subsequent visit to Sydney in 1937 enabled the completion of references by working on the extensive collections of separates accumulated by the late Mr. Charles Hedley for his researches on the British Antarctic Expedition 1907-9 and the Australian Antarctic Expedition molluscan collections.

Later I received on loan from Dr. Nils H. Odhner of Stockholm a representative series of molluscs from the collections made by the Swedish South Polar Expedition.

My private collection of mollusca, now deposited in the Auckland Museum, contains much southern material and this has proved invaluable for comparative purposes.

SYSTEMATIC

AMPHINEURA

ISCHNOCHITONIDAE

Ischnochiton Gray, 1847; Chiton textilis Gray.

imitator (E. A. Smith, 1881). Chiton (Ischnochiton) imitator Smith, 1881, p. 35: Thiele, 1908, p. 18: Odhner, 1923, p. 3. Type locality: Tom Bay, southern Patagonia. Range: Strait of Magellan, Tierra del Fuego and Falklands (Odhner).

johnstoni Cotton, 1937. Ischnochiton johnstoni Cotton, 1937, p. 11. Type locality: Off Kerguelen Island, 150 metres.

mawsoni Cotton, 1937. Ischnochiton mawsoni Cotton, 1937, p. 9. Type locality: Off Lusitania Bay, 69 metres, Macquarie Island.

Tonicina Thiele, 1906 (o.d.): Chiton zschaui Pfeffer.

***zschaui** (Pfeffer, 1886). Chiton zschaui Pfeffer, 1886, p. 205: Pilsbry, 1892, p. 204: Thiele, 1908, p. 18: Odhner, 1923, p. 3: David, 1934, p. 127: Carcelles & &Williamson, 1951, p. 247. Type locality: South Georgia. Range: Also Magellan Region (Carcelles & Williamson), Booth, Wandel and Petermann Islands (Odhner).

LEPIDOPLEURIDAE

Terenochiton Iredale, 1914 (o.d.): Lepidopleurus subtropicalis Iredale.

fairchildi Iredale & Hull, 1929. Terenochiton kerguelenensis: Hedley, 1916 (non Haddon), p. 34: Terenochiton fairchildi Iredale & Hull, 1929, p. 79: Cotton, 1937, p. 12: Powell, 1955, p. 131. Type locality: Macquarie Island.

***kerguelenensis** (Haddon, 1886). Leptochiton kerguelenensis Haddon, 1886, p. 12: Leptochiton pagenstecheri Martens & Pfeffer, 1886, p. 107: Odhner, 1923, p. 1: Cotton, 1937, p. 11. Type localities: Kerguelen Island (kerguelenensis), South Georgia (pagenstecheri). Range: Strait of Magellan, South Orkneys, Booth, Wandel and Petermann Islands, South Georgia and Kerguelen Island (Odhner).

LEPIDOCHITONIDAE

Notochiton Thiele, 1906 (monotypy): N. mirandus Thiele.

***mirandus** Thiele, 1906. Notochiton mirandus Thiele, 1906, p. 332 and 1908, p. 12: Smith, 1907, p. 2: Cotton, 1937, p. 14: Carcelles & Williamson, 1951, p. 246. Type locality: Winter Station, Kaiser Wilhelm II Land. Range: Also McMurdo Bay, Ross Sea (Smith), Bouvet Island, Falkland Islands, Burdwood Bank and d'Urville Sea (Carcelles & Williamson), Enderby Land, 220-300 metres (Cotton).

CALLOCHITONIDAE

Icoplax Thiele, 1892 (monotypy): Chiton puniceus Couthouy.

***bouveti** (Thiele, 1906). Callochiton (Icoplax) bouveti Thiele, 1906, p. 330 and 1908, p. 15. Type locality: Bouvet Island.

***gaussi** (Thiele, 1908). Callochiton (Icoplax) gaussi Thiele, 1908, p. 15: Hedley, 1916, p. 35: Cotton, 1937, p. 16. Type locality: Gauss Station, Davis Sea. Range: Also Adelie Land, 640 metres (Cotton), d'Urville Sea and Shackleton Ice-shelf (Hedley).

punicea (Gould, 1846). Chiton puniceus Gould, 1846, p. 143: Odhner, 1923, p. 2: Chiton illuminatus Reeve, 1847, f. 147: Melvill & Standen, 1914, p. 113: Chiton dimorphus Rochebrune & Mabille, 1889, p. 142: Thiele, 1908, p. 14: Powell, 1951, p. 182. Type localities: Orange Harbour, Patagonia (puniceus and dimorphus), Strait of Magellan (illuminatus). Range: Patagonia, Strait of Magellan and North West Falklands (Melvill & Standen), Burdwood Bank (Odhner).

***steinenii** (Pfeffer, 1886). Trachydermon steinenii Pfeffer, 1886, p. 103: Odhner, 1923, p. 3: Cotton, 1937, p. 15. Type locality: South Georgia. Range: Also Enderby Land, 193-209 metres and Kemp Land, 219 metres (Cotton).

PLAXIPHORIDAE

Plaxiphora Gray, 1847 (monotypy): Chiton carmichaelis Wood.

aurata aurata (Spalowsky, 1795). Chiton auratus Spalowsky, 1795, p. 88: Chiton raripilosus Blainville, 1825: Chiton carmichaelis Wood, 1828, Pl. 1, f. 10: Chiton setiger King, 1831, p. 338: Thiele, 1908, p. 16: Chaetopleura savatieri Rochebrune, 1881, p. 119: Chaetopleura hahni Rochebrune, 1889, p. 135: Chaetopleura frigida Rochebrune, 1889, p. 137: Iredale & Hull, 1932, p. 120. Type locality: Falkland Islands (aurata), Tierra del Fuego (setiger), Strait of Magellan (savatieri), Patagonia (hahni and frigida).

aurata campbelli Filhol, 1880. Tonicia atrata Hutton (non Sowerby), 1880, p. 114: Plaxifora campbelli Filhol, 1880, p. 1095: Tonicia subatrata Pilsbry, 1893, p, 201: Plaxiphora superba Pilsbry, 1893, p. 319: Plaxiphora aucklandica Suter, 1909, p. 2: Plaxiphora aurata Odhner, 1924, p. 8: Iredale & Hull, 1932, p. 120: Cotton, 1937, p. 17: Powell, 1955, p. 132 and 1957, p. 140. Type locality: Campbell Island, New Zealand. Range: Also Macquarie Island (Powell, 1957), Auckland Islands and Antipodes Islands (Powell, 1955).

Hemiarthrum Dall, 1876 (monotypy): Hemiarthrum setulosum Dall.

hamiltonorum Iredale & Hull, 1932. Hemiarthrum setulosum: Hedley, 1916 (non Dall), p. 34: H. hamiltonorum Iredale & Hull, 1932, p. 137: Cotton, 1937, p. 14: Powell, 1955, p. 134. Type locality: Macquarie Island.

***setulosum** Dall, 1876. Chiton castaneus Gould, 1852 (non Wood, 1816), p. 326: Hemiarthrum setulosum Dall, 1876, p. 44: Acanthochiton couthouyi and stygma Rochebrune, 1889, p. 133: Pilsbry, 1892, p. 20: Odhner, 1923, p. 2: Cotton, 1937, p. 13: Powell, 1957, p. 138. Type locality: Strait of Magellan. Range: Also Graham Land, South Orkneys, South Georgia, Kerguelen, Booth, Wandel and Petermann Islands (Odhner).

CHITONIDAE

Tonicia Gray, 1847. Chiton elegans Frembly.

atrata (Sowerby, 1841). Chiton atrata Sowerby, 1841, p. 294: Melvill & Standen, 1914, p. 112: Odhner, 1923, p. 3: Carcelles & Williamson, 1951, p. 250. Type locality: Falkland Islands. Range: Tierra del Fuego and Falkland Islands (Odhner): Strait of Magellan (Carcelles & Williamson).

bennetti (Iredale, Ms.) Melvill & Standen, 1914. Tonicia bennetti Iredale Ms. Melvill & Standen, 1914, p. 112. Type locality: North west Falklands.

Other Magellanic chitons listed by Carcelles and Williamson (1951, pp. 243-250) are Leptochiton agesilaus Dall, 1918, nicomedes Dall, 1919, Lepidopleurus culliereti Rochebrune, 1891, medinae Plate, 1899, viridulus Gould, 1852, Nuttalochiton martiali Rochebrune, 1889, Mopalia grisea Dall, 1919, Chaetopleura veneris

Rochebrune, 1882, peruviana Lamarck, 1819, fulva Wood, 1815: Ischnochiton punctulatissimus Sowerby, 1832, acelidotus and exanthematus Dall, 1919: Chiton magnificus Deshayes, 1844, granosus Frembly, 1827, bowenii King, 1831, Tonicia chilensis Frembly, 1827, calbucensis Plate, 1897, fastigiata Gray, 1841, lebruni and horniana Rochebrune, 1889 and Schizochiton hyadesi Rochebrune, 1889. Thiele (1908, pp. 9-22) adds Notoplax magellanicus Thiele, Nuttalochiton hyadesi Rochebrune, 1889, Ischnochiton pusia Sowerby, 1832 and Acanthochites hirundiniformis Sowerby, 1832.

GASTROPODA

SCISSURELLIDAE

Scissurella Orbigny, 1823: S. laevigata Orbigny.

eucharista Melvill & Standen, 1912. Scissurella eucharista Melvill & Standen, 1912, p. 344. Type locality: Burdwood Bank, 56 fathoms.

medioplicata Thiele, 1925. Scissurella medioplicata Thiele, 1925, p. 42. Type locality: Gazelle Harbour, Kerguelen Island.

obliqua Watson, 1886. Scissurella obliqua Watson, 1886, p. 116. Type locality: Royal Sound, shore, Kerguelen Island.

***petermannensis** Lamy, 1910. Scissurella petermannensis Lamy, 1910, p. 323 and 1911, p. 16. Type locality: Petermann Island.

supraplicata Smith, 1875. Scissurella supraplicata Smith, 1875, p. 72 and 1877, p. 176: Thiele, 1912, p. 234: Powell, 1957, p. 124. Type locality: Swain's Bay, Kerguelen Island. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

***timora** Melvill & Standen, 1912. Scissurella timora Melvill & Standen, 1912, p. 345. Type locality: Scotia Bay, 9-10 fathoms, South Orkneys.

A Magellanic species is clathrata Strebel, 1908 from Tierra del Fuego, 36 metres.

Schizotrochus Monterosato, 1877: Scissurella crispata Fleming.

***amoenus** (Thiele, 1912). Scissurella amoena Thiele, 1912, p. 187. Type locality: Gauss Station, Davis Sea.

***euglyptus** (Pelseneer, 1903). Scissurella euglypta Pelseneer, 1903, p. 17: Thiele, 1912, p. 187: Melvill & Standen, 1912, p. 345: Powell, 1951, p. 79 and 1958, p. 179. Type locality: West Antarctica, Circa 70° S, 83-87° W. Range: Also Burdwood Bank, 56 fathoms, South Georgia, 155-178 metres, Palmer Archipelago, 93-130 metres, Enderby Land, 220-300 metres and Adelie Land, 640 metres.

Watson (1886, p. 112) recorded the European type of the genus, crispata, from between Marion and Prince Edward Islands, 100 fathoms but the record requires checking.

Sinezona Finlay, 1927 ,o.d.): Scissurella brevis Hedley.

subantarctica (Hedley, 1916). Schismope subantarctica Hedley, 1916, p. 36: Powell, 1955, p. 46. Type locality: Aerial Cove, Macquarie Island.

FISSURELLIDAE

Fissurella Lamarck, 1799 (monotypy): Patella nimbosa Linn.

exquisita Reeve, 1850. Fissurella exquisita Reeve, 1850, Pl. 11, f. 74: Rochebrune & Mabille, 1889, p. 74: Pilsbry, 1890, p. 148: Strebel, 1908, p. 78. Type locality: Strait of Magellan. Range: Falkland Islands, 3-7 metres and Paulet Island, 100-150 metres (Strebel).

radiosa Lesson, 1830. Fissurella radiosa Lesson, 1830, p. 411: Strebel, 1906, p. 85: Melvill & Standen, 1914, p. 115. Type locality: Falkland Islands. Range: Falklands and Tierra del Fuego (Strebel), East Falklands (Melvill & Standen).

Fissurella (Balboaina) Farfante, 1943 (monotypy): Patella picta Gmelin.

darwini Reeve, 1849. Fissurella darwini Reeve, 1849, Pl. 1, f. 7: Rochebrune & Mabille, 1889, p. 74: Melvill & Standen, 1898, p. 102: Strebel, 1906, p. 93 and 1908, p. 79. Type locality: Strait of Magellan. Range: Tierra del Fuego and Strait of Magellan, Lively Island, Falkland Islands (Melvill & Standen).

oriens Sowerby, 1834. Fissurella oriens Sowerby, 1834, p. 124: Pilsbry, 1890, p. 152: Strebel, 1906, p. 88: Melvill & Standen, 1907, p. 97 and 1908, p. 78: Powell, 1951, p. 85. Type locality: Valparaiso, Chile. Range: Coast of Chile and Island of Chiloe, various Magellanic localities and Falkland Islands.

picta (Gmelin, 1791). Patella picta Gmelin, 1791, p. 3729: Hupé (Gay), 1854, p. 237: Rochebrune & Mabille, 1889, p. 70: Pilsbry, 1890, p. 144: Melvill & Standen, 1907, p. 98 and 1914, p. 115: Strebel, 1906, p. 83: Powell, 1951, p. 85. Type locality: Strait of Magellan. Range: Valparaiso, Chile, Tierra del Fuego, Patagonia and Falkland Islands.

polygona Sowerby, 1886. Fissurella polygona Sowerby, 1866, p. 186: Melvill & Standen, 1898, p. 102 and 1914, p. 115. Type locality: Falkland Islands.

Magellanic species are alba Philippi, 1845, arenicola Rochebrune & Mabille, 1885, concinna Philippi, 1845, dozei Rochebrune & Mabille, 1885, flavida Philippi, 1857, hedeia Rochebrune & Mabille, 1885 and patagonica Orbigny, 1843. Carcelles & Williamson (1951) record from this Province, bella Reeve, 1849, crassa Lamarck, 1822, lata Sowerby, 1834 and nigra Lesson, 1830.

Megatebennus Pilsbry, 1890 (o.d.): Fissurellidea bimaculata Dall.

patagonicus Strebel, 1907. Megatebennus patagonicus Strebel, 1907, p. 98 and 1908, p. 79: Melvill & Standen, 1914, p. 116: Powell, 1951, p. 85. Type locality: Lennox Island, Tierra del Fuego. Range: Also East Falklands, 15 metres and North West Falklands (Melvill & Standen).

Puncturella Lowe, 1827 (o.d.): Patella noachina Linn.

***conica** (Orbigny, 1841). Rimula conica Orbigny, 1841, p. 471: Powell, 1951, p. 86 and 1957, p. 125: Cemoria falklandica A. Adams, 1862, p. 208: Dall, 1889a, p. 356: Pilsbry, 1890, p. 231: noachina (non Linn.) Watson, 1886, p. 42: Puncturella analoga Martens, 1903, p. 70: Strebel, 1907, Pl. 2, f. 24, 25 and 1908, p. 79: Thiele, 1912, p. 234: Melvill & Standen, 1912, p. 344 and 1914, p. 115. Type localities: Falkland Islands (conica and falklandica), Kerguelen Island (analoga). Range: Strait of Magellan, Falklands, South Georgia, South Shetlands and Kerguelen Island.

***enderbyensis** Powell, 1958. Puncturella enderbyensis Powell, 1958, p. 180. Type locality: Off Enderby Land, 300 metres.

pseudanaloga Powell, 1957. Puncturella analoga: Hedley, 1916, p. 60 and Tomlin, 1948, p. 224 (non Martens, 1903): Puncturella pseudanaloga Powell, 1957, p. 140. Type locality: Lusitania Bay, 69 metres, Macquarie Island.

***spirigera** Thiele, 1912. Puncturella spirigera Thiele, 1912, p. 186: Powell, 1958, p. 180. Type locality: Gauss Station, Davis Sea. Range: Mackenzie Sea, 456 metres, Enderby Land, 220-300 metres, Kaiser Wilhelm Land, 393 metres and Adelie Land, 640 metres (Powell).

Parmaphorella Strebel, 1907 (monotypy): Tugalia antarctica Strebel, 1907 (non Melvill & Standen, 1907).

***mawsoni** Powell, 1958. Parmaphorella mawsoni Powell, 1958. p. 180. Type locality: Off Mackenzie Sea, 540 metres. Range: Also off Enderby Land and MacRobertson Land, 193-300 metres.

melvilli (Thiele, 1912). Tugalia antarctica Melvill & Standen, 1907 (non Strebel, 1907) p. 98: Tugalia melvilli Thiele, 1912, p. 257: Powell, 1951, p. 87. Type locality: Burdwood Bank, south of Falklands, 56 fathoms.

The only other members of the genus so far known are Tugalia antarctica Strebel, 1907 (non Melvill & Standen) and Parmaphorella barnardi Tomlin, 1932 from 180 fathoms off Cape Point, South Africa.

ACMAEIDAE

Patelloida Quoy and Gaimard, 1834 (Gray, 1847): Acmaea rugosa Quoy & Gaimard.

ceciliana ceciliana (Orbigny, 1841). Patella ceciliana Orbigny, 1841, p. 482: Hupé (Gay), 1854, p. 260: Tryon & Pilsbry, 1891, p. 33: Melvill & Standen, 1907, p. 126: Powell, 1951, p. 80. Type locality: Falkland Islands ?. Range: Also Antofagasta to Valparaiso, Chile. Melvill & Standen's (1898, p. 103) record of "Acmaea textilis A.Ad." from Lively Island, Falklands, probably refers to this species.

ceciliana magellanica Strebel, 1907. Acmaea ceciliana magellanica Strebel, 1907, Pl. 3, f. 35, 36, 39 and 1908, p. 80: Melvill & Standen, 1914, p. 113. Type locality: Uschuaia, low tide, Tierra del Fuego. Range: Also north-west Falklands (Melvill & Standen).

Actinoleuca Oliver, 1926 (o.d.): Patella campbelli Filhol.

macquariensis (Hedley, 1916). Radiacmea macquariensis Hedley, 1916, p. 41: Oliver, 1926, p. 566: Powell, 1955, p. 65. Type locality: Macquarie Island, on rocks.
Other New Zealand members of the genus are campbelli campbelli (Filhol), Campbell Island and campbelli bountyensis Powell, 1955, Bounty Islands, 50 fathoms.

Notoacmea Iredale, 1915 (o.d.): Patelloida pileopsis Q. & G.

pileopsis sturnus (Hombron & Jacquinot, 1841). Patella sturnus Hombron & Jacquinot, 1841, p. 191: Patelloida antarctica Hombron & Jacquinot, 1841, p. 192: Powell, 1955, p. 63. Type localities: ? (sturnus); Auckland Islands (antarctica). Range: South Island and southern islands of New Zealand, Macquarie Island (Powell).

Acmaea (s.l.)

inquilinus Preston, 1913. Acmaea inquilinus Preston, 1913, p. 220. Type locality: Port Stanley, Falkland Islands.

perconica Preston, 1913. Acmaea perconica Preston, 1913, p. 220. Type locality: Falkland Islands.
Dall (1909, p. 237) recorded Acmaea orbignyi (new name for Acmaea scutum Orbigny, 1841, non Escholtz, 1833) from Peru to Strait of Magellan. Another Magellanic record, Patella exilis Philippi, 1846, from Cape Horn, based upon juvenile specimens was referred to Acmaea by Tryon and Pilsbry (1891, p. 35) but its status is uncertain.

Scurria Gray, 1847 (o.d.): Patella scurra Lesson.

scurra (Lesson, 1830). Patella scurra Lesson, 1830, p. 421: Rochebrune & Mabille, 1889, p. 38: Melvill & Standen, 1898, p. 103 and 1914, p. 113: Strebel, 1907, p. 110: Scurria scurra charon Preston, 1913, p. 220. Type locality: West coast of South America. Range: Also Falkland Islands (Strebel) and Lively Island, Falklands (Melvill & Standen).
Carcelles & Williamson (1951, p. 259) record a second Magellanic species, zebrina (Lesson, 1830) but ascribe it to Patelloida.

PATELLIDAE

Nacella Schumacher, 1817 (Gray, 1847): Patella mytilina Helbling.

mytilina (Helbling, 1779). Patella mytilina Helbling, 1779, p. 104: Gmelin, 1791, p. 3698: Dall, 1870, p. 274: Pilsbry, 1891, p. 115: Smith, 1905, p. 336: Strebel, 1907, p. 113: Thiele, 1912, p. 234: Melvill & Standen, 1914, p. 114: Powell, 1951, p. 80 and 1957, p. 126: Patella conchacea Gmelin, 1791, p. 3708: Nacella mytiloides Schumacher, 1817, p. 179: Nacella compressa Rochebrune & Mabille, 1889, p. 98: Nacella falklandica Preston, 1913, p. 221. The following also are probably synonyms:—Patella cymbularia Lamarck. 1819, hyalina Philippi, 1845 and vitrea Philippi, 1845. Type locality: Strait of Magellan. Range: Strait of Magellan, Falkland Islands and Kerguelen Island.
Preston's falklandica is quite strongly radially ribbed and may prove separable.

Patinigera Dall, 1905 (o.d.): Patella magellanica Gmelin. (= Patinella Dall, 1871 (non Gray)).

deaurata (Gmelin, 1791). Patella aenea Martyn, 1784, p. 17 (non binom.): Pilsbry, 1891, p. 117: Powell, 1951, p. 82: Patella deaurata Gmelin, 1791, p. 3719: Strebel, 1908, p. 80: Melvill & Standen, 1914, p. 114: Patella variçosa Reeve, 1854, f. 21: Nacella strigatella Rochebrune & Mabille, 1885, p. 110: Helcioniscus bennetti Preston, 1913, p. 221. Type locality: Strait of Magellan. Range: Tierra del Fuego, Strait of Magellan and Falkland Islands.

delicatissima (Strebel, 1907). Patinella delicatissima Strebel, 1907, p. 145 and 1908, Pl. 1, f. 75: Melvill & Standen, 1914, p. 114: Powell, 1951, p. 82. Type locality: Strait of Magellan, 20-30 fathoms. Range: Also many Falkland localities, 10-115 metres.

kerguelenensis (Smith, 1877). Patella (Patinella) kerguelenensis Smith, 1877, p. 177: Hedley, 1916, p. 44: Powell, 1955, p. 69. Type locality: Swain's Bay, Kerguelen Island. Range: Also Macquarie Island (Hedley) and B.A.N.Z.A.R.E. Stn. 19, Heard Island, shore.

fuegiensis fuegiensis (Reeve, 1855). Patella fuegiensis Reeve, 1855, f. 73: Rochebrune & Mabille, 1889, p. 95: Tryon, 1891, p. 121: Melvill & Standen, 1907, p. 97: Lamy, 1911, p. 15. Type locality: Tierra del Fuego. Range: Falkland Islands (Melvill & Standen), Petermann Island (Lamy), Tierra del Fuego (Rochebrune & Mabille).

fuegiensis edgari Powell, 1957. Patella (Patinella) fuegiensis: Smith, 1877 (non Reeve): Pilsbry, 1891, Pl. 49, f. 28, 29 (only): Thiele, 1912, p. 234: Patinigera fuegiensis edgari Powell, 1957, p. 127. Type locality: Royal Sound, 20 metres, Kerguelen Island.

magellanica (Gmelin, 1791). Patella magellanica Gmelin, 1791, p. 3703: Reeve, 1854, f. 19: Pilsbry, 1891, p. 119: Powell, 1951, p. 81: Patella atramentosa Reeve, 1854, f. 41: Patella meridionalis, metallica, pupillata and tincta (Rochebrune & Mabille, 1885, pp. 109, 110 and 120). Type locality: Strait of Magellan. Range: Tierra del Fuego, Strait of Magellan and Patagonia.

macquariensis (Finlay, 1927). Nacella fuegiensis Suter, 1913 (in part, non Reeve) p. 77: Nacella delesserti Hedley, 1916 (non Philippi) p. 42: Nacella macquariensis Finlay, 1927, p. 337: Powell, 1955, p. 68. Type locality: Macquarie Island.

***polaris polaris** (Hombron & Jacquinot, 1841). Patella polaris Hombron & Jacquinot, 1841, p. 191: Martens & Pfeffer, 1886, p. 101: Pilsbry, 1891, p. 120: Strebel, 1908, p. 81: Lamy, 1911a, p. 15: David, 1934, p. 127: Bartsch, 1945: Powell, 1951, p. 82. Type locality: South Georgia. Range: South Georgia, South Orkneys, South Shetlands, Palmer Archipelago, Seymour Island, Paulet and Bouvet Islands, 0-60 metres.

***polaris concinna** (Strebel, 1908). Patinella polaris concinna Strebel, 1908, p. 82: Powell, 1951, p. 83. Type locality: Cumberland Bay, 15-25 metres, South Georgia.

Other Magellanic species are chiloensis and venosa Reeve and flammea Gmelin.

LEPETIDAE

Lepeta Gray, 1840: Patella caeca Mueller.

***coppingeri** (Smith, 1881). Tectura (Pilidium) coppingeri Smith, 1881, p. 35: Rochebrune & Mabille, 1889, p. 90: Pilsbry, 1891, p. 71: Strebel, 1907, p. 110 and 1908, p. 83: Smith, 1915, p. 62: Hedley, 1916, p. 41: Eales, 1923, p. 6: Powell, 1951, p. 84, 1957, p. 128 and 1958, p. 184: Lepeta (Pilidium) antarctica Smith, 1907, p. 12 and 1915, p. 62: Patella emarginuloides Philippi, 1868, p. 224. Type localities: Sandy Point, 9-10 fathoms, Patagonia (coppingeri); McMurdo Sound, 130 fathoms (antarctica). Range: Patagonia, Falklands, Kerguelen Island and Enderby Land to Ross Sea, 18-300 metres.

?*depressa Hedley, 1916. Lepeta depressa Hedley, 1916, p. 42. Type locality: Off Shackleton Ice-shelf, 240 fathoms.

Propilidium Forbes & Hanley, 1849: Propilidium ancyloide Forbes.

***pelseneeri** Thiele, 1912. Propilidium pelseneeri Thiele, 1912, p. 185. Type locality: North West of Gauss Station, 3397 metres.

TROCHIDAE

Calliostoma Swainson, 1840 (Herrmannsen, 1846): Trochus conulus Linn.

falklandicum Strebel, 1908. Calliostoma falklandicum Strebel, 1908, p. 69: Powell, 1951, p. 90. Type locality: Port Albemarle, Falkland Islands, 15 metres. Range: Falkland Islands to Patagonia, 15-256 metres.

mobiusi Strebel, 1905. Calliostoma mobiusi Strebel, 1905, p. 133. Type locality: Strait of Magellan. Range: Burdwood Bank, Strait of Magellan and Tierra del Fuego (Carcelles & Williamson, 1951).

modestulum Strebel, 1908. Calliostoma modestulum Strebel, 1908, p. 70: Melvill & Standen, 1912, p. 347: Powell, 1951, p. 90. Type locality: South Falkland Islands, 197 metres. Range: Falklands area to Patagonia and Tierra del Fuego, 66-350 metres.

venustulum Strebel, 1908. Calliostoma venustulum Strebel, 1908, p. 68. Type locality: Port Albemarle, Falkland Islands, 40 metres.

The following species referable to Calliostoma have been recorded from the Magellanic Province:—consimilis (Smith, 1881), coppingeri (Smith, 1880): dozei Rochebrune & Mabille, 1889, irisans, and kophameli Strebel, 1905: nudus (Philippi, 1845): nuda flavidocarnea Strebel, 1905: nuda roseocincta Pfeffer, 1905: nordenskjoldi Strebel, 1908: nudiuscula (Martens, 1881): optima and senius Rochebrune & Mabille, 1889.

Venustatrochus Powell, 1951 (o.d.): V. georgianus Powell.

*__georgianus__ Powell, 1951. Venustatrochus georgianus Powell, 1951, p. 92. Type locality: Cumberland Bay, South Georgia, 120-204 metres.

*__secundus__ Powell, 1958. Venustatrochus secundus Powell, 1958, p. 181. Type locality: Off Mackenzie Sea, 540 metres.

Maurea Oliver, 1926 (o.d.): Trochus tigris Martyn.

megaloprepes Tomlin, 1948. Maurea (Mucrinops) megaloprepes Tomlin, 1948, p. 225: Powell, 1955, p. 55. Type locality: B.A.N.Z.A.R.E. Stn. 80, off North East corner of Macquarie Island, 120-80 metres.

Closely related species are spectabile (A. Adams, 1885), Auckland Islands and Campbell Island and foveauxana Dell, 1950 from Foveaux Strait and Eastern Otago, New Zealand.

Calliotropis Seguenza, 1903: Trochus ottoi Philippi.

infundibulum (Watson, 1879). Trochus (Margarita) infundibulum Watson, 1879, p. 707 and 1886, p. 84. Type locality: ? Off Bermuda, 1075 fathoms (First mentioned locality). Range: Also off Marion Island, 1375 fathoms (Watson).

*__lamellosa__ (Pelseneer, 1903). Margarita lamellosa Pelseneer, 1903, p. 18: Thiele, 1912, p. 187: Powell, 1958, p. 182. Type locality: Bellingshausen Sea. Range: Bellingshausen Sea, Gauss Station and Kemp Land, 603 metres.

Falsimargarita Powell, 1951 (o.d.): Margarites gemma Smith.

*__gemma__ (Smith, 1915). Margarites gemma Smith, 1915, p. 62: Eales, 1923, p. 8: Powell, 1951, p. 93 and 1958, p. 181. Type locality: Off Oates Land, 180-200 fathoms. Range: Oates Land, westward to Bransfield Strait, South Shetlands, 200-400 metres.

iris (Smith, 1915). Margarites iris Smith, 1915, p. 91: Eales, 1923, p. 7: Powell, 1951, p. 93. Type locality: West of Falkland Islands, 125 fathoms. Range: Falkland Islands to Patagonia.

Photinula H. & A. Adams, 1854 (Pilsbry, 1889): Margarita coerulescens King & &Broderip.

coerulescens (King & Broderip, 1831). Margarita coerulescens King & Broderip, 1831, p. 346: Rochebrune & Mabille, 1889, p. 81: Pilsbry, 1889, p. 278: Strebel, 1905, p. 140 and 1908, p. 71: Melvill & Standen, 1914, p. 116: Powell, 1951, p. 93: Photinula ringei Pfeffer, 1887, p. 133. Strebel (1905) refers Trochus lineatus Philippi, Margarita hombroni Fischer and M. maxima Hombron & Jacquinot to the above. Type locality: Strait of Magellan. Range: Falklands to Patagonia, Strait of Magellan and Tierra del Fuego, 0-202 metres.

Other Magellanic species are couteaudi and resurrecta Rochebrune & Mabille, 1889 but their status requires checking.

Photinastoma Powell, 1951 (o.d.): Trochus taeniatus Wood.

taeniata taeniata (Wood, 1828). Trochus taeniatus Wood, 1828, Pl. 5: H. & A. Adams, 1858, p. 427: Pilsbry, 1889, p. 278: Rochebrune & Mabille, 1889, p. 87: v. Ihering, 1902, p. 101: Strebel, 1905, p. 135: Melville & Standen, 1907, p. 98: Strebel, 1908, p. 71: Melvill & Standen, 1914, p. 116: Powell, 1951, p. 95: Photinula taeniata elata Strebel, 1905, p. 138. Type locality: Port Stanley, Falkland Islands (Powell, 1951, p. 95). Range: Strait of Magellan, Patagonia and Falkland Islands, 0-84 metres.

Strebel (1905) refers Trochus bicolor Lesson to the synonymy of the above. Another Magellanic species, related to if not identical with taeniata is gamma Rochebrune & Mabille, 1885.

taeniata nivea (Cooper & Preston, 1910). Photinula taeniata nivea Cooper & Preston, 1910, p. 112: Powell, 1951, p. 95. Type locality: Falkland Islands. Range: 0-115 metres.

Margarella Thiele, 1893 (o.d.): Margarita violacea King.

***antarctica** (Lamy, 1905). Margarita antarctica Lamy, 1905, p. 481 and 1907, p. 9: Melvill & Standen, 1907, p. 99: Lamy, 1911a, p. 13: Powell, 1951, p. 98. Type locality: South Orkney Islands. Range: Palmer Archipelago, Wandel, Moureau and Petermann Islands, South Orkneys and South Shetlands, 0-36 metres.

***bouvetia** Powell, 1951. Margarella bouvetia Powell, 1951, p. 97 and 1958, p. 182. Type locality: 1 mile east of Bouvet Island, 40-45 metres. Range: Bouvet Island, Commonwealth Bay, and King George V Land.

expansa (Sowerby, 1838). Margarita expansa Sowerby, 1838, p. 24 and 1841, f. 16, 17: H. & A. Adams, 1858, p. 427: Smith, 1879, p. 167: Pilsbry, 1889, p. 279: V. Ihering, 1902, p. 99: Smith, 1902, p. 207: Strebel, 1905, p. 152 and 1908, p. 72: Melvill & Standen, 1907, p. 98: Thiele, 1912, p. 234: Powell, 1951, p. 95 and 1957, p. 125. Type locality: Falkland Islands. Range: Falkland Islands and Kerguelen Island (Powell).

Strebel (1905) refers two species to the above synonymy:—Trochus hilli and purpuratus Forbes, 1850, both erroneously cited as "W. coast of N. America".

***jason** Powell, 1951. Margarella jason Powell, 1951, p. 97. Type locality: E. of Jason Light, South Georgia, 238-270 metres.

macquariensis Hedley, 1916. Margarella macquariensis Hedley, 1916, p. 37: Tomlin, 1948, p. 225: Powell, 1955, p. 58. Type locality: Aerial Cove, Macquarie Island, under stones. Range: Macquarie Island, 0-69 metres.

porcellana Powell, 1951. Margarella porcellana Powell, 1951, p. 98. Type locality: Off Marion Island, 97-104 metres.

***refulgens** (Smith, 1907). Valvatella refulgens Smith, 1907, p. 11: Hedley, 1911, p. 4: Thiele, 1912, p. 188: Smith, 1915, p. 64: Eales, 1923, p. 9: Hedley, 1916, p. 37: Powell, 1958, p. 182. Type locality: McMurdo Sound, 10-130 fathoms. Range: Ross Sea to Enderby Land, 20-640 metres.

solidula (Cooper & Preston, 1910). Photinula solidula Cooper & Preston, 1910, p. 111: Photinula solidula var depressa Preston, 1913, p. 219. Type locality: Falkland Islands.

***steineni** (Strebel, 1905). Margarita (Photinula) expansa: Martens & Pfeffer, 1886 (non Sowerby, 1838), Pl. 2: Photinula steineni Strebel, 1905, p. 158 and 1908, p. 73: David, 1934, p. 127: Powell, 1951, p. 97. Type locality: South Georgia. Range: 0-35 metres.

***subantarctica** (Strebel, 1908). Margarita subantarctica Strebel, 1908, p. 76. Type locality: Cumberland Bay, low tide, South Georgia.

violacea (King & Broderip, 1831). Margarita violacea King & Broderip, 1831, p. 346: Rochebrune & Mabille, 1889, p. 87: v. Ihering, 1902, p. 98: Strebel, 1905, p. 145: Smith, 1905, p. 336: Melvill & Standen, 1907, p. 99 and 1914, p. 116: Strebel, 1908, p. 72: Margarita persica Gould, 1852, p. 192: Photinula almyris Rochebrune & Mabille, 1885, p. 108: Photinula halmyris Rochebrune & Mabille, 1889, p. 89: Powell, 1951, p. 96 and 1957, p. 125.

Type locality: Strait of Magellan. Range: Magellan Province; Patagonia, Tierra del Fuego, Falkland Islands and doubtfully Kerguelen Island.
Strebel (1905) places Margarita magellanica Hombron & Jacquinot in the above synonymy.

wacei (Melvill & Standen, 1918). Photinula wacei Melvill & Standen, 1918, p. 234. Type locality: Falkland Islands.
Other Magellanic species are detecta, hyadesi and paradoxa (Rochebrune & Mabille, 1885), lahillei (v. Ihering), pruinosa (Rochebrune & Mabille, 1889), crawshayi and roseolineata (Smith, 1905).

Margarella (Promargarita) Strebel, 1908 (monotypy): Promargarita tropidophoroides Strebel.

***achilles** (Strebel, 1908). Photinula achilles Strebel, 1908, p. 73: Powell, 1951, p. 99. Type locality: South Georgia, 1-2 metres. Range. 1-35 metres.

***tropidophoroides tropidophoroides** Strebel, 1908, Promargarita tropidophoroides Strebel, 1908, p. 74: Thiele, 1912, Pl. 15: David, 1934, p. 127: Powell, 1951, p. 99. Type locality: South Georgia, 20 metres. Range: 18-55 metres.

***tropidophoroides obsoleta** Powell, 1951. Margarella (P.) tropidophoroides obsoleta Powell, 1951, p. 99. Type locality: South Georgia, 24-30 metres.

Submargarita Strebel, 1908 (monotypy): S: impervia Strebel.

***crebrilirulata** (Smith, 1907). Valvatella crebrilirulata Smith, 1907, p. 11, 1911, p. 4 and 1915, p. 63: Thiele, 1912, p. 258: Hedley, 1916, p. 38. Type locality: Discovery Winter Quarters. Range: Adelie Land to Ross Sea, 20-500 metres.

***impervia** Strebel, 1908. Submargarita impervia Strebel, 1908, p. 75: Thiele, 1912, p. 188: Powell, 1951, p. 100. Type locality: Cumberland Bay, 252-310 metres, South Georgia.

***liratulum** Pelseneer, 1903. Cyclostrema liratulum Pelseneer, 1903, p. 19: Thiele, 1912. Type locality: West Antarctica, 70° S, 80° 48′ W.

***mammillata** Thiele, 1912. Submargarita mammillata Thiele, 1912, p. 190. Type locality: Gauss Station, Davis Sea.

***minutissima** (Smith, 1907). Valvatella minutissima Smith, 1907, p. 12: Thiele, 1912. Type locality: Discovery Winter Quarters. Range: Also Alexander Island (Thiele).

***notalis** (Strebel, 1908). Margarita notalis Strebel, 1908, p. 76. Type locality: South Georgia, 24-52 metres.

***similis** Thiele, 1912. Submargarita, similis Thiele, 1912, p. 189. Type locality: Gauss Station, Davis Sea.

***strebeli** Thiele, 1912. Submargarita strebeli Thiele, 1912, Pl. 11, f. 13, 14. Type locality: Gauss Station, Davis Sea.

studeri Thiele, 1912. Submargarita studeri Thiele, 1912, p. 234. Type locality: Kerguelen Island.

***unifilosa** Thiele, 1912. Submargarita unifilosa Thiele, 1912, p. 190. Type locality: Gauss Station, Davis Sea.

Antimargarita Powell, 1951 (o.d.): Valvatella dulcis Smith.

***dulcis** (Smith, 1907). Valvatella dulcis Smith, 1907, p. 10: Thiele, 1912, p. 190: Smith, 1915, p. 63: Hedley, 1916, p. 38: Eales, 1923, p. 6: Powell, 1951, p. 100 and 1958, p. 183. Type locality: McMurdo Sound, 130 fathoms. Range: Ross Sea to South Shetlands, 200-640 metres.

***smithiana** (Hedley, 1916). Submargarita smithiana Hedley, 1916, p. 38: Powell, 1958, p. 183. Type locality: Off Shackleton Ice-shelf, 240 fathoms. Range: Also Commonwealth Bay, 30-40 metres.

***thielei** (Hedley, 1916). Minolia thielei Hedley, 1916, p. 39: Powell, 1951, p. 100 and 1958, p. 183. Type locality: Near Shackleton Ice-shelf, 110 fathoms. Range: Commonwealth Bay to Ross Sea, 220-567 metres.

Tropidomarga Powell, 1951 (o.d.): T. biangulata Powell.

***biangulata** Powell, 1951. Tropidomarga biangulata Powell, 1951, p. 101. Type locality: Cumberland Bay, South Georgia, 160 metres. Range: Also Cape Bowles, Clarence Island, 342 metres.

Cantharidus (**Plumbelenchus**) Finlay, 1927 (o.d.): Trochus capillaceus Phil.

coruscans (Hedley, 1916). Cantharidus pruninus perobtusus: Suter, 1913, p. 125 (non Pilsbry, 1889): Photinula coruscans Hedley, 1916, p. 40: Powell, 1955, p. 52. Type locality: Northern end of Macquarie Island.

The subgenus has one other species, capillaceus Philippi, which is restricted to the southern islands of New Zealand.

Solariella Searles-Wood, 1842 (monotypy): S. maculata Searles-Wood.

***antarctica** Powell, 1958. Solariella antarctica Powell, 1958, p. 183. Type locality: Off Kemp Land, 603 metres.

***brychius** (Watson, 1879). Trochus (Margarita) brychius Watson, 1879, p. 699 and 1886, p. 77: Powell, 1951, p. 102. Type locality: 900 miles south of Kerguelen Island, 1260 fathoms.

charopus charopus (Watson, 1879). Trochus (Margarita) charopus Watson, 1879, p. 700 and 1886, p. 78: Powell, 1951, p. 102. Type locality: Off Cumberland Bay, 105 fathoms, Kerguelen Island.

charopus caeruleus (Watson, 1879). Trochus (Margarita) charopus caeruleus Watson, 1879, p. 701 and 1886, p. 78: Powell, 1951, p. 102. Type locality: Off Heard Island, 75 fathoms.

kempi Powell, 1951. Solariella kempi Powell, 1951, p. 102. Type locality: Between Falkland Islands and Argentina, 545 metres. Range: Falklands to vicinity of Argentina and Patagonia, 150-545 metres. Other Magellanic Trochoids are:—Tegula atra (Lesson, 1830), orbignyana (Pilsbry, 1900), Margarites sigaretina (Sowerby, 1838), dilecta A. Adams, 1854, kophameli Strebel, 1905 and Zediloma nigerrima (Gmelin, 1790).

LIOTIIDAE

Cirsonella Angas, 1877: Cirsonella australis Angas.

***extrema** Thiele, 1912. Cirsonella extrema Thiele, 1912, p. 191: Powell, 1951, p. 103 and 1958, p. 184. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 193-351 metres.

kerguelensis Thiele, 1912. Cirsonella kerguelensis Thiele, 1912, p. 235. Type locality: Observatory Bay, Kerguelen Island.

Brookula Iredale, 1912 (o.d.): B. stibarochila Iredale.

calypso (Melvill & Standen, 1912). Cyclostrema calypso Melvill & Standen, 1912, p. 345: Powell, 1951, p. 103. Type locality: Burdwood Bank, south of Falklands, 56 fathoms. Range: Also east of Falklands, 115 metres.

***decussata** (Pelseneer, 1903). Cyclostrema decussata Pelseneer, 1903, p. 104: Powell, 1951, p. 104. Type locality: Bellingshausen Sea. Range: Also Palmer Archipelago, 278-500 metres.

***pfefferi** Powell, 1951. Brookula pfefferi Powell, 1951, p. 104. Type locality: Off Stromness Harbour, 155-178 metres, South Georgia.

***strebeli** Powell, 1951. Brookula strebeli Powell, 1951, p. 104. Type locality: Off Stromness Harbour, 155-178 metres, South Georgia. A Magellanic species is Cyclostrema crassicostatum Strebel, 1908 from Tierra del Fuego, 36 metres.

Crosseola Iredale, 1924 (o.d.): Crossea concinna Angas.

pseudocollonia Powell, 1957. Crosseola pseudocollonia Powell, 1957, p. 126. Type locality: Just south of Kerguelen Island, 150 metres.

Tharsiella Bush, 1897: T. romettensis (Seguenza) (=Tharsis Jeffreys, 1883 non Giebel, 1847).

***globosa** (Pelseneer, 1903). Tharsis globosa Pelseneer, 1903, Pl. 5, f. 46. Type locality: West Antarctica, 70° S, 80° 48′ W.

Circulus Jeffreys, 1865: C. striatus Philippi.

?*perlatus Pelseneer, 1903. Circulus perlatus Pelseneer, 1903. Type locality: West Antarctica, 70° 23′ S, 82° 47′ W.

Cyclostrema (s.l.)

coatsianum Melvill & Standen, 1912. Cyclostrema coatsianum Melvill & Standen, 1912, p. 346. Type locality: Burdwood Bank, south of Falklands, 56 fathoms.

gaudens Melvill & Standen, 1912. Cyclostrema gaudens Melvill & Standen, 1912, p. 346. Type locality: Burdwood Bank, south of Falklands, 56 fathoms.

?*meridionale Melvill & Standen, 1912. Cyclostrema meridionale Melvill & Standen, 1912, p. 346. Type locality: Scotia Bay, 9-10 fathoms, South Orkneys.

?*humile Pelseneer, 1903. Cyclostrema humile Pelseneer, 1903, Pl. 5, f. 49. Type locality: West Antarctica, 70° 20′ S, 83° 23′ W. The figure shows a rather featureless shell with a slight indication of spiral sculpture. It may be a Cirsonella or even a Submargarita.

TURBINIDAE

Leptocollonia Powell, 1951 (o.d.): L. thielei Powell.

***innocens** (Thiele, 1912). Leptothyra innocens Thiele, 1912, p. 192: Powell, 1958, p. 183. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193-300 metres and Kaiser Wilhelm Land, 393 metres.

***thielei** Powell, 1951. Leptocollonia thielei Powell, 1951, p. 105. Type locality: Cumberland Bay, 106 metres, South Georgia. Range: Palmer Archipelago to South Georgia, 106-315 metres. The genus Homalopoma Carpenter, 1864, is represented in the Magellanic Province by Collonia cunninghami Smith, 1881. Another Magellanic member of the family is Prisogaster niger (Wood, 1828).

SKENEOPSIDAE

Microdiscula Thiele, 1912 (o.d.): M. vanhoffeni Thiele.

subcanaliculata (Smith, 1875). Skenea subcanaliculata Smith, 1875, p. 71: Strebel, 1908, p. 53: Thiele, 1912, p. 240. Type locality: Observatory Bay, Kerguelen Island.

***vanhoffeni** Thiele, 1912. Microdiscula vanhoffeni Thiele, 1912, p. 240. Type locality: Gauss Station, Davis Sea.

OMALOGYRIDAE

Omalogyra Jeffreys, 1860: O. nitidissima Forbes & Hanley (= Homalogyra Jeffreys, 1867).

***atomus atomus** (Philippi, 1841). Truncatella atomus Philippi, 1841, p. 54: Watson, 1886, p. 120: Thiele, 1912, p. 198. Range: Norway to Madeira and Mediterranean (Watson); between Marion Island and Prince Edward Island, 140 fathoms (Watson); Gauss Station, Davis Sea (Thiele).

atomus burdwoodianus Strebel, 1908. Homalogyra atomus burdwoodianus Strebel, 1908, p. 52. Type locality: Burdwood Bank, south of Falkland Islands, 137-150 metres.

TRACHYSMATIDAE

Trachysma G. O .Sars, 1878: T. sarsianum Thiele.

***ignobile** Thiele, 1912. Trachysma ignobile Thiele, 1912, p. 198. Type locality: Gauss Station, Davis Sea.

***tenue** Thiele, 1912. Trachysma tenue Thiele, 1912, p. 197. Type locality: Gauss Station, Davis Sea.

RISSOELLIDAE

Jeffreysiella Thiele, 1912 (o.d.): J. notabilis Thiele.

notabilis Thiele, 1912. Jeffreysiella notabilis Thiele, 1912. Type locality: Observatory Bay, Kerguelen Island.

edwardiensis (Watson, 1880). Jeffreysia edwardiensis Watson, 1880, p. 99 and 1886, p. 584: Thiele, 1912. Type locality: Prince Edward Island, 310 fathoms.

LITTORINIDAE

Laevilitorina Pfeffer, 1886 (Suter, 1913): Hydrobia caliginosa Gould.

***antarctica** (Smith, 1902). Paludestrina antarctica Smith, 1902, p. 204: Lamy, 1911, p. 9: Hedley, 1916, p. 45: Powell, 1958, p. 184. Type locality: Cape Adare, 8 fathoms. Range: Also Proclamation Island, 2 metres, Enderby Land and Commonwealth Bay, 2-7 fathoms.

bennetti Preston, 1912. Laevilitorina bennetti Preston, 1912, p. 636: Melvill & Standen, 1914, p. 118. Type locality: Port Stanley, Falkland Islands. Range: Also Roy Cove, North West Falklands (Melvill & Standen).

***caliginosa caliginosa** (Gould, 1848). Littorina caliginosa Gould, 1848, p. 83: Smith, 1879, p. 173: Martens & &Pfeffer, 1886, p. 81: Tryon, 1887, p. 254: Pelseneer, 1903, p. 8: Lamy, 1906a, p. 112: Melvill & Standen, 1907, p. 100: Strebel, 1908, p. 50: Lamy, 1911a, p. 8: Thiele, 1912, p. 235: Melvill & Standen, 1912, p. 348 and 1914, p. 118: Hedley, 1916, p. 45: Davil, 1934, f. 1: Powell, 1951, p. 107, 1955, p. 75 and 1957, p. 128. Type locality: Royal Sound, Kerguelen Island. Range: Tierra del Fuego, Falkland Islands, South Shetlands, South Orkneys, South Georgia, Kerguelen Island and Macquarie Island.

caliginosa aestualis Strebel, 1908. Laevilitorina caliginosa aestualis Strebel, 1908, p. 51. Type locality: Port Louis, Falkland Islands.

***claviformis** Preston, 1916. Laevilitorina claviformis Preston, 1916, p. 270: Powell, 1951, p. 108. Type locality: South Shetlands, low water. Range: Also Melchior Island, Palmer Archipelago, 4-10 metres.

***granum** Martens & Pfeffer, 1886. Laevilitorina granum Martens & Pfeffer, 1886, p. 87. Type locality: South Georgia.

latior Preston, 1912. Laevilitorina latior Preston, 1912, p. 637: Melvill & Standen, 1914, p. 118. Type locality: Port Stanley Harbour, Falkland Islands. Range: Also North West Falklands (Melvill & Standen).

***pygmaea** Martens & Pfeffer, 1886. Laevilitorina pygmaea Martens & Pfeffer, 1886, p. 86. Type locality: South Georgia.

***umbilicata** Martens & Pfeffer, 1886. Laevilitorina umbilicata Martens & Pfeffer, 1886, p. 88. Type locality: South Georgia.

***venusta** Martens & Pfeffer, 1886. Laevilitorina venusta Martens & Pfeffer, 1886, p. 85. Type locality: South Georgia.

Laevilitorina (Corneolitorina) Powell, 1951 (o.d.): Laevilitorina coriacea Melvill & Standen.

***coriacea** (Melvill & Standen, 1907). Littorina (Laevilitorina) coriacea Melvill & Standen, 1907, p. 130: Powell, 1951, p. 108. Type locality: Scotia Bay, South Orkneys, 5-10 fathoms. Range: Also Signy Island, South Orkneys.

***elongata** Pelseneer, 1903. Laevilitorina elongata Pelseneer, 1903, p. 14. Type locality: Two Hummocks Island.

Pellilitorina Pfeffer, 1886 (Thiele, 1929): Littorina setosa Smith.

***pellita** (Martens, 1885). Littorina pellita Martens, 1885, p. 92: Martens & Pfeffer, 1886, p. 79: Smith, 1902b, p. 204: Melvill & Standen, 1907, p. 101: Strebel, 1908, p. 50: Melvill & Standen, 1912, p. 348: David, 1934, p. 127: Powell, 1951, p. 109. Type locality: South Georgia.

***setosa** (Smith, 1875). Littorina setosa Smith, 1875, p. 69 and 1879, p. 172: Martens & Pfeffer, 1886, p. 77: Smith, 1902b, p. 204: Melvill & Standen, 1907, p. 101: Strebel, 1908, p. 50: Thiele, 1912, p. 235: David, 1934, p. 127: Powell, 1951, p. 109. Type locality: Swain's Bay, 3-4 fathoms, Kerguelen Island. Range: Kerguelen and Bouvet Islands, Cape Adare, South Georgia and South Orkneys.

Laevilacunaria Powell, 1951 (o.d.): Pellilitorina bransfieldensis Preston.

***antarctica** Martens, 1885. Lacuna antarctica Martens, 1885, p. 92 and 1886, p. 89: Lamy, 1906, p. 123 and 1911, p. 10: Strebel, 1908, p. 52: David, 1934, p. 127: Powell, 1951, p. 108. Type locality: South Georgia.

Lamy's records from South Orkneys and South Shetlands probably refer to bransfieldensis.

***bransfieldensis** (Preston, 1916). Pellilitorina bransfieldensis Preston, 1916, p. 271: Powell, 1951, p. 108. Type locality: Bransfield Strait, South Shetlands. Range: 0-8 fathoms.

Laevilacunaria (Pellilacunella) Powell, 1951 (o.d.): Pellilitorina bennetti Preston.

***bennetti** (Preston, 1916). Pellilitorina bennetti Preston, 1916, p. 270: Powell, 1951, p. 109. Type locality: South Shetlands, 15 fathoms. Range: Also Palmer Archipelago, 4-10 metres.

Macquariella Finlay, 1927 (o.d.): Paludestrina hamiltoni Smith.

hamiltoni (Smith, 1898). Paludestrina hamiltoni Smith, 1898, p. 22: Finlay, 1927, p. 375: Powell, 1955, p. 75. Type locality: Macquarie Island.

Two other members of the genus are known, aucklandica Powell, 1933, Auckland, Chatham and Stewart Islands and delli Powell, 1955, Antipodes Islands.

LACUNIDAE

Lacuna Turton, 1827: Lacuna puteolus Turton.

***abyssicola** Melvill & Standen, 1912. Lacuna abyssicola Melvill & Standen, 1912, p. 349. Type locality: 71° 22′ S, 16° 34′ W, 1410 fathoms.

This species does resemble the North Atlantic Lacuna cincta and naticiformis Jeffreys (sic "nautiliformis") as claimed by Melvill & Standen.

divaricata (Fabricius, 1780). Trochus divaricatus Fabricius, 1780, p. 392: Melvill & Standen, 1907, p. 101. Range: Northern Europe, Iceland, Greenland, New England and North-west coast of North America.

Melvill & Standen (l.c.) record this Boreal species from Port William, Falkland Islands but it is probably an accidental introduction.

HYDROBIIDAE

Potamopyrgus Stimpson, 1865: Melania corolla Gould.

?melvilli (Hedley, 1916). Tatea melvilli Hedley, 1916, p. 46: Powell, 1955, p. 90. Type locality: Garden Bay, Macquarie Island.

?*georgiana (Pfeffer, 1886). Hydrobia georgiana Martens & Pfeffer, 1886, p. 91. Type locality: South Georgia.

RISSOIDAE

Onoba H. & A. Adams, 1854: Rissoa striata Montagu.

cymatodes Melvill & Standen, 1916. Onoba cymatodes Melvill & Standen, 1916, p. 120. Type locality: Burdwood Bank, south of Falklands.

Subonoba Iredale, 1915 (o.d.): Rissoa fumata Suter.

***bickertoni** Hedley, 1916. Subonoba bickertoni Hedley, 1916, p. 47. Type locality: Commonwealth Bay, 45-50 fathoms, Adelie Land.

***contigua** Powell, 1958. Subonoba contigua Powell, 1958, p. 184. Type locality: Commonwealth Bay, 150 metres, Adelie Land. Range: Also Enderby Land, 300 metres.

***deserta** (Smith, 1907). Rissoia deserta Smith, 1907, p. 9: Thiele, 1912, p. 194: Melvill & Standen, 1912, p. 349: Hedley, 1916, p. 48: Powell, 1958, p. 185. Type locality: Discovery Winter Quarters, 10 fathoms. Range: South Orkneys (Melvill & Standen), Enderby Land, Gauss Station and Adelie Land.

***filostria** (Melvill & Standen, 1912). Rissoa (Onoba) filostria Melvill & Standen, 1912, p. 349. Type locality: Scotia Bay, South Orkneys, 9-10 fathoms.

***fraudulenta** (Smith, 1907). Rissoa fraudulenta Smith, 1907, p. 9: Melvill & Standen, 1907, p. 103: Hedley, 1911, p. 5: Thiele, 1912, p. 194: Powell, 1951, p. 110. Type locality: McMurdo Sound. Range: South Orkneys to Gauss Station and Ross Sea, 12-40 metres.

Tomlin's (1948, p. 226) record of this species from Macquarie Island is based upon a new species of Ovirissoa.

fuegoensis (Strebel, 1908). Rissoa (? Cingula) fuegoensis Strebel, 1908, p. 56: Melvill & Standen, 1912, p. 350. Type locality: Tierra del Fuego, 36 metres. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

***gelida** (Smith, 1907). Rissoia gelida Smith, 1907, p. 9: Thiele, 1912, p. 195: Smith, 1915, p. 65: Hedley, 1916, p. 48: Powell, 1958, p. 185. Type locality: Discovery Winter Quarters, 12-41 fathoms. Range: Also Enderby Land, 220-300 metres, Gauss Station and Cape Adare.

*glacialis (Smith, 1907). Rissoia glacialis Smith, 1907, p. 9: Hedley, 1911, p. 5: Smith, 1915, p. 65: Hedley, 1916, p. 48. Type locality: Discovery Winter Quarters, 25-127 fathoms. Range: Adelie Land to Ross Sea, 20-500 metres.

*grisea (Martens, 1886). Rissoa grisea Martens, 1886, p. 92: Strebel, 1908, p. 53. Type locality: South Georgia. Range: Also Port Albemarle, 40 metres, Falkland Islands (Strebel).

*inflatella (Thiele, 1912). Rissoa inflatella Thiele, 1912, p. 195. Type locality: Gauss Station, Davis Sea.

*insignificans (Strebel, 1908). Rissoia insignificans Strebel, 1908, p. 55. Type locality: South Georgia, 12-15 metres.

*ovata (Thiele, 1912). Rissoa ovata Thiele, 1912, p. 194: Hedley, 1916, p. 48. Type locality: Gauss Station, Davis Sea. Range: Also Commonwealth Bay, Adelie Land, 25 fathoms.

*paucilirata (Melvill & Standen, 1912). Rissoa (Onoba) paucilirata Melvill & Standen, 1912, p. 350: Powell, 1951, p. 110. Type locality: Burdwood Bank, 56 fathoms. Range: Also South Georgia, 155-178 metres (Powell).

*schraderi (Strebel, 1908). Rissoia schraderi Strebel, 1908, p. 54. Type locality: South Georgia, 12-15 metres.

*steineni (Strebel, 1908). Rissoia steineni Strebel, 1908, p. 55. Type locality: South Georgia. Range: 20-22 metres.

suavis (Thiele, 1925). Rissoa suavis Thiele, 1925, p. 76. Type locality: Gazelle Harbour, Kerguelen Island.

subantarctica (Thiele, 1912). Rissoa subantarctica Thiele, 1912, p. 238: Hedley, 1916, p. 49. Type locality: Kerguelen Island.

*sulcata (Strebel, 1908). Rissoa sulcata Strebel, 1908, p. 56: Melvill & Standen, 1912, p. 350. Type locality: South Georgia, 12-15 metres. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

*turqueti (Lamy, 1906). Rissoa turqueti Lamy, 1906, p. 6: Melvill & Standen, 1912, p. 350. Type locality: Wandel Island. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

*wilkesiana Hedley, 1916. Subonoba wilkesiana Hedley, 1916, p. 48. Type locality: Commonwealth Bay, 45-50 fathoms, Adelie Land.

Ovirissoa Hedley, 1916 (o.d.): Rissoa adarensis Smith.

*adarensis (Smith, 1902). Rissoa adarensis Smith, 1902, p. 205: Melvill & Standen, 1907, p. 102: Lamy, 1911, p. 10: Hedley, 1911, p. 5: Smith, 1915, p. 65: Hedley, 1916, p. 47. Type locality: Cape Adare, 24 fathoms. Range: Petermann Island (Lamy): South Orkneys (Melvill & Standen), Adelie Land to Ross Sea.

*columna (Pelseneer, 1903). Rissoa columna Pelseneer, 1903, p. 21: Smith, 1915, p. 65: Hedley, 1916, p. 47. Type locality: Charcot Land.

*demissa (Smith, 1915). Rissoia demissa Smith, 1915, p. 65. Type locality: Off Cape Adare, 45-50 fathoms. Range: Also McMurdo Sound, 190-250 fathoms.

*georgiana (Pfeffer, 1886). Rissoa georgiana Pfeffer, 1886, p. 92: Strebel, 1908, p. 54: Hedley, 1916, p. 47: Powell, 1951, p. 110. Type locality: South Georgia. Range: South Georgia, 18-168 metres, also Port Louis, Falkland Islands (Strebel).

Eatoniella Dall, 1876 (o.d.): Eatonia kerguelenensis Smith. (= Eatonia Smith, 1875 non Hall, 1857).

*caliginosa (Smith, 1875). Eatonia caliginosa Smith, 1875, p. 71: Dall, 1876, p. 43: Smith, 1879, p. 175: Watson, 1886, p. 614: Lamy, 1906, p. 7 and 1911, p. 11: Thiele, 1912, p. 236. Type locality: Kerguelen Island. Range: Also Petermann Island and Port Lockroy (Lamy).

hyalina Thiele, 1912. Eatoniella hyalina Thiele, 1912, p. 236. Type locality: Observatory Bay, Kerguelen Island.

*kerguelenensis contusa Strebel, 1908. Eatoniella kerguelenensis contusa Strebel, 1908, p. 58. Type locality: Moltke Harbour, South Georgia. Range: South Georgia and Port Louis, Falkland Islands, 0-125 metres.

***kerguelenensis kerguelenensis** (Smith, 1875). Eatonia kerguelenensis Smith, 1875, p. 70: Dall, 1876, p. 42: Smith, 1879, p. 174: Melvill & Standen, 1907, p. 104: Lamy, 1906, p. 7: Thiele, 1912, p. 235: Hedley, 1916, p. 46: Tomlin, 1948, p. 226: Powell, 1955, p. 89 and 1957, p. 185. Type locality: Royal Sound, 40 fathoms, Kerguelen Island. Range: Kerguelen Island and Commonwealth Bay, Adelie Land, 13-100 metres and doubtfully, Macquarie Island (Powell).

***kerguelenensis major** Strebel, 1908. Eatoniella kerguelenensis Melvill & Standen, 1907, p. 104: Lamy, 1911, p. 11: Eatoniella kerguelenensis f. major Strebel, 1908, p. 57: Melvill & Standen, 1912, p. 351: Powell, 1951, p. 110. Type locality: Cumberland Bay, South Georgia, low tide. Range: South Georgia, South Orkneys and probably Petermann Island, 0-125 metres.

***subgonostoma** Strebel, 1908. Eatoniella subgonostoma Strebel, 1908, p. 59: David, 1934, p. 127. Type locality: South Georgia, 22 metres.

subrufescens (Smith, 1875). Eatonia subrufescens Smith, 1875, p. 71. Type locality: Royal Sound, 7 fathoms, Kerguelen Island.

Eatoniopsis Thiele, 1912 (o.d.): Eatoniella paludinoides Smith.

ainsworthi Hedley, 1916. Eatoniopsis ainsworthi Hedley, 1916, p. 46: Powell, 1955, p. 89. Type locality: Aerial Cove, Macquarie Island.

***paludinoides** (Smith, 1902). Eatoniella paludinoides Smith, 1902, p. 205: Thiele, 1912, p. 237. Type locality: Cape Adare.

Boogina Thiele, 1913 (monotypy): Rissoa (Setia) sinapi Watson (= Watsonella Thiele, 1912, non Grabau, 1900).

sinapi (Watson, 1886). Rissoa (Setia) sinapi Watson, 1886, p. 610: Thiele, 1912, p. 237. Type locality: Royal Sound, Kerguelen Island, shore.

Rissoa (s.l.).

***anderssoni** Strebel, 1908. Rissoa anderssoni Strebel, 1908, p. 55. Type locality: South Georgia, 12-15 metres.

australis Watson, 1886. Rissoa (Setia) australis Watson, 1886, p. 608. Type locality: Royal Sound, Kerguelen Island.

bythinella Thiele, 1912. Rissoa bythinella Thiele, 1912, p. 238. Type locality: Kerguelen Island.

***edgariana** Melvill & Standen, 1907. Rissoa edgariana Melvill & Standen, 1907, p. 102. Type locality: Scotia Bay, 9-15 fathoms, South Orkneys.

edwardiensis Watson, 1886. Rissoa (Setia) edwardiensis Watson, 1886, p. 610. Type locality: Off Prince Edward Island, 50-150 fathoms.

***inflata** Pelseneer, 1903. Rissoa inflata Pelseneer, 1903. Type locality: West Antarctica, 70° 23′ S, 82° 47′ W.

inornata Strebel, 1908. Rissoia inornata Strebel, 1908, p. 53. Type locality: Port Louis, 1 metre, Falkland Islands.

kergueleni Smith, 1875. Rissoa kergueleni Smith, 1875, p. 69 and 1879, p. 176: Thiele, 1912, Pl. 14, f. 30. Type locality: Swain's Bay, Kerguelen Island.

lartetia Thiele, 1912. Rissoa lartetia Thiele, 1912, p. 239. Type locality: Kerguelen Island.

marionensis Watson, 1886. Rissoa (Setia) marionensis Watson, 1886, p. 607. Type locality: Off Marion Island, 50-75 fathoms. Range: Also between Marion Island and Prince Edward Island, 140 fathoms.

miliaris Thiele, 1912. Rissoa miliaris Thiele, 1912, p. 239. Type locality: Observatory Bay, Kerguelen Island.

observationis Thiele, 1912. Rissoa (?) observationis Thiele, 1912, p. 239. Type locality: Observatory Bay, Kerguelen Island.

***pelseneeri** Thiele, 1912. Rissoa subtruncata Pelseneer, 1903, p. 21 (non Velain, 1877): Rissoa pelseneeri Thiele, 1912, p. 194. Type locality: 70° S, 80° 48′ W. Range: Also Gauss Station (Thiele).

principis Watson, 1886. Rissoa (Setia) principis Watson, 1886, p. 608: Thiele, 1912, Pl. 14, f. 34. Type locality: Between Marion Island and Prince Edward Island, 140 fathoms. Range: Also Royal Sound, Kerguelen, shore (Watson).

***regularis** Smith, 1915. Rissoia regularis Smith, 1915, p. 65. Type locality: Off Cape Adare, 45-50 fathoms.

*scotiana Melvill & Standen, 1907. Rissoa (Onoba) scotiana Melvill & Standen, 1907, p. 103. Type locality: Scotia Bay, 9-15 fathoms, South Orkneys.

studeriana Thiele, 1912. Rissoa studeriana Thiele, 1912, p. 238. Type locality: Kerguelen Island.

transenna Watson, 1886. Rissoa (Ceratia) transenna Watson, 1886, p. 603: Smith, 1915, p. 65. Type locality: Between Marion Island and Prince Edward Island, 140 fathoms.

valdiviae Thiele, 1925. Rissoa valdiviae Thiele, 1925, p. 77. Type locality: Gazelle Harbour, Kerguelen Island.

Skenella Pfeffer, 1886 (monotypy): S. georgiana Pfeffer.

*georgiana Pfeffer, 1886. Skenella georgiana Pfeffer, 1886, p. 97: Strebel, 1908, p. 53. Type locality: South Georgia.

The following Antarctic and Subantarctic records of European Rissoids require investigation:—Rissoa (Cingula) cingillus Montagu, Scotia Bay, 9-15 fathoms, Rissoa parva Da Costa and Rissoa (Manzonia) zetlandica Montagu, both Port William, Falkland Islands (Melvill & Standen, 1907, pp. 132, 133).

LITIOPIDAE

Alaba H. & A. Adams, 1853: A. melanura C. B. Adams.

*incolorata Thiele, 1912. Alaba incolorata Thiele, 1912, Pl. 12, f. 19. Type locality: Gauss Station, Davis Sea.

Diala A. Adams, 1861: D. varia A. Adams.

limnaeiformis (Watson, 1880). Litiopa (?) limnaeiformis Watson, 1880, p. 123 and 1886, p. 567. Type locality: 46° 43′ S, 38° 4′ 30″ E, Prince Edward Island, 50-150 fathoms.

TORNIDAE

Tornus Turton, 1830 (Iredale, 1911): Helix subcarinatus Montagu. (= Adeorbis S. Wood, 1842).

?*antarcticus (Thiele, 1912). Adeorbis antarcticus Thiele, 1912, p. 195. Type locality: Gauss Station, Davis Sea.

TROCHACLIDAE

Trochaclis Thiele, 1912 (monotypy): T. antarctica Thiele.

*antarctica Thiele, 1912. Trochaclis antarctica Thiele, 1912, p. 192: Hedley, 1916, p. 51: Powell, 1951, p. 111 and 1958, p. 185. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 177-640 metres.

CERITHIIDAE

Ataxocerithium Tate, 1893 (o.d.): Cerithium serotinum Adams.

pullum (Philippi, 1845). Cerithium pullum Philippi, 1845b, p. 66: Rochebrune & Mabille, 1889, p. 40: Strebel, 1905b, p. 652: Melvill & Standen, 1907, p. 105, 1912, p. 351 and 1914, p. 118: Strebel, 1908, p. 47: Cerithium caelatum Couthouy, 1849, p. 148: Powell, 1951, p. 111. Type localities: Strait of Magellan (pullum), Orange Harbour, Tierra del Fuego (caelatum). Range: Patagonia and Tierra del Fuego to Falkland Islands and Burdwood Bank, 8-196 fathoms.

Cerithiella Verril, 1882 (=Lovenella Sars, 1878, non Hincks, 1869) (monotypy): Cerithium metula Loven.

*astrolabiensis (Strebel, 1908). Bittium astrolabiensis Strebel, 1908, p. 48: Thiele, 1912, p. 261: Powell, 1951, p. 112. Type locality: Astrolabe Island, 95 metres.

*erecta Thiele, 1912. Cerithiella erecta Thiele, 1912, p. 203: Powell, 1958, p. 186. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Adelie Land, 193-640 metres.

*eulimella Powell, 1958. Cerithiella eulimella Powell, 1958, p. 186: Type locality: Enderby Land, 193 metres.

?macroura (Melvill & Standen, 1912). Cerithiopsis macroura Melvill & Standen, 1912, p. 352. Type locality: Burdwood Bank, 56 fathoms.

*seymouriana (Strebel, 1908). Bittium seymouriana Strebel, 1908, p. 47: Thiele, 1912, p. 261: Powell, 1951, p. 112. Type locality: Southeast of Seymour Island, 150 metres. Range: Also South Georgia, 130 metres.

***similis** Thiele, 1912. Cerithiella similis Thiele, 1912, p. 203: Powell, 1957, p. 129. Type locality: Gauss Station, Davis Sea. Range: Also Royal Sound, Kerguelen Island.

***superba** Thiele, 1912. Cerithiella superba Thiele, 1912, p. 203: Powell, 1958, p. 186. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 220-300 metres.

werthi Thiele, 1912. Cerithiella werthi Thiele, 1912, p. 242. Type locality: Kerguelen Island.

Cerithiopsilla Thiele, 1912 (o.d.): Cerithiopsilla cincta Thiele.

***antarctica** (Smith, 1907). Lovenella antarctica Smith, 1907, p. 10: Hedley, 1911, p. 5: Thiele, 1912, p. 205: Smith, 1915, p. 70: Hedley, 1916, p. 49: Powell, 1958, p. 186. Type locality: Discovery Winter Quarters, 41 fathoms. Range: Enderby Land to Ross Sea, 50-500 metres.

***austrina** (Hedley, 1911). Lovenella austrina Hedley, 1911, p. 5: Thiele, 1912: Powell, 1958, p. 186. Type locality: Off Cape Royds, 10-20 fathoms. Range: Also Gauss Station and Enderby Land, 193 metres.

***bisculpta** (Strebel, 1908). Bittium bisculptum Strebel, 1908, p. 49. Type locality: Cumberland Bay, South Georgia, 253-310 metres.

burdwoodianum (Melvill & Standen, 1912). Bittium burdwoodianum Melvill & Standen, 1912, p. 351 and 1914, p. 119. Type locality: Burdwood Bank, 56 fathoms. Range: Also Rapid Point, North-west Falklands (Melvill & Standen, 1914).

***charcoti** (Lamy, 1906). Cerithium charcoti Lamy, 1906, p. 4: Thiele, 1912: Powell, 1957, p. 129. Type locality: Wandel Island, Graham Land. Range: Also Kerguelen Island, 150 metres.

***cincta** Thiele, 1912. Cerithiopsilla cincta Thiele, 1912. Type locality: Gauss Station, Davis Sea.

***georgiana** (Pfeffer, 1886). Cerithium georgianum Pfeffer, 1886, p. 97: Melvill & Standen, 1907, p. 104. Type locality: South Georgia. Range: Also South Orkneys, 9-10 fathoms (Melvill & Standen).

kerguelensis Thiele, 1912. Cerithiopsilla kerguelensis Thiele, 1912, p. 241. Type locality: Kerguelen Island.

***liouvillei** (Lamy, 1910). Cerithium liouvillei Lamy, 1910, p. 320. Type locality: Port Lockroy, 70 metres, Palmer Archipelago.

Eumetula Thiele, 1912 (o.d.): Eumetula dilecta Thiele.

***dilecta** Thiele, 1912. Eumetula dilecta Thiele, 1912, p. 203: Powell, 1958, p. 186. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 220-300 metres.

macquariensis Tomlin, 1948. Eumetula macquariensis Tomlin, 1948, p. 227: Powell, 1955, p. 92. Type locality: 69 metres off Macquarie Island.

ornata Thiele, 1912. Eumeta ornata Thiele, 1912, p. 242: Powell, 1957, p. 129. Type locality: Observatory Bay, Kerguelen Island. Range: 0-150 metres.

***strebeli laevis** (Thiele, 1912). Eumete strebeli laevis Thiele, 1912, p. 203: Powell, 1958, p. 187. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 300 metres.

***strebeli strebeli** (Thiele, 1912). Eumeta strebeli Thiele, 1912, p. 203: Hedley, 1916, p. 49: Powell, 1958, p. 187. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Adelie Land, 90-300 metres.

A Magellanic species is Bittium michaelseni Strebel, 1905.

TRIPHORIDAE

Triphora Blainville, 1828 (monotypy): Triphora gemmatum Blainville.

***delicatula** (Thiele, 1912). Triforis delicatula Thiele, 1912, p. 205. Type locality: Gauss Station, Davis Sea.

TURRITELLIDAE

Banzarecolpus Powell, 1957 (o.d.): Turritella austrina Watson).

austrina (Watson, 1881). Turritella austrina Watson, 1881, p. 224 and 1886, p. 470: Powell, 1957, p. 131. Type locality: Kerguelen Island. Range: 15-150 metres.

frigida (Thiele, 1912). Turritella frigida Thiele, 1912, p. 241. Type locality: Kerguelen Island.

sp.

Thiele (1912, p. 240) recorded Turritella hookeri Reeve from Kerguelen Island on the basis of a specimen taken by the "Gazelle" Expedition but Smith states that the type specimens are labelled "Cape Frio" which is east of Rio de Janeiro. He also records the species from off Rio de Janeiro, 40 fathoms (Smith, 1915, p. 96).

Colpospirella Powell, 1951 (o.d.): Turritella algida Melvill & Standen.

***algida** (Melvill & Standen, 1912). Turritella algida Melvill & Standen, 1912, p. 352: Powell, 1951, p. 113. Type locality: Burdwood Bank, 56 fathoms. Range: Falkland Islands to Patagonia, Burdwood Bank and South Georgia, 110-174 metres.

Turritellopsis Sars, 1878 (monotypy): Turritellopsis acicula (Stimpson).

***gratissima** Thiele, 1912. Turritellopsis gratissima Thiele, 1912, p. 201. Type locality: Gauss Station, Davis Sea.

***latior** Thiele, 1912. Turritellopsis latior Thiele, 1912, p. 202. Type locality: Gauss Station, Davis Sea.

***thielei** Powell, 1951. Turritellopsis thielei Powell, 1951, p. 112. Type locality: Palmer Archipelago, 160-335 metres.

I have not been able to trace "Turritella incolor Smith" recorded from Kerguelen in Thiele's 1912 faunal list.

Mathilda Semper, 1865: Turbo quadricarinata Brocchi.

malvinarum (Melvill & Standen, 1907). Cerithiopsis malvinarum Melvill & Standen, 1907, p. 135 and 1914, p. 118: Cerithiopsis malvinarum Strebel, 1908, p. 49: Powell, 1951, p. 113. Type localities: Hearnden Water, Falkland Islands (Melvill & Standen), Port Louis, Falkland Islands, 1 metre (Strebel). Although Melvill & Standen claim that Strebel's species is the same as theirs, the respective figures appear to be different in sculpture but only examination of the types can decide this.

rhigomaches Melvill & Standen, 1912. Mathilda rhigomaches Melvill & Standen, 1912, p. 353. Type locality: Burdwood Bank, 56 fathoms.

Carcelles & Williamson (1951, p. 274) record magellanica P. Fischer, 1872 from Strait of Magellan and Patagonia.

VERMETIDAE

Serpulorbis Sasso, 1827 (= Vermicularia Lamarck, 1799).

***murrayi** (Hedley, 1911). Vermicularia murrayi Hedley, 1911, p. 6. Type locality: Cape Royds, 60-80 fathoms.

EPITONIIDAE

Coroniscala Boury, 1909: Scalaria magellanica Philippi.

***fenestrata** (Strebel, 1908). Scalaria fenestrata Strebel, 1908, p. 63: Powell, 1951, p. 114. Type locality: Cumberland Bay, 253-310 metres, South Georgia.

magellanica magellanica (Philippi, 1845). Scalaria magellanica Philippi, 1845b, p. 46: Strebel, 1905b, p. 656 and 1908, p. 63: Melvill & Standen, 1912, p. 347: Powell, 1951, p. 114. Type locality: Strait of Magellan. Range: Also Falkland Islands, 105-229 metres (Powell) and Burdwood Bank (Melvill & Standen).

magellanica latecostata (Strebel, 1905). Scalaria magellanica var latecostata Strebel, 1905b, p. 658: Melvill & Standen, 1914, p. 117: Powell, 1951, p. 114. Type locality: Strait of Magellan. Range: Also Cape Horn to Southern Argentina and between Patagonia and the Falklands, 100-545 metres.

Acirsa Moerch, 1857 (Cossmann, 1912): Scalaria costulata Mighels.

annectens Powell, 1951. Acirsa annectens Powell, 1951, p. 115. Type locality: North of Falkland Islands, 545 metres.

***antarctica** (Smith, 1907). Scala antarctica Smith, 1907, p. 8 and 1915, p. 8 and 1915, p. 64: Powell, 1957, p. 131 and 1958, p. 187. Type locality: Discovery Winter Quarters, McMurdo Sound. Range: Enderby Land to Ross Sea and Kerguelen Island, 150-300 metres. Carcelles & Williamson (1951, p. 276) record Epitonium orbignyi (Nyst, 1873) from Tierra del Fuego.

I have not been able to place Scalaria symphylla Martens, 1878, p. 25 recorded from Kerguelen Island in the "Gazelle" Report, vol. 3, Zool. & Geol., p. 147.

JANTHINIDAE

Rochebrune & Mabille (1889, p. 45) record Janthina courcelli R. & M. from Orange Bay, Tierra del Fuego.

EULIMIDAE

Balcis Leach, 1847: Balcis montagui Leach = B. alba da Costa.

amblia (Watson, 1883). Eulima amblia Watson, 1883, p. 127 and 1886, p. 521. Type locality: Between Marion Island and Prince Edward Island, 50-150 fathoms.

***antarctica** (Strebel, 1908). Eulima antarctica Strebel, 1908, p. 65: Thiele, 1912, Pl. 11, f. 30: Powell, 1951, p. 113. Type locality: South-east of Seymour Island, 150 metres. Range: Also South Sandwich Islands, 329-278 metres (Powell) and doubtfully, Burdwood Bank, 56 fathoms (Melvill & Standen).

***convexa** (Smith, 1907). Eulima convexa Smith, 1907, p. 7: Powell, 1951, p. 187. Type locality: Discovery Winter Quarters, 12-51 fathoms. Range: Also Enderby Land, 220-300 metres.

***solitaria** (Smith, 1915). Eulima solitaria Smith, 1915, p. 64: Powell, 1951, p. 114. Type locality: McMurdo Sound, 250 fathoms. Range: Doubtfully, Palmer Archipelago, 93-130 metres.

***subantarctica** (Strebel, 1908). Volutaxiella subantarctica Strebel, 1908, p. 65. Type locality: South Georgia, 22 metres.

***tumidula** (Thiele, 1912). Eulima tumidula Thiele, 1912, p. 193: Powell, 1951, p. 114. Type locality: Gauss Station, Davis Sea. Range: Clarence Island, 61° 25′ 30″ S, 53° 46′ W, 342 metres (Powell).

Melanella Bowdich, 1822: M. dufresnii Bowdich.

***exulata** (Smith, 1915). Eulima exulata Smith, 1915, p. 64: Hedley, 1916, p. 49. Type locality: McMurdo Sound, 190-250 fathoms.

***laseroni** Hedley, 1916. Melanella laseroni Hedley, 1916, p. 49: Tomlin, 1948, p. 227: Powell, 1955, p. 100. Type locality: Commonwealth Bay, 25 fathoms, Adelie Land.

Tomlin's (1948, p. 227) record from Macquarie Island requires confirmation.

A Magellanic number of the genus, according to Carcelles & Williamson, 1951, is Leiostraca carforti Rochebrune & Mabille, 1889.

Diacolax Mandahl-Barth, 1946 (o.d.): D. cucumariae M.-Barth.

cucumariae Mandahl-Barth, 1946. Diacolax cucumariae M.-Barth, 1946, p. 55. Type locality: Between Falkland Islands and Patagonia, 150 metres.

STILIFERIDAE

Stilifer Broderip, 1832: S. astericola Broderip.

***polaris** Hedley, 1916. Stilifer polaris Hedley, 1916, p. 50. Type locality: Off Shackleton Ice-shelf, 325 fathoms.

TRICHOTROPIDAE

Antitrichotropis Powell, 1951 (o.d.): Trichotropis antarctica Thiele.

***antarctica** (Thiele, 1912). Trichotropis antarctica Thiele, 1912, p. 197: Smith, 1915, p. 67: Hedley, 1916, p. 50: Powell, 1951, p. 123. Type locality: Gauss Station, Davis Sea. Range: Davis Sea to Ross Sea, 600 metres.

Melvill & Standen, 1912 (p. 348) also described a Trichotropis antarctica (renamed by them, Trichotropis bruceana, 1916, p. 90) but their shell, from Burdwood Bank, 56 fathoms is too imperfect for accurate determination. The figure suggests an immature Xymenopsis (Muricidae) rather than a Trichotropis.

***wandelensis** (Lamy, 1907). Lacuna wandelensis Lamy, 1907, p. 5: Melvill & Standen, 1912, p. 349: Powell, 1951, p. 124. Type locality: Wandel Island, Palmer Archipelago. Range: Palmer Archipelago, South Orkneys and South Shetlands, 18-391 metres.

Trichoconcha Smith, 1907 (monotypy): T. mirabilis Smith.

***mirabilis** Smith, 1907. Trichoconcha mirabilis Smith, 1907, p. 6: Thiele, 1912, p. 197: Smith, 1915, p. 68: Hedley, 1916, p. 50: Eales, 1923, p. 14: Powell, 1951, p. 124. Type locality: Off Coulman Island, 100 fathoms. Range: South Georgia to Ross Sea, 200-800 metres.

***planispira** (Smith, 1915). Trichotropis planispira Smith, 1915, p. 67: Powell, 1958, p. 188. Type locality: McMurdo Sound, 222-241 metres. Range: Also off MacRobertson Land, 219 metres.

Neoconcha Smith, 1907 (monotypy): N. vestita Smith.

***insignis** Smith, 1915. Neoconcha insignis Smith, 1915, p. 68. Type locality: McMurdo Sound, 300 fathoms.

***vestita** Smith, 1907. Neoconcha vestita Smith, 1907a, p. 6 and 1915, p. 68: Eales, 1923, p. 11: Powell, 1951, p. 125 and 1958, p. 188. Type locality: Off Coulman Island, 100 fathoms. Range: Enderby Land to Ross Sea, 177-220 metres.

Discotrichoconcha Powell, 1951 (o.d.): D. cornea Powell.

***cornea** Powell, 1951. Discotrichoconcha cornea Powell, 1951, p. 125 and 1958, p. 188. Type locality: Palmer Archipelago, 278-500 metres. Range: Also off Adelie Land, 640 metres.

LIPPISTIDAE

Lippistes Montfort, 1810 (o.d.): Argonauta cornu Gmelin.

***exilis** Powell, 1958. Lippistes exilis Powell, 1958, p. 188. Type locality: Off Enderby Land, 193 metres.

CALYPTRAEIDAE

Trochita Schumacher, 1817 (Rehder, 1943): T. spiralis Schum. = Trochus radians Lamarck.

decipiens (Philippi, 1845). Calyptraea decipiens Philippi, 1845, p. 61: Rehder, 1943, p. 44: Trochita clypeolum Reeve, 1859, Pl. 3, sp. 14: Clypeola magellanica Gray, 1867, p. 735: Clypeola corrugata var laevis Gray, 1867, p. 735: Powell, 1951, p. 127. Type localities: Strait of Magellan. Range: Tierra del Fuego, Strait of Magellan and Falklands.

***georgiana** Powell, 1951. Trochita georgiana Powell, 1951, p. 127. Type locality: Shag Rocks, West of South Georgia, 177 metres.

pileus (Lamarck, 1822). Patella trochiformis Dillwyn, 1817 (in part), p. 1018: Trochus pileus Lamarck, 1822, p. 11: Calyptraea costellata Philippi, 1845, p. 62: Trochita corrugata Reeve, 1859, Pl. 2, f. 9: Rehder, 1943, p. 44: Trochita trochiformis: Powell, 1951 (non Gmelin, 1791), p. 126. Type locality: ? Strait of Magellan. Range: Tierra del Fuego, Strait of Magellan to Argentina and Falklands (Rehder); Burdwood Bank, Falklands and Tierra del Fuego, 110-145 metres (Powell).

Crepipatella Lesson, 1831: Crepidula dilatata Lamarck.

dilatata (Lamarck, 1822). Crepidula dilatata Lamarck, 1822, p. 25: Strebel, 1906, p. 166: Melvill & Standen, 1907, p. 130 and 1914, p. 117: Powell, 1951, p. 125: Crepidula pallida Broderip, 1835: Crypta subdilitata Rochebrune & Mabille, 1889, p. 37. Type localities: ? (dilatata), Falkland Islands (pallida), Orange Bay, Patagonia (subdilitata).

Melvill & Standen's (1912, p. 348) record of the European Calyptraea chinensis Linn. from Burdwood Bank is improbable.

CAPULIDAE

Capulus Montfort, 1910 (o.d.): Patella ungarica Linn.

***subcompressus** Pelseneer, 1903. Capulus subcompressus Pelseneer, 1903, p. 20: Thiele, 1912, p. 199: Hedley, 1911, p. 5: Smith, 1915, p. 66: Eales, 1923, p. 11: Powell, 1958, p. 189. Type locality: Bellingshausen Sea, 70° S, 81° W. Range: Also Enderby Land to McMurdo Sound, 190-300 metres.

Magellanic species are chilensis Dall, 1908 and compressus Smith, 1891.

STRUTHIOLARIIDAE

Perissodonta Martens, 1878 (monotypy): Struthiolaria mirabilis Smith, 1875 = Struthiolarella Steinmann & Wilckens, 1908.

***mirabilis** (Smith, 1875). Struthiolaria mirabilis Smith, 1875 (1st. July), p. 67 and 1877, p. 170: Struthiolaria costulata Martens, 1875 (24th. July), p. 66: Perissodonta mirabilis var. georgiana Strebel, 1908, p. 46: Powell, 1951, p. 129 and 1957, p. 131. Type locality: 3-7 fathoms, Kerguelen Island (mirabilis), Cumberland Bay, South Georgia, 252-310 metres (georgiana).

NATICIDAE

Amauropsis Moerch, 1857 (Dall. 1909): Natica helicoides Johnson.

***anderssoni** (Strebel, 1906). Natica anderssoni Strebel, 1906, p. 142 and 1908, p. 61: Powell, 1951, p. 116. Type locality: Falkland Islands. Range: Falkland Islands and South Georgia, 20-310 metres.

***aureolutea** (Strebel, 1908). Natica aureolutea Strebel, 1908, p. 63: Powell, 1951, p. 116. Type locality: South Georgia, 24-52 metres. Range: Snow Hill Island, 152 metres, Clarence Island, South Georgia and South Sandwich Islands.

?*bransfieldensis (Preston, 1916). Lunatia bransfieldensis Preston, 1916, p. 270. Type locality: Bransfield Strait, 15 fathoms, South Shetlands.

***georgianus** (Strebel, 1908). Natica georgianus Strebel, 1908, p. 62: Powell, 1951, p. 117. Type locality: South Georgia, 64-74 metres.

***godfroyi** (Lamy, 1910). Natica godfroyi Lamy, 1910, p. 322 and 1911, p. 12. Type locality: South Shetlands, 420 metres.

prasina (Watson, 1881). Natica prasina Watson, 1881, p. 263 and 1886, p. 449: Powell, 1957, p. 130. Type locality: 60 fathoms, Royal Sound, Kerguelen Island. Range: 0-150 metres.

***rossiana** Smith, 1907. Amauropsis rossiana Smith, 1907a, p. 5: Smith, 1915, p. 69: Hedley, 1916, p. 52: Eales, 1923, p. 19: Powell, 1951, p. 116 and 1958, p. 189. Type locality: Discovery Winter Quarters, McMurdo Sound. Range: Enderby Land to Ross Sea.

***subpallescens** (Strebel, 1908). Natica subpallescens Strebel, 1908, p. 62. Type locality: 64° 20′ S, 57° W, 6 metres.

suturalis (Watson, 1881). Natica suturalis Watson, 1881, p. 257 and 1886, p. 445: Powell, 1957, p. 129. Type locality: 60 fathoms, Royal Sound, Kerguelen Island. Range: 20-120 metres.

***xantha** (Watson, 1881). Natica xantha Watson, 1881, p. 262 and 1886, p. 445: Powell, 1958, p. 189. Type locality: Between Kerguelen and Heard Island, 150 fathoms. Range: Also Enderby Land, 300 metres.

Amauropsis (Kerguelenatica) Powell, 1951 (o.d.): Natica grisea Martens.

***grisea** (Martens, 1878). Natica grisea Martens, 1878, p. 24: Watson, 1886, p. 432: Martens & Thiele, 1903, p. 64: Strebel, 1908, p. 61: Smith, 1915, p. 69: Hedley, 1916, p. 52: David, 1934, p. 128: Powell, 1951, p. 118, 1957, p. 130 and 1958, p. 190: Natica delicatula Smith, 1902, p. 206: Thiele, 1912, p. 199. Type localities: Kerguelen (grisea), Cape Adare (delicatula). Range: Circum Antarctic, Kerguelen, South Georgia and Bouvet Island.

Falsilunatia Powell, 1951 (o.d.): Natica soluta Gould.

falklandica (Preston, 1913). Natica falklandica Preston, 1913, p. 218. Type locality: Port Stanley, Falkland Islands.
Probably a synonym of soluta.

fartilis (Watson, 1881). Natica fartilis Watson, 1881, p. 264 and 1886, p. 446: Powell, 1957, p. 113. Type locality: Between Marion Island and Prince Edward Island, 50-140 fathoms. Range: Also Royal Sound, 60 fathoms, Kerguelen Island and between Kerguelen and Heard Islands, 150 fathoms.

sp.
Friginatica fartilis: Tomlin, 1948, p. 227 (non Watson, 1881): Powell, 1955, p. 95. Locality: Off Lusitania Bay, Macquarie Island, 69 metres.

pisum (Hedley, 1916). Friginatica pisum Hedley, 1916, p. 52: Tomlin, 1948, p. 228: Powell, 1955, p. 95. Type locality: Off Lusitania Bay, Macquarie Island, 69 metres.

recognita (Rochebrune & Mabille, 1889). Natica recognita Rochebrune & Mabille, 1889, p. 33: Powell, 1951, p. 119. Type locality: Orange Bay, Patagonia, 120 metres. Range: Between Falkland Islands and Argentina.

soluta (Gould, 1848). Natica soluta Gould, 1848, p. 239: Tyron, 1886, p. 39: Strebel, 1906, p. 138 and 1908, p. 60: Powell, 1951, p. 119. Type locality: Southern coast of South America. Range: Patagonia to Falkland Islands.

?subantarctica (Preston, 1913). Natica subantarctica Preston, 1913, p. 219. Type locality: Falkland Islands.

Sinuber Powell, 1951 (o.d.): Natica sculpta Martens.

***sculpta sculpta** (Martens, 1878). Natica sculpta Martens, 1878, p. 24: Martens & Thiele, 1903, p. 65: Powell, 1951, p. 120 and 1958, p. 190. Type locality: Kerguelen Island. Range: MacRobertson Land, 177 metres to Ross Sea, 351 metres and north of Falkland Islands, 242-296 metres (Powell).

***sculpta scotiana** Powell, 1951. Sinuber sculpta scotiana Powell, 1951, p. 120. Type locality: South Orkneys, 244-344 metres. Range: Also South Georgia, 225-270 metres.

perscalpta (Martens, 1878). Natica (Amauropsis) perscalpta Martens, 1878, p. 25: Watson, 1886, p. 454: Powell, 1957, p. 130. Type locality: Royal Sound, 60 fathoms, Kerguelen Island.

Polinices Montfort, 1810 ,o.d.): P. albus Montfort.

magellanica (Philippi, 1844). Natica magellanica (Philippi, 1844): Hombron & Jacquinot, 1845, Pl. 16, f. 28-29: Hupé (Gay), 1854, p. 222: Rochebrune & Mabille, 1889, p. 32: Melvill & Standen, 1898, p. 101: Strebel, 1906, p. 136. Type locality: Strait of Magellan. Range: Also Lively Island, Falkland Islands (Melvill & Standen).

***patagonicus** (Philippi, 1845). Natica patagonica Philippi, 1845b, p. 65: Hupé (Gay), 1854, p. 221: Tryon, 1886, p. 37: Rochebrune & Mabille, 1889, p. 35: Strebel, 1906, p. 137 and 1908, p. 61: Powell, 1951, p. 118. Type locality: North-east Strait of Magellan. Range: Patagonia, Strait of Magellan, Tierra del Fuego, Falkland Islands and South Georgia, 0-411 metres.
Other Magellanic species are constrictus Dall, 1908, secunda Rochebrune & Mabille, 1885, strebeli Dall, 1908 and vaginatus Dall, 1908.

Prolacuna Thiele, 1913 (o.d.): Sublacuna indecora Thiele (= Sublacuna Thiele, 1912 non Pilsbry, 1895 = Frigidilacuna Tomlin, 1930).

***indecora** (Thiele, 1912). Sublacuna indecora Thiele, 1912, p. 195: Smith, 1915, p. 66: Eales, 1923, p. 21: Powell, 1951, p. 121 and 1958, p. 190. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 220-351 metres.

***macmurdensis** (Hedley, 1911). Lacuna macmurdensis Hedley, 1911, p. 4: Powell, 1951, p. 121 and 1958, p. 191. Type locality: 10-20 fathoms, Cape Royds, Ross Sea. Range: Enderby Land to Ross Sea, 20-351 metres.

***notorcadensis** (Melvill & Standen, 1907). Lacuna notorcadensis Melvill & Standen, 1907, p. 101: Thiele, 1912, p. 195: Powell, 1951, p. 121. Type locality: Scotia Bay, South Orkneys, 9-10 fathoms.

***trilirata** (Thiele, 1912). Sublacuna trilirata Thiele, 1912, p. 196: Powell, 1951, p. 121 and 1958, p. 190. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 220-300 metres.
This may be a synonym of macmurdensis.

Frovina Thiele, 1912 (o.d.): Frovina soror Thiele.

***soror** Thiele, 1912. Frovina soror Thiele, 1912, p. 196. Type locality: Gauss Station, Davis Sea.

Tectonatica Sacco, 1890 ,monotypy): Natica tectula Bonelli.

***impervia impervia** (Philippi, 1845). Natica impervia Philippi, 1845a, p. 11: Hupé (Gay), 1854, p. 221: Tryon, 1886, p. 31: Rochebrune & Mabille, 1889, p. 34: Strebel, 1906, p. 134 and 1908, p. 61: Melvill & Standen, 1912, p. 348 and 1914, p. 117: Powell, 1951, p. 122. Type locality: Strait of Magellan. Range: Strait of Magellan to Falklands and South Georgia, —161 metres.

***impervia major** (Strebel, 1908). Natica impervia var. major Strebel, 1908, p. 61. Type locality: Paulet Island, 63° 36′ S, 55° 48′ W, 100-150 metres.

Martens & Thiele (1903, p. 66, Pl. 3, f. 22 record Natica psila Watson from off Kerguelen Island in 88 metres but their shell is very unlike Watson's figure of his psila which is from 150 fathoms off Cape of Good Hope.

Watson's (1886, p. 447) record of the North European Natica groenlandica Beck, 1842 from Heard Island, 75 fathoms requires confirmation.

Magellanic Naticoids are Natica atrocyanea Philippi, 1845 (Smith, 1905, p. 334), limbata Orbigny, 1840, payeni Rochebrune & Mabille, 1885, Sinum antarcticus and praetenuis Gould, 1852 (Carcelles & Williamson, 1951, pp. 282-283).

LAMELLARIIDAE

Lamellaria Montagu, 1815: Lamellaria perspicua Linn.

ampla Strebel, 1907. Lamellaria ampla Strebel, 1907, p. 145: Melvill & Standen, 1914, p. 117. Type locality: Uschuaia, low tide, Tierra del Fuego. Range: Also North-west Falklands (Melvill & Standen).

elata Strebel, 1906. Lamellaria elata Strebel, 1906, p. 146: Powell, 1951, p. 123. Type locality: Puerto Condor, Patagonia. Range: Also Falklands, 81-82 metres (Powell).

patagonica Smith, 1881. Lamellaria patagonica Smith, 1881, p. 32: Rochebrune & Mabille, 1889, p. 36: Powell, 1951, p. 122. Type locality: Trinidad Channel, 30 fathoms, Patagonia. Range: Also Falkland Islands, 10½-16 metres.

Other Magellanic species are fuegoensis Strebel, 1907, hyadesi Rochebrune & Mabille, 1889, magellanica Strebel, 1907, perspicua incerta (Bergh, 1898) and perspicua maculata (Bergh, 1898). Odhned (1924, p. 31) described Lamellaria verrucosa from Carnley Harbour, Auckland Islands (Antipodean).

Marseniopsis Bergh, 1886 (Thiele, 1929): M. pacifica Bergh.

***antarctica** Vayssière, 1906. Marseniopsis antarctica Vayssière, 1906, Pl. 4, f. 54-63. Type locality: Wandel Island.

***conica** (Smith, 1902). Lamellaria conica Smith, 1902, p. 206 and 1915, p. 66: Eales, 1923, p. 23: Strebel, 1908, p. 60. Type locality: Cape Adare, 28 fathoms. Range: Also recorded from south-east of Seymour Island, 64° 20′ S, 56° 38′ W, 150 metres (Strebel). Tomlin (1948, p. 228) recorded this species from Macquarie Island, 69 metres but the specimen is not in good enough condition for accurate determination.

***mollis** (Smith, 1902). Lamellaria mollis Smith, 1902, p. 205 and 1915, p. 66: Eales, 1923, p. 25: Hedley, 1916, p. 53. Type locality: Cape Adare, 6-29 fathoms. Range: Davis Sea to Ross Sea, 12-800 metres.

marrayi Bergh, 1886. Marseniopsis murrayi Bergh, 1886, p. 23. Type locality: Off Marion Island.

***pacifica** Bergh, 1886. Marseniopsis pacifica Bergh, 1886, p. 19: Thiele, 1912, p. 242: Powell, 1951, p. 123: Carcelles & Williamson, 1951, p. 285. Type locality: Kerguelen Island. Range: Recorded also from South Georgia, South Orkneys and Palmer Archipelago, 93-344 metres (Powell) and Strait of Magellan (Carcelles & Williamson).

Lamellariopsis Vayssière, 1906 (monotypy): L. turqueti Vayssière.

***aurora** Hedley, 1916. Lamellariopsis aurora Hedley, 1916, p. 53. Type locality: Shackleton Ice-shelf, 64° 32′ S, 97° 20′ E, 110 fathoms.

***turqueti** Vayssière, 1906. Lamellariopsis turqueti Vayssière, 1906, Pl. 4, f. 42-53. Type locality: Antwerp Island.

CYMATIIDAE

Fusitriton Cossmann, 1903 (o.d.): Triton cancellatum Lamarck.

antarcticus Powell, 1958. Fusitriton antarcticus Powell, 1958, p. 191. Type locality: Off Kemp Land, 603 metres, Antarctica.

cancellatum (Lamarck, 1822). Murex magellanicus Chemnitz, 1788, p. 275 (non binom.): Rochebrune & Mabille, 1889, p. 42: Triton cancellatum Lamarck, 1822, p. 187 and 1845, p. 638: Reeve, 1848, Pl. 16, f. 62: Strebel, 1905b, p. 647: Tryon, 1881, p. 34: Powell, 1951, p. 130. Type locality: Strait of Magellan. Range: Many localities between Patagonia, Cape Horn and Falkland Islands, 30-313 metres.

Watson (1886) recorded cancellatum from off Marion Island but it probably represents a new species.

The genus is mostly archibenthal, distributed from Japan across the Aleutian Chain, the west coast of both Americas to South Africa, Marion Island, Kemp Land, Antarctica, New Zealand, and its southern Islands, southern Australia and New South Wales. In many localities it comes up on to the continental shelf, under the influence of cold up-welling water.

Cymatona Iredale, 1929 (o.d.): Nassaria kampyla Watson.

tomlini Powell, 1955. Nassaria kampyla Tomlin, 1948, p. 228 (non Watson): Cymatona tomlini Powell, 1955, p. 97. Type locality: Macquarie Island, 69 metres.

Argobuccinum Hermannsen, 1846: Murex argus Linn.

This genus ranges around the Southern Hemisphere in the zone of mixed waters in the vicinity of and north of the Sub-tropical Convergence, with the exception of the Strait of Magellan which has a truly Subantarctic member in vexillum Sowerby, also recorded from Gough Island (Melvill & Standen, 1907) and Tristan da Cunha.

Other species are argus Gmelin, 1790, Cape of Good Hope, proditor Fraunfeld, 1867, Islands of St. Paul and Amsterdam and tumida Dunker, 1862, New Zealand to Auckland Islands, Tasmania and South Australia.

COLUMBELLIDAE

The following members of this family have been either described or recorded from the Magellanic Province:—Columbella (Seminella) decorata and decorata inornata Strebel, 1905, pp. 635, 636, melvillei Strebel, 1905, p. 637, and paessleri Strebel, 1905, p. 637, Columbella rubra Martens, 1881, p. 76 and Columbella (Alia) unifasciata Sowerby, 1832, p. 114 (Strebel, 1905, p. 634) (Carcelles & Williamson, 1951, p. 292).

COMINELLIDAE

Pareuthria Strebel, 1905 (Tomlin, 1932): Fusus plumbeus Philippi.

cerealis (Rochebrune & Mabille, 1885). Euthria cerealis Rochebrune & Mabille, 1885, p. 100 and 1889, p. 60: Strebel, 1905, p. 623: Melvill & Standen, 1914, p. 121. Type locality: Orange Bay, Patagonia. Range: Strait of Magellan, Tierra del Fuego and Falkland Islands.

chlorotica (Martens, 1878). Euthria chlorotica Martens, 1878, p. 22: Powell, 1957, p. 132. Type locality: Kerguelen Island, 45-55 metres.

fuscata (Bruguière, 1789). Buccinum fuscatum Bruguière, 1789, p. 282: Watson, 1886, p. 209: Strebel, 1905b, p. 611: Lamy, 1907, p. 2: Melvill & Standen, 1907, p. 139: Strebel, 1908, p. 28: Melvill & Standen, 1914, p. 121: Buccinum antarcticum Reeve, 1846, f. 30: Lamy, 1905, p. 476: Tritonium schwartzianum Crosse, 1861, p. 174: Pareuthria fuscata curta Preston, 1913, p. 218: Powell, 1951, p. 132. Type localities: Falkland Islands (fuscatum, antarcticum and curta). Range: Strait of Magellan and Falkland Islands, 0-16 metres.

***innocens** (Smith, 1907). Thesbia ? innocens Smith, 1907, p. 4: Thiele, 1912, p. 212: Smith, 1915, p. 72: Hedley, 1916, p. 58: Powell, 1958, p. 191. Type locality: Discovery Winter Quarters, 25-30 fathoms. Range: Enderby Land, Gauss Station, McMurdo Sound, Ross Sea, 25-250 fathoms.

janseni (Strebel, 1905). Euthria janseni Strebel, 1905, p. 622. Type locality: Tierra del Fuego. Range: Uschuaia, 6-12 fathoms, Tierra del Fuego, Strait of Magellan and Falkland Islands, 16-40 metres.

magellanica (Philippi, 1848). Buccinum magellanicum Philippi, 1848, p. 48: Strebel, 1905b, p. 601: Melvill & Standen, 1907, p. 109: Strebel, 1908, p. 29: Melvill & Standen, 1914, p. 121: Fusus rufus Hombron & Jacquinot, 1854, p. 107: Powell, 1951, p. 133. Type locality: Strait of Magellan. Range: Strait of Magellan and Falkland Islands, 0-115 metres.

michaelseni (Strebel, 1905). Euthria michaelseni Strebel, 1905b, p. 621: Melvill & Standen, 1907, p. 109: Strebel, 1908, p. 28: Melvill & Standen, 1914, p. 121: Powell, 1951, p. 134. Type locality: Smyth Channel, Strait of Magellan. Range: Strait of Magellan, Tierra del Fuego, Falkland Islands, 156 metres.

mulachi (Strebel, 1905). Euthria mulachi Strebel, 1905b, p. 623: Melvill & Standen, 1914, p. 122: Type locality: Picton Island. Range: Also Rapid Point, North-west Falklands (Melvill & Standen).

***plicatula** Thiele, 1912. Pareuthria plicatula Thiele, 1912, p. 212: Powell, 1958, p. 192. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193-300 metres (Powell).

plumbea (Philippi, 1844). Fusus plumbeus Philippi, 1844, p. 108: Strebel, 1905b, p. 600 and 1908, p. 28: Melvill & &Standen, 1914, p. 121: Powell, 1951, p. 133. Type locality: Strait of Magellan. Range: Strait of Magellan, Tierra del Fuego and North-west Falklands. 0-8 metres.

regulus (Watson, 1882). Fusus (Sipho) regulus Watson, 1882, p. 378 and 1886, p. 204: Powell, 1957, p. 132. Type locality: Royal Sound, 28 fathoms, Kerguelen Island.

ringei (Strebel, 1905). Euthria ringei Strebel, 1905b, p. 619: Powell, 1951, p. 133. Type locality: Strait Le Maire. Range: Tierra del Fuego and Patagonia to Falklands and Burdwood Bank. 0-151 metres.

rosea (Hombron & Jacquinot, 1854). Fusus roseus Hombron & Jacquinot, 1854, p. 107: Rochebrune & Mabille, 1889, p. 59: Strebel, 1905b, p. 613 and 1908, p. 28: Melvill & Standen, 1912, p. 355. Type locality: Strait of Magellan. Range: Patagonia, Strait of Magellan, Tierra del Fuego, Falkland Islands and Burdwood Bank, 40-201 metres.

scalaris (Watson, 1882). Fusus (Sipho) scalaris Watson, 1882, p. 377 and 1886, p. 203: Thiele, 1912, p. 263: Powell, 1951, p. 134. Type locality: North-west Patagonia, 125 fathoms. Range: Patagonia to north-west Falklands, 70-125 fathoms.

valdiviae Thiele, 1925. Euthria (Pareuthria) valdiviae Thiele, 1925, p. 180: Powell, 1957, p. 132. Type locality: Gazelle Harbour, Kerguelen Island, 20-30 metres.

Other Magellanic species are atrata (Smith, 1881), paessleri and philippi Strebel, 1905 and venustula Powell, 1951.

The genus extends to the New Zealand Southern Islands, i.e. Pareuthria campbelli (Filhol, 1880), Campbell Island (Powell, 1955, p. 103).

Glypteuthria Strebel, 1905 (Tomlin, 1932): Euthria meridionalis Smith.

acuminata Smith, 1915. Glypteuthria acuminata Smith, 1915, p. 91. Type locality: West of Falkland Islands, 125 fathoms.

euthrioides (Melvill & Standen, 1898). Lachesis euthrioides Melvill & Standen, 1898, p. 98. Type locality: Lively Island, Falkland Islands.

kobelti (Strebel, 1905). Euthria kobelti Strebel, 1905b, p. 632: Melvill & Standen, 1914, p. 122: Powell, 1951, p. 138. Type locality: Strait of Magellan. Range: Strait of Magellan, Tierra del Fuego, 3-27 fathoms and north-west Falklands.

meridionalis (Smith, 1881). Euthria meridionalis Smith, 1881, p. 29: Rochebrune & Mabille, 1889, p. 61: Strebel, 1905b, p. 627: Thiele, 1912, Pl. 13, f. 6: Melvill & Standen, 1914, p. 122: Powell, 1951, p. 138. Type locality: St. Andrew's Sound, 10 fathoms, Patagonia. Range: Patagonia, Strait of Magellan, Tierra del Fuego, —3838 metres and doubtfully north-west Falklands (Melvill & Standen). The genus is represented in South African waters by capensis Thiele, 1925, sculpturata Tomlin, 1945 (= capensis Tomlin, 1932, non Thiele, 1925), and solidissima Tomlin, 1932.

Meteuthria Thiele, 1912 (o.d.): Euthria martensi Strebel.

agnesia (Strebel, 1905). Euthria (Glypteuthria) agnesia Strebel, 1905b, p. 631. Type locality: Picton Island, Banner Cove, 3 fathoms. Range: Strait of Magellan.

futilis (Watson, 1882). Fusus (Neptunea) futile Watson, 1882, p. 381 and 1886, p. 207. Type locality: Between Kerguelen and Heard Islands, 150 fathoms.

martensi (Strebel, 1905). Euthria (Glypteuthria) martensi Strebel, 1905b, p. 630. Type locality: Strait of Magellan.

Tromina Dall, 1918 (o.d.): Fusus unicarinatus Philippi.

bella Powell, 1951. Tromina bella Powell, 1951, p. 136. Type locality: Between Falkland Islands and Patagonia.

fenestrata Powell, 1951. Tromina fenestrata Powell, 1951, p. 135. Type locality: Between Falkland Islands and Argentina(545 metres.

simplex Powell, 1951. Tromina simplex Powell, 1951, p. 136. Type locality: North of Falkland Islands, 150-256 metres.

***tricarinata** Powell, 1951. Tromina tricarinata Powell, 1951, p. 135. Type locality: Off Cape Bowles, Clarence Islands, 342 metres. The typical species, unicarinatus (Philippi, 1868) is from the Strait of Magellan.

Parficulina Powell, 1958 (o.d.): Notoficula problematica Powell

problematica (Powell, 1951). Notoficula problematica Powell, 1951, p. 137 and 1958, p. 192. Type locality: Between Falkland Islands and Argentina, 545 metres.

Falsimohnia Powell, 1951 (o.d.): Buccinum albozonatum Watson.

***albozonata** (Watson, 1882). Buccinum albozonatum Watson, 1882, p. 358 and 1886, p. 212: Thiele, 1912, p. 244: David, 1934, p. 128: Mangelia antarctica Martens & Pfeffer, 1886, Pl. 1: Lachesis? australis Martens & Thiele, 1903, p. 62: Powell, 1951, p. 138 and 1957, p. 133. Type localities: Royal Sound, Kerguelen Island (albozonatum) South Georgia (antarctica), Kerguelen Island (australis).

Antistreptus Dall, 1902 (o.d.): A. magellanicus Dall.

magellanicus Dall, 1902. Antistreptus magellanicus Dall, 1902, p. 532: Melvill & Standen, 1912, p. 354: ? Euthria contraria Strebel, 1908, p. 29. Type localities: Strait of Magellan, 20 fathoms (magellanicus), Coast of Argentina, 37° 5′ S, 100 metres (contraria). Range: Argentina, Strait of Magellan and Burdwood Bank.

Anomacme Strebel, 1905 (monotypy): A: smithi Strebel.

smithi Strebel, 1905. Anomacme smithi Strebel, 1905b, p. 633: Thiele, 1912, Pl. 13, f. 8: Melvill & Standen, 1914, p. 122: Thiele, 1929, p. 318. Type locality: Smyth Channel, Strait of Magellan. Range: Also north-west Falklands (Melvill & Standen).

Savatieria Rochebrune & Mabille, 1885 (monotypy): S. frigida R. & M.

areolata Strebel, 1905. Savatieria areolata Strebel, 1905b, p. 645: Melvill & Standen, 1914, p. 124. Type locality: Uschuaia, Tierra del Fuego. Range: Also north-west Falklands (Melvill & Standen).

bertrandi Melvill & Standen, 1914. Savatieria bertrandi Melvill & Standen, 1914, p. 124. Type locality: Rapid Point, West Falklands, low water.

concinna Melvill & Standen, 1912. Savatieria concinna Melvill & Standen, 1912, p. 356. Type locality: Burdwood Bank, 56 fathoms.

dubia Strebel, 1905. Savatieria dubia Strebel, 1905b, p. 641 and 1908, p. 21. Type locality: ? Falkland Islands. Range: Strait of Magellan, Tierra del Fuego and Falkland Islands. (May be a synonym of frigida R. & M.).

molinae Strebel, 1905. Savatieria molinae Strebel, 1905b, p. 644. Type locality: Strait of Magellan. Range: Strait of Magellan and Falkland Islands.
Other Magellanic species are frigida Rochebrune & Mabille, 1885 and pfefferi Strebel, 1905.

BUCCINULIDAE

Chlanidota Martens, 1878 (monotypy): Cominella (Chlanidota) vestita Martens.

***densesculpta** (Martens, 1885). Cominella (Chlanidota) densesculpta Martens, 1885, p. 91: Martens & Pfeffer, 1886, p. 71: Strebel, 1908, p. 33: L. David, 1934, p. 128: Powell, 1951, p. 140. Type locality: South Georgia. Range: 0-270 metres.

***elongata** (Lamy, 1910). Cominella (Chlanidota) vestita var. elongata Lamy, 1910b, p. 319 and 1911a, p. 6: Powell, 1951, p. 140. Type locality: King George Island, 420 metres, South Shetlands, 200-810 metres.

?***gaini** (Lamy, 1910). Sipho gaini Lamy, 1910b, p. 319 and 1911a, p. 7: Thiele, 1912, p. 262: Powell, 1951, p. 142. Type locality: King George Island, 420 metres, South Shetlands.

***paucispiralis** Powell, 1951. Chlanidota paucispiralis Powell, 1951, p. 141. Type locality: South Georgia, 160 metres. Range: 160-970 metres.

***pilosa** Powell, 1951. Chlanidota pilosa Powell, 1951, p. 139. Type locality: Bouvet Island, 40-45 metres.

***signeyana** Powell, 1951. Chlanidota signeyana Powell, 1951, p. 141. Type locality: Off Signy Island, South Orkneys, 244-344 metres.

***smithi** Powell, 1958. Chlanidota smithi Powell, 1958, p. 192. Type locality: Off Enderby Land, 220 metres. Range: Smith's 1902 record of vestita from Cape Adare is probably this species.

vestita (Martens, 1878). Cominella (Chlanidota) vestita Martens, 1878, p. 23: Tryon, 1881, p. 201: Watson, 1886, p. 216: Smith, 1902, p. 203: Martens & Thiele, 1903, p. 63: Lamy, 1911a, p. 63: Powell, 1951, p. 139 and 1957, p. 133. Type locality: Kerguelen Island. Range: 5-50 metres.

Notoficula Thiele, 1917 (= Ficulina Thiele, 1912, non Gray, 1867) (monotypy): Ficulina bouveti Thiele.

***bouveti** (Thiele, 1912). Cominella (Chlanidota) densesculpta Martens, 1903 non 1885: Cominella (Ficulina) bouveti Thiele, 1912, p. 270: Thiele, 1925, p. 145: Powell, 1958, p. 193. Type locality: Bouvet Island. Range: Bouvet Island, Mackenzie Sea, 540 metres and Enderby Land, 193-220 metres.

Chlanificula Powell, 1958 (o.d.): C. thielei Powell.

***thielei** Powell, 1958. Chlanificula thielei Powell, 1958, p. 193. Type locality: Off Enderby Land, 220 metres.

Pfefferia Strebel, 1908 (Powell, 1951): Pfefferia palliata Strebel.

***chordata** Strebel, 1908. Pfefferia chordata Strebel, 1908, p. 36: Powell, 1951, p. 143. Type locality: South Georgia, 252-310 metres.

***cingulata** Strebel, 1908. Pfefferia cingulata Strebel, 1908, p. 36: Powell, 1951, p. 142. Type locality: South Georgia, 252-310 metres.

***elata** Strebel, 1908. Pfefferia elata Strebel, 1908, p. 35: Powell, 1951, p. 142. Type locality: South Georgia, 75 metres.

***palliata** Strebel, 1908. Pfefferia palliata Strebel, 1908, p. 34: Powell, 1951, p. 143. Type locality: South Georgia, 75 metres.

Neobuccinum Smith, 1877 (monotypy): Neobuccinum eatoni Smith.

***eatoni** (Smith, 1875). Buccinopsis eatoni Smith, 1875, p. 68 and 1879, p. 169: Studer, 1879, p. 129: Watson, 1886, p. 216: Smith, 1902, p. 202: Thiele, 1903, p. 168: Lamy, 1906b, p. 2: Smith, 1907a, p. 1: Melvill & Standen, 1907, p. 139: Lamy, 1910b, p. 199 and 1911a, p. 5: Hedley, 1911, p. 6: Thiele, 1912, p. 211: Smith, 1915, p. 72: Lamy, 1915, p. 69: Hedley, 1916, p. 59: Eales, 1923, p. 28: Neobuccinum praeclarum Strebel, 1908, p. 31: Powell, 1951, p. 143, 1957, p. 132 and 1958, p. 193. Type localities: Royal Sound, Kerguelen Island (eatoni); Graham Land, 360 metres (praeclarum). Range: Circum-Antarctic, Kerguelen and Heard Islands, 6-600 metres.

Chlanidotella Thiele, 1929 (monotypy): Cominella modesta Martens.
***modesta** (Martens, 1885). Cominella modesta Martens, 1885, p. 91: Martens & Pfeffer, 1886, p. 73: Strebel, 1908, p. 33: Thiele, 1929, p. 317: David, 1934, p. 128: Powell, 1951, p. 150. Type locality: South Georgia. Range: 0-18 metres.

Bathydomus Thiele, 1912 (o.d.): B. obtectus Thiele.
calathiscus (Watson, 1882). Fusus (Neptunea) calathiscus Watson, 1882, p. 375 and 1886, p. 201: Thiele, 1912. Type locality: Between Marion Island and Crozets, 1600 fathoms.
obtectus Thiele, 1912. Bathydomus obtectus Thiele, 1912, p. 247. Type locality: North West of Gauss Station, 65° S, 80° E, 3423 metres.
setosus (Watson, 1882). Fusus (Sipho) setosus Watson, 1882, p. 375 and 1886, p. 202 Type locality: Between Marion Island and Crozets, 1375 fathoms.
***thielei** Powell, 1958. Bathydomus thielei Powell, 1958, p. 194. Type locality: Off Enderby Land, 193 metres.

Fusinella Thiele, 1917 (= Buccinella Thiele, 1912 non Perry, 1811) (monotypy): Buccinella jucunda Thiele.
jucunda (Thiele, 1912). Buccinella jucunda Thiele, 1912, p. 246. Type locality: Observatory Bay, Kerguelen Island.

Cavineptunea Powell, 1951 (o.d.): C. monstrosa Powell.
***monstrosa** Powell, 1951. Cavineptunea monstrosa Powell, 1951, p. 145. Type locality: Off South Georgia, 160 metres.

Probuccinum Thiele, 1912 (o.d.): Neobuccinum tenerum Smith.
***angulatum** Powell, 1951. Probuccinum angulatum Powell, 1951, p. 145. Type locality: North of South Georgia, 200-236 metres.
?*archibenthalis (Melvill & Standen, 1907). Chrysodomus (Sipho) archibenthalis Melvill & Standen, 1907, p. 138. Type locality: 62° 10′ S, 41° 20′ W, 1775 fathoms.
***costatum** Thiele, 1912. Probuccinum costatum Thiele, 1912, p. 211: Hedley, 1916, p. 58: Powell, 1958, p. 194. Type locality: Gauss Station, 350 metres, Davis Sea. Range: Enderby Land, Davis Sea and Shackelton Ice-shelf.
***delicatulum** Powell, 1951. Probuccinum delicatulum Powell, 1951, p. 144. Type locality: South Georgia, 122-136 metres.
edwardiensis (Watson, 1882). Fusus (Sipho edwardiensis Watson, 1882, p. 379 and 1886, p. 204: Thiele, 1912. Type locality: Between Marion Island and Prince Edward Island, 140 fathoms.
regulus (Watson, 1882). Fusus (Sipho) regulus Watson, 1882, p. 378 and 1886, p. 204. Type locality: Royal Sound, 28 fathoms, Kerguelen Island.
***tenerum** (Smith, 1907). Neobuccinum tenerum Smith, 1907, p. 2. Type locality: Off Coulman Island, 100 fathoms.
***tenuistriatum** Hedley, 1916. Probuccinum tenuistriatum Hedley, 1916, p. 58: Powell, 1958, p. 194. Type locality: D'Urville Sea, Adelie Land, 157 fathoms. Range: Mackenzie Sea, Enderby Land, MacRobertson Land and Adelie Land, 300-456 metres.

Proneptunea Thiele, 1912 (o.d.): P. amabilis Thiele.
amabilis Thiele, 1912. Proneptunea amabilis Thiele, 1912, p. 246. Type locality: Kerguelen Island.
***duplicarinata** Powell, 1951. Proneptunea duplicarinata Powell, 1951, p. 150. Type locality: Between South Georgia and Shag Rocks, 177 metres.
***fenestrata** Powell, 1951. Proneptunea fenestrata Powell, 1951, p. 149. Type locality: East Cumberland Bay, South Georgia, 17-136 metres.

Prosipho Thiele, 1912 (Thiele, 1929): Prosipho gaussianus Thiele.
***antarctidis** (Pelseneer, 1903). Sipho antarctidis Pelseneer, 1903, p. 22: Lamy, 1911, p. 7. Type locality: West Antarctica 70° S, 84-92° W.
***astrolabiensis** (Strebel, 1908). Sipho (?Mohnia) astrolabiensis Strebel, 1908, p. 31: Thiele, 1912, p. 262: Powell, 1951, p. 146. Type locality: Astrolabe Island, 63° 9′ S, 58° 17′ W, 95 metres. Range: Palmer Archipelago to South Georgia, 95-279 metres.
***aurora** Hedley, 1916. Prosipho aurora Hedley, 1916, p. 56. Type locality: Commonwealth Bay, 25 fathoms, Adelie Land.
***bisculptus** Thiele, 1912. Prosipho bisculptus Thiele, 1912, p. 210. Type locality: Gauss Station, Davis Sea.

***cancellatus** Smith, 1915. Prosipho cancellatus Smith, 1915, p. 71: Powell, 1951, p. 147 and 1958, p. 195. Type locality: Ross Sea, 351 metres. Range: Enderby Land and Kaiser Wilhelm Land to Ross Sea, 220-393 metres.

certus Thiele, 1912. Prosipho certus Thiele, 1912, p. 245: Powell, 1957, p. 133. Type locality: Observatory Bay, Kerguelen Island.

***chordatus** (Strebel, 1908). Sipho? chordatus Strebel, 1908, p. 30: Powell, 1951, p. 146. Type locality: Cumberland Bay, South Georgia, 252-310 metres.

***congenitus** Smith, 1915. Prosipho congenitus Smith, 1915, p. 71: Powell, 1958, p. 195. Type locality: Off Oates Land, Antarctica, 180-200 fathoms. Range: Enderby Land to Oates Land, 193-400 metres.

***contrarius** Thiele, 1912. Prosipho contrarius Thiele, 1912, p. 209: Powell, 1951, p. 147 and 1958, p. 195. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 300-351 metres.

***crassicostatus** (Melvill & Standen, 1907). Chrysodomus (Sipho) crassicostatus Melvill & Standen, 1907, p. 138, 1912, p. 355 and 1914, p. 120. Type locality: Scotia Bay, 9-10 fathoms, South Orkneys.
Melvill & Standen (1912, p. 355) consider Strebel's astrolabiensis a synonym but Thiele (1912) lists them as separate species. The former add the localities Burdwood Bank, 56 fathoms and North West Falklands for crassicostatus.

***daphnelloides** Powell, 1958. Prosipho daphnelloides Powell, 1958, p. 196. Type locality: Off Enderby Land, 300 metres.

***elongatus** Thiele, 1912. Prosipho elongatus Thiele, 1912, p. 210: Smith, 1915, p. 70: Powell, 1958, p. 195. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to McMurdo Sound, 193-420 metres.

fuscus Thiele, 1912. Prosipho fuscus Thiele, 1912, p. 246, Type locality: Kerguelen Island.

***gaussianus** Thiele, 1912. Prosipho gaussianus Thiele, 1912, p. 209. Type locality: Gauss Station, Davis Sea.

***glacialis** Thiele, 1912. Prosipho glacialis Thiele, 1912, p. 208: Powell, 1958, p. 196. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Davis Sea, 300 metres.

***gracilis** Thiele, 1912. Prosipho gracilis Thiele, 1912, p. 207. Type locality: Gauss Station, Davis Sea.

***hedleyi** Powell, 1958. Prosipho hedleyi Powell, 1958, p. 195. Type locality: Off Enderby Land, 220 metres.

***hunteri** Hedley, 1916. Prosipho hunteri Hedley, 1916, p. 56: Powell, 1951, p. 147 and 1958, p. 196. Type locality: Commonwealth Bay, Adelie Land, 25 fathoms. Range: South Georgia, Enderby Land and Adelie Land, 90-300 metres.

***macleani** Hedley, 1916. Prosipho mundus macleani Hedley, 1916, p. 57: Powell, 1958, p. 196. Type locality: Commonwealth Bay, Adelie Land, 25 fathoms. Range: Enderby Land to Adelie Land, 50-220 metres.

***madigani** Hedley, 1916. Prosipho madigani Hedley, 1916, p. 56: Powell, 1951, p. 148. Type locality: Commonwealth Bay, Adelie Land, 25-50 fathoms. Range: Also Palmer Archipelago, 278-500 metres (Powell).

***mundus** Smith, 1915. Prosipho mundus Smith, 1915, p. 70: Powell, 1958, p. 197. Type locality: McMurdo Sound, 250 fathoms. Range: Enderby Land and McMurdo Sound, 220-500 metres.

***nodosus** Thiele, 1912. Prosipho nodosus Thiele, 1912, p. 36. Type locality: Gauss Station, Davis Sea.

pellitus Thiele, 1912. Prosipho pellitus Thiele, 1912, p. 245: Powell, 1957, p. 133. Type locality: Observatory Bay, Kerguelen Island.

***perversus** Powell, 1951. Prosipho perversus Powell, 1951, p. 147. Type locality: South Georgia, 155-178 metres.

***priestleyi** (Hedley, 1916). Trophon priestleyi Hedley, 1916, p. 87. Type locality: "Raised beach", McMurdo Sound.

propinquus Thiele, 1912. Prosipho propinquus Thiele, 1912, p. 245: Powell, 1957, p. 133. Type locality: Observatory Bay, Kerguelen Island.

pupa Thiele, 1912. Prosipho pupa Thiele, 1912, p. 246. Type locality: Observatory Bay, Kerguelen Island.

***pusillus** Thiele, 1912. Prosipho pusillus Thiele, 1912, p. 208. Type locality: Gauss Station, Davis Sea.

***reversa** Powell, 1958. Prosipho reversa Powell, 1958. p. 197. Type locality: Enderby Land, 220 metres.

***similis** Thiele, 1912. Prosipho similis Thiele, 1912, p. 207: Smith, 1915, p. 70: Powell, 1958, p. 196. Type locality: Gauss Station, Davis Sea. Range: Enderby Land, Davis Sea, Oates Land and MacRobertson Land, 177-400 metres.

***spiralis** Thiele, 1912. Prosipho spiralis Thiele, 1912, p. 209: Hedley, 1916, p. 57: Powell, 1958, p. 197. Type locality: Gauss Station, Davis Sea. Range: Enderby Land, Davis Sea and Commonwealth Bay, 193-800 metres.

***tuberculatus** Smith, 1915. Prosipho tuberculatus Smith, 1915, p. 71. Type locality: McMurdo Sound, 190-250 fathoms.

NASSARIIDAE

Nassarius Dumeril, 1806: Buccinum mutabile Linn.

vallentini (Melvill & Standen, 1907). Nassa (Ilyanassa) vallentini Melvill & Standen, 1907, p. 108. Type locality: Port William, Falkland Islands.

Other Magellanic members of the genus are taeniatus (Philippi, 1845) and coppingeri Smith, 1881. The genus Buccinanops Orbigny, 1841, is represented by squalidus (King, 1831), citrinus (Reeve) and globulosum elata Strebel, 1907 and Hima Leach, 1852, by gayi (Kiener, 1834).

MURICIDAE

Typhis (Typhina) Jousseaume, 1880 (o.d.): Typhis belcheri Broderip.

belcheri Broderip, 1833. Typhis belcheri Broderip, 1833, p. 178: Smith, 1915, p. 92. Type locality: "Cape Blanco, West Africa" = probably Cape Blanco, east coast Patagonia (Smith, 1915). Range: Also west of Falkland Islands, 125 fathoms.

Trophon Montfort, 1810 (o.d.): Trophon magellanicus (Gmelin).

***albolabratus** Smith, 1875. Trophon albolabratus Smith, 1875, p. 68 and 1877, p. 170: Trophon cinguliferus Martens & Pfeffer, 1886, p. 70: Melvill & Standen, 1907, p. 106: Strebel, 1908, p. 42: Powell, 1957, p. 134. Type localities: Royal Sound, Kerguelen Island (albolabratus), South Georgia (cinguliferus). Range: Kerguelen Island, South Georgia and South Orkneys (Melvill & Standen, 1907). Erroneously recorded from Macquarie Island by both Hedley (1916) and Tomlin (1948). See mawsoni Powell. Melvill & Standen's (1898) record from Lively Island, Falklands requires confirmation.

***brevispira** Martens, 1885. Trophon brevispira Martens, 1885, p. 91: Martens & Pfeffer, 1886, p. 68: Strebel, 1908, p. 42: David, 1934, p. 128: Powell, 1951, p. 154. Type locality: South Georgia.

***condensatus** Hedley, 1916. Trophon condensatus Hedley, 1916, p. 60. Type locality: Commonwealth Bay, 25 fathoms, Adelie Land.

***coulmanensis** Smith, 1907. Trophon coulmanensis Smith, 1907, p. 3: Thiele, 1912, p. 212: Smith, 1915, p. 73: Hedley, 1916, p. 61. Type locality: Off Coulman Island, 100 fathoms. Range: Also Gauss Station, Oates Land and Martz Glacier Tongue, 200-600 metres.

***cribellum** Strebel, 1908. Trophon cribellum Strebel, 1908, p. 41: David, 1934, p. 128. Type locality: South Georgia, 75 metres.

***cuspidarioides** Powell, 1951. Trophon cuspidarioides Powell, 1951, p. 155. Type locality: Off Cumberland Bay, 120-204 metres, South Georgia.

***distantelamellatus** Strebel, 1908. Trophon distantelamellatus Strebel, 1908, p. 43: Powell, 1951, p. 154. Type locality: South Georgia, 64-74 metres.

declinans Watson, 1882. Trophon declinans Watson, 1882, p. 388 and 1886, p. 168: Powell, 1951, p. 155. Type locality: Off Marion Island, 69 fathoms. Range: Also North East Falklands, 229-236 metres (Powell).

Erroneously recorded from Macquarie Island by Tomlin (1948). See macquariensis Powell.

***drygalskii** Thiele, 1912. Trophon drygalskii Thiele, 1912, p. 213: Smith, 1915, p. 73: Powell, 1958, p. 197. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 193-300 metres.

***echinolamellatus** Powell, 1951. Trophon echinolamellatus Powell, 1951, p. 152. Type locality: Off Cape Bowles, Clarence Island, 342 metres.

***enderbyensis** Powell, 1958. Trophon enderbyensis Powell, 1958, p. 197. Type locality: Off Enderby Land, 193 metres.

geversianus (Pallas, 1769). Buccinum geversianus Pallas, 1769, p. 33: Gould, 1852, p. 227: (Gay) Hupé, 1854, p. 167: Tryon, 1880, p. 144: Rochebrune & Mabille, 1889, p. 53: Strebel, 1905a, p. 173: Smith, 1905, p. 334: Melvill & &Standen, 1907, p. 106: Strebel, 1908, p. 37: Melvill & Standen, 1914, p. 120: Murex magellanicus Gmelin, 1792, p. 3548, No. 80 (excl. var. B.): Dillwyn, 1817, p. 730: d'Orbigny, 1841, p. 451: Murex lamellosus Dillwyn, 1817, p. 730: Murex patagonicus d'Orbigny, 1841, p. 451: Murex varians d'Orbigny, 1841, p. 451: Powell, 1951, p. 151. Type locality: Strait of Magellan (geversianus). Range: Southern Chile and Argentina, Strait of Magellan, Tierra del Fuego and Falkland Islands. 0-100 metres.

***longstaffi** Smith, 1907. Trophon longstaffi Smith, 1907, p. 3. Type locality: Flagon Point, 20 fathoms, Ross Sea.

macquariensis Powell, 1957. Trophon declinans Tomlin, 1948, p. 228 (not of Watson, 1882): Trophon macquariensis Powell, 1957, p. 143. Type locality: Lusitania Bay, Macquarie Island, 69 metres.

malvinarum Strebel, 1908. Trophon malvinarum Strebel, 1908, p. 44. Type locality: Falkland Islands, 197 metres.

mawsoni Powell, 1957. Trophon albolabratus: Hedley, 1916, p. 60: Finlay, 1927, p. 424 and Tomlin, 1948, p. 228 (not of Smith, 1875): Trophon mawsoni Powell, 1957, p. 142. Type locality: Lusitania Bay, 69 metres, Macquarie Island.

***minutus** Melvill & Standen, 1907. Trophon minutus (Strebel ms.) Melvill & Standen, 1907, p. 107: Strebel, 1908, p. 44: Melvill & Standen, 1912, p. 354: Powell, 1951, p. 155. Type locality: Scotia Bay, South Orkneys, 9-15 fathoms. Range: Also Bismark Strait, Palmer Archipelago, 93-130 metres (Powell).

ohlini Strebel, 1905. Trophon ohlini Strebel, 1905a, p. 203: Powell, 1951, p. 154. Type locality: Puerto Harris, 15 fathoms, Patagonia. Range: Patagonia to Falkland Islands, 30-219 metres.

pelseneeri Smith, 1915. Trophon pelseneeri Smith, 1915, p. 92. Type locality: West of Falkland Islands, 125 fathoms.

philippianus Dunker, 1878. Fusus intermedius (Gay) Hupé, 1854 (not F. intermedius Cristofori & Jan, 1832), p. 166: Tryon, 1880, Pl. 70, f. 433: Rochebrune & Mabille, 1889, p. 53: Trophon philippianus Dunker, 1878, p. 277: Strebel, 1904a, p. 174: Melvill & Standen, 1907, p. 107 and 1912, p. 354: Powell, 1951, p. 152. Type locality: Strait of Magellan. Range: Strait of Magellan, Falkland Islands and Burdwood Bank, 56 fathoms.

***poirieria** Powell, 1951. Trophon poirieria Powell, 1951, p. 155. Type locality: Bismark Strait, Palmer Archipelago, 93-130 metres. Range: Also Clarence Island, South Shetlands, 342 metres.

scolopax Watson, 1881. Trophon scolopax Watson, 1881, p. 392 and 1886, p. 171. Type locality: Between Kerguelen and Heard Islands, 150 fathoms.

***scotianus** Powell, 1951. Trophon scotianus Powell, 1951, p. 153. Type locality: Off South Georgia, 107 metres.

septus Watson, 1882. Trophon septus Watson, 1882, p. 391 and 1886, p. 170: Powell, 1957, p. 134. Type locality: Royal Sound, 28 fathoms, Kerguelen Island.

***shackletoni shackletoni** Hedley, 1911. Trophon shackletoni Hedley, 1911, p. 7: Smith, 1915, p. 73: Hedley, 1916, p. 61: Powell, 1951, p. 153 and 1958, p. 198. Type locality: Off Cape Royds, 7-20 fathoms. Range: Enderby Land to Ross Sea, 14-456 metres.

***shackletoni paucilamellatus** Powell, 1951. Trophon shackletoni paucilamellatus Powell, 1951, p. 153. Type locality: South Georgia, 132-148 metres. Range: South Georgia and South Sandwich Islands, 100-148 metres.

A Magellanic member of the typical genus is acanthodes Watson, 1881. Most of the Magellanic Trophons belong to Xymenopsis.

Trophon (Stramonitrophon) Powell, 1951 (o.d.): Trophon laciniatus Martyn.

***laciniatus** ((Gay) Hupé, 1854). Buccinum laciniatum Martyn, 1789, Pl. 42 (non. binom.): (Gay) Hupé, 1854, p. 168: Rochebrune & Mabille, 1889, p. 53: Strebel, 1905a, Pl. 3, f. 1-8 and 1908, p. 37: Melvill & Standen, 1914, p. 120: Powell, 1951, p. 156. Type locality: Strait of Magellan. Range: Strait of Magellan, Falklands, Burdwood Bank and South Georgia, 79-88 metres.

Trophon (Fuegotrophon) Powell, 1951 (o.d.): Fusus crispus Gould, 1849.

pallidus (Broderip, 1832). Murex pallidus Broderip, 1932, p. 194: Powell, 1951, p. 157: Fusus crispus Gould, 1849, p. 141 (non Borson, 1821): Tryon, 1880, p. 143: Strebel, 1905a, p. 204: Melvill & Standen, 1907, p. 106 and 1914, p. 119: Fusus fimbriatus (Gay) Hupé, 1854, p. 165 (non Borson, 1821): Fusus fasciculatus Hombron &Jacquinot, 1854, p. 110: Trophon crispus burdwoodianum Strebel, 1908, p. 38. Type localities: Falkland Islands (pallidus); Strait of Magellan (crispus, fimbriatus and fasciculatus); Burdwood Bank (burdwoodianum). Range: Strait of Magellan to Falklands and Burdwood Bank, 10-150 metres.

A second Magellanic species is pelecetus Dall, 1902.

Xymenopsis Powell, 1951 (o.d.): Fusus liratus Gould.

albidus (Philippi, 1846). Fusus albidus Philippi, 1846, p. 119: Strebel, 1904, p. 222: Powell, 1951, p. 159. Type locality: ? Strait of Magellan. Range: Magellan-Falklands area, 27-187 metres.

brucei (Strebel, 1904). Trophon brucei Strebel, 1904, p. 230: Melvill & Standen, 1907, p. 105. Type locality: Falkland Islands or Strait of Magellan. Range: Port Stanley, Falkland Islands, 1-10 fathoms (Melvill & Standen).

couthouyi (Strebel, 1904). Trophon couthouyi Strebel, 1904, p. 236 and 1908, p. 38: Melvill & Standen, 1914, p. 120. Type locality: Strait of Magellan. Range: Strait of Magellan, Tierra del Fuego and Falkland Islands.

decolor (Philippi, 1845). Fusus decolor Philippi, 1845, p. 68: Hombron & Jacquinot, 1853, Pl. 25, f. 6-8: (Gay) Hupé, 1854, p. 162: Rochebrune & Mabille, 1889, p. 54: Strebel, 1904, p. 210 and 1908, p. 39. Type locality: Strait of Magellan. Range: Strait of Magellan, Tierra del Fuego and Falklands.

elegans (Strebel, 1904). Trophon elegans Strebel, 1904, p. 241. Type locality: Port Stanley, 4-5 fathoms, Falkland Islands.

elongatus (Strebel, 1904). Trophon elongatus Strebel, 1904, p. 217 and 1908, p. 37. Type locality: Strait of Magellan. Range: Several Magellanic localities and Port William, Falkland Islands.

falklandicus (Strebel, 1908). Trophon falklandicus Strebel, 1908, p. 39: Melvill & Standen, 1912, p. 354: Powell, 1951, p. 159. Type locality: Falkland Islands, 7-40 metres.

hoylei (Strebel, 1904). Trophon hoylei Strebel, 1904, p. 227: Melvill & Standen, 1907, p. 107. Type locality: Falkland Islands.

liratus (Gould, 1849). Buccinum cancellarioides Reeve, 1847 (non Basterot in Grateloup, 1840-1846): Fusus liratus (Couthouy, ms.) Gould, 1849, p. 141: Strebel, 1905a, p. 238: Melvill & Standen, 1907, p. 107: Strebel, 1908, p. 37: Melvill & Standen, 1914, p. 120: Fusus textiliosus Hombron & Jacquinot, 1843, Pl. 25, f. 9, 10: Powell, 1951, p. 158. Type locality: Patagonia (liratus). Range: Patagonia and Strait of Magellan to Falklands.

ornatus (Strebel, 1904). Trophon ornatus Strebel, 1904, p. 231. Type locality: Port Stanley, 5 fathoms, Falkland Islands.

standeni (Strebel, 1904). Trophon standeni Strebel, 1904, p. 232. Type locality: Falkland Islands.

The following Magellanic species described as Trophon are referable to Xymenopsis:—acuminatus (Strebel, 1904), albus (Strebel, 1904), candidatus and dispar (Rochebrune & Mabille, 1889), fenestratus (Strebel, 1904), lebruni (Rochebrune & Mabille, 1889), obesus, paessleri, paessleri turrita, pseudoelongatus and ringei (Strebel, 1904), violaceus (Rochebrune & Mabille, 1889) and possibly amettei (Carcelles, 1946).

In any revision of the Subantarctic Trophons the following names require investigation:—buccineus Gray, 1939, cretaceus Reeve, 1847 and muriciformis King, 1831, all three recorded from Lively

Island, Falklands by Melvill & Standen (1898, p. 100), corrugatus Reeve, 1848, which may equal muriciformis King, according to Tryon (1880, p. 145) and plumbeus Gould, 1846-48, not of Philippi, 1844.

THAISIDAE

Acanthina Fischer de Waldheim, 1807 (Gray, 1847): Buccinum monoceros Chemnitz (= Buccinum calcar Martyn).

imbricata (Lamarck, 1816). Buccinum calcar Martyn, 1784, f. 50 (non binom.): Monoceros imbricatum Lamarck, 1816, p. 2 and 1844, p. 119: Monoceros striatum Lamarck, 1844, p. 119: Melvill & Standen, 1914, p. 123: Carcelles & Williamson, 1951, p. 291: Rochebrune & Mabille, 1889, p. 62: Strebel, 1908, p. 45. Type localities: Magellan Seas (imbricatum), Cape Horn (calcar). Range: Strait of Magellan and Falkland Islands (Strebel, Melvill & Standen).

The characteristic Magellanic Thaisid, Concholepas concholepas (Bruguiere, 1789) does not appear to extend to the Falklands.

COLUMBARIIDAE

Columbarium Martens, 1881: Pleurotoma spinicincta Martens.

***benthocallis** Melvill & Standen, 1907. Columbarium benthocallis Melvill & Standen, 1907, p. 140. Type locality: 62° 10′ S, 41° 20′ W, 1775 fathoms.

VOLUTIDAE

Adelomelon Dall, 1906 (o.d.): Voluta ancilla Solander.

ancilla (Solander, 1786). Voluta ancilla Solander, 1786, p. 137: Lamarck, 1816, Pl. 385, f. 3: Strebel, 1906, Pl. 8: Dall, 1907, p. 355: Melvill & Standen, 1914, p. 123: Smith, 1942, p. 55: Voluta magellanica Chemnitz, 1788, pp. 138-9, in part: Gmelin, 1791, p. 3465: Kiener, 1839, Pl. 51: Reeve, 1849, Pl. 17, f. 39: Lahille, 1895, p. 311 (with new vars. typica, ponderosa, elongata, expansa and abbreviata): Strebel, 1906, Pl. 8: Dall, 1907, p. 355: Smith, 1942, p. 57: Voluta spectabilis Gmelin, 1791, p. 3468: Voluta bracata Rochebrune & Mabille, 1889, p. 48: Scaphella (Voluta) arnheimi Rivers, 1891, "Monterey, California" Sic. = Magellan Region: Powell, 1951, p. 161. Type localities: Strait of Magellan. Range: Argentina, Patagonia, Strait of Magellan, Tierra del Fuego and Falkland Islands, 0-172 metres.

becki (Broderip, 1836). Voluta becki Broderip, 1836, p. 43: Melvill & Standen, 1898, p. 99: Strebel, 1907, p. 97. Type locality: ? Probably Patagonia. Range: Strait of Magellan and Lively Island, Falklands.

mangeri (Preston, 1901): Cymbiola mangeri Preston, 1901, p. 237: Smith, 1942, p. 59: Powell, 1951, p. 162. Type locality: Falkland Islands.

Other Magellanic species are ferussaci (Donovan, 1824), martensi (Strebel, 1906), subnodosa (Leach, 1815) and tuberculata (Wood, 1828).

Miomelon Dall, 1907 (o.d.): Volutilithes philippiana Dall.

scoresbyana Powell, 1951. Miomelon scoresbyana Powell, 1951, p. 163. Type locality: Between Falkland Islands and Strait of Magellan, 150 metres.

Guivillea Watson, 1886 (monotypy): Wyvillea alabastrina Watson.

***alabastrina** (Watson, 1882). Wyvillea alabastrina Watson, p. 332 and 1886, p. 262: Melvill & Standen, 1907, p. 140. Type locality: Between Marion Island and Crozets, 1600 fathoms. Range: Also 60° 10′ S, 41° 20′ W, 1775 fathoms (Melvill & Standen).

Provocator Watson, 1882 (monotypy): P. pulcher Watson.

pulcher Watson, 1882. Provocator pulcher Watson, 1882, p. 330 and 1886, p. 260: Powell, 1951, p. 164. Type locality: Off Cumberland Bay, Kerguelen Island, 105 fathoms. Range: Also between Kerguelen and Heard Islands, 150 fathoms and between Falkland Islands and Patagonia, 304-290 metres.

Harpovoluta Thiele, 1912 (monotypy): H. vanhoffeni Thiele.

***charcoti** (Lamy, 1910). Buccinum charcoti Lamy, 1910b, p. 318 and 1911a, p. 4: Thiele, 1912, p. 271: Smith, 1915, p. 72: Eales, 1923, p. 33: Powell, 1951, p. 164 and 1958, p. 199. Type locality: Off King George Sound, South Shetlands. 420 metres. Range: South Shetlands to Kemp Land.

***vanhoffeni vanhoffeni** Thiele, 1912. Harpovoluta vanhoffeni Thiele, 1912, p. 213: Hedley, 1916, p. 53. Type locality: Gauss Station, Davis Sea. Range: Also Mertz Glacier Tongue, Wilkes Land and Shackleton Ice-shelf, 110-288 fathoms.
Tomlin's (1948, p. 229) record of this species from Macquarie Island is based upon an Admete (Powell, 1957, p. 143).

***vanhoffeni striatula** Thiele, 1912. Harpovoluta vanhoffeni striatula Thiele, 1912, p. 214. Type locality: Gauss Station, Davis Sea.

Paradmete Strebel, 1908 (Powell, 1951): P. typica Strebel.

***curta** Strebel, 1908. Paradmete curta Strebel, 1908, p. 23: Powell, 1958, p. 198. Type locality: Shag Rock Bank, South Georgia, 160 metres. Range: Also Enderby Land, 193-300 metres and off Mackenzie Sea, 456 metres.

***fragillima** (Watson, 1882). Volutomitra fragillima Watson, 1882, p. 334 and 1886, p. 263: Smith, 1915, p. 74: Paradmete typica Strebel, 1908, p. 22: Powell, 1951, p. 165, 1957, p. 134 and 1958, p. 198. Type localities: Royal Sound, 28 fathoms, Kerguelen Island (fragillima), South Georgia, 75 metres (typica). Range: Burdwood Bank, South Georgia, Palmer Archipelago, Enderby Land, Kaiser Wilhelm Land and Kerguelen Island, 24-603 metres.

***longicauda** Strebel, 1908. Paradmete longicauda Strebel, 1908, p. 24. Type locality: South Georgia, 95 metres.

***percarinata** Powell, 1951. Paradmete percarinata Powell, 1951, p. 166 and 1958, p. 198. Type locality: Clarence Island, South Shetlands, 785-810 metres. Range: Also off Enderby Land, 300 metres.

***porcellana** (Melvill & Standen, 1912). Mitra (Volutomitra) porcellana Melvill & Standen, 1912, p. 355. Type locality: Scotia Bay, 9-10 fathoms, South Georgia. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).
A Magellanic species is Mitra crymochara Rochebrune & Mabille, 1885 (Powell, 1951, p. 166).

CANCELLARIIDAE

Admete Kroyer, 1842 (monotypy): Admete crispa Moeller.

***antarctica** Strebel, 1908. Admete antarctica Strebel, 1908, p. 21: Powell, 1951, 167 and 1958, p. 200. Type locality: South West of Snow Hill Island, 125 metres. Range: Also Clarence Island, and South Shetlands, 200-342 metres; Off Enderby Land, 193 metres.

carinata (Watson, 1883). Cancellaria (Admete) carinata Watson, 1883, p. 327 and 1886, p. 275: Carcelles & Williamson, 1951, p. 304 Type locality: Royal Sound, 28 fathoms, Kerguelen Island. Range: Also Falklands and Tierra del Fuego (Carcelles & Williamson).

***consobrina** Powell, 1951. Admete consobrina Powell, 1951, p. 167 and 1958, p. 200. Type locality: North of South Georgia, 160 metres. Range: Also MacRobertson Land, 177 metres.

***delicatula** Smith, 1907. Admete delicatula Smith, 1907, p. 4 and 1915, p. 74: Hedley, 1916, p. 54. Type locality: Discovery Winter Quarters, 130 fathoms. Range: Adelie Land to Ross Sea.

***enderbyensis** Powell, 1958. Admete enderbyensis Powell, 1958, p. 201. Type locality: Off Enderby Land, 300 metres. Range: Also Mackenzie Sea, 540 metres.

harpovoluta Powell, 1957. Harpovoluta vanhoffeni: Tomlin, 1948 (not of Thiele, 1912): Toledonia globosa: Tomlin, 1948 (not of Hedley, 1916): Admete harpovoluta Powell, 1957, p. 143. Type locality: Off Lusitania Bay, 69 metres, Macquarie Island.

magellanica Strebel, 1905. Admete magellanica Strebel, 1905b, p. 594: Melvill & Standen, 1907, p. 111 and 1914, p. 124: Powell, 1951, p. 166. Type locality: Smyth Channel, Strait of Magellan. Range: Strait of Magellan and Patagonia to Falklands, 40-313 metres.

specularis (Watson, 1882). Cancellaria (Admete) specularis Watson, 1882, p. 325 and 1886, p. 274: Powell, 1957, p. 134. Type locality: Near Royal Sounds, 25 fathoms, Kerguelen Island.
Magellanic species are frigida Rochebrune & Mabille, 1889, philippii Carcelles, 1950 (= australis Philippi, 1856 non Sowerby, 1841) and schythei (Philippi, 1856).

OLIVIIDAE

Baryspira Fischer, 1883 (Cossmann, 1899): Ancillaria australis Sowerby.

***longispira** (Strebel. 1908). Ancillaria longispira Strebel, 1908, p. 26. Type locality: Between South Georgia and Falklands, 2675 metres. Probably a new subgenus but I have not seen examples.

MARGINELLIDAE

Marginella Lamarck, 1799 (monotypy): Voluta glabella Linn.

***ealesae** Powell, 1958. Marginella hyalina: Smith, 1915, p. 74 (non Thiele, 1912): Eales, 1923, p. 36 (non Thiele, 1912). Type locality: Off Enderby Land, 300 metres. Range: Enderby Land to Ross Sea.

dozei Rochebrune & Mabille, 1889. Marginella dozei Rochebrune & Mabille, 1889, p. 52: Powell, 1951, p. 160. Type locality: Between Strait of Magellan and Falkland Islands, 120 metres. Range: Also between Cape Horn and Tierra del Fuego, 121 metres.

***hyalina** Thiele, 1912. Marginella hyalina Thiele, 1912, p. 213: Hedley, 1916, p. 54: Powell, 1958, p. 199. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Davis Sea, 193-320 metres.

perrieri Bavay, 1905. Marginella (Volvarina) perrieri Bavay, 1905, p. 248. Type locality: Falkland Islands.

warrenii Marrat, 1876. Marginella warrenii Marrat, 1876, p. 136: Tryon, 1883, p. 56: Tomlin, 1917, p. 305: Powell, 1951, p. 160: Marginella hahni Mabille, 1884, p. 132: Rochebrune & Mabille, 1889, p. 51. Type localities: "50° 23′ 5″ N, 64° 0′ 4″ W", error for S. latitude = between Falkland Islands and Strait of Magellan (warreni), between Strait of Magellan and Falkland Islands, 120 metres (hahni). Range: Falkland Islands to Patagonia and Tierra del Fuego, 118-367 metres.

TURRIDAE

Aforia Dall, 1889 (o.d.): Pleurotoma circinata Dall.

goniodes (Watson, 1881). Pleurotoma clara Martens, 1880, p. 35 (non Reeve, 1845): Pleurotoma (Surcula) goniodes Watson, 1881, p. 394 and 1886, Pl. 20: Martens & Thiele, 1903, p. 90: Powell, 1951, p. 168. Type localities: Patagonia, 60 fathoms (clara); South-east of Rio de la Plata, Argentina, 600 fathoms (goniodes). Range: Also between Falklands and Patagonia, 150 metres.

lepta (Watson, 1881). Pleurotoma (Surcula) lepta Watson, 1881, p. 391 and 1886, p. 288. Type locality: 53° 55′ S, 108° 35′ E, 1950 fathoms.

***magnifica** (Strebel, 1908). Surcula magnifica Strebel, 1908, p. 19: Powell, 1951, p. 167 and 1958, p. 201. Type locality: South West of Snow Hill Island, 150 metres. Range: Palmer Archipelago, South Shetlands, South Sandwich Islands, Mackenzie Sea and Enderby Land, 150-540 metres.

staminea (Watson, 1881). Pleurotoma (Surcula) staminea Watson, 1881, p. 390 and 1886, p. 286: Powell, 1957, p. 113. Type locality: Off Marion and Prince Edward Islands, 1375 fathoms. Range: Also off Cumberland Bay, Kerguelen, 105 fathoms.

trilix (Watson, 1881). Pleurotoma (Surcula) trilix Watson, 1881, p. 390 and 1886, p. 287: Powell, 1957, p. 135. Type locality: Between Kerguelen and Heard Islands, 150 fathoms. Range: Also Royal Sound, 45 and 55 metres, Kerguelen Island.

Leucosyrinx Dall, 1889 (o.d.): Pleurotoma verrilli Dall.

falklandica Powell, 1951. Leucosyrinx falklandica Powell, 1951, p. 169. Type locality: North of Falkland Islands, 336-342 metres.

***macrobertsoni** Powell, 1958. Leucosyrinx macrobertsoni Powell, 1958, p. 202. Type locality: Off MacRobertson Land, 177 metres.

***mawsoni** Powell, 1958. Leucosyrinx mawsoni Powell, 1958, p. 201. Type locality: Off Mackenzie Sea, 456 metres. Range: Also off Enderby Land, 193 metres.

paragenota Powell, 1951. Leucosyrinx paragenota Powell, 1951, p. 169. Type locality: Burdwood Bank, South of Falklands, 171-169 metres.

***paratenoceras** Powell, 1951. Leucosyrinx paratenoceras Powell, 1951, p. 168. Type locality: King George Island, South Shetlands, 367-382 metres. Range: Palmer Archipelago, Clarence Island and South Shetland Islands, 200-810 metres.

Belaturricula Powell, 1951 (o.d.): Bela turrita Strebel.

***turrita** (Strebel, 1908). Bela turrita Strebel, 1908, p. 18: Powell, 1951, p. 170. Type locality: Shag Rock, west of South Georgia, 160 metres. Range: Also Cumberland Bay, South Georgia, 160 metres.

Conorbela Powell, 1951 (o.d.): Bela antarctica Strebel.

***antarctica** (Strebel, 1908). Bela antarctica Strebel, 1908, p. 16: Powell, 1951, p. 170. Type locality: South West of Snow Hill Island, 125 metres. Range: Also Clarence Island and South Sandwich Islands, 125-342 metres.

Lorabela Powell, 1951 (o.d.): Bela pelseneri Strebel.

?*bathybia (Strebel, 1908). ?Pleurotomella bathybia Strebel, 1908, p. 20. Type locality: Cumberland Bay, 252-310 metres, South Georgia.

***davisi** (Hedley, 1916). Oenopota davisi Hedley, 1916, p. 54: Powell, 1958, p. 202. Type locality: Adelie Land, 288 fathoms. Range: Also Enderby Land, 193-300 metres.

***notophila** (Strebel, 1908). Bela notophila Strebel, 1908, p. 16: Powell, 1951, p. 171. Type locality: Cumberland Bay, 252-310 metres, South Georgia.

***pelseneri** (Strebel, 1908). Bela pelseneri Strebel, 1908, p. 15: Powell, 1951, p. 171. Type locality: Cumberland Bay, 252-310 metres, South Georgia.

***plicatula** (Thiele, 1912). Bela plicatula Thiele, 1912, p. 215: Powell, 1951, p. 171 and 1958, p. 202. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 220-640 metres.

Belalora Powell, 1951 (o.d.): Belalora thielei Powell.

***striatula** (Thiele, 1912). Bela striatula Thiele, 1912, p. 215: Powell, 1958, p. 203. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 193 metres.

thielei Powell, 1951. Belalora thielei Powell, 1951, p. 172. Type locality: North West of Falklands to Patagonia, 165 metres. Range: Falkland Islands to Patagonia, 106-219 metres.

Pleurotomella Verril, 1873 (monotypy): P. packardi Verril.

***annulata** Thiele, 1912. Pleurotomella annulata Thiele, 1912, p. 217: Powell, 1958, p. 203. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 193 metres.

anomalapex Powell, 1951. Pleurotomella ? anomalapex Powell, 1951, p. 173. Type locality: Between Falkland Islands and Patagonia, 162 metres.

***enderbyensis** Powell, 1958. Pleurotomella enderbyensis Powell, 1958, p. 203. Type locality: Off Enderby Land, 193 metres.

***frigida** Thiele, 1912. Pleurotomella frigida Thiele, 1912, p. 216: Powell, 1958, p. 203. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 193-300 metres.

ohlini (Strebel, 1905). Thesbia ohlini Strebel, 1905b, p. 592: Powell, 1951, p. 173. Type locality: Fortescue Bay, 10-12 fathoms, Strait of Magellan. Range: North of Falklands to Strait of Magellan, 20-247 metres.

?papyracea (Watson, 1881). Pleurotoma (Thesbia) papyracea Watson, 1881, p. 450 and 1886, p. 338. Type locality: Between Prince Edward Island and Crozets, 1600 fathoms.

***simillima** Thiele, 1912. Pleurotomella simillima Thiele, 1912, p. 216: Powell, 1951, p. 172 and 1957, p. 135. Type locality: Gauss Station, Davis Sea. Range: Also Ross Sea, 351 metres and south of Kerguelen Island, 150 metres.

Spirotropis G. O. Sars, 1878 (monotypy): S. carinata Philippi.

***remota** Powell, 1958. Spirotropis remota Powell, 1958, p. 204. Type locality: Off Enderby Land, 300 metres.

studeriana (Martens, 1878). Pleurotoma studeriana Martens, 1878, p. 22: Watson, 1886, p. 322: Powell, 1957, p. 135. Type locality: Kerguelen Island. Range: 45-55 metres.

Pontiothauma Smith, 1895 (o.d.): P. mirabile Smith.

***ergata** Hedley, 1916. Pontiothauma ergata Hedley, 1916, p. 55: Powell, 1958, p. 204. Type locality: Off Shackleton Ice-shelf, 240 fathoms. Range: Also Enderby Land, 193-300 metres, Sabrina Land, 474 metres and MacRobertson Land, 177 metres.

Eumetadrillia Woodring, 1928 (o.d.): Agladrillia (E.) serra Woodring.

fuegiensis (Smith, 1888). Pleurotoma (Surcula) fuegiensis Smith, 1888, p. 300: Powell, 1951, p. 173. Type locality: Strait of Magellan. Range: Between Falklands, Argentina, Patagonia, Strait of Magellan and Tierra del Fuego, 79-148 metres.

Typhlomangelia G. O. Sars, 1878: Pleurotoma nivale Lovén.

fluctuosa (Watson, 1881). Pleurotoma (Drillia) fluctuosa Watson, 1881, p. 416 and 1886, p. 319: Pleurotoma (Typhlomangelia) cariosa Watson, 1886, p. 319: Powell, 1957, p. 135. Type localities: Heard Island, 75 fathoms (fluctuosa) and Royal Sound, 28 fathoms, Kerguelen Island (cariosa). Range: Also south of Kerguelen, 150 metres.

?*principalis Thiele, 1912. Typhlomangelia ? principalis Thiele, 1912, p. 215. Type locality: Gauss Station, Davis Sea.

Typhlodaphne Powell, 1951 (o.d.): Bela purissima Strebel.

corpulenta (Watson, 1881). Pleurotoma (Thesbia) corpulenta Watson, 1881, p. 446 and 1886, p. 331: Powell, 1957, p. 136. Type locality: Royal Sound, 28 fathoms, Kerguelen Island. Range: Kerguelen Island, 0-60 metres.

platamodes (Watson, 1881). Pleurotoma (Thesbia) platamodes Watson, 1881, p. 447 and 1886, p. 332: Powell, 1957, p. 113. Type locality: Royal Sound, 28 fathoms, Kerguelen Island.

***purissima** (Strebel, 1908). Bela purissima Strebel, 1908, p. 17: Powell, 1951, p. 174. Type locality: Off Shag Rocks, west of South Georgia, 160 metres. Range: South Georgia, 160-177 metres.

***translucida** (Watson, 1881). Pleurotoma (Thesbia) translucida Watson, 1881, p. 444 and 1886, p. 330: Thiele, 1912, p. 248: Powell, 1951, p. 175, 1957, p. 136 and 1958, p. 204. Type locality: Half-way between Marion Island and Prince Edward Island, 140 fathoms. Range: Also Kerguelen Island, 20-30 metres and Enderby Land, 193-300 metres.

GENERIC LOCATION UNCERTAIN

***anderssoni** Strebel, 1908. Bela anderssoni Strebel, 1908, p. 14: Melvill & Standen, 1912, p. 355. Type locality: South East of Seymour Island, 150 metres. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

***deliciosa** Thiele, 1912. Pleurotomella deliciosa Thiele, 1912, p. 217. Type locality: Gauss Station, Davis Sea.

***fulvicans** Strebel, 1908. Bela fulvicans Strebel, 1908, p. 15: Melvill & Standen, 1912, p. 356 and 1914, p. 123. Type locality: South Georgia, 24-52 metres. Range: Also Astrolabe Island, 95 metres (Strebel), Burdwood Bank, 56 fathoms, and Roy Cove, North West Falklands (Melvill & Standen).

***glacialis** Thiele, 1912. Bela glacialis Thiele, 1912, p. 215. Type locality: Gauss Station, Davis Sea.

michaelseni Strebel, 1905. Bela michaelseni Strebel, 1905, p. 587 and 1908, p. 14. Type locality: Port Harris, 15 fathoms, Strait of Magellan. Range: Also Stanley Harbour, 10 metres, Falkland Islands.

The following Turrids, described or recorded from the Magellanic Region require taxonomic evaluation:—Pleurotoma (Mangelia) coppingeri, Smith, 1881, Pleurotoma (Bela) cunninghami Smith, 1881, Cymatosyrinx elissa Dall, 1919, Bela gazellae Strebel, 1905, Pleurotoma hyemalis Rochebrune & Mabille, 1889, Drillia janseni Strebel, 1905, Drillia kophameli Strebel, 1905, Bela lateplicata Strebel, 1905, Bela martensi Strebel, 1905, Buccinum magellanicum Philippi, 1848, Pleurotoma patagonica magellanica Martens, 1881, Thesbia michaelseni Strebel, 1905, Bela paessleri Strebel, 1905, Pleurotoma patagonica Orbigny, 1841, Daphnella payeni Rochebrune & Mabille, 1889, and Drillia suxdorfi Strebel, 1905.

Melvill & Standen's (1907, p. 111) record of the European Mangilia costata Donovan, from Port William, Falkland Islands, based upon "One somewhat shattered example", should be ignored.

ACTEONIDAE

Acteon Montfort, 1810 (monotypy): Acteon tornatilis Montfort = tornatilis Linn.

***antarcticus** Thiele, 1912. Actaeon antarcticus Thiele, 1912, p. 219: Powell, 1951, p. 175 and 1958, p. 205. Type locality: Gauss Station, 380 metres, Davis Sea. Range: Also Clarence Island and South Shetlands, 200-380 metres.

bullatus (Gould, 1847). Tornatella bullata Gould, 1847, p. 251: Tryon & Pilsbry, 1893, p. 163: Powell, 1951, p. 175. Type locality: Off Patagonia. Range: Falkland Islands to Patagonia, 80-152 metres. Other Magellanic species are curtulus and delicatulus Dall, 1889, ringei Strebel, 1905 and vagabunda Mabille & Rochebrune, 1885.

Neactaeonina Thiele, 1912 (o.d.): Actaeonina cingulata Strebel.

***cingulata** (Strebel, 1908). Actaeonina cingulata Strebel, 1908, p. 8: Thiele, 1912, p. 219: Odhner, 1926, p. 4: Powell, 1951, p. 176. Type locality: South Georgia, 24-52 metres. Range: Also Clarence Island, 342 metres.

edentula (Watson, 1883). Actaeon edentula Watson, 1883, p. 284 and 1886, p. 632: Thiele, 1912, p. 219: Powell, 1957, p. 136. Type locality: Royal Sound, Kerguelen Island, 60 fathoms. Range: Kerguelen Island, 120-150 metres. My 1951 (p. 176) records of edentula from South Georgia and South Shetlands refer either to cingulata or to a new species, but the available material is not good enough to decide.

***fragilis** Thiele, 1912. Neactaeonina fragilis Thiele, 1912, p. 219: Hedley, 1916, p. 63: Powell, 1951, p. 176 and 1958, p. 206. Type locality: Gauss Station, Davis Sea. Range: Enderby Land to Ross Sea, 220-600 metres.

Toledonia Dall, 1902 (o.d.): T. perplexa Dall, 1902 (=Odostomiopsis Thiele, 1903 = Ohlinia Strebel, 1905).

circumrosa (Thiele, 1903). Odostomiopsis circumrosa Thiele, 1903, p. 69: Thiele, 1912, p. 249: Powell, 1957, p. 137. Type locality: Gazelle Harbour, Kerguelen Island.

***elata** Thiele, 1912. Toledonia elata Thiele, 1912, p. 249: Powell, 1957, p. 137 and 1958, p. 206. Type locality: Observatory Bay, Kerguelen Island. Range: Also off Enderby Land, 220 metres.

***globosa** Hedley, 1916. Toledonia globosa Hedley, 1916, p. 63: Powell, 1951, p. 177 and 1958, p. 206. Type locality: Off Mertz Glacier Tongue, 288 fathoms. Range: Enderby Land to Ross Sea, 220-640 metres.

Tomlin (1948, p. 229) erroneously recorded this species from Macquarie Island. (See Admete harpovoluta Powell, 1957.)

***hedleyi** Powell, 1958. Toledonia major elata Hedley, 1916, p. 63 (non Thiele, 1912): Toledonia major Thiele, 1912 (non Hedley, 1911), Pl. 14, f. 14, 15: Powell, 1958, p. 206. Type locality: Commonwealth Bay, 25 fathoms, Adelie Land. Range: Also off Adelie Land, 640 metres (Powell).

limnaeaeformis (Smith, 1879). Admete ? limnaeaeformis Smith, 1879, p. 172: Strebel, 1905b, p. 597: Thiele, 1912, p. 249: Odhner, 1926, p. 15: Powell, 1951, p. 176: Odostomiopsis typica Martens & Thiele, 1903, p. 68. Type localities: Kerguelen Island. Range: Also Tierra del Fuego, 118 metres (Powell), Prince Edward Island (Watson, 1886) and Burdwood Bank (Melvill & Standen, 1912).

***major** (Hedley, 1911). Odostomiopsis major Hedley, 1911, p. 6: Powell, 1951, p. 177 and 1958, p. 206. Type locality: Cape Royds. Range: South Shetlands and Enderby Land to MacRobertson Land, 177-300 metres (Powell).

media Thiele, 1912. Toledonia media Thiele, 1912, p. 249. Type locality: Observatory Bay, Kerguelen Island.

perplexa Dall, 1902. Toledonia perplexa Dall, 1902b, p. 513: Ohlinia limnaeaeformis Strebel, 1905b (non Smith, 1879), f. 32a, only: Powell, 1951, p. 177. Type locality: East of Punta Arenas, 61 fathoms, Strait of Magellan. Range: Also Port Stanley, Falkland Islands, 0-2 metres.

***punctata** Thiele, 1912. Toledonia punctata Thiele, 1912, p. 249: Powell, 1951, p. 177 and 1957, p. 136. Type locality: Observatory Bay, Kerguelen Island. Range: Kerguelen Island, —150 metres and South Georgia, 155-178 metres.

***striata** Thiele, 1912. Toledonia striata Thiele, 1912, p. 219. Type locality: Gauss Station, Davis Sea.

The genus is represented in the New Zealand Southern Islands by Toledonia succineaformis Powell, 1955 (p. 114) from 14 miles north of Auckland Islands, 95 fathoms.

SCAPHANDRIDAE

Kaitoa Marwick, 1931 (o.d.): Kaitoa haroldi Marwick.

***scaphandroides** Powell, 1951. Kaitoa scaphandroides Powell, 1951, p. 179. Type locality: West Cumberland Bay, South Georgia, 251 metres. Range: South Georgia, 26-251 metres.

Cylichnina Monterosato, 1884 (Cossmann, 1895): Cylichna strigella Loven.

***cumberlandiana** Strebel, 1908. Cylichnina cumberlandiana Strebel, 1908, p. 11. Type locality: Cumberland Bay, South Georgia, 250 metres.

***gelida** (Smith, 1907). Bullinella gelida Smith, 1907, p. 12: Thiele, 1912, p. 220: Powell, 1951, p. 179 and 1958, p. 207. Type locality: Discovery Winter Quarters, 130 fathoms. Range: Enderby Land to Ross Sea, 193-351 metres.

***georgiana** Strebel, 1908. Cylichnina georgiana Strebel, 1908, p. 10: Odhner, 1926, p. 4: Powell, 1951, p. 179. Type locality: Off Stromness Harbour, South Georgia, 252-310 metres.

RETUSIDAE

Retusa Brown, 1827 (Iredale, 1915): Bulla obtusa Montagu.

***anderssoni** Strebel, 1908. Retusa anderssoni Strebel, 1908, p. 9. Type locality: South Georgia, 22 metres.

***antarctica** (Pfeffer, 1886). Utriculus antarcticus Martens & Pfeffer, 1886, p. 109. Type locality: South Georgia.

***frigida** Hedley, 1916. Retusa frigida Hedley, 1916, p. 88. Type locality: "Raised beach", McMurdo Sound.

Melvill & Standen's (1907, p. 141) record of the European Retusa truncatula (Brug.) from the Falklands is improbable.

DIAPHANIDAE

Diaphana Brown, 1827: Retusa minuta Brown.

***antarctica** (Melvill & Standen, 1912). Retusa antarctica Melvill & Standen, 1912, p. 357. Type locality: Scotia Bay, 9-10 fathoms, South Orkneys.

***extrema** Thiele, 1912. Diaphana extrema Thiele, 1912, p. 220. Type locality: Gauss Station, Davis Sea.

***inflata** (Strebel, 1908). Retusa inflata Strebel, 1908, p. 10. Type locality: Cumberland Bay, 252-310 metres, South Georgia.

kerguelenensis Thiele, 1912. Diaphana kerguelenensis Thiele, 1912, p. 220. Type locality: Kerguelen Island.

paessleri (Strebel, 1905). Retusa paessleri Strebel, 1905b, p. 577: Powell, 1951, p. 179. Type locality: Patagonia. Range: Falkland Islands and South Georgia, 12-40 metres (Strebel), East Falklands, 115 metres (Powell).

***pfefferi** (Strebel, 1908). Retusa pfefferi Strebel, 1908, p. 10. Type locality: South Georgia, 12-15 metres.

Newnesia Smith, 1902 (monotypy): N. antarctica Smith (= Anderssonia Strebel, 1908).

***antarctica** Smith, 1902. Newnesia antarctica Smith, 1902, p. 208: Hedley, 1916, p. 64: Odhner, 1926, p. 7. Type locality: Cape Adare, 20-24 fathoms. Range: Also Shackleton Ice-shelf, 110 fathoms (Hedley).

***sphinx** (Strebel, 1908). Anderssonia sphinx Strebel, 1908, p. 12. Type locality: Paulet Island, 100-150 metres.

APLUSTRIDAE

Parvaplustrum Powell, 1951 (o.d.): P. tenerum Powell.

tenerum Powell, 1951. Parvaplustrum tenerum Powell, 1951, p. 180. Type locality: East Falklands, 105-115 metres. Range: Falklands area, 104-300 metres.

PHILINIDAE

Philine Ascanius, 1772: Philine aperta Linn.

***alata** Thiele, 1912, Philine alata Thiele, 1912, p. 220: Powell, 1951, p. 177 and 1958, p. 207. Type locality: Gauss Station, Davis Sea. Range: Palmer Archipelago, South Orkneys, South Shetlands and South Sandwich Islands to Enderby Land and Davis Sea, 18-329 metres.

amoena Thiele, 1925. Philine amoena Thiele, 1925, p. 280: Powell, 1957, p. 137. Type locality: Gazelle Bay, Kerguelen Island. Range: —55 metres.

***antarctica** Smith, 1902. Philine antarctica Smith, 1902, p. 208. Type locality: Cape Adare, 20 fathoms.

***apertissima** Smith, 1902. Philine apertissima Smith, 1902, p. 208. Type locality: Cape Adare, 24 fathoms.

falklandica Powell, 1951. Philine falklandica Powell, 1951, p. 178. Type locality: Between Falkland Islands and Patagonia, 116 metres. Range: Also north of Falklands, 116-219 metres.

***gibba** Strebel, 1908. Philine gibba Strebel, 1908, p. 13: Odhner, 1926, p. 17: Powell, 1951, p. 177. Type locality: South Georgia, 20 metres. Range: 20-329 metres.

kerguelensis Thiele, 1925. Philine kerguelensis Thiele, 1925, p. 279: Powell, 1951, p. 178. Type locality: Kerguelen Island. Range: Also North West of Falklands, 116 metres (Powell).

PYRAMIDELLIDAE

Odostomia Fleming, 1817 (Dall & Bartsch): Turbo plicatus Montagu.

biplicata Strebel, 1908. Odostomia biplicata Strebel, 1908, p. 65: Melvill & Standen, 1914, p. 119: Carcelles & Williamson, 1951, p. 277. Type locality: Berkley Sound, 16 metres, Falkland Islands. Range: Also Tierra del Fuego (Carcelles & Williamson).

***georgiana** (Martens & Pfeffer, 1886). ?Liostomia georgiana Martens & Pfeffer, 1886, p. 98. Type locality: South Georgia.

peregrina Thiele, 1912. Odostomia peregrina Thiele, 1912, p. 235. Type locality: Observatory Bay, Kerguelen Island.

***translucens** (Strebel, 1908). Volutaxiella translucens Strebel, 1908, p. 64. Type locality: South Georgia, 22 metres.

sp.

Odostomia rissoides Hanley, 1844, p. 18: Watson, 1886, p. 481. Type locality: Guernsey. Range: Recorded by Watson from between Marion Island and Prince Edward Island, 50-140 fathoms, but doubtfully.

Streptocionella Martens & Pfeffer, 1886 (monotypy): S. singularis M. & P.

***singularis** Martens & Pfeffer, 1886. Streptocionella singularis Martens & Pfeffer, 1886, p. 99. Type locality: South Georgia.

Chemnitzia Orbigny, 1893 (Dall & Bartsch): Melania campanellae Phil.

lamyi (Hedley, 1916). Turbonilla lamyi Hedley, 1916, p. 62: Powell, 1955, p. 117. Type locality: Lusitania Bay, Macquarie Island.

***polaris** Hedley, 1916. Turbonilla polaris Hedley, 1916, p. 86. Type locality: "Raised beach", McMurdo Sound.

smithi (Strebel, 1905). Turbonilla smithi Strebel, 1905, p. 659: Melvill & Standen, 1912, p. 353, and 1914, p. 119. Type locality: Strait le Maire, Tierra del Fuego. Range: Also Burdwood Bank, 56 fathoms and North West Falklands (Melvill & Standen).

Turbonilla (s.l.).

xenophyes Melvill & Standen, 1912. Turbonilla xenophyes Melvill & Standen, 1912, p. 353. Type locality: Burdwood Bank, 56 fathoms. A Magellanic species of uncertain generic status is Turbonilla madrinensis Lamy, 1906.

Order PTEROPODA

The following pteropods have been taken in Antarctic or Subantarctic waters.

***Cavolina longirostris** (Lesueur, 1821). West Antarctica, 63° 18′ S, 45° 3′ w, surface (Hubendick, 1951, p. 5).

***Hyalocylis striata** (Rang, 1828). West Antarctica, 63° 25′ S, 45° 39′ W, 2800-0 metres (Hubendick, 1951, p. 5).

***Clio sulcata** (Pfeffer, 1879). South of New Zealand, 52° S (Massy, 1920, p. 212): South Georgia and between South Georgia and Falklands (Massy, 1932, p. 276).

Embolus inflatus (Orbigny, 1847). South of New Zealand to Ross Sea (Massy, 1920, p. 220).

***Spiratella australis** (Eydoux & Souleyet, 1840). West Antarctica, 53° 1′ S, 51° 53′ W, 200-0 metres, etc. (Hubendick, 1951, pp. 5, 6).

***Spiratella balea** (Moeller, 1841). South of New Zealand (Massy, 1920, p. 221): South Georgia to South Shetland Islands (Massy, 1932, p. 283).

***Spiratella costulata** (Preston, 1916). Bransfield Strait, South Shetlands (Preston, 1916, p. 269).

***Spiratella helicina** (Phipps, 1744). South of New Zealand to Ross Sea, 52° S (Massy, 1920, p. 216); West Antarctica, 65° 49′ S, 58° 40′ W, 250-0 metres and 48° 27′ S, 42° 36′ W, 2500-0 metres (Hubendick, 1951, p. 5); South Georgia (Massy, 1932, p. 281).

Thilea procera Strebel, 1908. Tierra del Fuego (Strebel, 1908, p. 84).

Procymbulia valdiviae Meisenheimer, 1905. West Subantarctic, 48° 27′ S, 42° 36′ W, 2500-0 metres (Hubendick, 1951, p. 6).

***Spongiobranchaea australis** Orbigny, 1840. South of New Zealand to Ross Sea (Massy, 1920, p. 225: Hedley, 1916, p. 64); South Georgia and South Sandwich Islands (Massy, 1932, p. 290).

***Clione antarctica** Smith, 1902. Ross Sea and McMurdo Sound (Massy, 1920, p. 223); Adelie Land (Hedley, 1916, p. 64); South Georgia, South Shetlands and Bouvet Island (Massy, 1932, p. 294).

Proclio subteres Hubendick, 1951. West Subantarctic, 48° 27′ S, 42° 36′ W, 2500-0 metres (Hubendick, 1951, p. 6).

PLEUROBRANCHIDAE

Bouvieria Vayssière, 1896: Pleurobranchus aurantiacus Risso.

patagonica (Orbigny, 1837). Pleurobranchus patagonica Orbigny, 1837, p. 204: Carcelles & Williamson, 1951, p. 312. Type locality: East coast of Argentina, 41° S. Range: Chile, Patagonia, Strait of Magellan and Falkland Islands (Carcelles & Williamson).

platei (Bergh, 1898). Pleurobranchus platei Bergh, 1898, p. 494: Odhner, 1926, p. 24: Carcelles & Williamson, 1951, p. 312. Type locality: Calbuco, Chile. Range: Also Burdwood Bank (Carcelles & Williamson).

DUVAUCELIIDAE

Duvaucelia Risso, 1826 (monotypy): D. gracilis Risso.

***appendiculata** Eliot, 1905. Tritonia appendiculata Eliot, 1905, p. 526. Type locality: Scotia Bay, 9 fathoms, South Orkneys.

***challengeriana** (Bergh, 1884). Tritonia challengeriana Bergh, 1884, p. 727: Eliot, 1907, p. 354: Tritonia antarctica Pfeffer, 1886, p. 112: Odhner, 1926, p. 36: Carcelles & Williamson, 1951, p. 312. Type localities: West coast of Patagonia (challengeriana), Antarctic Bay, South Georgia (antarctica). Range: Also Falkland Islands (Carcelles & Williamson) and Ross Sea (Eliot).

vorax Odhner, 1926. Duvaucelia vorax Odhner, 1926, p. 37. Type locality: Burdwood Bank, 137-150 metres.

poirieri Rochebrune & Mabille, 1891. Microlophus poirieri Rochebrune & Mabille, 1889, p. 11: Candiella australis Bergh, 1898, p. 536: Odhner, 1926, p. 38: Carcelles & Williamson, 1951, p. 313. Type localities: Orange Bay, Tierra del Fuego (poirieri), Calbuco, Chile (australis). Range: Strait of Magellan, Patagonia, Falklands and Burdwood Bank (Carcelles & Williamson).
The genus Microlophus Rochebrune & Mabille, 1889 proposed for this species and used subgenerically by Carcelles & Williamson is preoccupied by Duméril & Bibron, 1837 (Rept.).

Tritoniella Eliot, 1907: Tritoniella belli Eliot.

***belli** Eliot, 1907. Tritoniella belli Eliot, 1907, p. 6: Odhner, 1934, p. 290. Type locality: Discovery Winter Quarters. Range: Also McMurdo Sound, 348-547 metres.

***sinuata** Eliot, 1907. Tritoniella sinuata Eliot, 1907, p. 10: Hedley, 1916, p. 66: Odhner, 1926, p. 40 and 1934, p. 292. Type locality: Discovery Winter Quarters. Range: Also McMurdo Sound, 92-457 metres (Odhner): Commonwealth Bay, Adelie Land, 25 fathoms (Hedley): Falklands, South Georgia, Shag Rock and Seymour Island (Odhner, 1926).

BATHYDORIDIDAE

Bathydoris Bergh, 1884 (monotypy) :B. abyssorum Bergh.

***browni** Evans, 1914. Bathydoris browni Evans, 1914, pp. 191-209. Type locality: Off Coats Land, 2540 metres.

***clavigera** Thiele, 1912. Bathydoris clavigera Thiele, 1912, p, 220. Type locality: Gauss Station, Davis Sea.

***hodgsoni** Eliot, 1907. Bathydoris hodgsoni Eliot, 1907, p. 12: Hedley, 1916, p. 66. Type locality: Off Coulman Island, 100 fathoms. Range: Also Davis Sea, 120 fathoms (Hedley).

***inflata** Eliot, 1907. Bathydoris inflata Eliot, 1907, p. 17. Type locality: Discovery Winter Quarters.

***obliquata** Odhner, 1934. Bathydoris obliquata Odhner, 1934, p. 233. Type locality: McMurdo Sound, 366 metres.

NOTODORIDIDAE

Aegires (Anaegires) Odhner, 1934 (o.d.): Aegires albus Thiele.

***albus** Thiele, 1912. Aegires albus Thiele, 1912, p. 222: Hedley, 1916, p. 66: Odhner, 1926, p. 41. Type locality: Gauss Station, Davis Sea. Range: Also north of Joinville Island, 62° 55′ S, 55° 27′ W, 104 metres (Odhner).

***protectus** Odhner, 1934. Aegires (Anaegires) protectus Odhner, 1934, p. 241. Type locality: McMurdo Sound, 547 metres.

ONCHIDORIDAE

Acanthodoris Gray, 1850 (monotypy): Doris pilula Mueller.

falklandica Eliot, 1907. Acanthodoris falklandica Eliot, 1907, p. 358: Odhner, 1926, p. 46. Type locality: Falkland Islands.
A Magellanic species is vatheleti Rochebrune & Mabille, 1889.

Prodoridunculus Thiele, 1912 (monotypy): P. gaussianus Thiele.

***gaussianus** Thiele, 1912. Prodoridunculus gaussianus Thiele, 1912, p. 222. Type locality: Gauss Station, Davis Sea.

DORIDIDAE

Cadlina Bergh, 1879 (o.d.): Doris repanda A. & H. (= Doris laevis Linn).

***affinis** Odhner, 1934. Cadlina affinis Odhner, 1934, p. 251. Type locality: McMurdo Sound, 293 metres.

falklandica Odhner, 1926. Cadlina falklandica Odhner, 1926, p. 60: Carcelles & Williamson, 1951, p. 314. Type locality: Berkeley Sound, 16 metres, Falkland Islands. Range: Also Patagonia (Carcelles & Williamson).

kerguelensis Thiele, 1912. Cadlina kerguelensis Thiele, 1912, p. 250: Odhner, 1926, p. 57. Type locality: Kerguelen Island.
Magellanic species are laevigata Odhner, 1926 and magellanica Odhner, 1926.

Austrodoris Odhner, 1926: Archidoris rubescens Bergh.

***antarctica** (Hedley, 1916). Doris antarctica Hedley, 1916, p. 65. Type locality: Commonwealth Bay, 350-400 fathoms, Adelie Land.

***granulatissima** (Vayssière, 1917). Archidoris granulatissima Vayssière, 1917, p. 17: Odhner, 1934, p. 263. Type locality: West Antarctica. Range: Also off Oates Land and McMurdo Sound, 146-366 metres (Odhner).

***macmurdensis** Odhner, 1934. Austrodoris macmurdensis Odhner, 1934, p. 260. Type locality: Off Butter Point, 146 metres, McMurdo Sound.

***nivium** Odhner, 1934. Austrodoris nivium Odhner, 1934, p. 267. Type locality: McMurdo Sound, 406-441 metres.

***rubescens** (Bergh, 1898). Archidoris rubescens Bergh, 1898(p. 501: Odhner, 1934, p. 265. Type locality: Punta Arenas. Range: Also Falkland Islands, Burdwood Bank, Shag Rock Bank and South Georgia (Odhner, 1926).

***tomentosa** Odhner, 1934. Austrodoris tomentosa Odhner, 1934, p. 265. Type locality: McMurdo Sound, 180-200 metres. Range: Also Ross Sea, 190 fathoms and Oates Land, 180-200 fathoms.
Magellanic species are crenulata and michaelseni Odhner, 1926.

Doridigitata Orbigny, 1839 (monotypy): D. bertheloti Orbigny (= Staurodoris Bergh, 1878).

falklandica Eliot, 1907. Staurodoris falklandica Eliot, 1907, p. 356. Type locality: Falkland Islands.

Archidoris Bergh, 1878 (o.d.): Doris tuberculata Cuvier.

australis Bergh, 1884. Archidoris australis Bergh, 1884, p. 89. Type locality: Howe's Foreland, Kerguelen Island.

kerguelenensis Bergh, 1884. Archidoris kerguelenensis Bergh, 1884, p. 85. Type locality: Off Royal Sound, 25 fathoms, Kerguelen Island.

***nivalis** Thiele, 1912. Archidoris tuberculata var. Vayssière, 1906, p. 4: Archidoris nivalis Thiele, 1912, p. 221: Hedley, 1916, p. 65. Type locality: Gauss Station, Davis Sea. Range: Also Commonwealth Bay, Adelie Land (Hedley).

Geitodoris Bergh, 1891 (monotypy): Doris complanata Verrill.

falklandica Odhner, 1926. Geitodoris falklandica Odhner, 1926, p. 83. Type locality: Stanley Harbour, 10 metres, Falkland Islands.
A Magellanic species is patagonica Odhner, 1926.

Diaulula Bergh, 1880.

vestita (Abraham, 1877). Doris vestita Abraham, 1877, p. 252: Odhner, 1926, p. 89: Diaulula sandiegensis var. pallida Bergh, 1894, p. 172. Type localities: Strait of Magellan (vestita), Cape Delgada, east coast Patagonia (pallida). Range: Also Falkland Islands (Eliot).

Gargamella Bergh, 1894 (o.d.): G. immaculata Bergh.

immaculata Bergh, 1894. Gargamella immaculata Bergh, 1894, p. 175: Odhner, 1926, p. 92. Type locality: Cape Delgado, Patagonia, 77 metres. Range: North Argentina and Burdwood Bank, 140-150 metres.
Another Magellanic species is latior Odhner, 1926.

IDULIIDAE

Idulia Leach, 1852 (monotypy): Doris maculata Montagu (= Doto Oken, 1815).

***antarctica** (Eliot, 1907). Doto antarctica Eliot, 1907, p. 19: Odhner, 1934, p. 302. Type locality: Discovery Winter Quarters. Range: Also Cape Adare, 82-92 metres.

NOTAEOLIDIIDAE

Notaeolidia Eliot, 1905 (o.d.): N. gigas Eliot.

***depressa** Eliot, 1907. Notaeolidia depressa Eliot, 1907, p. 20: Hedley, 1916, p. 66. Type locality: McMurdo Sound, 4-10 fathoms. Range: Also Commonwealth Bay, 25 fathoms, Adelie Land.

***gigas** Eliot, 1905. Notaeolidia gigas Eliot, 1905, p. 520. Type locality: Scotia Bay, 9-10 fathoms, South Orkneys.

***purpurea** Eliot, 1905. Notaeolidia purpurea Eliot, 1905, p. 524. Type locality: Scotia Bay, 10 fathoms, South Orkneys.

***robsoni** Odhner, 1934. Notaeolidia robsoni Odhner, 1934, p. 278. Type locality: McMurdo Sound, 457 metres.

***rufipicta** Thiele, 1912. Notaeolidia rufipicta Thiele, 1912, p. 224. Type locality: Gauss Station, Davis Sea.

Pseudotritonia Thiele, 1912 (monotypy): P. quadrangularis Thiele.

***quadrangularis** Thiele, 1912. Pseudotritonia quadrangularis Thiele, 1912, p. . Type locality: Gauss Station, Davis Sea.

CHARCOTIIDAE

Charcotia Vayssière, 1906 (monotypy): Charcotia granulosa Vayssière.

***granulosa** Vayssière, 1906. Charcotia granulosa Vayssière, 1906, p. 148. Type locality: Wandel Island.

Telarma Odhner, 1934 (o.d.): T. antarctica Odhner.

***antarctica** Odhner, 1934. Telarma antarctica Odhner, 1934, p. 272. Type locality: Off Barne Glacier, 366 metres, McMurdo Sound.

EUBRANCHIDAE

Eubranchus Forbes, 1838 (monotypy): E. tricolor Forbes. (= Galvina Alder & Hancock, 1855).

***adarensis** Odhner, 1934. Eubranchus adarensis Odhner, 1934, p. 283. Type locality: Off Cape Adare, 82-92 metres.

falklandicus (Eliot, 1907). Galvina falklandica Eliot, 1907, p. 353: Odhner, 1934, p. 283. Type locality: Falkland Islands.

Galvinella Eliot, 1907: G. antarctica Eliot.

***antarctica** Eliot, 1907. Galvinella antarctica Eliot, 1907, p. 26. Type locality: Discovery Winter Quarters.

***glacialis** Thiele, 1912. Galvinella glacialis Thiele, 1912, p. 223. Type locality: Gauss Station, Davis Sea.
A Magellanic species is fuegiensis Odhner, 1926.

Coryphella Gray, 1850 (Ald. & Hanc., 1855): Eolis rufibranchialis Johnston.

***falklandica** Eliot, 1907. Coryphella falklandica Eliot, 1907, p. 354: Odhner, 1926, p. 26. Type locality: Falkland Islands. Range: Falkland Islands, South Georgia and Shag Rock Bank.

TERGIPEDIDAE

Tergipes Cuvier, 1805 (tautonomy): Limax tergipes Forskal.

***antarcticus** Pelseneer, 1903. Tergipes antarcticus Pelseneer, 1903, p. 15. Type locality: West Antarctica, 70° S, 85° W.

Guyvalvoria Vayssière, 1906 (monotypy): G. francaisi Vayssière.

***francaisi** Vayssière, 1906. Guyvalvoria francaisi Vayssière, 1906, p. 147. Type locality: Wandel Island.

Cuthonella Bergh, 1884 (o.d.): C. abyssicola Bergh.

***antarctica** Eliot, 1907. Cuthonella antarctica Eliot, 1907, p. 23. Type locality: Discovery Winter Quarters.

***modesta** Eliot, 1907. Cuthonella modesta Eliot, 1907, p. 25. Type locality: Discovery Winter Quarters.

***paradoxa** Eliot, 1907. Cuthonella paradoxa Eliot, 1907, p. 24. Type locality: Discovery Winter Quarters.

Cuthona Alder & Hancock, 1855 (monotypy): Eolis nana Alder & Hancock.

***antarctica** (Pfeffer, 1884). Aeolis antarctica Pfeffer, 1884 and 1886, p. 111: Odhner, 1926, p. 28. Type locality: South Georgia.

***georgiana** (Pfeffer, 1884). Aeolis georgiana Pfeffer, 1884 and 1886, p. 111: Odhner, 1926, p. 27. Type locality: South Georgia.

***schraderi** (Pfeffer, 1884). Aeolis schraderi Pfeffer, 1884 and 1886, p. 110: Odhner, 1926, p. 27. Type locality: South Georgia.

Cratena Bergh, 1864: Doris coerulea Montagu.

exigua Thiele, 1912. Cratena exigua Thiele, 1912, p. 252. Type locality: Observatory Bay, Kerguelen Island.

vallentini Eliot, 1907. Cratena vallentini Eliot, 1907, p. 352. Type locality: Falkland Islands.

AEOLIDIIDAE

Aeolidia Cuvier, 1798 (Gray, 1847): Doris papillosa (Linn).

serotina Bergh, 1874, Aeolidia serotina Bergh, 1874, p. 619: Eliot, 1907, p. 351: Odhner, 1926, p. 29: Carcelles & Williamson, 1951, p. 319. Type locality: Falkland Islands. Range: West Falkland Islands (Odhner), Chile and Patagonia (Carcelles & Williamson).
Other Magellanic nudibranchs are Ancula fuegiensis Odhner, 1926, Tierra del Fuego, Holoplocamus papposus Odhner, 1926, Magellan Sound and Trippa hispida Orbigny, 1836, Strait of Magellan.

SIPHONARIIDAE

Kerguelenella Powell, 1946 (o.d.): Siphonaria lateralis Gould (= Kerguelenia Rochebrune & Mabille, 1889) (non Stebbing, 1888).

***lateralis lateralis** (Gould, 1846). Siphonaria lateralis Gould, 1846, p. 153: Rochebrune & Mabille, 1889, p. 29: Strebel, 1907, p. 172: Melvill & Standen, 1914, p. 125: Hubendick, 1946, p. 26: Powell, 1957, p. 137: Siphonaria redimiculum Reeve, 1856, Pl. 5, f. 24: Siphonaria magellanica Philippi, 1875, p. 165. Type localities: Burnt Island, Orange Bay, Strait of Magellan (lateralis), probably Kerguelen Island (redimiculum). Range: Patagonia, Strait of Magellan, Falklands, South Georgia (Powell, 1951) and Kerguelen Island (Powell, 1957).

lateralis macquariensis (Powell, 1939). Kerguelenia macquariensis Powell, 1939, p. 238 and 1955, p. 122. Hubendick, 1946, p. 26. Type locality: Macquarie Island.
A Magellanic species name requiring investigation is macgillivrayi Reeve, 1856, recorded from Orange Bay by Rochebrune & Mabille, 1889, p. 28 and also from St. Paul (type locality) and Amsterdam Islands by Velain, 1878, p. 127.
The genus is represented in the New Zealand Region by stewartiana Powell, 1939, from Stewart, Snares and Bounty Islands and flemingi Powell, 1955 from Auckland, Campbell, and Antipodes Islands.

Pachysiphonaria Hubendick, 1945 (o.d.): Siphonaria lessoni Blainville.

lessoni (Blainville, 1824). Siphonaria lessoni Blainville, 1824, p. 49: Rochebrune & Mabille, 1889, p. 28: Melvill & Standen, 1898, p. 98: Hubendick, 1946, p. 21: Powell, 1951, p. 181. Type locality: Falkland Islands. Range: Patagonia and Falkland Islands.

sp.
Siphonaria tristensis Leach, 1824: Dall, 1870, p. 33: Strebel, 1908, p. 8: Melvill & Standen, 1914, p. 126: Siphonaria laeviuscula: Reeve, 1856, Pl. 1, f. 5 (non Sowerby): Hubendick, 1946, pp. 20, 22. Type localities: "Tristan d'Acunha" error for Orange Harbour, Tierra del Fuego (Reeve) Valparaiso (laeviuscula). Range: Recorded from the Falklands by both Strebel and Melvill & Standen but records doubtful according to Hubendick, 1946.
Another possible Magellanic member of this genus is Siphonaria antarctica Gould, 1852 from unknown locality but probably Strait of Magellan (Strebel, 1907, p. 173 and Hubendick, 1946, p. 66).
Dall, 1927 (p. 11) describes a minute Siphonarid as Williamia magellanica, from kelp at Port Churruca, Strait of Magellan.

ONCHIDIIDAE

Carcelles and Williamson (1951, p. 321) list a Magellanic species, Onchidium marginatum Gould, 1852 from Orange Bay, Tierra del Fuego.

SCAPHOPODA

DENTALIIDAE

Dentalium Linnaeus, 1758 (Montfort, 1810): Dentalium elephantinum Linn.

aegeum Watson, 1879. Dentalium aegeum Watson, 1879, p. 509 and 1886, p. 2: Powell, 1957, p. 138. Type locality: Off London River, 110 fathoms, Kerguelen Island.

***eupatrides** Melvill & Standen, 1907. Dentalium eupatrides Melvill & Standen, 1907, p. 112 and 1912, p. 358. Type locality: 71° 22′ S, 16° 34′ W, 1410 fathoms.

***magellanicum** Pilsbry & Sharp, 1897. Dentalium majorinum magellanicum Pilsbry & Sharp, 1897, p. 28: Powell, 1958, p. 207: Dentalium majorinum: Hedley, 1916, p. 67 (non Mabille & Rochebrune, 1889). Type locality: Strait of Magellan, 77½-369 fathoms. Range: Also near Shackleton Ice-shelf, 240 fathoms (Hedley), off Enderby Land, 193-300 metres, off Adelie Land, 640 metres, off Princess Elizabeth Land, 437 metres and off MacRobertson Land, 177 metres (Powell).

***majorinum gaussianus** Plate, 1908. Dentalium majorinum gaussianus Plate, 1908, p. 5. Type locality: Gauss Station, 385 metres, Davis Sea.

***majorinum grahamense** Odhner, 1931. Dentalium majorinum grahamense Odhner, 1931, p. 4. Type locality: Graham Land, 400 metres.

***megathyris** Dall, 1889. Dentalium megathyris Dall, 1889, p. 293: Dentalium shoplandi Melvill & Standen, 1907, p. 113 (non Jousseaume, 1894) and Melvill & Standen, 1912, p. 133. Type locality: Off Chiloe Island, South East Chile, 1050 fathoms. Range: Also 71° 22′ S, 16° 34′ W, 1410 fathoms.

SIPHONODENTALIIDAE

Cadulus (Polyschides) Pilsbry & Sharp, 1897 (o.d.): C. tetraschitus Watson.

***dalli antarcticus** Odhner, 1931. Cadulus dalli antarcticus Odhner, 1931, p. 5: ? C. dalli Powell, 1958, p. 207 (non Pilsbry & Sharp, 1898). Type locality: Graham Land, 360 metres. Range: Also off Enderby Land, 300 metres, off Princess Elizabeth Land, 437 metres and off MacRobertson Land, 177 metres (Powell, 1958, as dalli).

***thielei** Plate, 1908. Cadulus thielei Plate, 1908, p. 3. Type locality: Gauss winter station, 385 metres.

Siphonodentalium M. Sars, 1859: Dentalium lobatum Sowerby.

***minimum** Plate, 1908. Siphonodentalium minimum Plate, 1908, p. 4. Type locality: Gauss winter station, 3423 metres.

Magellanic Scaphopods are Cadulus dalli Pilsbry & Sharp, 1898 and Dentalium lebruni, majorinum and perceptum Mabille & Rochebrune, 1889.

PELECYPODA

SOLEMYIDAE

Solemya (Acharax) Dall, 1908 (o.d.): Solemya johnsoni Dall.

There are two Magellanic species, macrodactyla Rochebrune & Mabille, 1889 and patagonica Smith, 1855.

NUCULIDAE

Nucula Lamarck, 1788 (monotypy): Arca nucleus Linn.

falklandica Preston, 1912. Nucula falklandica Preston, 1912, p. 637. Type locality: Port Stanley, Falkland Islands.

kerguelensis Thiele, 1912. Nucula kerguelensis Thiele, 1912, p. 254: Powell, 1957, p. 114. Type locality: Kerguelen Island.

***notobenthalis** Thiele, 1912. Nucula notobenthalis Thiele, 1912, p. 254. Type locality: North west of Gauss Station, 2725 metres.

pisum Sowerby, 1832. Nucula pisum Sowerby, 1832, p. 198: Melvill & Standen, 1912, p. 360. Type locality: Valparaiso, 7-40 fathoms. Range: Also Falkland Islands (Melvill & Standen).

***sp.**

Nucula minuscula: (non Pfeffer, 1886) Melvill & Standen, 1907, p. 113: Soot-Ryen, 1951, p. 5. Locality: Scotia Bay, 9-15 fathoms, South Orkneys. The type of Pfeffer's Nucula minuscula, which is from South Georgia is a Mysella, probably synonymous with charcoti (Soot-Ryen, 1951, p. 33).

The following species ascribed to Nucula have been recorded from the Magellanic Province:—declivis Hinds, 1843, exigua Sowerby, 1832 (Dall, 1908), grayi Orbigny, pigafettae Dall, 1908, savatieri Rochebrune & Mabille, 1889, striata Sowerby and tanneri Dall, 1908.

Pronucula Hedley, 1902 (o.d.): P. decorosa Hedley.

mesembrina Hedley, 1916. Pronucula mesembrina Hedley, 1916, p. 17: Powell, 1955, p. 18. Type locality: Aerial Cove, Macquarie Island. The genus occurs also in the southern islands and mainland of New Zealand, Tasmania, southern Australia and New South Wales.

NUCULANIDAE

Nuculana (s.l.)

***inaequisculpta** (Lamy, 1906). Yoldia inaequisculpta Lamy, 1906, p. 125: Soot-Ryen, 1951, p. 6. Type locality: South Orkneys. Range: South Orkneys, South Shetlands and Palmer Archipelago, 75-150 metres (Soot-Ryen).

Carcelles & Williamson (1951, p. 324) record planulata Sowerby, 1871 from Patagonia.

Yoldiella Verrill & Bush, 1897 (o.d.): Yoldia lucida Loven.

***antarctica** (Thiele, 1912). Leda antarctica Thiele, 1912, p. 229: Powell, 1958, p. 171. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193-300 metres.

***ecaudata** (Pelseneer, 1903). Leda ecaudata Pelseneer, 1903, p. 22: Thiele, 1912, p. 229: Soot-Ryen, 1951, p. 5. Type locality: West Antarctica, 70° S, 80-92° W. Range: Also Gauss Station, Davis Sea.

***oblonga** (Pelseneer, 1903). Leda oblonga Pelseneer, 1903, p. 23: Hedley, 1916, p. 17: Soot-Ryen, 1951, p. 6. Type locality: West Antarctica, 70° S, 80-92° W. Range: Also off Shackleton Ice-shelf, 358 fathoms (Hedley).

***profundorum** (Melvill & Standen, 1912). Yoldia profundorum Melvill & Standen, 1912, p. 359: Soot-Ryen, 1951, p. 6. Type locality: 71° 22′ S, 16° 34′ W, 1410 fathoms.

***valettii** (Lamy, 1906). Yoldia valettii Lamy, 1906, p. 126: Soot-Ryen, 1951, p. 6. Type locality: South Orkneys.
A Magellanic species is granula Dall, 1908.

Propeleda Iredale, 1924 (o.d.): Leda ensicula Angas.

***longicaudata** (Thiele, 1912). Leda longicaudata Thiele, 1912, p. 229: Hedley, 1916, p. 18: Soot-Ryen, 1951, p. 5: Powell, 1951, p. 77 and 1958, p. 171. Type locality: Gauss Station, Davis Sea. Range: Belingshausen Sea to Adelie Land. Probably circum-Antarctic.

Yoldia (Aequiyoldia) Soot-Ryen, 1951 (o.d.): Yoldia subaequilateralis Smith.

isonota Martens, 1881. Yoldia isonota Martens, 1881, p. 79: Smith, 1885, p. 242: Soot-Ryen, 1951, p. 6: Powell, 1957, p. 115. Type locality: Kerguelen Island.

subaequilateralis Smith, 1875. Yoldia subaequilateralis Smith, 1875, p. 73 and 1877, p. 187: Soot-Ryen, 1951, p. 6: Powell, 1957, p. 114. Type locality: Swain's Bay, 7-10 fathoms, Kerguelen Island.

***woodwardi** Hanley, 1860. Yoldia woodwardi Hanley, 1860, p. 370: Reeve, 1871, pl. 1, f. 2: Pelseneer, 1903, p. 10: Lamy, 1906, p. 125: Soot-Ryen, 1951, p. 7: ?Yoldia eightsi Couthouy, 1839, p. 113: Melvill & Standen, 1907, p. 113 and 1914, p. 127: Smith, 1902b, p. 211: Hedley, 1911, p. 3: Soot-Ryen, 1951, pp. 6-8. Type localities: Near Falkland Islands (woodwardi), South Shetlands (eightsi). Range: Falkland Islands, Peter 1st. Island, Strait of Magellan, South Georgia, South Orkneys, South Shetlands, Palmer Archipelago and if eightsi is a synonym, as Soot-Ryen suggests, also South Orkneys and Ross Sea.

Silicula Jeffreys, 1879 (monotypy): Silicula fragilis Jeffreys.

***rouchi** Lamy, 1910. Silicula rouchi Lamy, 1910b, p. 394 and 1911, p. 30: Hedley, 1916, p. 18: Powell, 1958, p. 171. Type locality: Alexander Island, 250 metres. Range: Also Princess Elizabeth Land, MacRobertson Land and Adelie Land, 219-600 metres.

Carcelles & Williamson (1951, p. 324) record fragilis Jeffreys, 1879, from Patagonia.

MALLETIIDAE

Malletia Desmoulins, 1832 (Stoliczka): Malletia chilensis Desmoulins.

?*concentrica Thiele, 1912. Malletia concentrica Thiele, 1912, p. 254. Type locality: North west of Gauss Station, 3423 metres.

cumingii (Hanley, 1860). Solenella cumingii Hanley, 1860, p. 441: Carcelles & Williamson, 1951, p. 323. Type locality: Falkland Islands. Range: Falklands, Magellan Region and Rio de Janeiro (Carcelles & Williamson).

gigantea (Smith, 1875). Solenella gigantea Smith, 1875, p. 72 and 1877, p. 187: Thiele, 1912, p. 254: Hertlein & Strong, 1940, p. 421: Powell, 1957, p. 115. Type locality: Royal Sound, 10 fathoms, Kerguelen Island.

?*pellucida Thiele, 1912. Malletia pellucida Thiele, 1912, p. 254. Type locality: North west of Gauss Station, 2916 and 3423 metres.

***sabrina** Hedley, 1916. Malletia sabrina Hedley, 1916, p. 18: Powell, 1958, p. 172. Type locality: Off Shackleton Ice-shelf, 65° 6′ S, 96° 13′ E, 325 fathoms. Range: Also off MacRobertson Land, 219 metres.

Magellanic species are inaequalis Dall, 1908, magellanica Smith, 1881 and patagonica Rochebrune & Mabille, 1889 (= hyadesi Rochebrune & Mabille, 1889). Also, Carcelles & Williamson (1951) record subaequalis Sowerby, 1870.

Tindaria (Tindariopsis) Verrill & Bush, 1897 (o.d.): T. agathida Dall.

The Magellanic Nucula sulcqulata Couthouy, 1852 (= Leda lugubris A. Adams, 1856 = Leda orangica Rochebrune & Mabille, 1889) belongs here according to Hertlein & Strong (1940, p. 425).

ARCIDAE

Bathyarca Kobelt, 1891 (o.d.): Arca pectunculoides Scacchi.

***sinuata** Pelseneer, 1903. Bathyarca sinuata Pelseneer, 1903, p. 23: Lamy, 1911, p. 27: Soot-Ryen, 1951, p. 9. Type locality: West Antarctica, 70°-71° S, 80°-90° W.

***strebeli** Melvill & Standen, 1907. Arca (Bathyarca) strebeli Melvill & Standen, 1907, p. 144 and 1912, p. 360. Type locality: 67°33′ S, 36° 35′ W, 2000 fathoms.

LIMOPSIDAE

Limopsis Sassi, 1827 (Gray, 1847): Arca aurita Brocchi.

***enderbyensis** Powell, 1958. Limopsis enderbyensis Powell, 1958, p. 172. Type locality: Enderby Land, 193 metres.

hardingi Melvill & Standen, 1914. Limopsis hardingii Melvill & Standen, 1914, p. 128. Type locality: Roy Cove, Falkland Islands.

***hirtella** Rochebrune & Mabille, 1889. Limopsis hirtella Rochebrune & Mabille, 1889, p. 115: Lamy, 1911, p. 25: Powell, 1951, p. 77: Carcelles & Williamson, 1951, p. 326. Type locality: Orange Bay, Patagonia. Range: Patagonia, Tierra del Fuego, north of Falklands and Petermann Island.

***jousseaumi jousseaumi** (Rochebrune & Mabille, 1889). Felicia jousseaumi Rochebrune & Mabille, 1889, p. 78: Dall, 1908, p. 394: Lamy, 1911, p. 26: Thiele, 1912, p. 228: Powell, 1951, p. 78: Carcelles & Williamson, 1951, p. 9: Soot-Ryen, 1951, p. 9. Type locality: Beagle Channel, Tierra del Fuego. Range: Also Bellingshausen Sea, 487-512 metres (Powell).

This species is the type of Felicia Rochebrune & Mabille, 1889.

***jousseaumi grandis** Smith, 1907. Limopsis grandis Smith, 1907, p. 5: Thiele, 1912, p. 228: Hedley, 1916, p. 19: Powell, 1958, p. 173. Type locality: Near Antarctic Circle (Ross Sea) 254 fathoms. Range: Enderby Land to Ross Sea, 177-603 metres.

***laeviuscula** Pelseneer, 1903. Limopsis laeviuscula Pelseneer, 1903, p. 25. Type locality: West Antarctica, 71° S, 89° W.

***lilliei** Smith, 1915. Limopsis lilliei Smith, 1915, p. 76: Powell, 1958, p. 172. Type locality: McMurdo Sound, 250 fathoms. Range: Ross Sea to Enderby Land, 193-300 metres.

***longipilosa** Pelseneer, 1903. Limopsis longipilosa Pelseneer, 1903, p. 25: Melvill & Standen, 1912, p. 360: Soot-Ryen, 1951, p. 9. Type locality: West Antarctica, 71° S, 89° W. Range: Also Palmer Archipelago and Adelaide Island (Soot-Ryen).

***marionensis** Smith, 1885. Limopsis marionensis Smith, 1885, p. 254 and 1915, p. 75. Type locality: Off Marion Island, 140 fathoms. Range: Also Prince Edward Island, 100-150 fathoms and McMurdo Sound, 80-250 fathoms.

***scabra** Thiele, 1912. Limopsis scabra Thiele, 1912, p. 228: Powell, 1958, p. 172. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193 and 300 metres.

straminea Smith, 1885. Limopsis straminea Smith, 1885, p. 255. Type locality: Between Kerguelen and Heard Islands, 150 fathoms.

The following species have been recorded from the Magellan Province:—perieri P.Fischer, 1869 and habilliana Dall, 1908.

PHILOBRYIDAE

Hochstetteria Velain, 1878 (Kobelt, 1884): Hochstetteria aviculoides Velain (= Philippiella Pfeffer, 1886).

***bagei** (Hedley, 1916). Philippiella bagei Hedley, 1916, p. 20: Powell, 1958, p. 174. Type locality: 3-5 fathoms, Commonwealth Bay, Adelie Land. Range: Also Enderby Land, 193 and 220 metres, MacRobertson Land, 163 metres.

barbata (Thiele, 1912). Philobrya barbata Thiele, 1912, p. 252: Soot-Ryen, 1951, p. 10. Type locality: Observatory Bay, Kerguelen Island.

hamiltoni (Hedley, 1916). Philippiella hamiltoni Hedley, 1916, p. 17: Powell, 1955, p. 21. Type locality: Lusitania Bay, Macquarie Island.

kerguelensis (Smith, 1885). Mytilus kerguelensis Smith, 1885, p. 274: Powell, 1957, p. 118. Type locality: Royal Sound, shore, Kerguelen Island.

***limoides** (Smith, 1907). Philobrya limoides Smith, 1907, p. 4: Hedley, 1911, p. 3: Smith, 1915, p. 77: Soot-Ryen, 1951, p. 10: Powell, 1958, p. 173: Philippiella orbiculata Hedley, 1916, p. 21. Type localities: Discovery Winter Quarters (limoides), off Adelie Land, 288 fathoms (orbiculata). Range: Enderby Land to Ross Sea, 163-500 metres.

***meridionalis** (Smith, 1885). Mytilus meridionalis Smith, 1885, p. 273: Melvill & Standen, 1907, p. 115: Powell, 1957, p. 115: Philobrya laevis Thiele, 1912, p. 252. Type locality: Between Kerguelen and Heard Islands, 150 fathoms (meridionalis): Observatory Bay, Kerguelen Island (laevis). Range: Also Scotia Bay, 9-15 fathoms, South Orkneys (Melvill & Standen).

***obesa** Powell, 1958. Hochstetteria obesa Powell, 1958, p. 174. Type locality: Off Enderby Land, 193 metres.

***olstadi** (Soot-Ryen, 1951). Philippiella olstadi Soot-Ryen, 1951, p. 12. Type locality: Deception Island, South Shetlands.

***quadrata** (Pfeffer, 1886). Philippiella quadrata Pfeffer, 1886, p. 119: Melvill & Standen, 1907, p. 115: Soot-Ryen, 1951, p. 11. Type locality: South Georgia. Range: Also Scotia Bay, South Orkneys (Melvill & Standen).

***sublaevis** (Pelseneer, 1903). Philobrya sublaevis Pelseneer, 1903, p. 25: Lamy, 1906a, p. 51: Soot-Ryen, 1951, p. 10. Type locality: West Antarctica, 70° S, 80° 48′ W.

***tumida** (Thiele, 1912). Philobrya tumida Thiele, 1912, p. 227. Type locality: Gauss Station, Davis Sea.

***ungulata** (Pfeffer, 1886). Philippiella ungulata Pfeffer, 1886, p. 119: Soot-Ryen, 1951, p. 11. Type locality: South Georgia.

***wandelensis** (Lamy, 1906). Philobrya wandelensis Lamy, 1906, p. 16: Melvill & Standen, 1907, p. 116: Lamy, 1911, p. 24: Melvill & Standen, 1912, p. 361: Hedley, 1916, p. 19: Powell, 1958, p. 174. Type locality: Wandel Island, West Antarctica. Range: Probably circum-Antarctic. Burdwood Bank, 56 fathoms, Petermann Island, South Orkneys, Adelie Land, Enderby Land and MacRobertson Land, 10-300 metres.

Hochstetterina Thiele, 1935 (o.d.): Hochstetteria crenella Velain.

***limopsoides** (Thiele, 1912). Hochstetteria limopsoides Thiele, 1912, p. 227: Powell, 1958, p. 174. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193 and 220 metres.

Adacnarca Pelseneer, 1903 (o.d.): Adacnarca nitens Pelseneer.

***nitens** Pelseneer, 1903. Adacnarca nitens Pelseneer, 1903, p. 24: Lamy, 1911, p. 27: Thiele, 1912, p. 228: Hedley, 1916, p. 22: Smith, 1915, p. 76: Soot-Ryen, 1951, p. 13: Powell, 1958, p. 175. Type locality: West Antarctica, 70° S, 80° 48′ W. Range: Circum-Antarctic, 80-640 metres.

Lissarca Smith, 1877 (monotypy): Arca (Lissarca) rubrofusca Smith.

***bennetti** Preston, 1916. Lissarca bennetti Preston, 1916, p. 271. Type locality: Bransfield Strait, 15 fathoms, South Shetlands.

kerguelensis Thiele, 1912. Lissarca kerguelensis Thiele, 1912, p. 253: Smith, 1915, p. 75. Type locality: Kerguelen Island.

media Thiele, 1912. Lissarca media Thiele, 1912, p. 253. Type locality: Kerguelen Island.

***miliaris** (Philippi, 1845). Pectunculus miliaris Philippi, 1845, p. 56: David, 1934, p. 128: Soot-Ryen, 1951, p. 14: Carcelles & Williamson, 1951, p. 327. Type locality: Strait of Magellan. Range: Strait of Magellan, South Georgia, South Orkneys and Deception Island, South Shetlands (Soot-Ryen); 10-75 metres.

***notorcadensis** Melvill & Standen, 1907. Lissarca notorcadensis Melvill & Standen, 1907, p. 144: Smith, 1915, p. 75: Hedley, 1916, p. 19: Powell, 1951, p. 78 and 1958, p. 175: Arca (Bathyarca) gourdoni Lamy, 1911, p. 28: Thiele, 1912, p. 228. Type localities: Scotia Bay, 9-15 fathoms, South Orkneys (notorcadensis), Alexander Island (gourdoni). Range: Circum-Antarctic, 18-800 metres.

***rubrofusca** Smith, 1877. Lissarca rubrofusca Smith, 1877, p. 185: Martens & Pfeffer, 1886, p. 128: Melvill & Standen, 1907, p. 114: David, 1934, p. 128: Soot-Ryen, 1951, p. 9: Powell, 1957, p. 115. Type locality: Kerguelen Island. Range: Also South Orkneys (Melvill & Standen) and South Georgia (Martens & Pfeffer and David).

MYTILIDAE

Mytilus Linnaeus, 1758. (Gray, 1847): Mytilus edulis Linn.

edulis chilensis Hupé (Gay), 1854. Mytilus chilensis Hupé (Gay), 1854, p. 309: Rochebrune & Mabille, 1889, p. 117: Mytilus chiloensis Reeve, 1857, Pl. 6, f. 21: Mytilus fischerianus Tapparone-Canefri, 1874, p. 138: Mytilus infumatus Rochebrune & Mabille, 1889, p. 118: Mytilus hupeanus Rochebrune & Mabille, 1889, p. 118: Mytilus edulis Melvill & Standen, 1907, p. 115: Soot-Ryen, 1955, p. 19. Type localities: Valparaiso (chilensis), Island of Chiloe (chiloensis), Orange Bay, Tierra del Fuego (hupeanus and infumatus). Range: Chile, Patagonia, Strait of Magellan and Hearnden Water, Falkland Islands (Melvill & Standen).

edulis desolationis Lamy, 1936. Mytilus desolationis Lamy, 1936, p. 112: Mytilus kerguelensis Fletcher, 1938, p. 107: Soot-Ryen, 1955, p. 20 (as a synonym of edulis Linn.): Powell, 1957, p. 117. Type locality: Kerguelen Island (desolationis and kerguelensis).

Perna Retzius, 1788 (Soot-Ryen, 1955): Perna magellanica Retzius.

perna (Linnaeus, 1758). Mya perna Linn, 1758, p. 671: Mytilus elongatus Chemnitz, 1785: Perna magellanica Retzius, 1788: Mytilus magellanicus Roeding, 1798: Melvill & Standen, 1907, p. 115: Rochebrune & Mabille, 1889, p. 119: Smith, 1905, p. 338: Perna perna Soot-Ryen, 1955, p. 30. Type locality: Strait of Magellan. Range: Strait of Magellan and Atlantic coast of South America (Soot-Ryen), Falkland Islands (Melvill & Standen).

Choromytilus Soot-Ryen, 1952 (o.d.): Mytilus chorus Molina.

chorus (Molina, 1782). Mytilus chorus Molina, 1782, p. 177: Mytilus ungulatus Lamarck, 1819 (non Linn): Melvill & Standen, 1898, p. 104: Soot-Ryen, 1955, p. 31. Type locality: Chile. Range: Peru to Orange Bay, Tierra del Fuego and Lively Island, Falklands (Melvill & Standen).

Aulacomya Moerch, 1853 (Ihering, 1900): Mytilus magellanicus (Chemnitz) Lamarck, 1819.

ater ater (Molina, 1782). Mytilus ater Molina, 1782, p. 202: Mytilus magellanicus Chemnitz, Pl. 83, f. 742: Rochebrune & Mabille, 1889, p. 119: Melvill & Standen, 1907, p. 115: Smith, 1905, p. 338: Thiele, 1912, p. 253: Soot-Ryen, 1951, p. 33: Powell, 1957, p. 120. Type locality: Strait of Magellan? Range: Chile, Patagonia, Magellan area and Falkland Islands.

ater regia Powell, 1957. Aulacomya ater regia Powell, 1957, p. 120. Type locality: Bras Bolinder, 20-30 metres, Kerguelen Island.

Hormomya Moerch, 1853 (Jukes-Brown, 1905): Mytilus exustus Linn.

blakeanus Melvill & Standen, 1914. Brachyodontes (Hormomya) blakeanus Melvill & Standen, 1914, p. 211. Type locality: Roy Cove, Falkland Islands.

?ovalis Lamarck, 1819. Mytilus ovalis Lamarck, 1819, Pl. 219, f. 3: Melvill & Standen, 1907, p. 145. Type locality: Peru. Range: Also Hearnden Water, Falkland Islands (Melvill & Standen).

Crenella Brown, 1827 (monotypy): Mytilus decussatus Montagu

?marionensis Smith, 1885. Crenella marionensis Smith, 1885, p. 277. Type locality: Off Marion and Prince Edward Islands, 140 fathoms.

Melvill & Standen (1912, p. 135) recorded the European Crenella decussata Montagu from Burdwood Bank, 56 fathoms on the basis of minute examples. This record requires confirmation.

Dacrydium Torell, 1859: Modiola (?) vitrea Moeller.

***albidum** Pelseneer, 1903. Dacrydium albidum Pelseneer, 1903, p. 26: Thiele, 1912, Pl. 17, f. 10, 10a: Soot-Ryen, 1951, p. 20. Type locality: West Antarctica, 71° 18′ S, 88° 2′ W. Range: Also Gauss Station, Davis Sea.

?meridionalis Smith, 1885. Dacrydium meridionalis Smith, 1885, p. 282. Type locality: Prince Edward and Marion Islands, 100-150 fathoms.

***modioliforme** Thiele, 1912. Dacrydium modioliforme Thiele, 1912, p. 226: Soot-Ryen, 1951, p. 20. Type locality: Gauss Station, Davis Sea.

Lithophaga Roeding, 1798 (monotypy): L. mytuloides Roeding=Mytilus lithophagus L.

patagonicus (Orbigny, 1846). Lithodomus patagonicus Orbigny, 1846, p. 650: Rochebrune & Mabille, 1889, p. 119: Carcelles & Williamson, 1951, p. 328. Range: Uruguay, Argentina, Patagonia and Falklands (Carcelles & Williamson, 1951).

Melvill & Standen (1898, p. 104 and 1914, p. 128) recorded Mytilus bifurcatus (Conrad) from Lively Island and Roy Cove, but the occurrence of this Californian Septifer at the Falklands is most unlikely.

PINNIDAE

Orbigny (1844, pl. 85, f. 2) described Pinna patagonica from Rio Negro, Patagonia and Tierra del Fuego.

PECTINIDAE

Adamussium Thiele, 1935 (o.d.): Pecten colbecki Smith.

***colbecki** (Smith, 1902). Pecten colbecki Smith, 1902, p. 212 and 1915, p. 77: Thiele, 1935, p. 807: Soot-Ryen, 1951, p. 16: Powell, 1958, p. 176: Pecten racovitzai Pelseneer, 1903, p. 27. Type locality: Franklin Island. Range: Circum-Antarctic; obtained living from 4-700 metres.

Chlamys (Zygochlamys) Ihering, 1907 (o.d.): Pecten geminata Sowerby.

delicatula (Hutton, 1873). Pecten delicatulus Hutton, 1873, p. 30: Pecten diffluxa Hutton, 1873, p. 31: Chlamys subantarctica Hedley, 1916, p. 23: Chlamys campbellica Odhner, 1924, p. 61: Powell, 1955, p. 25 and 1957, p. 139. Type localities: Castle Point, New Zealand (Nukumaruan) (delicatulus) Weka Pass, New Zealand (Nukumaruan) (diffluxa), Macquarie Island (subantarctica) and Campbell Island (campbellica). Range: (Recent) Macquarie Island, Auckland, Campbell and Stewart Islands and Eastern Otago, 40-60 fathoms.

patagonicus (King, 1831). Pecten patagonicus King, 1831, p. 337: Reeve, 1853, Pl. 26, f. 110: Smith, 1885, p. 294. Type locality: Patagonia. Range: South Patagonia, 9 fathoms and Falkland Islands, 12 fathoms (Smith).

rufiradiatus (Reeve, 1853). Pecten rufiradiatus Reeve, 1853, sp. 147: Melvill & Standen, 1898, p. 103 and 1914, p. 130. Type locality: Strait of Magellan. Range: Also Lively Island, Whaler Point and Roy Cove, N.W. Falklands (Melvill & Standen).

Other Magellanic Recent species are darwini Reeve, 1853, patriae Doello-Jurado, 1918 and probably nasans Philippi, 1845. The type of the subgenus is from the Patagonian Miocene.

The subgenus is known also from the Tertiary of Grahamsland, Kerguelen and Heard Islands (Fleming, 1957).

Cyclopecten Verrill, 1897 (Suter, 1913): Pecten pustulosus Verrill.

aviculoides (Smith, 1885). Pecten aviculoides Smith, 1885, p. 305. Type locality: Prince Edward Island, 100-150 fathoms.

***gaussianus** (Thiele, 1912). Camptonectes (Palliolum) gaussianus Thiele, 1912, p. 226: Powell, 1958, p. 176. Type locality: Gauss Station, Davis Sea.

***hexagonalis** Powell, 1958. Cyclopecten hexagonalis Powell, 1958, p. 176. Type locality: Off Enderby Land, 300 metres.

***thielei** Powell, 1958. Cyclopecten thielei Powell, 1958, p. 176. Type locality: Off Adelie Land, 640 metres.

Palliolum Monterosato, 1884 (Cossmann & Peyrot): Pecten testae Bivona.

***clathratum** (Martens, 1881). Pecten clathratus Martens, 1881, p. 79: Smith, 1885, p. 305: Lamy, 1911, p. 23: Powell, 1957, p. 116. Type locality: Kerguelen Island. Range: Also Alexander Island, 297 metres (Lamy).

?distinctus (Smith, 1885). Pecten distinctus Smith, 1885, p. 304. Type locality: Off Marion Island, 100 fathoms.

***notalis** (Thiele, 1912). Camptonectes (Palliolum) notalis Thiele, 1912, p. 251. Type locality: North-west of Gauss Station, 3423 metres.

***pteriola** (Melvill & Standen, 1907). Pecten pteriola Melvill & Standen. 1907, p. 147: Soot-Ryen, 1951, p. 16. Type locality: Scotia Bay, 9-10½ fathoms, South Orkneys.

vitreum (King, 1831). Pecten vitreus King, 1831 (non vitrea Gmelin, 1790, which is a Delectopecten): Pecten corneus Sowerby, 1843, p. 71: Melvill & Standen, 1898, p. 103. Type locality: Strait of Magellan. Range: Also recorded from Lively Island, Falklands (Melvill & Standen).

Hyalopecten Verrill, 1897 (o.d.): Pecten (Hyalopecten) undatus Verrill.

pudicus (Smith, 1885). Pecten pudicus Smith, 1885, p. 302. Type locality: East of Marion Island, 1375 fathoms.

Variamussium Sacco, 1897: Pecten cancellatus Schmidt.

meridionale (Smith, 1885). Amussium meridionale Smith, 1885, p. 316. Type locality: South of Australia, in the Southern Ocean, 1800 fathoms. Range: Also east of Marion Island, 1800 fathoms and west of Patagonia, 1450 fathoms (Smith).

octodecimliratum (Melvill & Standen, 1907). Amussium octodecimliratum Melvill & Standen, 1907, p. 147. Type locality: 67° 33′ S, 36° 35′ W, 2500 fathoms.

Other Magellanic Pectens are Delectopecten vitrea (Gmelin, 1790), Palliolum subhyalinus (Smith, 1885), Pseudamussium gelatinosum (Rochebrune & Mabille, 1889), P. polyleptus Dall, 1908 and Pecten nasans Philippi, 1845, which according to Reeve's figure (1853, Pl. 27, f. 113) looks like a small Zygochlamys.

LIMIDAE

Limatula S.V.Wood, 1839 (Gray, 1847): Pecten subauriculata Montagu.

*__closei__ Hedley, 1916. Lima closei Hedley, 1916, p. 23. Type locality: Off Shackleton Ice-shelf, 358 fathoms.

*__deceptionensis__ Preston, 1916. Limatula deceptionensis Preston, 1916, p. 271. Type locality: Deception Harbour, 6 fathoms, South Shetlands.

*__hodgsoni__ (Smith, 1907). Lima (Limatula) hodgsoni Smith, 1907, p. 6: Hedley, 1916, p. 24: Tomlin, 1948, p. 230: Soot-Ryen, 1951, p. 20: Powell, 1955, p. 27 and 1958, p. 177. Type locality: Discovery Winter Quarters, 10-130 fathoms. Range: Also Adelie Land, 288-400 fathoms (Hedley), McMurdo Sound, 50-300 fathoms (Smith), Off Enderby Land, 193-300 metres (Powell), Bouvet Island (Soot-Ryen) and Macquarie Island, 69 metres (Tomlin).

*__ovalis__ (Thiele, 1912). Lima (Limatula) ovalis Thiele, 1912, p. 226: Hedley, 1916, p. 24: Powell, 1958, p. 177. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 193-220 metres and off MacRobertson Land, 177 metres.

*__pygmaea__ (Philippi, 1845). Lima pygmaea Philippi, 1845, p. 56: Smith, 1877, p. 191: Thiele, 1912, p. 251: Tomlin, 1948, p. 230: Powell, 1955, p. 27, 1957, pp. 116 and 144: Limatula falklandica A.Adams, 1863, p. 509: Soot-Ryen, 1951, p. 20. Type localities: Strait of Magellan (pygmaea) and Falkland Islands (falklandica). Range: Strait of Magellan to Falklands, Petermann Island, Palmer Archipelago, South Shetlands, South Orkneys, South Sandwich Islands, Marion and Prince Edward Islands, Kerguelen and Macquarie Islands, 5-150 metres.

*__simillima__ (Thiele, 1912). Lima (Limatula) simillima Thiele, 1912, p. 226: Powell, 1958, p. 177. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 220 metres and off MacRobertson Land, 177 metres.

Recorded Magellanic Limidae are Limea martiali Rochebrune & Mabille, 1889 (p. 124), Acesta goliath (Sowerby, 1883) and A. patagonica (Dall, 1904) (Carcelles & Williamson, 1951, p. 332).

ANOMIIDAE

Anomia Linnaeus, 1758 (Gray, 1847): Anomia ephippium Linn.

ephippium Linnaeus, 1758. Anomia ephippium Linnaeus, 1758, p. 701: Melvill & Standen, 1914, p. 127.

Melvill & Standen recorded this European species from Roy Cove, Falkland Islands but the record requires confirmation.

ASTARTIDAE

Astarte Sowerby, 1816 (Stoliczka, 1871): Astarte lurida Sowerby.

*__antarctica__ Thiele, 1912. Astarte antarctica Thiele, 1912, p. 229: Soot-Ryen, 1951, p. 24: Powell, 1958, p. 177. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 300 metres (Powell).

longirostris Orbigny, 1846. Astarte longirostris Orbigny, 1846, p. 576: Rochebrune & Mabille, 1889, p. 110: Chenu, 1862, p. 130: Dall, 1908, p. 411: Carcelles & Williamson, 1951, p. 333: Powell, 1957, p. 121. Type locality: Falkland Islands. Range: Strait of Magellan and Falkland Islands, 15-110 metres (Carcelles & Williamson), Kerguelen Island, 150 metres (Powell)

magellanica E.A.Smith, 1881. Astarte magellanica Smith, 1881, p. 41: Rochebrune & Mabille, 1889, p. 110: Melvill & Standen, 1912, p. 362. Type locality: Boija Bay, 20 fathoms, Strait of Magellan. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

CARDITIDAE

Cyclocardia Conrad, 1867 (o.d.): Cardita borealis Conrad.

- ***antarctica** (Smith, 1907). Cardita antarctica Smith, 1907, p. 2: Soot-Ryen, 1951, p. 24. Type locality: Near Antarctic Circle, 254 fathoms.
- ***astartoides** (Martens, 1878). Cardita astartoides Martens, 1878, p. 25: Thiele, 1912, p. 230: Hedley, 1916, p. 30: Soot-Ryen, 1951, p. 25: Powell, 1957, p. 121 and 1958, p. 177. Type locality: Kerguelen Island. Range: Also Bouvet Island, South Georgia, South Shetlands and Crown Princess Martha Land (Soot-Ryen), Enderby Land, 193-300 metres and Adelie Land, 640 metres (Powell).
- **congelascens** (Melvill & Standen, 1912). Cardita congelascens Melvill & Standen, 1912, p. 362. Type locality: Burdwood Bank, south of Falkland Islands, 56 fathoms.
- ***intermedia** (Thiele, 1912). Cardita (Cyclocardia) intermedia Thiele, 1912, p. 230: Powell, 1958, p. 178. Type locality Gauss Station, Davis Sea. Range: Also off Mackenzie Sea, 456 metres (Powell).
- **malvinae** (Orbigny, 1846). Cardita malvinae Orbigny, 1846, p. 580. Type locality: Falkland Islands.
- **thouarsii** (Orbigny, 1846). Cardita thouarsii Orbigny, 1846, p. 579. Type locality: Falkland Islands.

  A Magellanic species is Cardita (Actinobolus) velutinus Smith, 1881.

CONDYLOCARDIIDAE

Carditella E.A.Smith, 1881: Carditella pallida Smith.

- **pallida duodecimcostata** Melvill & Standen, 1912. Carditella pallida duodecimcostata Melvill & Standen, 1912, p. 361. Type locality: Burdwood Bank, 56 fathoms.
- **naviformis** (Reeve, 1843). Cardita naviformis Reeve, 1843, Pl. 9, f. 45: Melvill & Standen, 1914, p. 130: Carcelles & Williamson, 1951, p. 334. Type locality: Valparaiso. Range: Valparaiso and Strait of Magellan (Carcelles & Williamson).

  Other Magellanic species are exulata Smith, 1885, pallida Smith, 1881 and tegulata (Reeve, 1843).

VESICOMYIDAE

Vesicomya Dall, 1886 (o.d.): Callocardia atlantica E. A. Smith.

- ***laevis** (Pelseneer, 1903). Callocardia laevis Pelseneer, 1903, p. 27: Soot-Ryen, 1951, p. 25. Type locality: West of Alexander 1st. Land, 70°-71° S, 80°-88° W.

Ptychocardia Thiele, 1912 (monotypy): P. vanhoffeni Thiele.

- ***rudis** Hedley, 1916. Ptychocardia rudis Hedley, 1916, p. 31: Soot-Ryen, 1951, p. 25. Type locality: Off Mertz Glacier, Adelie Land, 288 fathoms.
- ***vanhoffeni** Thiele, 1912. Ptychocardia vanhoffeni Thiele, 1912, p. 232: Hedley, 1916, p. 30: Soot-Ryen, 1951, p. 25. Type locality: Gauss Station, Davis Sea. Range: Also Commonwealth Bay, 55-60 fathoms.

CYAMIIDAE

Cyamium Philippi, 1845 (monotypy): Cyamium antarcticum Philippi.

- **antarcticum** Philippi, 1845. Cyamium antarcticum Philippi, 1845, p. 51: Melvill & Standen, 1907, p. 119. Type locality: Chile. Range: Also Falklands (Melvill & Standen).
- **bennetti** Preston, 1912. Cyamium bennetti Preston, 1912, p. 637. Type locality: Port Stanley, Falkland Islands.
- **commune** Thiele, 1912. Cyamium commune Thiele, 1912, p. 255. Type locality: Observatory Bay, Kerguelen Island.
- **copiosum** Preston, 1913. Cyamium copiosum Preston, 1913, p. 222. Type locality: Mullet Creek, Falkland Islands.
- **cuneatum** Preston, 1913. Cyamium cuneatum Preston, 1913, p. 222. Type locality: Falkland Islands.
- **exasperatum** Preston, 1912. Cyamium exasperatum Preston, 1912, p. 638. Type locality: Port Stanley, Falkland Islands.

falklandicum Melvill & Standen, 1898. Cyamium falklandicum Melvill & Standen, 1898, p. 104, 1907, p. 119, 1912, p. 363 and 1914, p. 130: Cyamium iridescens Cooper & Preston, 1910, p. 112. Type localities: Hearnden Water, Falkland Islands (falklandicum), Falkland Islands (iridescens).

piscium Preston, 1912. Cyamium piscium Preston, 1912, p. 638. Type locality: Port Stanley, Falkland Islands.

stanleyensis Preston, 1913. Cyamium stanleyensis Preston, 1913, p. 222. Type locality: Port Stanley, Falkland Islands.

***willii** Pfeffer, 1886. Cyamium willii Pfeffer, 1886, p. 117: Cyamium mosthaffi Pfeffer, 1886, p. 118: David, 1934, p. 128: Soot-Ryen, 1951, p. 28. Type locality: South Georgia (willii and mosthaffi), Pfeffer's Cyamium imitans described with the above is probably a synonym of Kidderia bicolor Martens (Soot-Ryen, 1951, p. 30).

Pseudokellya Pelseneer, 1903 (monotypy): Kellia cardiformis Smith.

***cardiformis** (Smith, 1885). Kellia cardiformis Smith, 1885, p. 202: Pelseneer, 1903, p. 48: Soot-Ryen, 1951, p. 28: Powell, 1947, p. 122. Type locality: Royal Sound, 28 fathoms, Kerguelen Island. Range: Also Port Lockroy, 70 metres (Lamy).

***gradata** Thiele, 1912. Pseudokellya gradata Thiele, 1912, p. 231: Soot-Ryen, 1951, p. 28. Type locality: Gauss Station, Davis Sea.

***stillwelli** Hedley, 1916. Pseudokellya stillwelli Hedley, 1916, p. 31: Soot-Ryen, 1951, p. 28. Type locality: Off Mertz Glacier, Adelie Land, 288 fathoms. Range: Also Davis Sea, 120 fathoms.

Cyamiomactra Bernard, 1897: Cyamiomactra problematica (Bernard).

***laminifera** (Lamy, 1906). Mactra (Heteromactra) laminifera Lamy, 1906, p. 45, 1906a, p. 121, 1911a, p. 18: Diplodonta incerta Smith, 1907, p. 4: Hedley, 1916, p. 30: Soot-Ryen, 1951, p. 28. Type locality: Petermann Island (laminifera), McMurdo Sound, 130 fathoms (incerta). Range: South Sandwich Islands and Ross Sea.

PERRIERINIDAE

Cyamiocardium Soot-Ryen, 1951 (o.d.): Cyamium denticulatum Smith.

***denticulatum** (Smith, 1907). Cyamium denticulatum Smith, 1907, p. 3: Lamy, 1911, p. 19: Melvill & Standen, 1912, p. 363: Soot-Ryen, 1951, p. 26: Powell, 1957, p. 116 and 1958, p. 175. Type locality: Discovery Winter Quarters, McMurdo Sound. Range: Burdwood Bank, south of Falklands, Bouvet Island, Kerguelen Island, Peter 1st. Island, Palmer Archipelago, Enderby Land to Ross Sea, 25-300 metres.

?fragillimum (Thiele, 1912). Cyamium fragillimum Thiele, 1912, p. 256. Type locality: Observatory Bay, Kerguelen Island.

***rotundatum** (Thiele, 1912). Cyamium rotundatum Thiele, 1912, p. 231: Hedley, 1916, p. 30: Soot-Ryen, 1951, p. 26. Type locality: Gauss Station, Davis Sea. Range: Also Commonwealth Bay, Adelie Land and Shackleton Ice-shelf, 90-500 metres.

GAIMARDIIDAE

Gaimardia Gould, 1852: Modiola trapesina Lamarck.

bennetti (Preston, 1913). Modiolarca bennetti Preston, 1913, p. 221. Type locality: Mullet Creek, Port Stanley, Falkland Islands.

gemma (Cooper & Preston, 1910). Modiolarca gemma Cooper & Preston, 1910, p. 112. Type locality: Falkland Islands.

kerguelensis (Smith, 1885). Modiolarca kerguelensis Smith, 1885, p. 280: Powell, 1958, p. 122. Type locality: Off Royal Sound, 25 fathoms, Kerguelen Island.

mesembrina (Melvill & Standen, 1907). Modiolarca mesembrina Melvill & Standen, 1907, p. 116 and 1912, p. 118: Modiolarca picturata Cooper & Preston, 1910, p. 112. Type locality: Both Falkland Islands.

***trapesina trapesina** (Lamarck, 1819). Modiola trapesina Lamarck, 1819, p. 114: Smith, 1877, p. 190: Lamy, 1911, p. 24: Melvill & Standen, 1914, p. 129: Hedley, 1916, p. 25, with the following in synonomy:—Modiolarca cannellieri, crassa, fuegiensis, hahni, lephayi and savatieri, all of Rochebrune & Mabille, 1889, pp. 120-123: Soot-Ryen, 1951, p. 29, with the following in synonymy:—faba, nigromarginata and subquadrata, all of Pfeffer, 1886: Powell, 1957, p. 122. Type locality: Unknown, probably Magellan Province. Rochebrune & Mabille's species were from Orange Bay, Patagonia and Pfeffer's from South Georgia. Range: Magellan Province, including Falkland Islands, Alexander 1st. Land (Lamy), South Georgia, Marion Island, Kerguelen Island and Crozets (Powell).

trapesina coccinea Hedley, 1916. Gaimardia trapezina coccinea Hedley, 1916, p. 24: Powell, 1955, p. 28. Type locality: Macquarie Island. A large sized supspecies, trapesina flemingi Powell, 1955 (p. 28) occurs at Auckland Islands.

Kidderia Dall, 1876 (o.d.): K. minuta Dall.

***bicolor** (Martens, 1885). Modiolarca bicolor Martens, 1885, p. 93: Martens & Pfeffer, 1886, Pl. 4, f. 12 a-d: David, 1934, p. 130: Soot-Ryen, 1951, p. 29: Cyamium imitans Pfeffer, 1886, p. 115: Cyamionema decoratum Melvill & Standen, 1914, p. 131. Type localities: South Georgia (bicolor and imitans), Falkland Islands (decoratum).

exilis (H. & A. Adams, 1863). Modiolarca exilis H. & A. Adams, 1863, p. 435: Smith, 1879, p. 190: Melvill & Standen, 1914, p. 129: Powell, 1957, p. 112. Type locality: Falkland Islands. Range: Kerguelen Island (Smith), Fox Bay, N.W. Falklands (Melvill & Standen).

hamiltoni Finlay, 1927. Kidderia pusilla: Hedley, 1916, p. 26 (non Gould, 1850): Kidderia hamiltoni Finlay, 1927, p. 456: Powell, 1955, p. 30. Type locality: Hassellborough Bay, Macquarie Island.

macquariensis Hedley, 1916. Kidderia macquariensis Hedley, 1916, p. 26: Powell, 1955, p. 31. Type locality: Hassellborough Bay, Macquarie Island.

minuta Dall, 1876. Kidderia minuta Dall, 1876, p. 46: Smith, 1877, p. 191: Thiele, 1912, Pl. 17, f. 19, 19a: Powell, 1957, p. 122. Type locality: Kerguelen Island.

pusilla (Gould, 1850). Modiolarca pusilla Gould, 1850, p. 245: Melvill & Standen, 1898, p. 104: Carcelles & Williamson, 1951, p. 337. Type locality: Tierra del Fuego. Range: Tierra del Fuego and Lively Islands, Falklands (Melvill & Standen).

smithi (Suter, 1913): Modiolarca bicolor: Smith, 1898, p. 25 (non Martens, 1885) Modiolarca smithi Suter, 1913, p. 895: Powell, 1955, p. 31. Type locality: Macquarie Island.

The genus is represented in New Zealand by further species in the Antipodean, Forsterian and Aupourian Provinces.

LUCINIDAE

Lucinoma Dall, 1901 (o.d.): Lucina filosa Stimpson.

lamellata (Smith, 1881). Diplodonta lamellata Smith, 1881, p. 38: Rochebrune & Mabille, 1889, p. 108: Melvill & Standen, 1912, p. 363: Carcelles & Williamson, 1951, p. 338. Type locality: St. Andrew's Sound, 10 fathoms, Patagonia. Range: Also Cape Horn (Rochebrune & Mabille), Burdwood Bank, 56 fathoms (Melvill & Standen).

Another Magellanic member of the family is Loripes partenuis Smith, 1881.

THYASIRIDAE

Thyasira Lamarck, 1818 (monotypy): Tellina flexuosa Montagu.

***bongraini** (Lamy, 1910). Axinus bongraini Lamy, 1910, p. 389 and 1911, p. 17: Soot-Ryen, 1951, p. 30. Type locality: Petermann Island. Range: Also Palmer Archipelago.

***falklandica** (Smith, 1885). Cryptodon falklandicus Smith, 1885, p. 190: Melvill & Standen, 1898, p. 105, 1907, p. 118 and 1914, p. 130: Soot-Ryen, 1951, p. 30. Type locality: Off Falkland Islands, 3-5 fathoms. Range: Also Scotia Bay, South Orkneys (Melvill & Standen) and South Georgia (Soot-Ryen).

marionensis (Smith, 1885). Cryptodon marionensis Smith, 1885, p. 194: Thiele, 1912. Type locality: Between Prince Edward and Marion Islands, 100-150 fathoms.

Magellanic species are fuegiensis Dall, 1889 and magellanica Dall, 1901.

Axinopsis G. O. Sars, 1878: Axinopsis orbiculata G. O. Sars.

***debilis** Thiele, 1912. Axinopsis debilis Thiele, 1912, p. 232: Hedley, 1916, p. 27: Soot-Ryen, 1951, p. 30. Type locality: Gauss Station, Davis Sea. Range: Also off Shackleton Ice-shelf, 358 fathoms.

LEPTONIDAE

Notolepton Finlay, 1927 (o.d.): Kellia antipoda Filhol.

***parasiticum** (Dall, 1876). Lepton parasiticum Dall, 1876, p. 45: Thiele, 1912, p. 255: Lepton costulatum Martens, 1885, and Montacuta christenseni Greig, 1929, Soot-Ryen, 1951, p. 32: Powell, 1957, p. 123. Type localities: Kerguelen Island (parasiticum), South Georgia (costulatum and christenseni).

This species is commensal upon the spatangid echinoid, Abatus cavernosus.

umbonatum (Smith, 1885). Davila (?) umbonata Smith, 1885, p. 82: Tomlin, 1948, p. 231: Powell, 1955, p. 37 and 1957, p. 122. Type locality: Balfour Bay, 20-60 fathoms, Royal Sound, Kerguelen Island. Range: Also Macquarie Island, 69 metres (Tomlin).

Davisia Cooper & Preston, 1910 (monotypy): D. cobbi Cooper & Preston.

bennetti Preston, 1912. Davisia bennetti Preston, 1912. Type locality: Port Stanley, Falkland Islands.

cobbi Cooper & Preston, 1910. Davisia cobbi Cooper & Preston, 1910, p. 113: Melvill & Standen, 1912, p. 364 and 1914, p. 132. Type locality: Falkland Islands. Range: Also Burdwood Bank, 56 fathoms (Melvill & Standen).

concentrica Preston, 1912. Davisia concentrica Preston, 1912, p. 639. Type locality: Port Stanley, Falkland Islands.

ERYCINIDAE

Lasaea Brown, 1827 (monotypy): Cardium rubrum Montagu.

***consanguinea** (Smith, 1879). Lasaea rubra: Dall, 1876 (non Montagu), p. 45: Kellia consanguinea Smith, 1879, p. 184: Melvill & Standen, 1907, p. 119 and 1914, p. 132: Thiele, 1912, p. 225: Soot-Ryen, 1951, p. 31: Powell, 1957, p. 123. Type locality: Royal Sound, Kerguelen Island. Range: Also Falkland Islands and Scotia Bay, 6-10 fathoms, South Orkneys (Melvill & Standen).

Hedley's record of this species from Macquarie Island is Lasaea rossiana Finlay.

miliaris Philippi, 1845. Lasaea miliaris Philippi, 1845, p. 51: Melvill & Standen, 1914, p. 132: Carcelles & Williamson, 1951, p. 339. Type locality: Mediterranean (Suter, 1939, p. 927). Range: Also Northwest Falklands (Melvill & Standen) and Strait of Magellan (Carcelles & Williamson). These records require confirmation.

rossiana Finlay, 1928. Lasaea consanguinea: Hedley, 1916, p. 32 (non Smith, 1877): Lasaea rossiana Finlay, 1928, p. 275: Powell, 1955, p. 34. Type locality: Macquarie Island. Range: Also Auckland, Campbell, Antipodes and Bounty Islands, New Zealand southern islands.

A Magellanic species is petitiana Récluz, 1843 (Carcelles & Williamson, 1951, p. 339).

Kellia Turton, 1822 (Récluz, 1844): Kellia suborbicularis Montagu.

***nimrodiana** Hedley, 1911. Kellia nimrodiana Hedley, 1911, p. 4 and 1916, p. 31: Soot-Ryen, 1951, p. 31. Type locality: Cape Royds, 10-20 fathoms, Ross Sea. Range: Also Commonwealth Bay, 25-60 fathoms, Adelie Land.

nuculina Martens, 1881. Kellia nuculina Martens, 1881, p. 79: Smith, 1885, p. 201: Thiele, 1912, p. 255. Type locality: Kerguelen Island, 120 fathoms. Range: Also Prince Edward Island, 50-150 fathoms.

***simulans** Smith, 1907. Kellia simulans Smith, 1907, p. 2 and 1915, p. 77: Lamy, 1911, p. 20: Soot-Ryen, 1951, p. 31. Type locality: Hut Point, McMurdo Sound. Range: Also Port Lockroy, 70 metres, South Shetlands (Lamy).

magellanica Smith, 1881. Kellia magellanica Smith, 1881, p. 41: Melvill & Standen, 1912, p. 364: Carcelles & Williamson, 1951, p. 339. Type locality: Elizabeth Island, 6 fathoms, Strait of Magellan. Range: Also Falkland Islands and Burdwood Bank, 56 fathoms.

***sp.**

Kellia suborbicularis Smith, 1885 (non Montagu, 1803), p. 201: Lamy, 1911, p. 20: Soot-Ryen, 1951, p. 31.

This English species was recorded from Royal Sound, Kerguelen (Smith) and Port Lockroy, 70 metres, South Shetlands (Lamy) but Soot-Ryen (1951) considers its identity not yet settled; probably a nearly related species.

sp.

Erycina cycladiformis Deshayes, 1850, p. 736: Melvill & Standen, 1912, p. 363 and 1914, p. 132.

Recorded by Melvill & Standen, from Burdwood Bank, 56 fathoms and North-west Falklands, but these are unlikely identifications.

Scacchia Philippi, 1844: S. elliptica (Scacchi).

plenilunium Melvill & Standen, 1907: Scacchia plenilunium Melvill & Standen, 1907, p. 120. Type locality: Shore, Cape Pembroke, Falkland Islands. A Magellanic member of the family is Aligena pisum Dall, 1908.

MONTACUTIDAE

Mysella Angas, 1877 (monotypy): Mysella anomala Angas.

***antarctica** (Smith, 1907). Tellimya antarctica Smith, 1907, p. 3: Soot-Ryen, 1951, p. 33. Type locality: Hutt Point, Ross Sea.

arthuri (Cooper & Preston, 1910). Malvinasia arthuri Cooper & Preston, 1910, p. 113: Soot-Ryetn, 1951, p. 33. Type locality: Falkland Islands.

***charcoti** (Lamy, 1906). Montaguia charcoti Lamy, 1906, p. 16, 1906a, p. 13 and 1911, p. 19: Smith, 1915, p. 78: David, 1934, p. 128: Hedley, 1916, p. 33: Soot-Ryen, 1951, p. 33: Powell, 1955, p. 35 and 1957, p. 124: Montaguia turqueti Lamy, 1906, p. 47: Tellimya minima Thiele, 1912, p. 255. Type localities: Petermann Island (charcoti), Kerguelen Island (minima). Range: South Georgia, South Shetlands, Palmer Archipelago, Kerguelen and Macquarie Islands.

***flavida** (Preston, 1916). Tellimya flavida Preston, 1916, p. 272. Type locality: Bransfield Strait, 15 fathoms, South Shetlands.

***gibbosa** (Thiele, 1912). Tellimya gibbosa Thiele, 1912, p. 230: Soot-Ryen, 1951, p. 33. Type locality: Gauss Station, Davis Sea.

***lamyi** (Melvill & Standen, 1907). Kellyia australis Lamy, 1906 (non Deshayes), p. 124: Kellia lamyi Melvill & Standen, 1907, p. 119: Soot-Ryen, 1951, p. 33. Type locality: South Orkneys.

macquariensis (Hedley, 1916). Rochefortia macquariensis Hedley, 1916, p. 32: Powell, 1955, p. 36. Type locality: Aerial Cove, Macquarie Island.

***miniuscula** (Pfeffer, 1886). Nucula miniuscula Pfeffer, 1886, p. 113: Soot-Ryen, 1951, p. 33. Type locality: South Georgia.

David (1934) considered this probably synonymous with charcoti but Soot-Ryen (1951) noted differences in outline.

***ovalis** (Thiele, 1912). Tellimya ovalis Thiele, 1912, p. 230: Soot-Ryen, 1951, p. 33: Powell, 1958, p. 178. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 193-300 metres (Powell).

***subquadrata** (Pelseneer, 1903). Cyamium subquadratum Pelseneer, 1903, p. 15: Smith, 1915, p. 78: Lamy, 1911, p. 19: Soot-Ryen, 1951, pp. 28, 33. Type locality: Two Hummocks Island ? . Range: South Shetlands area.

Magellanic species are mabillei and rochebrunei (Dall, 1908).

GALEOMMATIDAE

Solecardia Conrad, 1849: S. eburnea Conrad.

***antarctica** Hedley, 1911. Solecardia antarctica Hedley, 1911, p. 4: Soot-Ryen, 1951, p. 32. Type locality: Cape Royds, 10-20 fathoms. Probably not a typical member of the genus.

CARDIIDAE

Trachycardium Moerch, 1853. (V. Martens, 1870): Cardium isocardia Linn.
delicatulum (Smith, 1915). Cardium delicatulum Smith, 1915, p. 93. Type locality: West of Falkland Islands, 125 fathoms.
Melvill & Standen (1914, p. 133) record the European Cardium edule Linn. from North-west Falklands but this is probably a shell from ship's ballast.

VENERIDAE

Gomphina (Jukesena) Iredale, 1915 (nom nov. for Acolus Jukes-Browne, 1913, non Foerster, 1856) (o.d.): Psephis foveolata Cooper & Preston.
foveolata (Cooper & Preston, 1910). Psephis foveolata Cooper & Preston, 1910, p. 114. Type locality: Falkland Islands.
Eurhomalea Cossmann, 1920 (o.d.): Venus rufa Lamarck.
exalbida (Chemnitz, 1795). Venus exalbida Chemnitz, 1795, p. 225: Smith, 1885, p. 117: Chione (Omphaloclathrum) exalbida: Melvill & Standen, 1898, p. 105: Samarangia exalbida: Carcelles & Williamson, 1951, p. 342: Keen, 1951, p. 8 and Eurhomalea exalbida: Keen, 1954, p. 54. Type locality: Strait of Magellan. Range: Island of Chiloe, Strait of Magellan and Falkland Islands.
Tawera Marwick, 1927 (o.d.) Venus spissa Deshayes.
mawsoni (Hedley, 1916). Chione mawsoni Hedley, 1916, p. 33: Tomlin, 1948, p. 231: Powell, 1955, p. 41 and 1957, p. 139. Type locality: 14 fathoms, Lusitania Bay, Macquarie Island.
The genus is represented by a number of species from the New Zealand mainland, New Zealand Southern Islands, Tasmania and Southern coast of Australia.
Carcelles & Williamson (1951, p. 341) record from the Magellan Province—Venus gayi Hupé (Gay), 1854 (referred to Clausinella) and Petricolaria patagonica (Orbigny, 1846).
Melvill & Standen (1914, p. 133) record the Central American Cryptogramma subimbricata Sowerby from West Falklands but this is obviously based upon a shell from ship's ballast.
Chione fuegiensis Smith, 1905 (which looks like a Tawera).

MACTRIDAE

Darina Gray, 1853: Erycina solenoides King.
solenoides (King, 1831). Erycina solenoides King, 1831, p. 335: Melvill & Standen, 1914, p. 134: Lutraria kingi Fischer, 1887, p. 1119: Carcelles & Williamson, 1951, p. 344. Type locality: Strait of Magellan. Range: Tierra del Fuego, Magellan region and Patagonia (Carcelles & Williamson), Roy Cove, N.W. Falklands (Melvill & Standen).
Other Mactrids recorded from the Magellan Province are:—Mulinia byronensis Gray, 1837, edulis (King, 1831), laevicardo (Smith, 1881), Mactra fuegiensis Smith, 1905 and Darina tenuis (Philippi, 1845) (Carcelles & Williamson, 1951, pp. 343-344).

GARIDAE

A Magellanic member of this family is Sanguinolaria antarctica Rochebrune & Mabille, 1889 (Carcelles & Williamson, 1951, p. 344).

TELLINIDAE

Melvill & Standen (1914, p. 134) record the European Tellina squalida Pulteney from North-west Falklands but this single valve probably originated from ship's ballast.

SOLENIDAE

Solen Linnaeus, 1758 (Children, 1822): Solen vagina Linn.
macha Molina, 1787. Solen macha Molina, 1787, p. 178: Melvill & Standen, 1914, p. 135: Carcelles & Williamson, 1951, p. 346. Range: Valparaiso to Strait of Magellan (Carcelles & Williamson), Pebble Island, N.W. Falklands (Melvill & Standen).
Two other Magellanic species have been recorded:—Solen poirieri Rochebrune & Mabille, 1889 and S. sicarius Gould, 1852.

MYIDAE

Mya (s.l.)

antarctica (Melvill & Standen, 1898). Thracia antarctica Melvill & Standen, 1898, p. 105: Mya antarctica Melvill & Standen, 1914, p. 134. Type localities: Lively Island, Falklands (Thracia antarctica), North-west Falklands (Mya antarctica).

Tomlin (1938, p. 84) erroneously referred this species to the synonymy of Laternula elliptica (King & Broderip). (See note under that species).

A Magellanic member of the family is Sphenia hatcheri Pilsbry, 1899.

HIATELLIDAE

Hiatella Daudin, 1801: Mya arctica Linn.

*__antarctica__ (Philippi, 1845). Saxicava antarctica Philippi, 1845, p. 52: Smith, 1881, p. 40 and 1885, p. 78: Thiele, p. 256: Melvill & Standen, 1914, p. 135: Hedley, 1916, p. 53: David, 1934, p. 130: Soot-Ryen, 1951, p. 33: Powell, 1955, p. 44 and 1957, p. 124. Type locality: Chonos, Chile. Range: Circum-Subantarctic; Chile, Patagonia, Marion and Prince Edward Islands, Falkland Islands, Burdwood Bank, South Georgia, Kerguelen and Macquarie Islands.

bisulcata (Smith, 1877). Saxicava bisulcata Smith, 1877, Pl. 9, f. 21 and 1879, p. 184: Powell, 1957, p. 124. Type locality: Kerguelen Island.

subantarctica (Preston, 1913). Saxicava subantarctica Preston, 1913, p. 223. Type locality: Falkland Islands.

The following Magellanic species require investigation:—chilensis Hupé (Gay), 1854 and frigida, lebruni, and mollis Rochebrune & Mabille, 1889. Probably all are synonyms of antarctica Philippi.

PHOLADIDAE

This family is represented in the Magellanic Province by Barnea subtruncata lamellosa (Orbigny, 1846), Xylophaga martensi (Stempell, 1899) and Nettastomella darwini (Sowerby, 1849) (Carcelles & Williamson, 1951, pp. 347, 348).

TEREDINIDAE

Bankia Gray, 1842 (s.d. 1847): Teredo bipalmulata Lamk.

odhneri Roch, 1931. Bankia odhneri Roch, 1931, p. 215. Type locality: Falkland Islands.

LYONSIIDAE

Lyonsia Turton, 1822 (monotypy): Mya striata Montagu = Mya norwegica Gmelin.

A Magellanic species is Lyonsia fretalis Dall, 1915, p. 454: Carcelles & Williamson, 1951, p. 348.

Entodesma Philippi, 1845: Entodesma chilensis Philippi.

*__arcaeformis__ (Martens, 1885). Lyonsia arcaeformis Martens, 1885, p. 94 and Martens & Pfeffer, 1886, p. 113: Lyonsia cuneata Melvill & Standen, 1907, p. 121 (non Gray, 1828): Lyonsia malvinensis (nom. nud.) Melvill & Standen, 1914, p. 135: Soot-Ryen, 1951, p. 21. Type locality: South Georgia. Range: Also Port Stanley, Falkland Islands (Melvill & Standen).

Mytilimeria Conrad, 1837 (monotypy): M. nuttallii Conrad.

falklandica Preston, 1913. Mytilimeria falklandica Preston, 1913, p. 223. Type locality: Falkland Islands.

PANDORIDAE

The family is represented in the Magellanic Region by Kennerlia braziliensis (Sowerby, 1874) (Smith, 1881 and Powell, 1951, p. 79), K. patagonica Dall, 1915, Pandora cistula Gould, 1850 and P. diffissa Rochebrune & Mabille, 1889.

PHOLADOMYIDAE

Pholadomya Sowerby, 1823: Pholadomya candida Sowerby.

*adelaidis Hedley, 1916. Pholadomya adelaidis Hedley, 1916, p. 28: Soot-Ryen, 1951, p. 21: Powell, 1958, p. 178. Type locality: Off Adelie Land, 288 fathoms. Range: Also Enderby Land, 220 metres.

*antarctica Hedley, 1916. Pholadomya antarctica Hedley, 1916, p. 28: Soot-Ryen, 1951, p. 21. Type locality: Off Shackleton Ice-shelf, 240 fathoms.

*mawsoni Hedley, 1916. Pholadomya mawsoni Hedley, 1916, p. 28: Soot-Ryen, 1951, p. 21. Type locality: Off Adelie Land, 288 fathoms.

THRACIIDAE

Thracia Blainville, 1824 (Gray, 1847): Thracia corbuloidea Blainville.

*meridionalis Smith, 1885. Thracia meridionalis Smith, 1885, p. 68: Soot-Ryen, 1851, p. 21: Mysella? truncata Thiele, 1912, p. 230: Mysella? frigida Thiele, 1912, p. 231: Powell, 1958, p. 178. Type localities: Royal Sound, 20-60 fathoms, Kerguelen Island (meridionalis), Gauss Station, Davis Sea (truncata and frigida). Range: Kerguelen, Marion and Prince Edward Islands and circum-Antarctic, 10-325 fathoms.

LATERNULIDAE

Laternula Roeding, 1798 (Gray, 1847): L. anatina Roeding = Solen anatinus Linn.

*elliptica (King & Broderip, 1831). Anatina elliptica King & Broderip, 1831, p. 335: Thiele, 1912, p. 256: Soot-Ryen, 1951, p. 22: Powell, 1957, p. 120. Type locality: South Shetlands. Range: South Georgia, South Sandwich, South Orkney and South Shetland Islands, Palmer Archipelago, Peter 1st. Island, Adelie Land, Ross Sea and Kerguelen Island.

Tomlin (1938, p. 84) referred both Thracia antarctica Melvill & Standen, 1898 and Mya antarctica Melvill & Standen, 1914 (obviously both the same species) to the synonymy of Laternula elliptica but Dr. C. A. Fleming, who has a Falklands specimen identical with Melvill & Standen's figures of their species, claims that these shells are not Laternula (see footnote, Powell, 1957, p. 120). They closely resemble Mya, and are provisionally placed in that genus.

VERTICORDIIDAE

Lyonsiella M. Sars, 1868: Lyonsiella abyssicola M. Sars.

*planulata Thiele, 1912. Lyonsiella planulata Thiele, 1912, p. 232: Soot-Ryen, 1951, p. 22: Powell 1958, p. 178. Type locality: Gauss Station, Davis Sea. Range: Also Enderby Land, 193 metres.

A Magellanic species is L. radiata Dall, 1889.

POROMYIDAE

Poromya Forbes, 1844 (monotypy): P. anatinoides Forbes (= granulata Nyst & West).

spinosula Thiele, 1912. Poromya spinosula Thiele, 1912, p. 232: Soot-Ryen, 1951, p. 23. Type locality: Gauss Station, Davis Sea.

CUSPIDARIIDAE

Cuspidaria Nardo, 1840: Tellina cuspidata Olivi.

*concentrica Thiele, 1912. Cuspidaria concentrica Thiele, 1912, p. 233: Soot-Ryen, 1951, p. 24: Powell, 1958, p. 179. Type locality: Gauss Station, Davis Sea. Range: Also off Enderby Land, 300 metres. Not a synonym of kerguelenensis as claimed by Soot-Ryen (Powell, l.c.).

*infelix Thiele, 1912. Cuspidaria infelix Thiele, 1912, p. 233: Hedley, 1916, p. 29: Soot-Ryen, 1951, p. 23. Type locality: Gauss Station, Davis Sea. Range: Also Peter 1st. Island, 380 metres (Soot-Ryen) and Shackleton Ice-shelf, 240 fathoms (Hedley).

kerguelenensis (Smith, 1885). Neaera kerguelenensis Smith, 1885, p. 46: Soot-Ryen, 1951, p. 24: Powell, 1958, p. 179. Type locality: Off Christmas Harbour, 120 fathoms, Kerguelen Island. Range: Soot-Ryen (1951) records this from Palmer Archipelago but the record may refer to Thiele's concentrica which he erroneously considers a synonym (Powell, 1958, p. 179).

***plicata** Thiele, 1912. Cuspidaria plicata Thiele, 1912, p. 233: Hedley, 1916, p. 29: Soot-Ryen, 1951, p. 23: Powell, 1958, p. 179. Type locality: Gauss Station, Davis Sea. Range: Also off Adelie Land, 288 fathoms (Hedley): Crown Princess Martha Land, 220 metres (Soot-Ryen): Enderby Land, 193-300 metres and off MacRobertson Land, 177 metres (Powell).

***tenella** Smith, 1907. Cuspidaria tenella Smith, 1907, p. 1: Soot-Ryen, 1951, p. 23: Powell, 1958, p. 179. Type locality: Off Coulman Island, 100 fathoms, Ross Sea. Range: Also Enderby Land, 193-220 metres (Powell).

A Magellanic species is patagonica Smith, 1885.

Myonera Dall & Smith, 1886 (o.d.): Neaera paucistriata Dall.

***fragilissima** (Smith, 1885). Neaera fragilissima Smith, 1885, p. 53: Pelseneer, 1903: Soot-Ryen, 1951, p. 23. Type locality: Off Prince Edward Island, 300 fathoms. Range: Also West Antarctica, 70° S, 80° 48′ W. (Pelseneer).

Cardiomya A. Adams, 1864: Neaera gouldiana Hinds.

simillima (Smith, 1915). Cuspidaria (Cardiomya) simillima Smith, 1915, p. 104: Carcelles & Williamson, 1951, p. 350. Type locality: Off Rio de Janeiro, 40 fathoms. Range: Also west of Falkland Islands, 125 fathoms (Smith) and Tierra del Fuego (Carcelles & Williamson).

CEPHALOPODA

SEPIOLIDAE

Semirossia Steenstrup, 1881: Heteroteuthis tenera Verrill.

***tenera** (Verrill, 1880). Heteroteuthis tenera Verrill, 1880, p. 392: Rossia patagonica Smith, 1881, p. 22: Massy, 1916, p. 162: Odhner, 1923, p. 5. Type locality: 32°-40° N. off East coast, North America. Range: Also off south of West Falklands, 197 metres and off South Georgia, 150 metres (Odhner): off Rio de Janeiro, 40 fathoms (Massy).

ALLUROTEUTHIDAE

Alluroteuthis Odhner, 1923 (monotypy): A. antarcticus Odhner.

***antarcticus** Odhner, 1923. Alluroteuthis antarcticus Odhner, 1923, p. 2. Type locality: Weddell Sea, 2800-0 metres.

BATHYTEUTHIDAE

Bathyteuthis Hoyle, 1885: B. abyssicola Hoyle (= Benthoteuthis Verrill, 1885).

abyssicola Hoyle, 1885. Bathyteuthis abyssicola Hoyle, 1855, p. 272. Odhner, 1923, p. 1: Benthoteuthis megalops Verrill, 1885, p. 401. Type locality: Southern Ocean, 1600 fathoms. Range: Also 48° 27′ S, 42° 36′ W, 2500-0 metres (Odhner).

STAUROTEUTHIDAE

Cirroctopus Naef, 1923: C. mawsoni Berry (=Grimpoteuthis Robson, 1932).

***glacialis** Robson, 1930. Cirroteuthis glacialis Robson, 1930, p. 375 and 1932, p. 150. Type locality: Discovery II Stn. 182, Schollaert Channel, Palmer Archipelago, 273-152 fathoms.

***mawsoni** (Berry, 1917). Stauroteuthis (?) mawsoni Berry, 1917, p. 8: Robson, 1932, p. 147: Thiele, 1935, p. 985. Type locality: Off Mertz Glacier Tongue, Adelie Land, 288-300 fathoms.

Also several other Antarctic records of the genus but not specifically determined, Robson (1932, p. 154) i.e. off South Georgia and Weddell Sea, 2425 fathoms.

CIRROTEUTHIDAE

Cirroteuthis Eschricht, 1838: C. mülleri Eschricht.

magna Hoyle, 1885. Cirroteuthis magna Hoyle, 1885, p. 233: Robson, 1932, p. 162. Type locality: Between Prince Edward Island and the Crozets, 1375 fathoms. (Generic placing uncertain, Robson, l.c.).

OCTOPODIDAE

Pareledone Robson, 1932 (o.d.): Eledone charcoti Joubin.

***adelieana** (Berry, 1917). Moschites adelieana Berry, 1917, p. 17: Robson, 1932, p. 278. Type locality: Off Mertz Glacier Tongue, Adelie Land, 288-300 fathoms.

***antarctica** (Thiele, 1920). Moschites antarcticus Thiele, 1920, p. 434: Robson, 1932, p. 279. Type locality: Gauss Station, Davis Sea.

***charcoti** (Joubin, 1905). Eledone charcoti Joubin, 1905, p. 22: Moschites charcoti Massy, 1916, p. 151: Moschites aurorae Berry, 1917, p. 20: Odhner, 1923, p. 6: Robson, 1932, p. 270. Type localities: Wandel Island (charcoti), Queen Mary Land, 120-325 fathoms (aurorae). Range: South Orkneys, South Shetlands, Oates Land, Queen Mary Land, Ross Sea and off Rio de Janeiro, 12-675 metres.

***harrisoni** (Berry, 1917). Moschites harrisoni Berry, 1917, p. 24: Robson, 1932, p. 277. Type locality: Shackleton Ice-shelf, Queen Mary Land, 325 fathoms.

***polymorpha** (Robson, 1930). Graneledone polymorpha Robson, 1930, p. 390 and 1932, p. 276. Type locality: South Georgia, 149-8 fathoms.

***turqueti** (Joubin, 1905). Eledone turqueti Joubin, 1905, p. 29: Massy, 1916, p. 155: Robson, 1932, p. 273. Type locality: West Antarctica. Range: South Shetlands, Palmer Archipelago, north of South Georgia, Ross Sea and off Rio de Janeiro, 27-620 metres.

Octopus Lamarck, 1798: Octopus vulgaris Lamarck.

tehuelchus Orbigny. Octopus tehuelchus Orbigny, 1835, p. 27: Robson, 1929, p. 147. Type locality: St. Blas Bay, Patagonia. Range: Also Falkland Islands? (Robson).

Other species of Octopus recorded from the Magellanic Province are pentherinus Rochebrune & Mabille, 1889 (may be a Joubinia), see Robson, l.c. and patagonicus Lönnberg, 1907.

Enteroctopus Rochebrune & Mabille, 1889 (Hoyle, 1910): E. membranaceus Rochebrune & Mabille.

megalocyathus (Gould, 1852). Octopus megalocyathus Gould ,1852, p. 471: Rochebrune & Mabille, 1889, p. 8: Polypus brucei Hoyle, 1912, p. 276: Odhner, 1923, p. 6: Robson, 1929, p. 176. Type locality: Strait of Magellan. Range: Patagonia, Strait of Magellan, Tierra del Fuego, Falkland Islands and Burdwood Bank (Robson).

Other Magellanic species are membranaceus Rochebrune & Mabille, 1889 and Joubinia fontaniana (Orbigny, 1835).

Benthoctopus Grimpe, 1921 (o.d.): Octopus piscatorum Verrill.

eureka (Robson, 1929). Polypus tehuelchus: Hoyle, 1912, p. 278 (non Orbigny, 1835): Enteroctopus eureka Robson, 1929, p. 179: Robson, 1930, p. 331 and 1932, p. 228. Type locality: Falkland Islands.

***levis** (Hoyle, 1885). Octopus levis Hoyle, 1885, p. 229: Robson, 1932, p. 227. Type locality: Heard Island, 75 fathoms.

thielei Robson, 1932. Polypus levis. Thiele, 1915, p. 486 (non Hoyle, 1885): Benthoctopus thielei Robson, 1932, p. 233. Type locality: Gazelle Harbour, Kerguelen Island.

The genus is represented in the Magellanic Province by magellanicus Robson, 1930, based upon B. hyadesii Robson, 1929 (non Rochebrune & Mabille).

Graneledone Joubin, 1918 (o.d.): Eledone verrucosa Verrill.

***setebos** Robson, 1932. Moschites sp. Massy, 1916, p. 159: Graneledone setebos Robson, 1932, p. 313. Type locality: Cape Evans, McMurdo Sound, in rock pool.

Thaumeledone Robson, 1930 (o.d.): Eledone brevis Hoyle.

***gunteri** Robson, 1930. Thaumeledone gunteri Robson, 1930, p. 392 and 1932, p. 316. Type locality: North east of South Georgia, 224-219 fathoms.

Bentheledone Robson, 1932 (o.d.): Eledone rotunda Hoyle.

***albida** (Berry, 1917). Moschites albida Berry, 1917, p. 15: Robson, 1932, p. 320. Type locality: Off Wilkes' Land, 1700 fathoms.

rotunda (Hoyle, 1885). Eledone rotunda Hoyle, 1885, p. 230: Robson, 1932, p. 317. Type locality: 53° 55′ S, 108° 35′ E, east of Kerguelen Island, 1950 fathoms.

Carcelles & Williamson (1951, pp. 351-355) list the following cephalopods from the Magellanic:—Loligo gahi Orbigny, 1835, Pterygioteuthis giardi Fischer, 1895, Onychoteuthis banksi (Leach, 1817), Moroteuthis ingens (Smith, 1881) and Ommastrephes bartramii (Lesueur, 1821).

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Scleractinian Corals from the Norfolk Island Cable

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INTRODUCTION

Among the modern corals in the collections of the Auckland Museum are a suite of specimens collected by the late Mr. W. Foster from the Norfolk Island-New Zealand cable during its repair in 1932. Seven specimens of Scleractinia were taken alive from the cable together with a number of large reteporid bryozoans, stylasterids and alcyonarian corals. The scleractinian corals are of some interest because of the association of species, certain characters of their morphology, and the significant extensions of geographic ranges indicated by the presence of some of the species.

Of some considerable interest was the possibility of deriving the growth rates of the specimens taken from the cables. In the absence of data otherwise obtained, growth rates of the deeper-water corals have generally been deduced through study of specimens found adhering to objects of a known age, such as cables or buoy chains. Data obtained in this fashion can represent only the minimum growth rate, assuming that the larvae settled on the object immediately upon its immersion. The shorter the period of immersion of the substrate, the more valuable the data. With some anticipation the maintenance records of the cable in question were sought. Unfortunately, from the stand-point of growth rate studies, its service had been quite satisfactory and its history is therefore a long one. Only three previous studies of corals attached to cables are known to me, two of which are from the Atlantic, one from the Mediterranean.

A great amount of information may be obtained from a study of cable faunas. Their collection and preservation is to be encouraged. The specimens described here were collected by the late Mr. W. Foster, Engineer of the New Zealand Post Office, a conscientious collector, who greatly enriched the collections of the museums of New Zealand. I am grateful to Dr. A. W. B. Powell for permission to study this interesting suite of corals and for the kind hospitality extended to me at the Auckland Museum. Information concerning the cable history was supplied by the Engineer in Chief, New Zealand Post Office, Wellington, Mr. George Bull, through the kind offices of Dr. R. A. Falla, Dominion Museum. Photographs of the specimens were made by Mr. S. N. Beatus, New Zealand Geological Survey. This study was completed during the tenure of a Fulbright Research Grant under the auspices of the New Zealand Geological Survey.

GROWTH RATES

Growth rate data derived from studies of cable faunas are not common literature; three previous studies are known to me and are summarized in table 2. The significant feature in common to all of these is the relatively short time that each of the cables had been in service, and the great depth of water from which the specimens had been recovered. Unfortunately, the information derivable from the Norfolk Island cables is not of comparable significance. According to the records supplied by Mr. George Bull, the section of cable under consideration, 15.655 nautical miles from Norfolk Island (position approximately 29° 20′ 00″ S., 168° 07′ 35″ E.) was lifted August 19, 1932 and 1.63 miles were cut out. Of the section cut out, 1.32 miles had been laid in 1901, the remaining 0.31 miles laid in 1914. Under the assumption that the specimens are as old as the cable, they have alternative maximum ages of 17 or 30 years. Growth rates derived from these alternatives are given in table 1.

Table 1

Growth Rates of Scleractinian Corals from Norfolk Island Cable.

	Assuming Cable Age of 17 Years			Assuming Cable Age of 30 Years		
Species	Height[1] (mm/yr)	Weight[2] (gms/yr)	No. Corallites (calices/yr)	Height[1] (mm/yr)	Weight[2] (gms/yr)	No. Corallites (calices/yr)
Caryophyllia profunda						
Spec. A	2.02	.57	—	1.15	.32	—
Spec. B	1.55	.42	—	.88	.24	—
Spec. C	1.96	.39	—	1.11	.22	—
Average	1.84	.46	—	1.05	.26	—
Goniocorella dumosa	2.94	.77	—	1.67	.44	—
Culicia australiensis	.46	—	6.35	.26	—	1.12
Tubastrea aurea	—	—	—	—	—	—
Spec. A	1.82	1.16	.47	1.03	.66	.27
Spec. B	3.16	4.50	2.18	1.79	2.52	1.23

[1]Measurements of all specimens are given with the descriptions.

[2]Weight is based upon the dry weight of the cleaned corallum.

Table 2

Summary of Scleractinian Growth Rate Data as deduced from studies of Cable Fauna:

Species	Cable Depth	Cable Location	Cable Age	No. of Specimens	Growth Rate
Caryophyllia electrica[1]	2000-2800 m.	Mediterranean	2 years	10	2.5 mm/year
Lophosmilia telegraphicus[1]	2000-2800 m.	Mediterranean	2 years	1	5.0 mm/year
Lophelia prolifera[2]	—	Off Spain	6 years	–	7.5 mm/year
Desmophyllum cristagalli[3]	1139-1200 m.	North Atlantic	6 years	1	7.1 mm/year
Lophelia prolifera[3]	1139-1200 m.	North Atlantic	6 years	–	6.8 mm/year
Solenosmilia variabilis[3]	1139-1200 m.	North Atlantic	6 years	–	no data
Caryophyllia arcuata[1]	2000-2800 m.	Mediterranean	2 years	1	no data

[1]Data from Milne-Edwards and Haime (1861).

[2]Data from Pratje (1924).

[3]Data from Duncan (1877).

Rates of growth given by Milne-Edwards (1861) for *Caryophyllia* are somewhat greater than those obtained for *Caryophyllia profunda* in the present study. This is not unexpected and probably indicates an excessive age being attributed to the specimens. An additional complication is the fact that at least one of the specimens of *Caryophyllia* is believed to display gerontic characteristics in its morphology, possibly indicating cessation of upward growth. *Goniocorella* has no direct analogies among the Atlantic Ocean corals, but is comparable in growth form to *Lophelia*. There is no comparison in growth rates. The rates obtained for the "shallower" water corals represented by *Tubastrea* and *Culicia* (both have an extensive depth range, but are commonly found in much shallower water than

Caryophyllia or *Goniocorella*) are not as good. Data for *Culicia* are the least reliable of the group, largely because of its growth habit which makes measurements difficult. The two specimens of *Tubastrea* differ considerably in size.

Any conclusions reached through the information given in table 1 must be extremely tenuous. It would seem probable that the age of the specimens is less than the 17 year minimum allowed by the cable history. The *Caryophyllia profunda* are apparently the product of one or two settlements of larvae, possibly representing one- or two-year age classes. In contrast, the two specimens of *Tubastrea* are seemingly of quite different ages, if the growth rates are admissable as criteria for age determination.

SYSTEMATICS

Phylum Coelenterata Frey and Leuckart, 1847.

Class Anthozoa Ehrenberg, 1834.

Order Scleractinia Bourne, 1900.

Family CARYOPHYLLIDAE Gray, 1847.

Genus GONIOCORELLA Yabe and Eguchi, 1932.

Goniocorella dumosa (Alcock), 1902. Figures 1-4.

1902—*Pourtalosmilia dumosa* Alcock, "Siboga" Expedition Monographs: 16a, p. 36, pl. 5, Figs. 33-33a.

A single corallum 88 mm long, 77 mm wide, and 50 mm in height was taken from the cable. The corallum is a dense thicket of elongate, profusely budding corallites which are secured and bound together by extrathecal scalariform processes. Extratentacular budding occurs near the calicular lip, the buds arising from the parent corallite at right angles, soon growing at a lesser angle to the axis of the parent corallite. Calices are consistently 3 to 4 mm in diameter. Septa are non-exsert and are at present in three cycles, arranged in three groups. Septa of the first cycle extend about three-quarters of the way to the centre of the calice, while those of the second are thinner but are about the same length. Third cycle septa are very short. Septa are laterally finely ridged, the ridges not being parallel to the septal margin. The vertical proximal edge of a septum is smooth, sometimes slightly thickened. There is no columella but at depth first cycle septa may loosely mingle. Flat tabular dissepiments are developed at intervals of 5 to 10 mm.

The exteriors of the corallites are covered by fine granulations usually arranged to approximate costae. Fine continuous raised costal lines corresponding to the first cycle of septa are present on most corallites, while older corallites may have costal lines corresponding to the first two cycles of septa. The edge zone of the polyps is extensive, reaching as much as one or two centimetres down the sides of the corallites.

Scalariform processes sent out at irregular intervals to bind the corallum together demonstrate a remarkable directiveness in their construction. The processes are solid rods of extrathecal origin which are apparently formed within rolls of temporary extensions of the edge-zone or coenosarc. Dried tissue present on the corallum before it was cleaned indicated that streamers of the coenosarc must have been sent out as much as 25 mm from the corallites, and that they were not retractable! Secretion of carbonate is apparently stimulated by contact of the coenosarc extension with some solid object, for process formation is always complete (in observed instances of incomplete construction, the gap was bridged by the coenosarc). In the corallum there are several examples of processes from adjacent corallites meeting end to end and uniting, a disc like pad of carbonate indicating the junction. Processes developed on the lower portions of the corallum bear either fragments of shell or bits of bitumen from the cable at their terminus.

The processes are developed from the calicular lip although construction may continue after the corallite has grown up to a centimetre beyond this point. The solid nature of the processes indicates that they are formed within a fold of coenosarc in the fashion of the solid costal spines of several other caryophyllids, as for example *Stephanocyathus*. The initial portion of the corallum is unknown. The corallum was in contact with the substrate (either cable or sand) at 16 points as indicated by particles of adhering asphalt or shell fragments. None of these contact points were on the corallites, all were on processes. It is possible that the larva which produced the corallum settled upon some bit of sand or shell or soft object, and after a certain amount of development came in contact with the cable.

The development of processes and the general form of the corallum of the specimen at hand are quite different from that figured and described by Alcock (1902). The description of the genus given by Yabe and Eguchi (1932) indicates that processes were present on the specimen before them. The specimen figured by Alcock is quite possibly a fragment, although depth of occurrence and type of substrate may affect the degree of process developments.

Goniocorella dumosa (Alcock) is the only recorded species of the genus although Yabe and Eguchi (1942) list a second unnamed species occuring in shallower water than *G. dumosa* on the Japanese shelf.

Distribution records:

(For *Goniocorella dumosa* (Alcock))

Alcock, 1902, p. 36:

"Siboga" Station 156 0° 29.2′ S., 130° 5.3′ E., 469 m.
259 5° 29.2′ S., 132° 52.5′ E., 487 m.

Yabe and Eguchi, 1936, p. 167:

Off Awasi, Minami-Muro-gun, Mie Prefecture Japan, 100 m.

Yabe and Eguchi, 1942, p. 161:

"Soyo Maru" Station 255 34° 46′ 15″ N., 139° 05′ 00″ E., 263 m.
331 32° 30′ 15″ N., 132° 46′ 20″ E., 344 m.

(For *Goniocorella* sp.)

"Soyo Maru" Station 211 33° 33′ 30″ N., 135° 19′ 00″ E., 190 m.
212 37° 50′ 00″ N., 135° 10′ 30″ E., 181 m.
216 33° 26′ 00″ N., 134° 22′ 00″ E., 274 m.

Genus **CARYOPHYLLIA** Lamarck, 1801.

Caryophyllia profunda Moseley, 1881. Figs. 5-7, 9-11.

1881—*Caryophyllia profunda* Moseley, Scientific Repts., Challenger Expedition, Zool. vol. 2 pl. 138, pl. 1, Figs. 6, 6a, 6b.

Three specimens of this species were taken from the cable. They are described below in some detail because of the morphological differences in the coralla. These are apparently not all attributable to variation in the corallum morphology, but are indicative of a change in structure with age.

Specimen A: the largest specimen; deposition of stereome within the corallum is apparently responsible for the disproportionately high increase in weight. The costae of this specimen are the most highly developed and most flange-like. The columella is strong and broad, composed of several rows of stout curled laths. Septa of the first group may be lobate at their proximal margin and the pali may be bilobed or trilobed. The septa and pali are coarsely granulate laterally and only septa with pali before them are wavy on their proximal edge. Specimen B: Costae are not as pronounced as in the specimen above, but tend to be broader and more robust. The costae are covered by several rows of relatively fine granules which are aligned in a transverse pattern. The columella is finer, more delicate and narrow, and the septa and pali are not lobate and are more narrow than in specimen A. The septa are finely granulate or smooth laterally, while the pali are glossy smooth. All septa tend to be wavy on the proximal edges. Specimen C: The external ornamentation of this specimen is intermediate between specimens A and B. Septa are lightly granulate, the pali are smooth laterally. Only one septum and one palus are lobate. The columella is composed of a single row of broad laths rather than a bundle of finer ones.

Table 3

Measurements of *Caryophyllia profunda* Moseley.

	Specimen A	Specimen B	Specimen C
Height of Corallum	34.4 mm	26.3 mm	33.5 mm
Corallum diameters	29.8 x 30.0 mm	25.4 x 22.6 mm	23.6 x 21.7 mm
Number of Septa	94	94	80
Number of Pali	22	23	20
Columella diameters	8.0 x 5.0 mm	8.0 x 3.5 mm	5.0 x 2.5 mm
Weight of Corallum	9.7 gms	7.1 gms	6.7 gms
Weight/Height	2.82 gms/cm	2.70 gms/cm	2.0 gms/cm

As noted by Gardiner (1939, p. 337) there is probably a maximum size attained by most solitary corals after which there is little additional growth. The observation is based upon the analogy with growth and sexual development in *Flabellum* (Gardiner, 1902). Cessation of growth in the specimens of *Caryophyllia profunda* from the Norfolk Island cable is indicated by many features of the morphology which are assumed to be gerontic, but is shown more precisely by an increasing ratio of height to weight, although the gross dimensions of all three specimens are nearly the same. Similar measurements upon a large number of specimens will be necessary before this observation can be adequately documented. It is interesting that Gardiner (1939, p. 338) did not anticipate such a development and indeed stated that there would be no proportional increase in weight of corallum with increase in size.

Many instances of morphological variation observed among the solitary corals may be a response to cessation of growth. Characters believed to indicate this condition among the present specimens are increasing coarseness of the lateral ornamentation of septa and pali, lobation of the pali and septa, increase in thickness of septa (and consequent reduction in width of interseptal loculi) and increase in portions and massiveness of the collumella. Certain characters of the external ornamentation may also reflect gerontic development such as coarsening of the ornamentation, thickening of the costae and production of costal flanges. Some of these characters are demonstrated by the specimens at hand, but frequently they may reflect environmental conditions and therefore are not trustworthy. The sequence of specimens from the cable show the development of these gerontic characters well. Specimen "C" can be considered as the "youngest", while "A" is the "oldest".

Distribution records for *Caryophyllia profunda* Moseley:

Moseley 1881, p. 139:	
"Challenger" Station 135	Off Nightingale Island, Tristan da Cunha Group. 100-150 fathoms
Gardiner, 1929, p. 126:	
"Terra Nova" Station 91	Off Three Kings Islands, New Zealand. 300 fathoms.
Gardiner, 1939, p. 331:	
"Discovery" Station 6	Tristan da Cunha, Quest Bay, 80-140 m.
Station 1187	S.E. of South Hill, Inaccessible Island, Tristan Group, 117-140 m.

Family RHIZANGIIDAE d'Orbigny, 1851.

Genus CULICIA Quoy and Gaimard, 1833.

Culicia australiensis Hoffmeister, 1933. Fig. 8.

1933—*Culicia australiensis* Hoffmeister, Biol. Res. Fishing Exper. F.I.S. "Endeavour", 1909-14: 6 (1), 12, pl. 3, Figs. 3-4.

A single specimen consisting of 21 corallites spread upon a mat of polyzoan and indeterminate material seems most closely allied with this species. As remarked by Wells (1954, p. 464) the species of *Culicia* are in need of revision but can be grouped according to the nature of septal margins, and the number of septa. *Culicia australiensis* is characterized by the possession of nearly four complete cycles of septa, the first and second cycles being subentire, usually exsert. Higher cycles of septa are progressively more highly dentate. In this respect, the species is most closely allied with *Culicia truncata* Dana from which it differs in not having the first cycle septa notched next to the wall.

Distribution records for *Culicia australiensis*.

Hoffmeister, 1933, p. 12:

Off Marsden Point, Kangaroo Island, South Australia. 17 fathoms.

Table 4

Measurements of *Culicia australiensis*.

	Corallites				
	A	B	C	D	E
Diameter of corallites	5.0 mm	5.0 mm	3.75 mm	3.5 mm	4.0 mm
Number of septa	38	38	38	33	41

Family DENDROPHYLLIDAE Gray, 1847.

Genus TUBASTREA Lesson, 1834.

Tubastrea aurea (Quoy and Gaimard), 1833. Fig. 12.

1926—*Dendrophyllia aurea* (Quoy and Gaimard), van der Horst, Trans. Linnean Soc. London, ser. 2, Zool.: 19, 46, pl. 2, Figs. 1-4, 8, 9.

Van der Horst has discussed the synonymy of this species and I can add nothing. The growth form of the specimens from the cable is typical of young specimens of this species. A spreading mat of peritheca serves as a basis for initial upward growth. Lateral budding soon covers this mat with young calices and the form of the corallum becomes hemispherical. *Tubastrea* is typically a rock coral found usually in shaded areas in shallow waters and to a considerable depth of water, but always attached to a fresh rock surface, or some other hard bit of substrate. The distribution of *Tubastrea aurea* is circumtropical.

Table 5

Measurements of two specimens of *Tubastrea aurea* (Quoy and Gaimard):

	Corallum A	Corallum B
Weight of corallum	19.7 gms	76.1 gms
Maximum diameter of corallum	56.7 mm	65.8 mm
Height of corallum	30.8 mm	53.7 mm
Number of corallites	8	37

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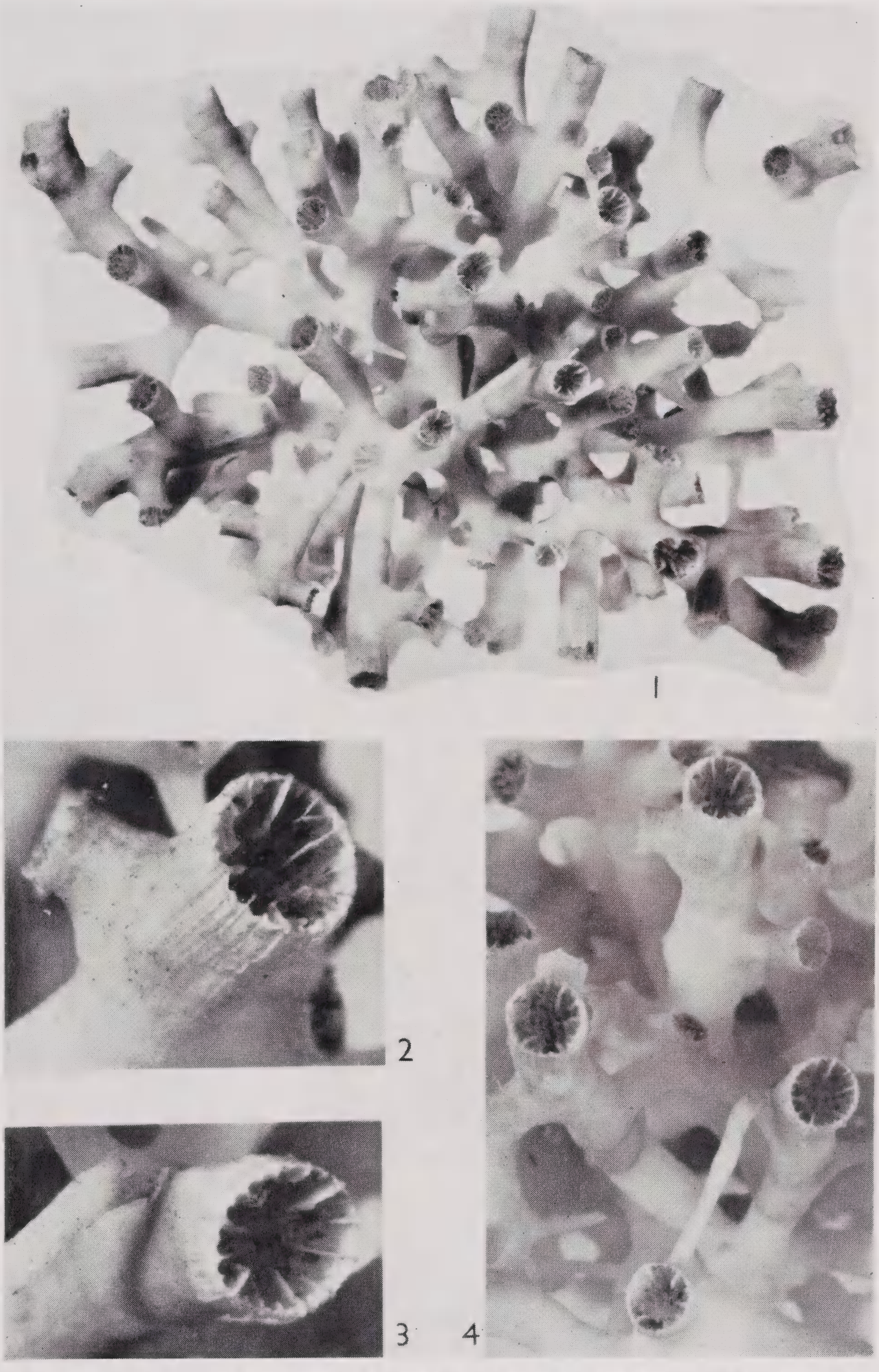
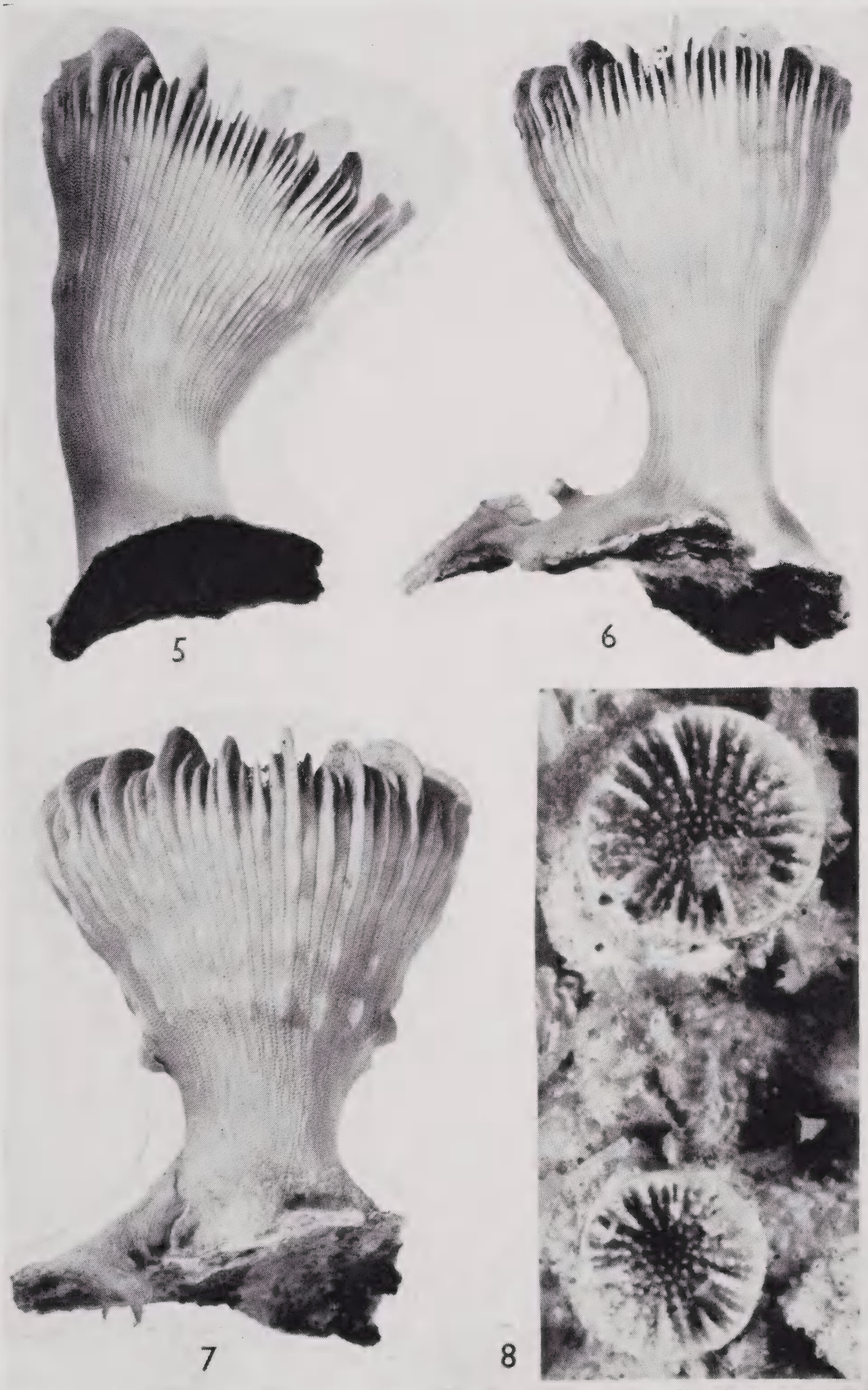
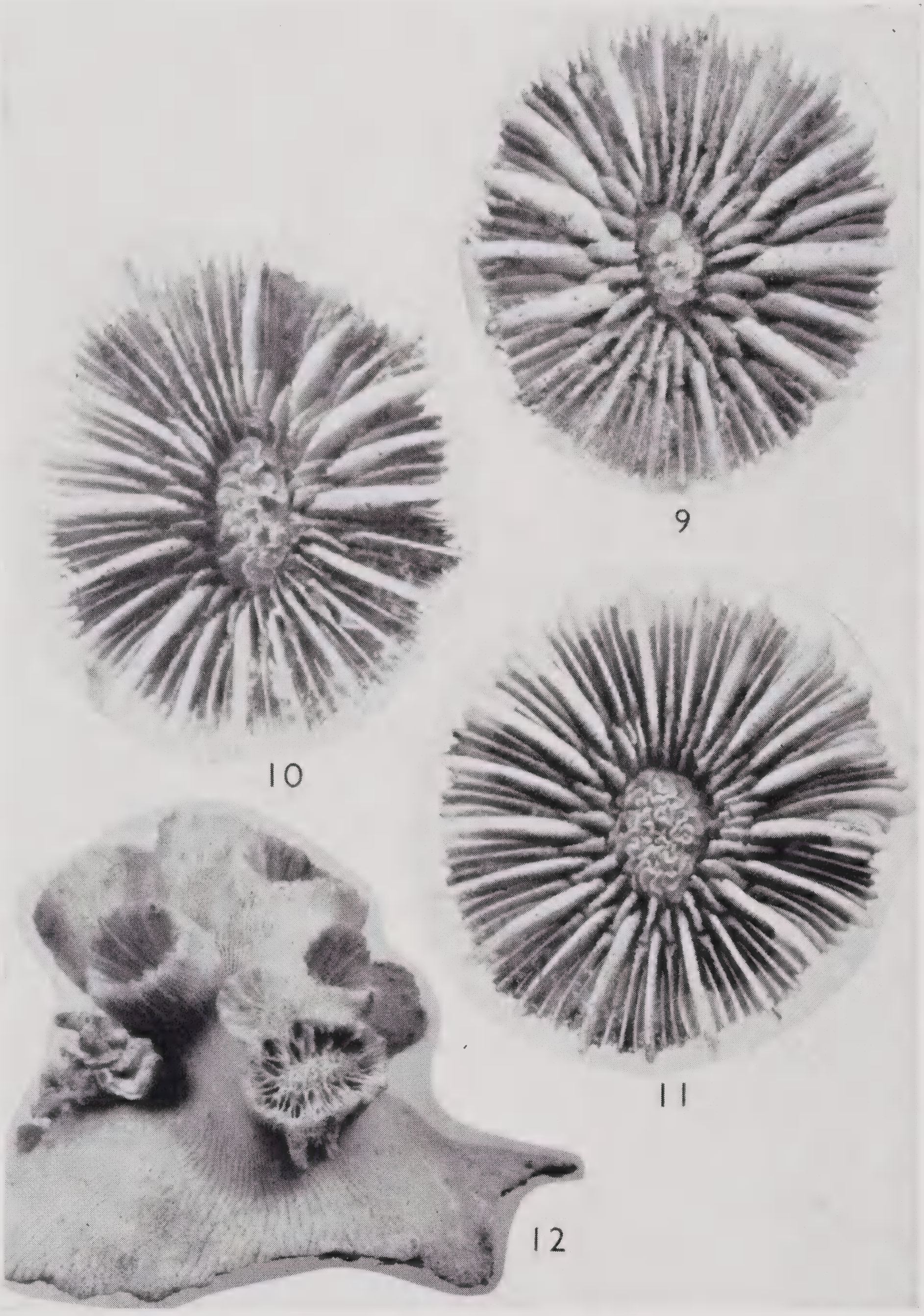


Figs. 1-4. *Goniocorella dumosa* (Alcock). (Fig. 1.) Corallum, x 1.4. (Fig. 2.) Calice, x 10.4; note costae and fine granules approximating costae. (Fig. 3) Calice and process, x 10.4; showing disc-like pad where process attaches to corallite. (Fig. 4.) Calices and process, x 5.2.



Figs. 5-7. *Caryophyllia profunda* Moseley. (Fig. 5.) Specimen B, x 2.0. (Fig. 6.) Specimen C, x 2.0. Notice slight development of flanges on costae. (Fig. 7.) Specimen A, x 2.0. Notice massive appearance of septa and costal ornamentation.

Fig. 8. *Culicia australiensis* Hoffmeister. Corallum x 7.0.



Figs. 9-11. *Caryophyllia profunda* Moseley. (Fig. 9.) Specimen C, Calice, x 2.5, showing lightness of construction. (Fig. 10.) Specimen B, Calice, x 2.5. (Fig. 11.) Specimen A, Calice, x 2.5.

Fig. 12. *Tubastrea aurea* (Quoy and Gaimard). Smaller specimen, approximately x 2.0.

Pare (Door Lintels) of Human Figure Composition

By GILBERT ARCHEY

The simplest compositional arrangement seen in Maori wood carving is a succession of human figures standing in alternate full-face and profile attitude, *tiki* and *manaia*. Attention was drawn to this by the writer in 1936 (Archey, 1936, p. 57), and illustrations were later given (Archey, 1955, pp. 8-16) of the further development of this simple rhythm into quite involved patterns which included double spirals *(pitau)* as well as *tiki* and *manaia*.

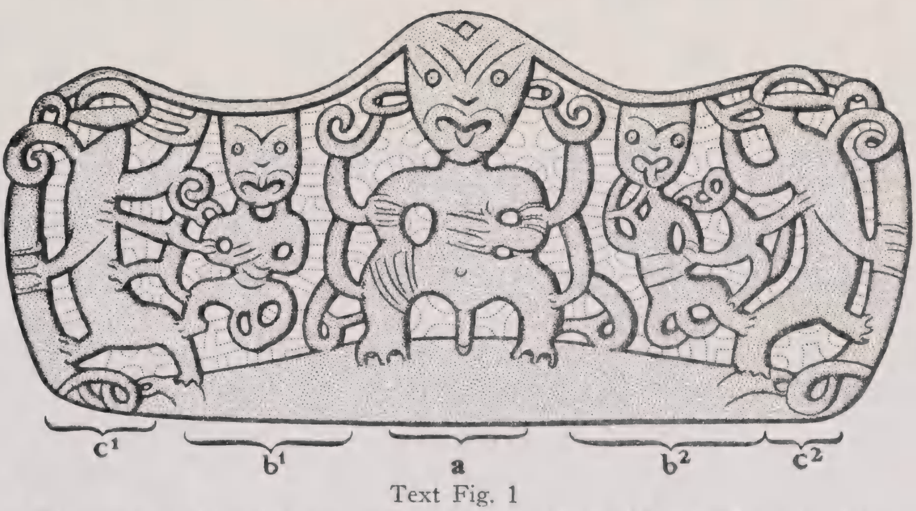
In certain door-lintels *(pare)* this primary succession had already advanced from the simple, unvaried repetition that we see on house thresholds or canoe washstrakes to a decorative design that had gained a measure of variety through the different sizes of the figure elements and their changing pose of limbs and bodies.

This condition (Fig. 1) is made the basis of the present paper which will present some dozen and a half *pare* compositions created from human figures alone, some naturalistic, others stylized. They do not include double spirals; but it may be remarked by way of reservation that spirals themselves are held by the writer to be human figure derivatives, a decorative form drawn out or abstracted from profile faces in strongly curved stylization (Archey, 1933, p. 175). This paper then invites you to look at certain Maori carvings as we endeavour to identify these elements and comment upon their compositional arrangement.

I

Simple Figure Sequence

Structurally the door lintel is a panel carrying a group of figures or figure-derivatives standing above a plain basal portion. The *pare* of our first illustration (Fig. 1) is as simple an example as we know of



Text Fig. 1

1. *Pare* composition of a row of figures alternately full-face *(tiki)* and profile *(manaia)*.

this arrangement. Its basal bar is undecorated except for elements of a head or face at either end. The disposition of the figures, which seems to be the basis for all *pare* compositions, comprises: a central full-face figure or *tiki* (a); on either side of it a succession of *manaia: tiki:manaia* (b^1, b^2), in that order; terminally on each side a pair of *manaia* figures in conflict or embrace (c^1, c^2). The lower edge of the basal bar is nearly straight, its upper edge gently arched; the upper margin of the *pare* itself is embayed between the central *tiki* and the terminal paired *manaia*. A photograph of this *pare* appears on Plate 36

The other lintels presented in this brief review exhibit variations on this simple order. I have placed the designs in such series or groups as has seemed appropriate; the difficulty of devising an 'inevitable' classification arises from the fact that the carvers were individuals, and versatile to a degree in their handling of a common theme.

II

Stylized Tiki and Manaia in Complex Designs

In text-figure 2 we present a *pare* we have previously illustrated in conjunction with Fig. 1 (Archey, 1955, pl. III). On that occasion

Text Fig. 2

2. *Pare* with figures in strongly curved stylization.

the connecting chocks between the actual figures were eliminated; here Miss Dorothy Kempin whom I again thank for her clear drawings for my papers, has emphasized the figures at the expense of the connections, so that both can be seen, in an effect the carver envisaged if he did not precisely achieve it. In this *pare* the three figures which in Fig. 1 stand between the central *tiki* and the terminal paired *manaia* are reduced to one on each side (b^1, b^2); its sweeping, curved body however and its large profile head with amply curled upper lip, adequately fill the space. It is assisted in this 'space-filling' function by the terminal *manaia* heads of the base (c^1, c^2) projecting upwards into the figure-design area. Despite these variations, this *pare*, a carving obtained in Sydney many years ago by the donor, the late Mr. John Kenderdine, is clearly a rendering or variant of the design of Fig. 1. Although our carver here devoted himself to his design of curves and loops, he nowhere departed from the organic elements proper to a *pare*; indeed it was by pliant wielding of them that he achieved his purpose, the effect of which can be seen in the photographic illustration, Plate 36 B.

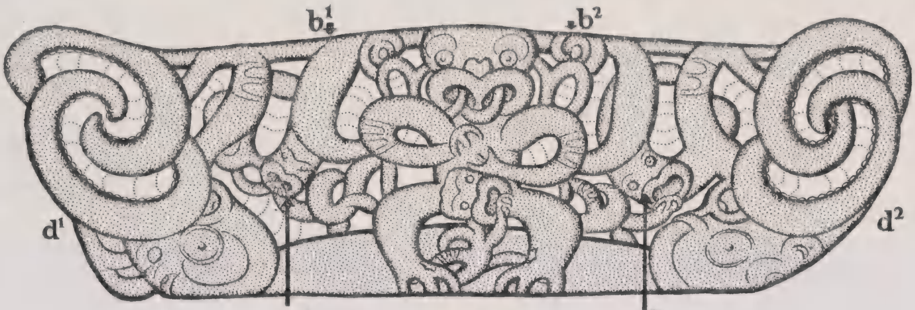
In text-fig. 3 and Plate 37 A, a *pare* from Thornton's Bay, Coromandel, the central *tiki* (a) is again flanked by a single figure on each side (b^1, b^2); the heads of the base again project into the design area (c^1, c^2), but they now face *inwards* to meet the mouth of the central figure. The carver of this *pare* had little need for connecting

Text Fig. 3

3. *Pare* with figures in more angular stylization.

blocks of non-organic nature; he achieved almost every detail of his pierced design by an adroit linking of the bodies and limbs of the figures.

In text-figure 4 and in Plate 37 B we observe a central and sub-lateral elements similar to those of Plate 36, B, i.e. a central *tiki* (a)



Text Fig. 4

4. *Pare* with curved stylization of *tiki* and *manaia* and terminal motive of strongly developed interlocking mouths.

flanked by a pair of U-looped *manaia* (b^1, b^2). An additional element is a small *tiki* with contorted body (c^1, c^2) placed just above the base of the *pare;* its head, full-face, appears on the bottom of the loop of the main *manaia.*

The terminal feature of this *pare* (Fig. 4, d^1, d^2) is a striking decorative form — a large double-loop or incipient double-spiral, both loops provided with a row of teeth. The lower of these two loops is clearly the mouth of the large profile face at either end of the plain basal bar of the *pare*. This great double-loop is, both by its position and its form, the counterpart of the *manaia* in combat (or in embrace?) that is the more customary end-feature of a door-lintel composition. Or, to put it another way, the opposed *manaia* that usually constitute the end-feature of these *pare* compositions here appear as a much expanded representation or stylization of their interlocking mouths. It is most unusual to find the heads of the base forming part of the terminal *manaia* combat; it shows us the freedom the artist could claim to modify the content of the normal *pare* figure-group in favour of his design concept.

III

Design Grouping of Tiki

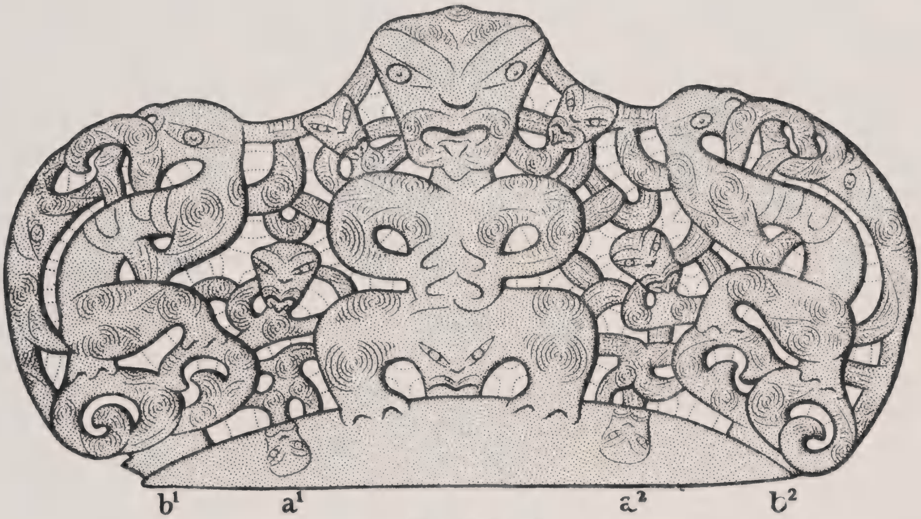
In giving attention now to a handsomely carved *pare* from the East Coast (Plate 38, A) we return to a composition of figures that are for the most part naturalistic; we present it, however, as the prototype of a second series of designs in *stylized* versions of the human body. In the former series the intermediate figures are in a row, in line with the central *tiki* and the terminal *manaia;* in this second group they are irregularly disposed, sometimes becoming an involved medley.

The base, as yet unornamented except for a few tentative loops on one side, carries at each end a finely turned curled-lip *manaia* face in pierced carving. The central figure of the *pare* itself is boldly naturalistic. The outline of the upper margin of the lintel, embayed more deeply than in text-figure 1, extends boldly outward around the lateral margins. This border is excellently expressed by the inevitable paired manaia, and here I feel I must dwell for a moment on an admirable example of Maori design competence. It is not only that the figures are each carved in appropriate strength for their respective function — the inner bold, to hold the composition together; the outer diminished, to give lightness to the margin. Real merit prevails too in the sweeping continuity of body and limbs in two movements, confluent and countervailing; figure 5 expresses their formal essence.

Text Fig. 5

5. Design motive of terminal *manaia* of East Coast *pare* of Plate III, A.

On each side, between the central figure and the marginal *manaia* three naturalistic female figures are presented in active attitudes; their size and arrangement are such as to reduce considerably the need for connecting bars, and this together with their very light surface ornament, leaves the figures themselves in full prominence. A small detail for passing note is the looping of an arm of one around the leg of another. In the balanced arrangement of faces and the easy movement of body and limbs, these figures fill the required space appropriately and demonstrate how satisfactory a design the Maori carver could contrive by a composition of natural figures alone.



Text Fig. 6

6. A figure-composition with tracery of *tiki* and powerfully developed terminal *manaia*.

In our next illustration (Fig. 6) (cf. Pl. 38, B) this three-figure composition appears to be replaced by an evenly spaced tracery of pierced carving; nevertheless the same three figures are there. Their naturalistic faces alone are obvious, their bodies and limbs being more slender and blending with the now more prominent connecting bars. They are not really easy to disentangle, though we are often helped here by the simple chevron pattern on the connections.

At first sight it might be thought that there are only two figures on each side; the third face however appears upside-down on the otherwise plain base of the *pare*, clearly carved on the right and only roughly outlined so far on the left.

The pleasing all-over evenness in texture of this lintel derives from a similar fairly strong surface ornament having been applied to the larger figures (the central *tiki* and paired *manaia*), as well as to the tracery. The main figures however are not thereby subordinated or even subdued. They stand or carry themselves boldly, with the same vigour of expression that we saw in Plate 38, A. In both these lintels the outer marginal element, which from its slenderness might be thought to be an eel or a snake (not known in New Zealand), possesses clearly indicated arms extending downward from a typical spiral-decorated shoulder-boss and across to meet the body of its 'adversary'. In fact these arms are very similar in form in both *manaia* shown on this Plate.

As a final comment on this fine British Museum example of Maori art we note the bold treatment of the *manaia* faces that project upward from either end of the lintel base (Fig. 6, b^1, b^2). Expanded as they are, they provide a firm base for the sub-terminal *manaia* to stand upon; with their sweeping loops they also have their own definite place in the design as a whole.

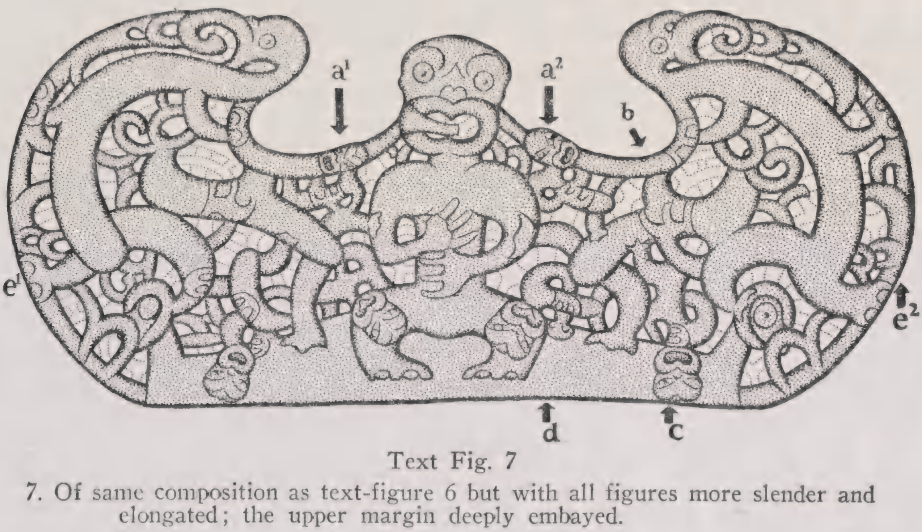
As we now have the general composition of this type of *pare* clearly in mind it would be merely repetitive to describe further examples in detail; points of comparison and of general interest will therefore be sufficent comment on the illustrations which follow.

Captain William Richardson's gift of 1807 to the Peabody Museum of Salem (Pl. 39, A) shows the limbs of all the figures comprising the *pare* (even where they are still naturalistic) expressed as undoubted design elements with a very clear realization of compositional relationship. The elongated horizontal oval made of the arm of the sub-terminal *manaia* is one such element; its strongly curved leg is another. We see the sub-lateral (tracery) *manaia* now drawn out into two strong curves, the inner (leg) disposed around the arm of the central figure, the outer (head and arm) following the strong backward curve of the leg of the sub-terminal *manaia*. The surface pattern picks up the same theme with an elegance of scrolls and spirals that express both the form and the movement of the limbs they ornament.

The carvers of the national centennial house at Waitangi (see Phillipps, 1955, p. 264, fig. 153) have carried this expedient of distinct emphasis, or over-emphasis, a stage further to produce a window lintel that is almost rectangular both in outward form and inner design. The *manaia* flanking the central tiki are stiffly jointed and dominate the composition, while above them the strongly developed arms we have just noted are replaced by horizontally placed figures, armless and with a long curved neck and three-toed foot. They could be birds, a form that, whether or not it occurred in pre-European times, has become familiar in present day interpretations.

The horizontal arm we noted above is part of a tendency to throw the curve of the terminal paired *manaia* upward and backward, a movement accompanied by a deeper embayment of the upper margin of the lintel. In Pl. 40, B, this tendency grows into such an emphatic extension of the main sub-terminal *manaia* as to confer almost a new shape on the *pare* as a whole, and in Pl. 40, A this is even more strongly marked.

In text-figure 7, a fine *pare* in the Liverpool Museum we can identify the same three tracery figures that we saw in the *pare* of



Text Fig. 7

7. Of same composition as text-figure 6 but with all figures more slender and elongated; the upper margin deeply embayed.

Plate 38, i.e. an upper small figure (a^1, a^2), its full face lying along the embayed upper margin; a middle figure (b), an elongated *manaia* extending from the curved back of the sub-terminal *manaia* nearly to the elbow of the main central *tiki;* and a third (c) upside-down with its full-face head on the base of the *pare*. There is also a fourth figure (d), its head upside-down on the knee of the main *tiki*, its body lying horizontally below the legs of the large *manaia* b; while for good measure there is a reduced *manaia* face (e), two loops only, passing across from the terminal to the sub-terminal *manaia*.

The carver of this *pare* undoubtedly enjoyed himself; but with all his enthusiasm for intricacies of pattern he nowhere abandoned the natural forms that comprised its elements, and we cannot help but feel that they had meaning for him, be that meaning symbolic of some idea or event or merely commemorative of persons. Indeed in all six *pare* of this group we see this same theme of natural forms, human figures, rendered in variations of different degrees of complexity, but always retaining an unbroken harmony of content and form.

IV

Hauraki and Te Puke

Although the Hauraki *pare* (text-figure 8; Pl. 41, B) is so elegant and the Te Puke lintel (Pl. 41, A) so rugged, they are to be taken together, for each consists of a row of figures, i.e. five naturalistic images with the customary paired *manaia* at either end. The squat heavily decorated form of the Te Puke figures undoubtedly impairs the attempted energy of their attitudes, especially in comparison with the *joie de vivre* of the Hauraki ballet, while the effect of the heavy connecting tracery of the former falls far short of the elegance of the interlocking loop pattern of the latter.

It is the tracery of Hauraki that constitutes its importance in respect to the origin and relationship of typical elements of Maori carving, especially of the double spiral. This however we have previously discussed at some length (Archey, 1955, p. 14). Here, we will do no more than note the compositional relationship between the Hauraki lintel's frieze of dancing figures set against a background tracery of interlocking loops Fig 8, and the static figures standing

Text Fig. 8

8. Composition of a row of naturalistic figures in active attitudes against a light tracery of interlocking loops. *Figure rhythm.*

upright between expanded and smoothly spinning double spirals in another group of *pare* (i.e. Arawa and East Coast Fig. 9). In content they are the same; they differ only in design emphasis, this being on the figures in Hauraki and on the spirals in Arawa.

A five-figure *pare* of this group, "said to have been secured from a swamp in the Auckland Province" is illustrated by Phillipps (1955, p. 241, Fig. 140). It is unfortunate that we do not know its precise locality; in style it is close to Hauraki. Both in the posture of its figures and in its somewhat crude carving style it presents more of the vigour of the *haka* than of the dancing elegance of the Hauraki *pare*. The Hauraki lintel was the model for the carvers of the main doorway *pare* of the national centennial *whare runanga* erected at Waitangi in 1939. This also is illustrated by Phillipps (loc. cit. p. 263, fig. 152).

Text Fig. 9

9. *Spiral rhythm:* upright figures alternating with double spirals.

The question does perhaps arise as to whether the Hauraki *pare* is properly included in a paper on 'door lintels of human figure composition'. The Te Puke lintel is composed, as are the others discussed up to this point, of human figures alone, with connecting pieces of purely mechanical function. In Hauraki, such mechanical or neutral elements are replaced by interlocking loops of abstract human figure derivation and possibly of some symbolic significance. We may, however, be making rather much of classificatory relationship. I feel sure that a carver with individuality and enterprise would not have allowed his inventiveness to be constrained by subservience to a "sealed pattern".

V
Taranaki Designs

We next present two Taranaki *pare* which may also include something more than the human form in their content and meaning (Pl. 42, A, B).

We can agree that the figures and the end *manaia* in these designs are the counterpart of those in the compositions already discussed. But, we may ask, are the evenly repeated loops between the figures in 42, A, and the somewhat irregular loops of 42, B, merely space-filling background or are they of anthropomorphic or other natural derivation? A close examination of Plate 42, B and of text-figure 10

Text Fig. 10

10. Taranaki *pare* of upright figures and connecting loops.

Text Fig. 10a

10a. Taranaki *pare:* figures in active attitude, with background of alternate "chain-loops" and single spirals.

will throw some light on the question by disclosing two separate elements here.

In the front-facing figure marked (*b*), the arms and the wide-spread legs end in a crudely represented hand or foot. We can also identify the hand of the terminal *manaia* (*a*), and also its foot, although in the case of the feet we have to follow an extra limb-member to reach them. There seem to be similar extra lengths in the left leg of (c) and particularly of (d). Usually, though not invariably, the thighs only of these legs are surface-decorated.

The tracery loops above these limbs have no appearance of being either legs or arms; moreover they are decorated with a simple uniform pattern.

If then we accept this distinction, we can tentatively interpret the regularly looped background of Plate 42, A, as a space-filling design, a mechanical decoration devoid of symbolism.* We could also apply

*A newly-discovered *pare* from Waitara (Text-figure 10a) has timed its appearance nicely to comment on the interpretation given above. Its composition is a row of figures in the Taranaki manner moderately stylized and with faces and bodies in alternate attitudes. Typical of Taranaki is the restriction of surface decoration to the face and the proximal limb members.

Its background tracery comprises two separate designs, i.e. a single spiral in one area alternates with chain loops in the other. The chain loops are somewhat in the manner of those in the small Waitara *pare* shown in plate 43, A. In composition this new *pare* resembles Hauraki (Pl. 41, B), i.e. a succession of figures against a tracery background; in style of carving it is typical Taranaki, but with distinct individuality in its background of single spirals alternating with a pattern of loops. Here we see the expression of a *tohunga's* own personal design concept.

this interpretation to the simplified design of a small *pare* (Pl. 43, A) from Waitara *pa,* Taranaki, discovered by the late Mr. Thomas Prichard, father of Judge Ivor Prichard who presented it to the Auckland Museum. We may find further support for this identification in the like composition (but not decorative detail) of a *pare* of about the same size from Oruarangi deposited in the Museum by the finder, Mr. C. G. Murdoch (Pl. 43, B).

In both of these there is a central mask. In the Waitara specimen it follows the typical Taranaki face-rendering, widening considerably across the eyebrows, and with the eye-sockets originally containing a centre peg to hold the *paua* shell inlay and to represent the pupil. In the Oruarangi specimen (43, B) the face form is as in the Hauraki lintel, i.e. only slightly widened across the eyes and with deep sockets to hold an entire *paua* shell. The terminal figure of Oruarangi has a convex eye as in Te Puke (Pl. 41, A), while there is a general resemblance in the much simplified Waitara terminal *manaia* to profiles in the Dominion Museum Taranaki *pare* shown in Pl. 43, C. A further detail to be noted is that the space-filling in the Waitara lintel is of typical Taranaki loops, while the corresponding area in the Oruarangi *pare* carries scroll detail similar to that in the great Hauraki carving. Furthermore, in each *pare* this pattern is divided by a horizontal bar, as in the Taranaki lintel of Plate 42, A.

These several resemblances and differences are not cited merely as a catalogue of variant detail; they have a significance in that they reveal two small *pare* from widely separated localities exhibiting, not only the same simplification of general design, but also the well established characteristics shared, or possessed separately, by the Hauraki and Taranaki schools of Maori carving.

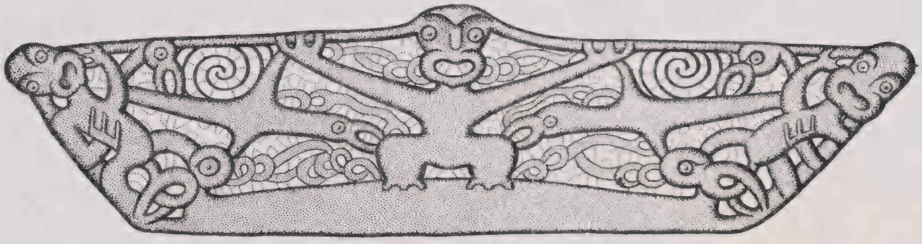
In drawing attention previously to these regional style relationships (Archey, 1933, p. 218) I tentatively suggested that they might connote a Tainui canoe area distribution; it is interesting to note these further occurrences of obviously related but not identical styles at nearly the extreme points of the area occupied by Tainui descendants.

Taranaki however has another string to its bow, a composition of curved, entwined human figures in a continuous running design (Pl. 43, C). The bodies are undecorated but the upper part of the limbs and parts of the face are ornamented as in the *pare* shown in Plate 42. Not to be outdone, Kaipara, another Tainui area, orders the human form in the same way, though we know of this only from certain *pou* or vertical house posts. (Archey, 1933, pl. 41.)

VI

Sui Generis

The freedom or licence our carver permitted himself to stretch the human form when it suited his design is well shown in text-figure 11, a *pare* in the collection of Mrs. H. G. Beasley. It will be seen that in one figure it is the arms that are drawn out, while in two others it is the body itself. I forbear to identify the two latter either as seals or as flying birds. In this lintel the figures function both mechanically and in design as a structural framework for the surrounding tracery. We recall the similar central support-beam figure surrounded by tracery in *taurapa,* the canoe stern-post.



Text Fig. 11

11. *Pare* composition of much elongated figures and limbs.

Plate 44, A, exhibits a design of this nature reduced to almost its simplest terms and very neatly expressed. A rectangle contains the central figure; on either side a beam (an elongated human body), at first angular, sweeps evenly outward to reach and support the lightly tilted head: a disposal of limbs with a pair of inwardly directed *manaia* as close supporters for the central figure comprise a tracery contained easily within the pleasantly curved margins. In either way, structurally or aesthetically (the same thing, really), it is satisfying.

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Text Fig. 12

12. *Pare* with stylized limbs forming a "chevron" pattern.

'Almost simplest terms' we said a moment ago; the qualification 'almost' becomes clearly necessary when we look at the Kaitaia lintel (Fig. 12). Its form is clearly that of a *pare* (Skinner, 1921): it has the almost inevitable plain base, central figure, curved upper margin and terminal *manaia*. And with what we have been seeing of bodies and limbs contorted, compressed, drawn out and extended, we should have little difficulty in recognizing the chevrons as limbs. They are hinted at in the arms of the Hauraki carving; they are seen clearly as limb conventions in the 'chevron pendants' (Archey, 1933, p. 215). The Kaitaia lintel has been very fully discussed (Skinner, 1921a, 1921b; Archey, 1933, 1934); here I will add but one word — to ask you to observe (Plate 44, C) the assurance and maturity of this outstanding concept of abstract art.

Plate 44, B, a *pare* in the Dominion Museum, presents us with still another independent or individual art concept. The central figure becomes only a face, and terminally there are full-faces as in Pl. 44, A, instead of *manaia*. The body belonging to the terminal head fits into the outer of the two loops that make the *pare's* unusual sub-terminal device. The outer of these loops is probably a body — a limb can be seen extending backward from it; the inner is possibly the head or face usually seen at either end of the *pare* base. It is from Manukorihi *pa*, Waitara; in the reduction of natural forms to a central full-face and terminal *manaia* it recalls the Prichard *pare* (Pl. 43, A) also from Waitara. We draw attention to the enlarged interlocking loops of Plate 37, B and text-figure 4, for somewhat similar expanded terminal loops.

VII
Summary

It seems hardly necessary to add much by way of general discussion because the carvings themselves have revealed their relationship to one another. Briefly, the foregoing review shows these *pare* as sharing a standard composition of a central human figure, supported on each side by one to three others of possibly lesser status, and a terminal feature of paired profile figures. The latter could be *manaia* in combat, in embrace, or no more than a design device to close the series. In one group the figures are normally posed in alternate attitudes either full-face and profile (Pl. 36) or all full-face with bodies and heads turned or tilted successively to right and left (Hauraki lintel, Pl. 41).

In another series of these figure-compositions the participants are not placed in a row but form a medley of position and posture (Plates 38 to 40) ; it is interesting to find quite naturalistic versions of both the single line grouping and of the medley; this we suggest is significant for our understanding of Maori carving patterns as a local, autonomous development, through individual design enterprise.

Only two *pare* in these first two groups are localized and we can make no suggestion as to an area of distribution for them. We are better placed in this respect with the remaining groups, though we have only two localities, Hauraki and Te Puke, for the somewhat similar naturalistic figure *pare*. The Hauraki Plains and the Taranaki localities for other carvings of obviously related style may be tokens of Tainui tribal connections.

If, in conclusion, I repeat what I have said elsewhere more than once, it is to observe, even to emphasize, that the more one examines Maori carving — in the figures that are its content, in its structural framework, in the firm purpose of its designs and the ingenuity with which figures are made pliable to that purpose — the more one is impressed by the Maori carver as a mature master of design. This stands out even above the technical proficiency with which he manipulated his complex and varied design concepts in wood, and also won them, when he wished to, out of stone.

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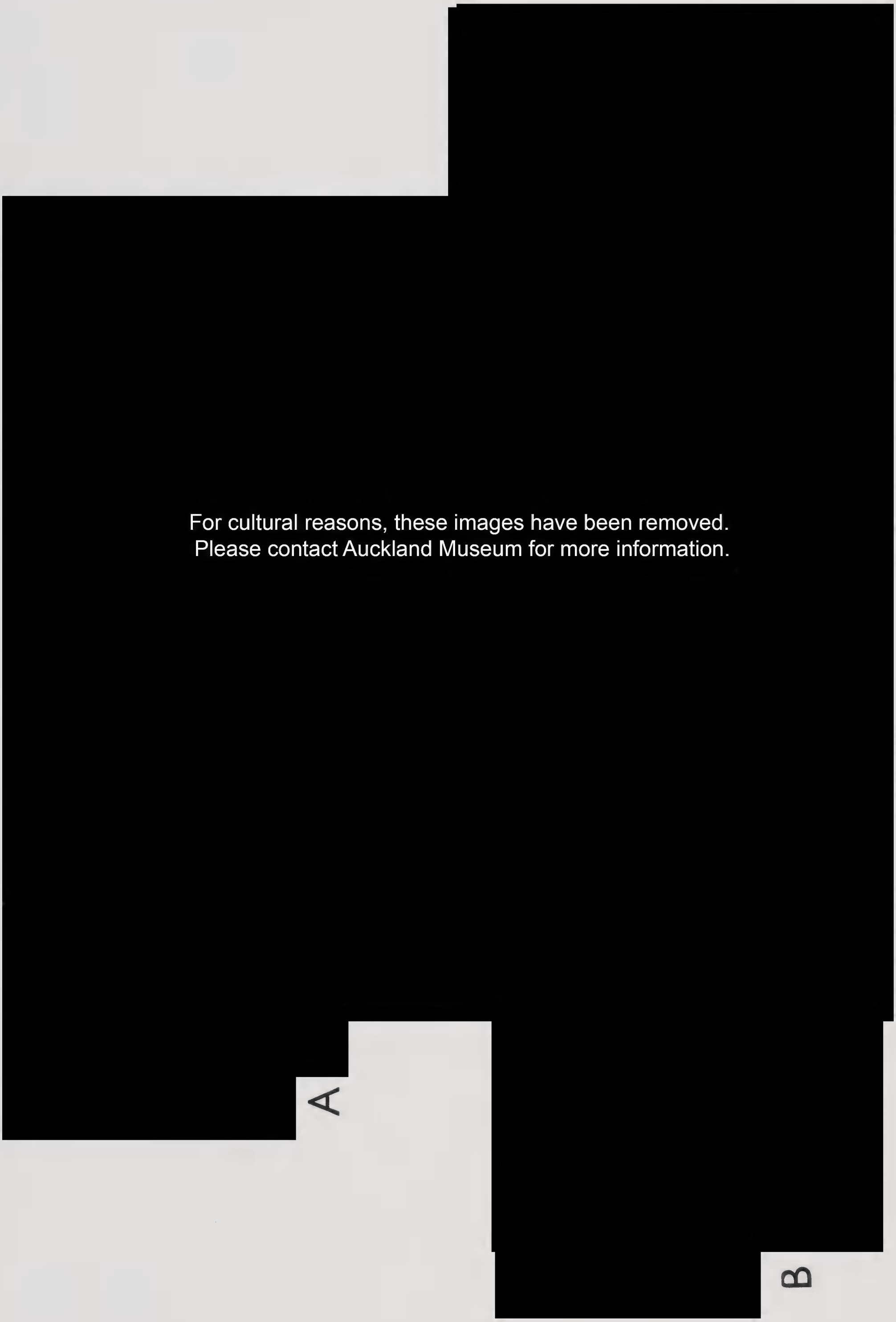
A

A. Rotorua. Auckland Museum (No. 202).

B. Locality unknown; purchased in Sydney. Auckland Museum; (9758); presented John Kenderdine.



A. Thorntons Bay, near Thames; recovered from a swamp. Auckland Museum (18681).

B. From a house formerly at Te Hauke, Hawkes Bay. Dominion Museum photo.

A

B

A. East Coast, North Island. Auckland Museum (164).

B. Locality unknown. British Museum, Sir George Grey, 1854.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A

B

A. Locality unknown. Peabody Museum of Salem (E.5501), presented by Captain Wm. Richardson in 1807. (Dodge, E. S., 1941. The New Zealand Maori Collection in the Peabody Museum of Salem. Salem, Peabody Museum).

B. Locality and origin of photograph unknown.

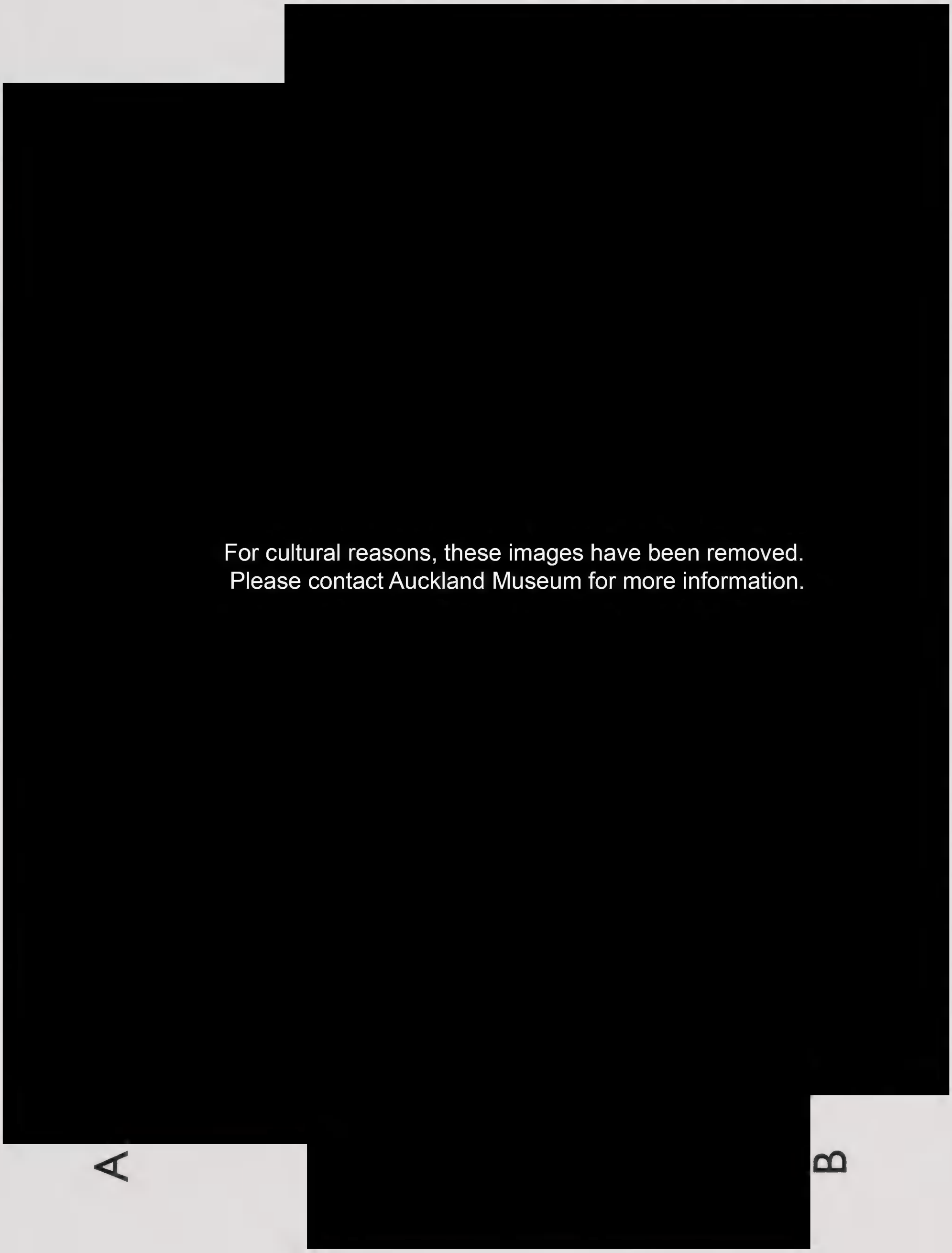
For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A

B

A. Mr. W. J. Phillipps advises that this was carved by Tene Waitere of the Anaha school of carving, Lake Okataina. The present whereabouts of the carving unknown. Photo: Dominion Museum.

B. Locality unknown. Liverpool Public Museum. (R.I.30).



A B

A. Te Puke. Auckland Museum (2024). Presented by Sir Frank Mappin.

B. Patetonga, Hauraki Plains. Auckland Museum (6189).

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A

B

A. Te Kawau, north of Awakino, Auckland Museum (6087).

B. Taranaki, Canterbury Museum.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A

B

C

A. Waitara, Taranaki. Auckland Museum (33737). Presented by Judge Ivor Prichard.

B. Oruarangi, Hauraki Plains. Recovered from a swamp by Mr. C. G. Murdoch; deposited in Auckland Museum (33309).

C. Waitara Swamp, Taranaki. Dominion Museum (4657).

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A

B

C

A. Locality unknown: formerly in collection of Augustus Hamilton at Napier. Illustrated, but with no information, Maori Art, p. 131. Dominion Museum.

B. From a swamp, Manukorihi pa, Waitara. Dominion Museum.

C. *Pare*, recovered from a swamp near Kaitaia. Auckland Museum (6341).

RECORDS

OF THE

AUCKLAND INSTITUTE AND MUSEUM

VOL. 5 NOS. 5 AND 6

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CONTENTS

Endemism and Isolation in the Three Kings Islands, New Zealand—With Notes on Pollen and Spore Types of the Endemics*

By LUCY M. CRANWELL
(Mrs. Watson Smith)

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Research Associate, Geochronology Laboratories, University of Arizona, Tucson, U.S.A.*

"No explanation of distribution that does not explain endemism is of value. . . ."
J. C. Willis, 1949.

The Three Kings Islands lie about 33 miles northwest of Cape Maria van Diemen, itself linked to the New Zealand mainland by a sand tombolo of recent origin. The main islands, high, jagged and majestic, were given their present name by Abel Tasman when he sighted them on January 5 (Eve of Twelfth Night) 1643. They range in size from under 5 to 70 acres, Great Island reaching a height of 920 feet: smaller islets lie around them. They are affected by a warm current, so that the climate is humid, with much mist or fog conducive to a dense plant cover in areas not ravaged by burning, goats, or primitive agriculture. The sheer cliffs, however, have protected them from most visitors, so that few collectors can boast of a landing. Some areas were cultivated at times by the Maori inhabitants as late as 1840, but the most drastic changes in the flora probably occurred when goats were introduced to Great Island before 1887 (Cheeseman 1889) and again in 1889, as a source of food for castaways who might survive both the surf and the climb up the cliff faces.

According to the map given by Pantin (1959) in the very fine "Descriptive Atlas of New Zealand", the group lies at the outer boundary between the 100 and 500 fathom contours. Separation from the mainland has probably been effective for a long time, perhaps from the Lower Tertiary.

Most New Zealand biologists have shown interest in the group, while Croizat (1958) has stressed the importance of a supposed relict or "horstian" component. As in all discussions of that elusive condition, endemism, stimulus is added to phytogeographic theorizing when the extreme views of Croizat and of Willis, for instance, are contrasted. A host of milder views lie between as in the summaries provided by Cain (1944) and Good (1953). I hope that this small contribution will at least add fuel to a zestful fire.

Cockayne (1928 and earlier papers) early set up a special Botanical District for the Three Kings, as part of the North Auckland Botanical Province, noting the presence of four local endemics found by Cheeseman

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I am indebted to the National Science Foundation, Washington, D.C., U.S.A., for assistance under NSF Grant G23159.

as support for this subdivision. To these four species — an *Alectryon,* a *Coprosma,* a *Davallia* and a *Pittosporum* — several important additions have been made, largely through adventurous collecting by members of expeditions sponsored by Auckland Museum. Now, with two monotypic genera and two families added to the terrestrial flora of the New Zealand region, Cockayne's judgment has been well sustained.

CONTINENTAL IMPLICATIONS

Shales, greywackes and Cretaceous lavas were first reported from Great Island in 1936 by an old friend of the Museum, the late Professor J. A. Bartrum, who later showed (1948) that South-West Island was partly, if not wholly, composed of igneous rock indistinguishable in hand specimens from the older rocks. This younger volcanic series, which also occurs extensively at nearby North Cape, was considered to be Upper Cretaceous. Thus a hundred million years could lie between the deposition of these rocks.

The presence of ancient basement rocks, coupled with nearness to the New Zealand mainland, makes it clear that there is no need to invoke chance dispersal as a source of all the fauna and flora, though some species must have come in, early or late, as in the case of the Australian grass, *Chloris truncata.*

Oliver (1948) put the case for both accidental and continental affiliations, but favoured the former, with chance movements on air, as for the *Tecomanthe,* a member of the Bignoniaceae, because it has winged seeds, and for *Davallia,* because it has buoyant spores. He thought it a "fair conclusion" that almost everything had been derived from the mainland, the endemics merely representing migrants that had deviated after isolation from the parent stock. This view is in line with that of the general youthfulness of endemics, as urged by Willis throughout his life. If we accept this reasoning we are left with an assemblage of waifs and strays. Against it, as I hope to show, is the very nature of the endemism exhibited by a rather high percentage of the flora in particular.

Further, there is as yet no evidence that seeds of *Tecomanthe* are very airworthy. Comparison might be made with the dispersal of another tropical family, the Dipterocarpaceae — also with massively-winged seeds — which Ridley (1930), supported by Foxworthy (1946), has found to be carried only rarely by air, in the rain-forest, more than 30 or 40 yards from the parent tree.

Even the fern, *Davallia tasmanii,* has never been found on the New Zealand mainland, nor on the islands to the east. It is the only temperate outlier in a genus that still seems circumscribed — apart from the Pacific Islands — by the far-off influence of the Tethys Sea boundaries. Other species occur in Australia, but, according to Cheeseman (1925), ties with the Canary and Madeira species may be strongest. In both the fauna and flora of New Zealand there are genera with rather similar patterns of distribution, in some cases extending further west across the Atlantic to the Caribbean region as well.

Other islands of the New Zealand region, even on the outer verge of the 500 fathom contour, suggest continentality in the same way. Powell (1955, 1960) believes that the Aucklands, for instance, have "a basic fauna of relict New Zealand mainland origin." For the Three

THREE KINGS ISLANDS
Shown in Relation to New Zealand
and the Continental Shelf

Depths in Fathoms.

After H. M. Pantin

Kings he stresses (1955) that the land-snail fauna of the Three Kings "is almost completely endemic . . ." and thus not to be explained by casual colonisation. Possibly the earwigs and the springtails described by Giles (1958) and Salmon (1948) respectively speak also for long isolation.

On more tenuous evidence — as no ancient basement rocks have ever been found in the Pacific — Professor C. F. Skottsberg has marshalled the case for continental ties between the Juan Fernandez Group and Chile, 400 miles to the east. In this he has accepted the very high percentage of unique woody genera, either endemic in the highest degree (being restricted to Juan Fernandez) or of a second rank (being restricted to the Group and to South America), as his chief evidence.

These same degrees of generic endemism, the unique and the localized, as exemplified by *Plectomirtha* and *Paratrophis* respectively, occur in the Three Kings flora, all (except for a sedge and a fern) being woody also.

Unfortunately no terrestrial fossil material has been found in the Group, so it is impossible to test opposing theories, or estimate whether isolation, even since the Tertiary, would necessarily cause much differentiation in the very homogeneous populations characteristic of, for example, the puka *(Meryta sinclairii)*, with Polynesian affinities, or the one Australasian *Gymnelaea*, formerly known as *Olea apetala*.

It is possible that lavas have sealed in organic deposits of small extent. If these are ever found, a key to the history of the flora may be at hand. If they are fossiliferous the morphological studies of pollen and spores that follow will be of special value; in any case, they will be useful in Australasian and even wider researches.

In the meantime, there is much to be learned about the general and floral ecology of the species today. Is *Tecomanthe*, for instance (cf. p. 229), visited by bats at dusk in its native habitat? Do its seeds float lightly on the wind, or do they twist and drop quickly, like a shuttlecock? In such studies may lie many of the answers to many pressing questions about migration in general.

A total of about 177 species of native flowering plants and ferns together with 22 introduced species (mainly on Great Island) has been reported from the group by Oliver (1948) and by Baylis (1958), and one monotypic endemic seaweed *(Perisporochnus)* has recently been described by Chapman (1954) in his survey of the algal flora.

The nature and varying degree of endemism in the terrestrial flora is briefly outlined below.

A: Unique at generic level: affinities obscure:

1. *Elingamita*, 2. *Plectomirtha*.

B: Distinctive at specific or varietal level with close allies elsewhere:

(a) with congeners restricted to New Zealand lowlands:

1. *Alectryon grandis*, 2. *Brachyglottis repanda* var. *arborescens*.

(b) with congeners restricted to New Zealand and Pacific areas:

1. *Coprosma macrocarpa*, 2. *Cordyline kaspar*, 3. *Hebe insularis*, 4. *Paratrophis smithii*, 5. *Pittosporum fairchildii*.

As will be seen later, three of the genera are centred in New Zealand at present, one in Australia, and one in Polynesia.

(c) with congeners centred in New Guinea and Australia; lacking on New Zealand mainland:

1. *Tecomanthe speciosa.*

(d) with congeners very widely dispersed:

1. *Carex elingamita,* 2. *Davallia tasmanii.*

LOCALLY ENDEMIC SPECIES AND VARIETIES IN THE VASCULAR FLORA

Table I.

List of endemics and dates of first collections (*Coprosma macrocarpa* retained) as in Baylis, 1958.

G.I. = Great Island N-E.I. = North-East Island
S-W.I. = South-West Island W.I. = West Island

	SPECIES	G.I.	S-W.I.	N-E.I.	W.I.
1	*Alectryon grandis*	1889			
2	*Brachyglottis repanda var. arborescens*	1945			1950
3	*Carex elingamita*	1889	1950	1947	1951
4	*Coprosma macrocarpa*	1887	1889	1947	1951
5	*Cordyline kaspar*	1887	1887	1889	
6	*Davallia tasmanii*	1887	1889		1950
7	*Elingamita johnsoni*				1950
8	*Hebe insularis*	1889	1889		
9	*Myrsine oliveri = Rapanea dentata* ..	1934			
10	*Paratrophis smithii*	1887	1889	1947	1950
11	*Pittosporum fairchildii*	1887		1947	1950
12	*Plectomirtha baylisiana*	1945			
13	*Tecomanthe speciosa*	1945			

THE MICROSPORES: DESCRIPTIONS AND DISCUSSION

Many interesting pollen types are represented in the flora of the group, but it is my aim to concentrate at this time on those of the endemics, since their recognition may be of great value in the rapidly developing studies of ancient communities, their migrations, and the climates that influenced them.

Some of the finer morphological details will be discussed more fully in the Atlas of New Zealand microspore types being prepared by Mr. Neville Moar and myself. Neither form nor function is as easily understood as one could wish. In the European floras, for instance, many types have been known for over a hundred years, yet they are, according to the latest views of Dr. Gunnar Erdtman, still sorely in need of closer study. New Zealand types with rather unusual apertures, as in the *Coprosma, Elingamita* and *Myrsine* discussed here, are little understood, and need comparative study on a broad family basis, so that ancestral forms, perhaps less affected by adaptation to wind-pollination, may be recognized and then utilized in interpretation.

Pollen descriptions for three genera *Elingamita, Plectomirtha* and *Tecomanthe* have not hitherto been published.

ALECTRYON Gaertn., 1788 SAPINDACEAE

About 20 species are known, the New Zealand pair being endemic. Duguid (1961) gives interesting observations on the erratic sexuality of a tree of *A. excelsus* he has cultivated. During one season it was "quite smoky with bloom" (almost wholly male) for about two months, and set only a few fruit: two years later fruit was set in abundance.

1. A. grandis Cheesem., 1912.

No flowers have been collected: the species was discovered by Cheeseman on Great Island in 1889. The single clump had dwindled to one poor tree, seen by Baylis in 1945 and then by Turbott and Bell in 1946.

As affinity with the mainland Titoki *(A. excelsus* Gaertn.) is very close it is not likely that the pollen grains would differ significantly. In Titoki (Cranwell, 1942, p. 299) they are small (18μ), with three long furrows and rounded pores on the equator.

The Hawaiian *A. macrococcus* Radkl. has slightly larger grains with distinctive arcs running between the pores to cut off polar triangles: this condition, which seems fairly common in the Sapindaceae, is well illustrated by Selling (1947, Pl. 27, figs. 405-409).

Alectryon is a Western Pacific genus ranging from Australia eastward to Hawaii. As the oldest fossil record is from the New Zealand Miocene (Couper 1953), a northern origin is suggested: however, as the pollen is so distinctive it would be well to re-open the question as to whether the other species, formerly grouped in *Nephelium,* should really be included in *Alectryon.*

BRACHYGLOTTIS Forst., 1776 COMPOSITAE

A monotypic genus related to *Senecio:* restricted to the New Zealand lowlands. The variety whose pollen is described here was given specific rank by Oliver (1948) but was reduced by the late Dr. H. H. Allan (1961).

2. B. repanda J. R. et G. Forst. var. arborescens (W. R. B. Oliver) Allan Pl. III, figs. 15, 16.

Pollen grains spheroidal, tricolporate, about 24-28 x 23-27μ; furrows meridional, long, narrow, tapering; pores rounded, as wide as furrows where they cross equator (3μ); exine densely spiny, about 3.5μ or thicker midway between furrows, the spines sharp, with broad bases, regularly arranged, opposed in pairs along furrow margins.

Distribution: Endemic to two islands of Group (see Table I): first collected by Baylis, December 1, 1945.

Flowering: December. Insect-pollinated; seed with pappus.

Affinities: Apparently very close to the common mainland species.

Pollen preparations: Great I., G. T. S. Baylis, Dec. 1, 1945, A22, S199 (acetolysed, and lactophenol methods): ex herb. Auck. Mus., 22847

Fossil range of genus: Tentative records of pollen of this type were given by Couper (1953). No records of this family older than Mid-Tertiary are confidently given for New Zealand.

CAREX L. CYPERACEAE

Eighteen species of this family are reported. Some of these may well have come in after settlement, or on the feet of seabirds, though Skottsberg in particular has pointed to the poor representation in the

Pacific in spite of seeming superiority in dispersal mechanisms.

3. C. elingamita Hamlin, 1958. Pl. II, fig. 6.

Pollen grains with several vaguely indicated patchlike apertures, irregular in size and shape, mainly pear- or top-shaped, ranging from 32-41 x 30-32μ in size; apertures poroid, about 7μ long, with ragged outlines, four usually present, one always discernible at broad end of grain; exine thin, firm, tectate, the pattern consisting of small rods running towards the surface or fully exposed (and larger) where tectum is lacking over the apertures.

Distribution: Endemic to Group. First collected by Cheeseman in 1889. See Table I.

Flowering: Mainly wind-pollinated.
Affinities: See Hamlin (1958).

Pollen preparations: Ex herb. Auck. Mus. 2839, collected by T. F. Cheeseman, Nov., 1889; A3, G61, acetolysed.

Note on Carex pollen: Few monocotyledons have more than one aperture: the possession of four in *Carex* is an unusual feature due to the dissolution of walls between the tetrad units, each of which would have had a single pore. Such a grain has been called a "false tetrad", or "pseudotetrad" as it really is only the ghost of a normal tetrad.

Fossil range of genus: Surprisingly short, in spite of its wide distribution over the face of the globe. The oldest New Zealand records appear to be mid-Tertiary; no authentic Cretaceous pollen finds are known. The exines are delicate, but occur abundantly in many peats and coals so there should be no difficulty in recognizing the grains if they are present in a deposit.

COPROSMA J. R. et G. Forst. 1776 RUBIACEAE

About 90 species, typically dioecious, are known, 45 in New Zealand (all but one endemic: Allan, 1961), then ranging west to Tasmania and Australia, north to New Guinea, and east to Hawaii and Juan Fernandez. Absent from South America, though the closely related *Nertera* grows there: fossil leaves from Chile have been attributed to the genus, but the material needs critical revision. No older Tertiary pollen records east of New Zealand.

4. C. macrocarpa Cheesem.

Pollen grains tricolporate, spheroidal, often flattened over poles, markedly triangular or rounded-triangular in equatorial outline, about 31.6 x 25μ (28-34 x 18-28μ); apertures midway between angles of grain, meridional, very short, slitlike, about 9μ long, with dense rims usually pressed together, underlain by vestibules of large size, running the length of the slits and almost coalescing at angles of grain; exine firm, rather thick, 2μ or more, tectate, the rod pattern stronger around apertures and over polar triangle.

Distribution: Table I shows distribution on the Three Kings. Cheeseman considered this plant endemic to the Group. Very similar forms with small fruit are known from the Auckland Province, however.

Flowering: Wind-pollinated, with freely exposed anthers, as in all members of the genus.

Affinities: Comparable forms with much smaller fruit occur in northern mainland as far as 37° S. lat.; these forms may be co-specific, as treated by Allan (1961).

Pollen preparations: Ex herb. L.M.C., grown in Opotiki by N. Potts; S467, acetolysed.

Fossil range: Couper (1960) does not give records older than Middle Oligocene. In the Paparoa beds I have found *Coprosma* grains that may be Oligocene, or perhaps Eocene. I have also found fairly high frequencies (up to 5%) in subfossil peat collected for me by Dr. A. W. B. Powell on the Chathams.

CORDYLINE Comm. ex Juss. AGAVACEAE

About 20 species known, with 5 endemic in New Zealand, together with one cultigen known from Polynesia to India: the other species grow in and around the Pacific, but there is one outlier in South America.

5. C. kaspar W. R. B. Oliver, 1948. Pl. 11, Figs. 7-10.

Pollen grains monocolpate, conspicuously flattened on distal side, bulging when expanded or deeply channelled when unexpanded on opposite (proximal) side, about 30-36μ x 20-30μ; furrow longer than grain, wide (about 10μ) and very distensible, without well-defined margins; exine firm, dense, under 2μ thick, only slightly roughened on surface, with walls of about equal thickness, the outer carrying the fine rods (bacula) in a crowded pattern; furrow membrane thinner; intine thick under furrow.

[The grains were probably rather immature as some adhered in their tetrads and others were unexpanded. Stronger exine pattern may be characteristic of riper material.]

Distribution: Lacking only on West Island (see Table I).

Flowering: Late spring and early summer insect- and probably bird-visited for its nectar.

Affinities: Closely allied to the lowland trees, *C. australis* and *C. banksii*, both of which grow on the islands. I have seen a hybrid between these two, at Anawhata on the West Coast near Auckland, which had comparably wide foliage. The light exine pattern of *C. kaspar* and its allies sets it apart from the montane *C. indivisa* which has a very rough surface.

Pollen preparations: Great I., Baylis, Dec. 1, 1945, ex herb. Auck. Mus. 22851 (A5, acetolysed; glycerine).

Fossil record for genus: Apparently the pollen is rather freely air-borne (Licitis, 1953) and may thus be expected to occur in organic deposits. Couper (1953) reports it from mid-Tertiary and later deposits in New Zealand but there are no records elsewhere to help trace the ancestral home of the genus. At present it would seem that the New Zealand species are part of an Oligocene influx from warmer regions. The South American species presents a special problem in distribution.

DAVALLIA J. E. Smith, 1793 DAVALLIACEAE

About 40 species, all epiphytic, are scattered from the Canary Islands to Madagascar and New Zealand (one species only), and especially in East Asia and the Pacific Islands. Manton and Sledge

(1954) suggest that n = 40 is the base number for the genus. Brownlie (1961) reports the same number for the Three Kings species.

6. D. tasmanii Cheesem. ex Field. Pl. I, figs. 1, 2; Pl. II, figs. 3-5.

Spores monolete, medium-sized, bean-shaped (plano-convex), slightly recurved at ends towards dehiscence scar (laesura) on flatter side, mainly about 54 x 34 x 34μ, equatorial outline rounded-elliptic; scar lips (commissures) smooth, flat, sharply delimited (especially after compression), usually more than half length of long axis; exine about 3μ thick, smoothly verrucate except over scar area; outer wall (when visible) very thin, covering low crowded bosses (verrucae) uniformly; endexine very thin.

Size-range: Size varies greatly according to method of preparation. In lactic mounts swelling is considerable. Apart from obviously swollen examples most lie between 46-60 x 27-39μ. A few long narrow spores (60 x 30μ), apparently sterile, were noted.

Distribution: Endemic to Three Kings (see Table I). It is interesting to note that the species has not spread in recent times to the mainland, or to the Kermadecs.

Affinities: *D. canariensis* is said to be closely related. I have therefore checked fresh herbarium material of this species, collected by Dr. W. A. Sledge on the island of Madeira, and grown by him in Leeds. The spores in this species differ (as shown also by Erdtman, 1957, Fig. 99) in the larger, more pointed and less crowded bosses; in Erdtman's picture, at least, the outermost wall is lacking. The scar and "prow" ends (as in an Indian canoe) are well marked, but the former seems to widen more under pressure than does that of the Three Kings species.
Spore preparations: From Cheeseman's original collection: (a) Sc974, acetolysed; lactic, ex herb. Auck. Mus., 419, (b) G97, acetolysed, ex herb. Hort. Reg. Kew ("recd. 5/1889").

Fossil range of genus: Warty spores of this type have been reported by Dr. R. A. Couper (1953), and by Dr. Suzanne Duigan (1956) for Australia. Apparently, according to Professor R. Potonié, these should be included in the form genus *Verrucatosporites*.

As *Davallia*-like spores occur widely in the Polypodiaceae (to which many still refer *Davallia* and its allies) exact generic identification is made difficult, or impossible. It would be interesting, for example, to be able to distinguish the spores of *Microsorium (Polypodium) diversifolium*, common in New Zealand, from those of the *Davallia*, but, as their ecological requirements are similar little would be gained for climatological interpretation. Nothing is known about the history of *Davallia* in southern lands but it is probable that it could have entered the New Zealand region from the north, where the bulk of the species now grows (see p. 216).

Note: Harris (1956), see Pl. 7, fig. 1, has already described the spores of *D. tasmanii*, cultivated on Kapiti I. off the West Coast of New Zealand. I was more fortunate in having access to collections made by Mr. T. F. Cheeseman and have thus thought it worth confining my description to the type material. The differences I have observed may merely be due to immaturity of some of the spores already described.

ELINGAMITA Baylis 1951 **MYRSINACEAE**

A monotypic endemic: the pollen, which is of a very distinctive type, will perhaps give further clues to family position. The name commemorates the tragic loss of the ship "Elingamite" in 1902, in a fog on West Island, "beneath the cliffs on which the tree grows" (Baylis, 1951).

7. **E. johnsoni** Baylis 1951. Pl. III, figs. 11, 12.

Pollen grains prolate or oblate spheroidal, tricolporate, rounded or deeply lobed in equatorial outline according to state of expansion, about 19 x 15μ (16-27 x 13-18μ); polar field narrow; furrows very long and narrow, tapering little, meridional and either straight or sinuous; pore equatorial, about 7μ in diameter, geniculate, the outer wall bulging to form vestibules about rectangular inner apertures which may link around equator like cross furrows; exine very thin, smooth, outer wall continuous over pores, middle wall with slight rod pattern (coarser around inner apertures), innermost wall also thicker around inner apertures.

Distribution: West King only. Collected by Major M. E. Johnson for the first time in 1950, then by Baylis in 1951, when about a dozen trees remained in windswept scrub.

Flowering: January (flowers and fruit together) on West King. Date of flowering in Auckland (S650) not available. Flowers "cream coloured", the stamens extending beyond the short corolla, a good indicator of wind-pollination, as the pollen grains are small and suitable for this method of pollination.

Affinities: Not clear at present. See discussion by Baylis (1951) who suggests relationship with certain monotypic genera in Malayasia and the Pacific islands. It is too early to suggest whether this has been a northern or southern element in the flora.

Pollen preparations: (a) from type material, ex herb. Auck. Mus., 36263, S650, S655, acetolysed and lactophenol preparations, and (b) from a plant grown by Mr. W. Farnell in the grounds of Auckland Hospital Board; ex herb. Auck. Mus. 50942.

Note on geniculate pollen types: No other New Zealand member of the family has well defined pores, and few families in any flora have the bulging (geniculate) germinal apparatus characteristic of the species described. It is thus possible that relationship should be sought in some family with comparable pollen type. The geniculate pore occurs in rather few families and genera, to my knowledge. Stanley and Kremp (1959) list various families in which it occurs, or may occur.

HEBE Comm. ex Juss. 1789 **SCROPHULARIACEAE**

Allan (1961) recognized about 100 species, "mostly endemic in N.Z. but two shared with S. America and one of them extending to Falkland Is.; a few spp. in Tasmania, south-east Australia and New Guinea." New Zealand claims 79 of these species and 11 of *Parahebe*. According to incomplete studies I have made of the pollen the size range in the two genera is from 18μ to 39μ, the largest grains being in *Hebe buxifolia* (30-39μ), and the smallest in *H. ciliolata*.

8. **H. insularis** (Cheesem.) Ckn. et Allan 1926. Pl: III, figs. 13, 14.

Pollen grains tricolpate, rather small, about 33-36μ, spheroidal, deeply lobed in equatorial outline, especially when unexpanded; polar field wide; furrows meridional, very long, wide on equator, tapering towards the poles, their membranes thin, very distensible, tending to rupture above and below equator, margins weakly delimited over most of their length; exine firm, almost or completely smooth, about 2μ thick, a little thicker in polar area, tectate, the two walls of about same thickness, endexine thinner, pattern rather obscure, seemingly sub-reticulate, the rod elements spread evenly over whole surface.

Distribution: Found only on Great I. and South-West I. The removal of goats may result in the spread of the species beyond the rocky areas in which it had previously been noted by Cheeseman and Baylis.

Flowering: November and December (Cheeseman, 1897). Insect-pollinated. Heine (1937) lists a wide range of vectors for *Hebe*.

Affinities: Comparisons have been made with *H. diosmifolia* and some Chathams species, but its position is not clear.

Pollen preparations: Great I., Cheeseman, 1889, ex herb. Auck. Mus. 7888 (A45, acetolysed); Baylis, Dec. 2, 1945, ex herb. Auck. Mus. 22824 (A96, acetolysed).

Fossil range of genus: Little is known about history and nothing about the homeland of the genus. As already indicated New Zealand is its present focus. The small tricolpate pollen grains are characteristic of the *Hebe-Parahebe* complex: they are fairly distinctive (Cranwell, 1942). They adhere closely and are unlikely to be spread far by the wind: reports even from sub-fossil deposits are rare.

MYRSINE L., 1753 MYRSINACEAE

A small genus in a widespread family of about 1000 species, which are mainly tropical or subtropical. Hosaka (1940) discussed *Myrsine*, in a wide sense, and Croizat has given prominence to the family in various recent books on plant distribution.

9. **M. oliveri** Allan (syn. **Rapanea dentata** Oliver). Pl. III, fig. 20.

Pollen grains tricolpate, subglobose, often shallowly lobed, about 19 x 18μ; apertures meridional, short, slitlike, or opening wide like pores under pressure; their membranes covered with coarse granules but margins only slightly roughened; exine thin, firm, smooth, tectate, the inner wall finely granular and only slightly thicker than outer wall.

Distribution: Great I.

Flowering: December; wind-pollinated, the smallish flowers said to be inconspicuous and slightly pink. The pollen of tree species on the mainland have been reported by Clark (1951) and Licitis (1935) from air plankton surveys in the Wellington district.

Affinities: Distinct from the coastal forms immediately to the south. The systematic study of the *Myrsine-Rapanea-Suttonia* complex presents many difficulties but the pollen grains offer only minor differences, mainly in the aperture areas. Reference should be made to Selling's treatment of the Hawaiian species (1947).

Pollen preparations: S200 (acetolysed); Great I., collected by G. T. S. Baylis, Dec. 5, 1945; ex herb. Auck. Mus. 22871.

Fossil range of genus: As the three genera just mentioned cannot at present be separated on pollen characters I am treating them as one unit, wide-ranging in time and space, as in recent Hawaiian, New Zealand and South American deposits, and in ancient ones of New Zealand and Antarctica. I believe that this small pollen type may be one of the most useful for southern pollen studies.

PARATROPHIS Blume, 1852 MORACEAE

About 60 genera in the family, mainly in hot regions. *Paratrophis* has 10 species in Polynesia and three endemic to New Zealand.

10. P. smithii Cheesem. Pl. III, fig. 17.

Pollen grains subglobose or collapsed on one side, obscurely 2-4 pored, about 16-20μ in diameter; pores circular, about 2-3μ across, with a small operculum sometimes persisting; exine thin, firm, smooth, obscurely flecked; intine thick.

Distribution: Restricted to Three Kings. See Table I.

Flowering: Late spring. Wind-pollinated; pollen whitish.

Affinities: The species is seemingly not closely allied to mainland forms.

Pollen preparations: Ex herb. Auck. Mus., 3771, collected by T. F. Cheeseman, EM 336, acetolysed.

Fossil range of genus: Not known. The very small moraceous pollen type may be difficult to identify with certainty. A close study of older deposits might, however, lead to much information about the former distribution and migrations of the genus.

PITTOSPORUM Banks ex Gaertn. 1788 PITTOSPORACEAE

Twenty-six of the 160 or so species are endemic to New Zealand. The remainder is scattered from Macronesia (1), Abyssinia (1), South Africa (1) and Madagascar (1) to Australia (the great majority), China and Japan (1) and Hawaii (23). Insect-pollinated. Australia is the centre for this very uniform family, whose relationships are obscure.

11. P. fairchildii Cheesem. 1888. Pl. IV, figs. 23, 24.

Pollen grains tricolporate, spheroidal, usually flattened over poles, distinctively rounded-triangular in equatorial outline, depressed where furrows cross equator, mainly 21-30 x 23-27μ (but sometimes reaching 35μ); furrows very long, tapering, with clearly defined margins; pores rather large, running transversely, strongly rimmed, rectangular or extending raggedly beyond limits of furrow, protruding strongly under pressure from cell contents but sunken when contents destroyed; exine smooth, firm, rather thin near furrows, but about 2.5μ thick midway between furrows, tectate, with small rods underlying arranged in a net-like pattern, but somewhat obscure; endexine thin, extending over furrow and pore areas; intine thick under pores.

Note on variation in the material: The diversity in exine pattern is shown in the accompanying photomicrographs. In old preparations the outer walls appear to separate, but this is probably an artifact. Acetolysed pores (without KOH) showed up poorly because of the infolding of the wide furrows. All grains are distinctive, however, in their general appearance and should not be confused with any other in the flora, though there have been comparisons with the grains of *Coprosma*. A monographic study of *Pittosporum* would be very useful, I believe, for phytogeographic studies. It seems that the African *P. viridifolium*, for instance, is rather separate from the New Zealand and Hawaiian material. I was fortunate to receive material of this species for comparison from Dr. M. Levyns, of Cape Town.

Distribution: Great I., "above north landing" according to Cheeseman (1888) and "where the shores are broken with boulders" (Fraser, 1929). **Flowering:** August-September (i.e., early spring).

Affinities: Cheeseman has compared it with the common coastal species to the south, *P. crassifolium* and the more local *P. umbellatum* of the East Coast only. These two species are separated in Cooper (1956) whose key indicates that the 3-valved New Zealand species are linked with the two from more northerly Norfolk and Lord Howe Islands. This may provide a clue to old migrations, but it seems from statements in Allan (1961) and in Cooper that valve number in the capsule may vary from 2-3, or 3-4 in some species. Whatever the significance of the valve number, the ties do appear to be closer with these islands than with Australia.

Pollen preparations: Ex herb. D. Petrie, 287 (in Auck. Mus. herb.), EM 255; cultivated by N. Potts, Opotiki, S622, both acetolysed. **Fossil record for genus:** No pollen records for New Zealand.

PLECTOMIRTHA Oliver 1948 ?ANACARDIACEAE

The Three Kings species is the only one known. Its pollen grains have not previously been described.

12. P. baylisiana Oliver 1948. Pl. III, figs. 18, 19.

Pollen grains typically tricolpate, spheroidal, usually flattened over poles, about 20-26 x 23-26μ, polar field very wide; apertures broad, slitlike, meridional, opening widely under pressure and usually causing little lobing of the equatorial outline; exine firm, dense, up to 2μ thick, almost perfectly smooth, tectate, with a fine rod layer in outer wall; endexine thinner than exine.

Note: A few grains showed obscure bulging of the apertures but did not throw light on their exact nature.

Distribution: Great Island only, at 700 ft. altitude: "only one tree found" (Baylis, 1945). This tree was visited by Turbott and Bell in 1946.

Flowering: Probably wind-pollinated.

Affinities: Said by Oliver (1948) to be close to *Semecarpus*, one of the most poisonous members of the Anacardiaceae. It is to be hoped that the chemistry of the Three Kings plant can be studied when more foliage, and seeds, are available. As yet there have been no records of contact dermatitis due to handling. In my opinion the pollen type is unlike any reported from this much-studied family, many of whose members differ in their distinct pores and reticulate (or striate) exines (cf. Erdtman, 1952).

When more material is available it will be possible to check the pollen characters more fully, and thus find fuller clues to affinities. Allan (1961) has also left open the question of family standing.

Pollen preparations: S271, S655, P158 (all acetolysed), from type specimen collected by Baylis, Dec. 2, 1945; ex herb. Auck. Mus. 22875.
Fossil records: Nothing of the kind has been reported from the New Zealand area.

TECOMANTHE Baill. 1888 BIGNONIACEAE

Tecomanthe, with 20 or more species centred in Melanesia, is a genus of woody climbers. The family comprises over 750 species and is almost wholly tropical, with the main focus today in Brazil: it is adapted to pollination by birds in particular, and, in some cases, by bats.

13. T. speciosa Oliver 1948. Pl. IV, fig. 22; Pl. V, figs. 27-30.

Pollen grains tricolpate, spheroidal, rather large, mainly 44-47μ in greatest diameter, equatorial outline rounded or deeply lobed, according to state of expansion; polar field wide; furrows long, broad, tapering, about 8μ on equator, thickened along most of margin; "pores" riftlike, poorly defined, opening mainly above and below equator; exine mainly intectate, reticulate, slightly roughened on surface, up to 3.4μ thick in areas midway between furrows, reduced in thickness and pattern towards furrow margins, rods of reticulum long, rounded at tips, crowded over poles and furrow margins; furrow membrane covered by stiff wall of exine.

Distribution: See Table I. Baylis (1958) states that the species is restricted to Great Island and is erroneously reported from North-East Island. As already noted (p. 218) the large winged seeds are unlikely to travel far on wind or ocean currents.

Flowering: Records for May, June, and, more doubtfully, July, are noted by Allan (1961). Hunter (1958) has described fruit from a cultivated plant which bloomed first in May 1954 but did not set seed, even with hand pollination, until July 1956, the capsules then taking 8 months to mature. This plant flowered as late as early August, "inflorescences tending to develop on the younger wood towards the end of the flowering season, as distinct from the cauliflory common at the beginning." The anthers are orange. It is interesting to note that kohekohe *(Dysoxylum spectabile)* is another winter-flowerer in New Zealand.

Affinities: The Three Kings species is said to be closest to *T. hillii* of eastern Australia (the only Australian species). Differences have been stated by Oliver (1948) and more recently by Hunter (1958) who has shown how much larger are the pods in *T. speciosa.* Significant, though minor, differences occur in the pollen grains but comparisons will be held for a comparative paper involving *Tecomanthe* in a wide sense. It seems clear, on the evidence now available, that the New Zealand species has not been derived very recently from the supposed parent stock to the north.

Pollen preparations: Great I., E. G. Turbott, May, 1946, ex herb. Auck. Mus. 23097; S225, S250, acetolysed; cultivated (a) in Whangarei by Mrs. W. Reynolds, May 23, 1960, temporary preparations; (b) in Auckland, by Plant Diseases Division, D.S.I.R., Mount Albert, from cutting taken on Great I. (ex. herb.), July 17, 1959, A4, acetolysed.
Comparative: *T. hillii* (F. Muell.) van Steenis. Ex herb. Hort. Reg. Kew collected by F. Turner, N.S.W.; A15, S954, acetolysed. Pollen of other species of *Tecomanthe* etc. were also studied.

Fossil range for family: No records for *Tecomanthe,* but they may turn up in the New Guinea-Australia-New Zealand triangle. In various parts of the world Cretaceous and younger deposits have yielded macrofossils attributed to the Bignoniaceae, as for example in Chile and in the London Clays of Britain.

The Campsis-Pandorea-Tecomanthe complex: Van Steenis (1928) mentioned the need to merge these genera. The pollen samples he has sent me show few differences, partly because there is great uniformity in 3-furrowed types in the family. Merging, while drawing attention to an older entity, would, however, veil the very real geographic segregation of the taxa as they exist today. *Pandorea* and *Tecomanthe* both occur in Melanesia, but *Campsis* is restricted to East Asia and the eastern United States. As has been indicated, tropical or sub-tropical origins seem reasonable for *Tecomanthe speciosa.* The possibility that it (and *Dysoxylum spectabile* also) have bat flowers strengthens the view that the plant came from hot regions; it could have lost its association with flower-visiting bats long ago. The flower of *Tecomanthe speciosa* lacks the heavy reddish tones common in bat flowers [see work on *Kigelia,* of the same family, by Harris and Baker (1958) and by Baker (1961)], but it is inverted in the same way, and is held clear of the stem. Some of the tropical species are known to have dark flowers.

A ROLE FOR POLLEN AND SPORE STUDIES AT THE GENERIC LEVEL

To sum up, the facts surveyed seem to favour the view that the biota of the Three Kings may be largely relict and that they have somehow preserved both northern and perhaps southern forms that have died out on the mainland, or may never have reached it in the case of warmer types that moved in pulsations along the northern arcs.

While so much points to an immediate tropical source, ultimate derivations are another matter. Pollen of bignoniaceous types, for instance, should therefore be sought in order to find the complete range of the family in time and space. Dr. Couper's finds (1960) of Oligocene *Bombax*-like grains stress how valuable their study can be in phytogeography. Such finds may present many surprises, so, although we can agree with Willis (1949) that the study of endemism is very important, our fossil studies tend more and more to deny his vehement belief that it "obeys definite laws" or that the endemics are most commonly "young beginners as species or genera."

For this reason the preservation of such rich areas as the Three Kings takes on special importance as an ancient repository where old and new mingle just as they do in a home that has been in the hands of a family for many generations. The need for sympathetic care of such areas and especially for protection from feral browsing animals, cannot be over-stressed.

ACKNOWLEDGEMENTS

I am happy to acknowledge the assistance of the following New Zealand friends and colleagues in assembling fertile herbarium material, either wild or cultivated, for microspore studies: Professor G. T. S. Baylis, Otago University, Dr. Robert C. Cooper, Botanist, Auckland Institute and Museum, Mr. W. Farnell, Auckland, Miss Lucy B. Moore, M.B.E., Botany Division, Christchurch, Mr. Norman Potts, Opotiki, Mrs. W. Reynolds (Katie Pickmere), Whangarei, Mr. E. Graham Turbott, Assistant-Director, Canterbury Museum, Christchurch; cultivated material of *Cordyline kaspar* and a photograph of flowering *Tecomanthe speciosa*, taken by Mr. Harley Powell, was also made available by The Director, Plant Diseases Division, D.S.I.R., Mount Albert, Auckland. In addition, spores of *Davallia canariensis* were sent by Dr. W. Sledge, of Leeds University, while Sir George Taylor, Director of the Royal Botanic Garden, Kew, England, sent fertile *D. tasmanii*, and samples of *Tecomanthe hillii* from Australia.

Other comparative material — eight species from five genera representative of "curious ancient members" of the Bignoniaceae in the New Guinea flora — was sent by Professor C. G. G. J. van Steenis of the Rijksherbarium, Leiden, Holland.

To Dr. H. G. Baker of the University of California, Berkeley, I am indebted for literature and comments on bat flowers, and to Professor Knut Faegri, Botanical Museum, Bergen, Norway, for discussion of the furrow condition in *Tecomanthe*.

Constant use of the new "Flora" (Allan, 1961) was made during my work.

TERMS USED

General:—

Cauliflory: A condition in which flowers are borne on old trunks or on woody branches. New Zealand examples: Kohekohe *(Dysoxylum spectabile)*, *Tecomanthe speciosa*. **Flagelliflory** occurs in this group, the flowers being arranged on hanging, whiplike stems, which may be exceedingly long, as in *Kigelia americana*, the sausage tree.

Concerning microspores:—

I have kept to simple descriptive terms as far as possible, following the usage of Faegri and Iversen in their "Text-Book of Modern Pollen Analysis" (1950), now in general use. A few terms only are defined below. For fern-spore terminology reference should be made to Harris (1955).

Colpate: Possessing furrows; **Colporate:** with furrows and associated pores.

Exine: Outer, layered wall of pollen grains and spores. Very resistant to almost all acids. **Ectexine:** outermost wall, sometimes with fused rod elements making a roof *(Tectum)* over all or most of the grain. **Endexine:** inner wall, very uniform in appearance. Erdtman advocates the use of the terms "sexine" and "nexine" for these layers, respectively: these are good terms in themselves but not better, I think, than the older ones.

Geniculate: e.g., in *Elingamita*. From *geniculus*, as used by Potonié in 1934 to describe the bulging outlines of some apertures. The exine separates to form a "blister top" above the pore area and a floor below, with a vestibule between. Stanley and Kremp (1959) illustrates this condition for a *Quercus* and suggest that it may be intermediate between the tricolpate and the tricolporate; this may be true for *Quercus* as the Fagaceae may be of both types, perhaps as a result of varying response to wind-pollination, but in *Elingamita* the appearance is of a very specialised tricolporate development.

Intine: The innermost wall, destroyed by alkali treatment and by acetolysis, and hence rarely described. Usually thin, but thick all over, or locally, in some families, e.g. Fagaceae, and then important in rupturing the exine at germination, e.g. in *Nothofagus menziesii*-type grains. Knowledge of the intine is of special value when dealing with living or mildly treated material, as for aerobiological studies.

Monolete: With the tetrad scar forming a single line of dehiscence. In *Trilete* spores (e.g., those of *Hymenophyllum)* the scar is 3-armed (triradiate).

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ILLUSTRATIONS

1: *Photomicrographs:* All were taken by the author, mainly with the use of a Wild M20 microscope and its 50X and 100X Fluorite objectives. Magnifications have been varied to suit the material: better general impressions of microspores can often be obtained at lower magnifications without the use of oil immersion as for the objectives mentioned. Unless otherwise stated the spores and pollen grains are shown at 1000 diameters, for ease in comparative measurement.

2: Flowering *Tecomanthe speciosa* (Pl. 49, Fig. 27). This study of a young cultivated plant was made by Mr. Harley Powell while photographer with the Plant Diseases Division, Mount Albert.

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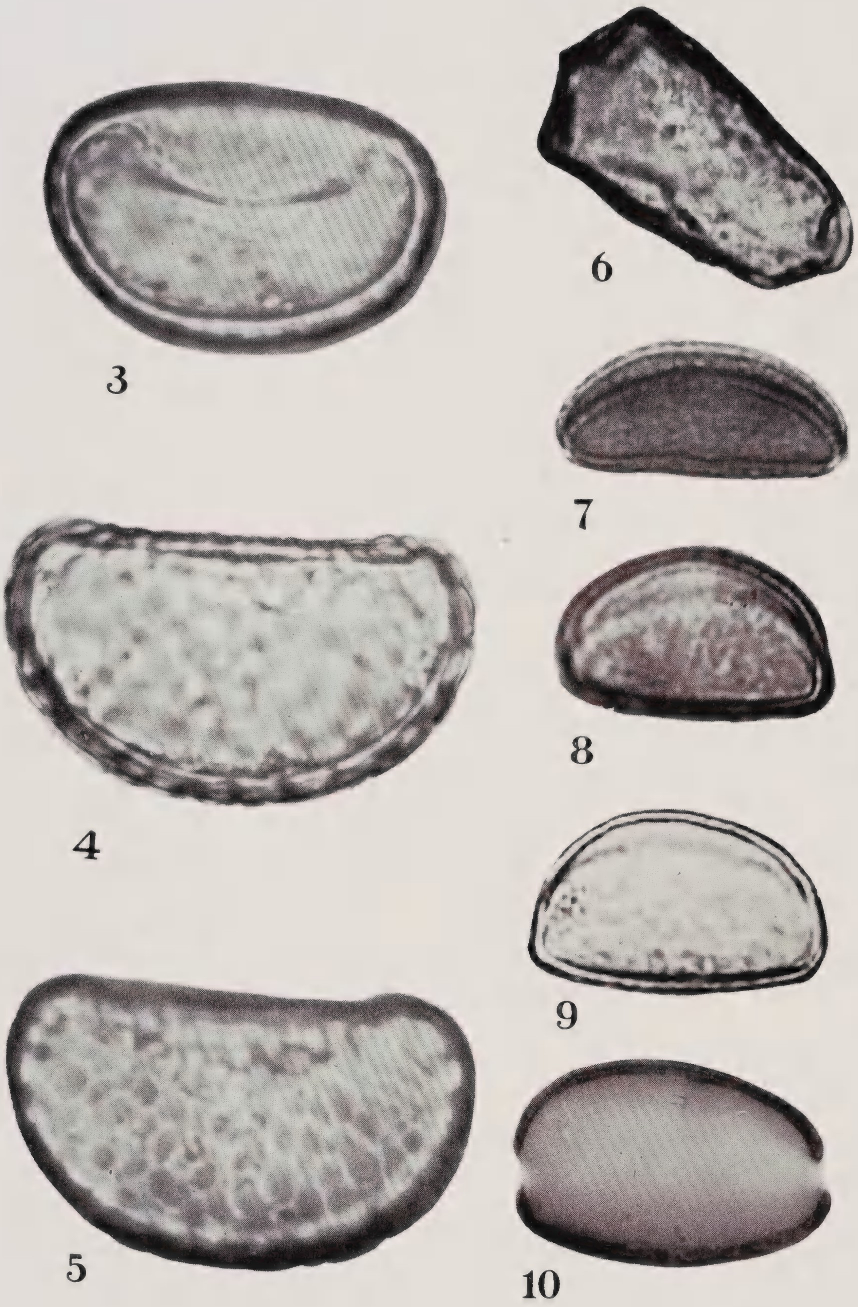
Fig. 1. Ruptured sporangium of *Davallia tasmanii*.

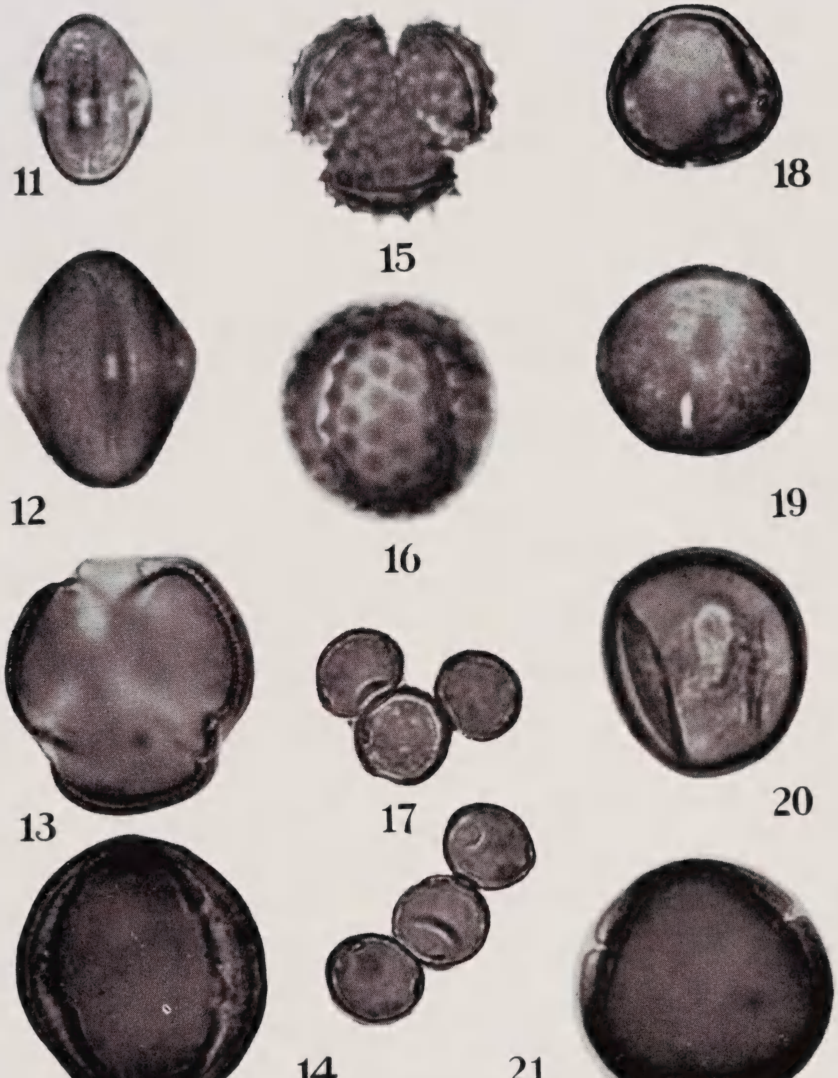
Fig. 2. Spore, in slightly oblique view, showing gaping scar (laesura). Lactophenol preparation.



Figs. 3-5. *Davallia tasmanii:* side view of spores at varying focus; (3) unexpanded spore with depressed scar area, (4, 5) spore seen at lower levels than in Fig. 2.

Fig. 6. *Carex elingamita:* elongate grain.

Figs. 7-10. *Cordyline kaspar:* (7-9) side views, furrow at top, (10) ruptured grain in optical section: (7) shows immature grain separated from its tetrad.



Figs. 11, 12. *Elingamita johnsoni:* side (equatorial) views.

Figs. 13, 14. *Hebe insularis:* (13) slightly oblique polar view; (14) side view.

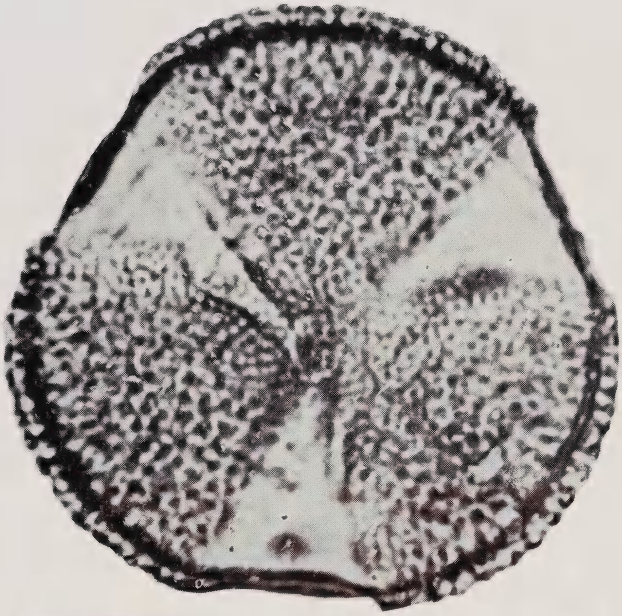
Figs. 15, 16. *Brachyglottis repanda* var. *arborescens:* (15) polar view, (16) side view.

Fig. 17. *Paratrophis smithii:* six clustered grains.

Figs. 18, 19. *Plectomirtha baylisiana:* (18) polar view, optical section; (19) side view showing poroid aperture.

Fig. 20. *Myrsine oliveri:* side view, showing a gaping aperture.

Fig. 21. *Coprosma macrocarpa:* polar view, optical section (see also Fig. 26).



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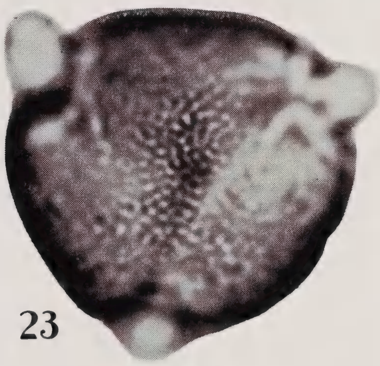

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Fig. 22. *Tecomanthe speciosa:* polar view showing large furrows with their heavy exine and jumbled reticulum as seen below the surface.

Figs. 23, 24. *Pittosporum fairchildii:* (23) polar view of grain with distended pore membranes and coarse exine pattern; (24) side view showing one pore clearly; reticulum finer.

Figs. 25, 26. *Coprosma macrocarpa* (see also Fig. 21): cell contents pushing out from wide vestibules, polar view; (26) side view showing flattened poles, coarser pattern around the aperture in focus. Vestibules collapsed after loss of cell contents.

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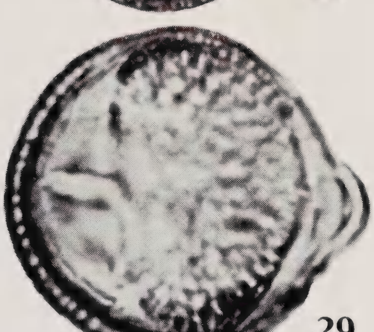

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Fig. 27. *Tecomanthe speciosa.* Flower clusters emerging from woody stem of a young plant. Note inversion of corolla. *Harley Powell photograph.*

Figs. 28-30. Polar view (28) showing reticulum in section; (29) tilted side view showing rifts in one furrow and bulging segment in another; (30) side view of grain with finer pattern and one furrow torn in two areas. 2000X.

Variation in *Tecomanthe speciosa* W. R. B. Oliver (BIGNONIACEAE) from the Three Kings Islands, New Zealand

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Auckland Institute and Museum

ABSTRACT

Variation in isolated plants of *Tecomanthe speciosa* W. R. B. Oliv. reflects environmental conditions. Two seedlings show more vigour than cuttings grown under similar conditions.

One plant only of *Tecomanthe speciosa* was found on Great Island in the Three Kings group by Dr. G. T. S. Baylis in 1945. *Tecomanthe speciosa* was named by Oliver in 1948 and the fruit, seed and seedling were described by Hunter in 1958.

A plant grown from a cutting was established at the Mount Albert Research Station, D.S.I.R., Auckland, New Zealand, in 1951, and will be referred to here as the Mount Albert parent. This plant produced flowers for the first time in May 1954 and again in 1955 and 1956. The flowers were hand-pollinated each year. Fruit pods did not develop in 1954 or 1955, but a cluster of 5 pods formed from flowers produced in 1956. The pods ripened in March 1957 and the seed germinated.

In August 1957, two plants, a seedling and a cutting struck from the Mount Albert parent, were set out 5 metres apart in a sheltered position facing North, in volcanic soil, at Mount Albert Research Station. In 1960, two further plants (one seedling and one cutting) were planted at the home of Dr. P. Fry, approximately 1 mile from the Mount Albert Research Station. These plants were grown in volcanic soil, 3 metres apart, on a trellis against an exposed North wall of the house.

No further pairs have been planted under the same environmental conditions, but the following isolated plants derived from the Mount Albert parent have been examined:

Origin	Locality	Environmental conditions	Soil
Seedling	Mr. E. Richardson, Rangikapiti Road, Mangonui	Enclosed bed on summit of exposed ridge	Pipeclay
Seedling	Mr. F. Brent, Old Mill Road, Mangonui	Sheltered, warm, northerly slope	Decayed conglomerate
Cutting	Auckland Domain	Sheltered, warm, northerly slope	Volcanic ash
Cutting	University of Auckland	Sheltered, cold, south wall	Volcanic ash

The age of the plant at first flowering varies, as the following dates show:

Plant	Year planted out	Year flowering began
Seedling at Mt. Albert	1957	1962
Cutting at Mt. Albert	1957	1960
Seedling at Dr. Fry's home	1960	Not flowered
Cutting at Dr. Fry's home	1960	Not flowered
Seedling at Mr. Richardson's	1957	1961
Seedling at Mr. Brent's	1958	1962
Cutting at Auckland Domain	1956	1959
Cutting at University	1955	1959

Flowering extends from April to September.

Observations of the habit and measurements of leaves and flowers of these plants suggest that those raised from seed grow much more vigorously than those raised from cuttings. Measurements of the following characters of the two plants at Mount Albert were made in May 1962:

1. *Calyx length* — measured from top of pedicel to rim of calyx tube.
2. *Corolla length* — measured from base of tube to tip of two terminal lobes of the upper lip. Flowers were compared at the height of the flowering period, and only mature flowers were measured. The flowers were considered to be mature when fully expanded, and when the tube parted readily from calyx and ovary.
3. *Corolla width* — measured at tips of two lateral lobes of upper lip.
4. *Leaflet length* — measured along main vein of terminal leaf blade.
5. *Leaflet width* — measured across terminal leaf blade at widest part. Allan (1961) described the leaves as "imparipinnately 3-5 — foliolate". Seven pinnate leaves occur on both seedling and cutting. The terminal leaflet was chosen for measurement as it appears to be unaffected by development of additional pinnae on the rhachis.
6. *Flower number* — counted on 10 clusters on each plant. Oliver (1948) described the inflorescence as "few-flowered". Hunter (1954) stated that the number of flowers varied from 10 to 27. Allan (1961) recorded the number as "up to 30". Seedling inflorescences had from 19 to 60, cutting inflorescences from 25 to 51 flowers.

Average measurements are listed in table 1, and individual measurements are given in the appendix.

Table 1

Flower and leaf measurements on a seedling and a cutting from the Mt. Albert parent plant, grown under similar environmental conditions at Mt. Albert Research Station.

	Seedling Mean	Cutting Mean	Significance of Difference
Calyx length	2.4 cm	2.3 cm	xxx
Corolla length	7.8 ,,	7.2 ,,	xxx
Corolla width	5.9 ,,	5.6 ,,	xx
Flower number	37	35	n.s.
Leaflet length	13.5 ,,	12.7 ,,	xxx
Leaflet width	8.5 ,,	8.2 ,,	x

xxx — significant at P = 0.001
xx — ,, ,, P = 0.01
x — ,, ,, P = 0.05
n.s. — not significant

Calyx length, corolla length and corolla width are averages from 10 clusters, totalling 100 flowers.

Flower number is the average from 10 clusters.

Leaflet length and width are averages from 100 terminal leaflets.

Statistical analyses were carried out by Dr. H. R. Thompson, Applied Mathematical Laboratory, D.S.I.R., Auckland, to whom we are indebted. The results in table 1 show significant differences in leaf and flower size between the two plants.

Since the pair of plants at Dr. Fry's home have not yet flowered, leaf measurements only are listed in table 2.

Table 2

Leaf measurements on a seedling and a cutting from the Mt. Albert parent plant, grown under similar environmental conditions at Dr. Fry's home.

	Seedling Mean	Cutting Mean	Significance of Difference
Leaflet length	10.5 cm*	9.2 cm**	xxx
Leaflet width	6.7 „ *	6.3 „ **	x

* — averages from 51 terminal leaflets
** — „ „ 27 „ „

Since additional pairs of plants are not available, and individual plants produce only a few clusters of flowers at present, measurements of terminal leaflets of the other plants referred to above are listed in table 3.

Table 3

Leaf measurements of plants raised from seed or from cuttings and grown under different environmental conditions.

	Seedlings			Cuttings		
	Fry	Richardson	Brent	Fry	Domain	University
No. of leaflets	51	33	17	27	34	40
Average leaflet length	10.5	13.1	15.3 cm	9.2	10.0	10.8 cm
Average leaflet width	6.7	9.0	8.9 „	6.3	7.6	8.2 „

Owing to the very large environmental variation, there is not enough information in table 3 to show significant differences between seedlings and cuttings; but the results do not contradict the evidence of seedling vigour shown by tables 1 and 2.

CONCLUSION

It is possible that large leaves found on seedling plants are "juvenile leaves". At Mount Albert Research Station, and at Dr. Fry's home, seedling plants have larger, and possibly thinner leaves than cuttings grown under similar conditions. Apart from these differences, foliage of seedling plants does not differ from that of cuttings. Nevertheless, the suggestion does not account for variation in flower size.

It is well known to horticulturists that seedlings of some plants, e.g. apples, are more vigorous than cuttings. Usually this increase in vigour results from cross-fertilisation. In this case, increased vigour has developed in seedlings from a self-fertilised, presumably homozygous plant.

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APPENDIX

Individual Measurements.

1. Floral measurements of the Seedling plant at Mt. Albert Research Station.

No. of inflorescences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
1	60	1	2.4	7.4	5.5
		2	2.4	7.9	5.8
		3	2.4	7.5	5.6
		4	2.3	7.6	5.8
		5	2.4	7.5	5.4
		6	2.4	8.0	6.0
		7	2.5	8.2	6.3
		8	2.4	7.7	6.0
		9	2.4	7.6	6.4
		10	2.4	7.6	6.1
			24.0	77.0	58.9
2	27	1	2.4	8.1	6.1
		2	2.1	7.7	5.6
		3	2.5	8.2	6.3
		4	2.5	7.6	6.0
		5	2.4	7.9	6.5
		6	2.6	8.2	6.4
		7	2.5	7.5	6.0
		8	2.4	7.6	5.9
		9	2.5	8.3	6.1
		10	2.4	8.3	6.7
			24.3	79.4	61.6
3	29	1	2.4	7.2	5.6
		2	2.4	7.6	6.0
		3	2.5	7.8	6.1
		4	2.5	7.6	5.8
		5	2.3	7.6	5.9
		6	2.4	7.9	6.0
		7	2.4	7.4	5.7
		8	2.4	7.5	5.8
		9	2.4	7.9	5.8
		10	2.5	8.1	5.9
			24.2	76.6	58.6

No. of inflores-cences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
4	35	1	2.5	7.8	6.0
		2	2.3	7.7	5.5
		3	2.4	8.0	6.2
		4	2.5	8.1	6.2
		5	2.5	7.9	6.1
		6	2.5	7.9	6.0
		7	2.4	7.7	5.6
		8	2.3	7.6	5.0
		9	2.5	7.8	6.1
		10	2.5	7.5	6.1
			24.4	78.0	58.8
5	23	1	2.4	7.8	5.6
		2	2.4	7.9	6.3
		3	2.4	7.7	6.3
		4	2.3	7.7	5.7
		5	2.3	7.4	5.3
		6	2.4	8.2	6.2
		7	2.4	7.8	6.5
		8	2.4	8.1	6.3
		9	2.4	7.9	6.0
		10	2.3	7.8	6.5
			23.7	78.3	60.7
6	31	1	2.4	8.0	5.7
		2	2.3	8.3	5.8
		3	2.4	8.2	6.2
		4	2.4	7.4	5.8
		5	2.3	7.9	6.0
		6	2.3	8.0	6.1
		7	2.4	8.1	6.3
		8	2.3	7.9	6.2
		9	2.4	7.9	5.9
		10	2.2	7.2	5.3
			23.4	78.9	59.3
7	59	1	2.3	8.0	5.6
		2	2.4	8.1	6.2
		3	2.4	8.2	6.0
		4	2.4	8.0	6.1
		5	2.4	8.2	6.2
		6	2.4	8.5	6.4
		7	2.4	8.2	6.2
		8	2.4	8.1	6.1
		9	2.3	7.9	5.7
		10	2.4	8.1	6.1
			23.8	81.3	60.6
8	19	1	2.3	8.1	6.4
		2	2.3	7.4	5.1
		3	2.4	7.4	5.3
		4	2.3	8.2	6.5
		5	2.3	8.2	6.4
		6	2.3	7.5	5.8
		7	2.3	7.0	6.0
		8	2.3	8.1	5.8
		9	2.4	8.1	6.1
		10	2.3	7.7	5.9
			23.2	77.7	59.3

No. of inflorescences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
9	56	1	2.3	7.4	5.8
		2	2.4	7.9	6.2
		3	2.3	7.4	5.2
		4	2.3	7.2	5.3
		5	2.2	7.0	5.0
		6	2.3	7.2	5.5
		7	2.2	7.2	5.5
		8	2.3	7.2	4.9
		9	2.3	7.6	6.0
		10	2.3	7.3	5.5
			22.9	73.4	54.9
10	30	1	2.4	8.0	5.8
		2	2.4	8.1	5.7
		3	2.3	8.2	5.9
		4	2.3	8.1	5.8
		5	2.3	7.7	6.0
		6	2.2	7.8	5.6
		7	2.4	8.1	6.2
		8	2.4	8.2	6.2
		9	2.3	7.8	5.7
		10	2.3	7.9	5.9
			23.3	79.9	58.8
Total 10	369	100	237.2	780.5	591.5
Mean –	37	–	2.4	7.8	5.9

2. Floral measurements of the Cutting at Mt. Albert Research Station.

No. of inflorescences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
1	49	1	2.2	7.1	5.6
		2	2.3	7.9	6.0
		3	2.3	7.3	5.6
		4	2.3	7.6	5.6
		5	2.3	7.9	5.7
		6	2.2	7.5	5.6
		7	2.5	7.8	6.0
		8	2.3	7.9	5.6
		9	2.1	7.1	5.6
		10	2.3	7.5	5.5
			22.8	75.6	56.8
2	51	1	2.4	7.0	5.7
		2	2.2	6.9	5.7
		3	2.2	6.8	5.8
		4	2.2	6.9	5.5
		5	2.3	7.1	5.5
		6	2.3	7.2	5.7
		7	2.3	7.1	5.5
		8	2.4	7.0	5.0
		9	2.3	6.9	5.5
		10	2.2	6.7	5.0
			22.8	69.6	54.9

No. of inflores-cences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
3	28	1	2.4	7.0	4.9
		2	2.4	7.4	5.8
		3	2.3	7.1	5.0
		4	2.1	6.5	5.0
		5	2.3	6.7	4.9
		6	2.2	6.4	5.5
		7	2.3	6.4	5.1
		8	2.0	6.6	4.5
		9	2.2	6.6	4.8
		10	2.4	7.3	5.8
			22.6	68.0	51.3
4	29	1	2.2	6.6	5.4
		2	2.1	6.9	5.5
		3	2.1	7.4	5.4
		4	2.1	6.6	4.9
		5	2.2	7.0	5.9
		6	2.2	6.4	4.9
		7	2.2	6.5	5.3
		8	2.3	7.4	5.7
		9	2.1	6.1	5.0
		10	2.2	6.6	5.4
			21.7	67.5	53.4
5	34	1	2.3	7.2	5.3
		2	2.2	7.1	5.7
		3	2.4	7.4	5.5
		4	2.2	7.3	5.6
		5	2.3	7.3	5.8
		6	2.3	7.3	5.5
		7	2.3	7.6	6.0
		8	2.2	7.5	5.5
		9	2.3	7.4	5.8
		10	2.4	7.5	6.1
			22.9	73.6	56.8
6	25	1	2.2	7.2	5.4
		2	2.3	6.8	5.0
		3	2.2	6.7	4.8
		4	2.2	6.8	4.6
		5	2.3	6.9	4.9
		6	2.2	6.6	5.0
		7	2.3	6.7	4.9
		8	2.3	6.9	5.0
		9	2.4	6.6	4.9
		10	2.3	7.8	5.0
			22.7	69.0	49.5

	No. of inflores-cences measured	No. of flowers per cluster	No. of mature flowers measured	Calyx length	Corolla length	Corolla width
	7	26	1	2.3	7.0	5.7
			2	2.2	7.1	5.0
			3	2.3	7.4	5.9
			4	2.2	6.9	5.2
			5	2.2	7.4	5.8
			6	2.4	7.4	5.5
			7	2.3	7.6	6.1
			8	2.3	7.9	6.0
			9	2.2	7.2	5.8
			10	2.4	7.1	5.0
				22.8	73.0	56.0
	8	36	1	2.3	7.1	5.8
			2	2.3	7.5	5.5
			3	2.3	7.1	5.1
			4	2.4	8.1	6.3
			5	2.3	7.3	5.8
			6	2.3	7.0	5.3
			7	2.3	7.1	5.2
			8	2.4	7.4	6.4
			9	2.4	7.5	6.2
			10	2.3	7.4	5.5
				23.3	73.5	57.1
	9	31	1	2.4	7.4	6.0
			2	2.3	7.5	5.9
			3	2.2	7.4	6.0
			4	2.2	7.4	6.1
			5	2.2	7.2	6.0
			6	2.4	7.3	5.6
			7	2.2	7.3	5.9
			8	2.1	5.8	5.1
			9	2.3	7.0	5.8
			10	2.2	7.3	5.5
				22.5	71.6	57.9
	10	38	1	2.3	7.6	6.5
			2	2.4	7.8	6.0
			3	2.3	7.9	6.5
			4	2.3	7.5	6.5
			5	2.3	7.9	6.0
			6	2.4	7.8	6.2
			7	2.3	7.5	6.5
			8	2.3	7.4	5.9
			9	2.3	7.4	5.8
			10	2.3	7.3	5.9
				23.2	76.1	61.8
Total	10	347	100	227.3	717.5	555.5
Mean	–	35	–	2.3	7.2	5.6

3. Leaflet measurements of the Seedling at Mt. Albert Research Station.

No.	Length	Width	No.	Length	Width
1	16.2	10.4	51	11.7	6.7
2	12.2	7.5	52	13.3	7.1
3	15.8	9.6	53	12.5	8.0
4	15.4	9.2	54	12.3	7.7
5	12.5	8.0	55	13.2	8.4
6	15.4	11.0	56	14.7	9.4
7	12.6	8.5	57	13.5	7.9
8	13.5	9.2	58	13.4	8.1
9	12.2	7.1	59	12.9	8.6
10	12.5	8.1	60	12.5	6.7
11	15.0	9.4	61	12.7	7.5
12	12.8	7.2	62	12.3	7.3
13	16.3	10.3	63	13.4	8.3
14	12.8	8.3	64	14.8	9.9
15	14.7	8.3	65	11.2	7.3
16	18.1	11.1	66	12.3	7.4
17	15.2	7.8	67	16.4	9.8
18	12.9	8.9	68	12.7	8.1
19	13.6	9.4	69	11.1	6.1
20	13.4	8.8	70	15.0	9.7
21	12.8	8.2	71	11.7	9.6
22	12.2	8.1	72	15.7	9.7
23	13.6	8.4	73	13.8	8.3
24	16.6	10.5	74	11.5	7.8
25	13.5	7.6	75	13.0	8.2
26	13.8	9.7	76	13.8	9.2
27	17.6	9.0	77	16.3	9.8
28	13.8	7.9	78	12.5	7.6
29	13.3	8.3	79	15.6	9.4
30	14.7	8.4	80	13.7	8.5
31	16.1	10.0	81	11.8	7.0
32	12.5	7.8	82	14.2	9.7
33	12.0	7.1	83	12.8	7.2
34	18.4	11.6	84	14.8	8.9
35	13.8	7.3	85	13.1	8.9
36	12.6	7.8	86	15.3	9.5
37	16.8	10.2	87	13.0	9.2
38	12.3	8.0	88	13.0	7.9
39	15.1	9.8	89	14.9	9.1
40	12.1	8.3	90	15.0	10.3
41	13.7	8.0	91	13.0	9.0
42	11.8	8.8	92	11.3	7.9
43	11.4	8.0	93	12.8	7.6
44	14.0	8.0	94	11.8	7.1
45	11.9	7.7	95	12.2	8.0
46	11.6	8.3	96	13.2	8.2
47	11.3	8.5	97	12.6	7.7
48	13.2	8.5	98	13.7	7.0
49	13.2	8.2	99	12.2	7.0
50	12.8	8.7	100	12.5	7.5
			Total	1354.3	847.6
			Mean	13.5	8.5

4. Leaflet measurements of the Cutting at Mt. Albert Research Station.

No.	Length	Width	No.	Length	Width
1	12.8	8.0	51	11.4	7.9
2	13.9	9.1	52	12.3	8.8
3	12.2	7.7	53	16.0	9.4
4	12.2	7.9	54	12.0	8.2
5	11.9	7.2	55	14.0	8.7
6	10.9	6.8	56	12.4	8.3
7	13.5	9.1	57	16.3	11.0
8	11.0	7.4	58	12.5	10.2
9	12.4	7.0	59	14.4	8.8
10	16.8	10.6	60	13.7	8.5
11	13.1	7.9	61	14.5	9.2
12	11.8	7.7	62	13.2	8.1
13	10.6	7.0	63	13.1	8.7
14	13.2	9.0	64	12.8	8.1
15	11.9	7.1	65	12.7	7.9
16	10.8	6.8	66	11.8	7.6
17	13.3	7.9	67	14.6	9.0
18	12.9	8.5	68	13.0	8.3
19	10.5	6.7	69	13.2	8.2
20	13.3	9.0	70	12.4	8.7
21	12.5	8.5	71	11.5	8.2
22	13.0	7.0	72	11.7	7.4
23	16.0	10.1	73	11.5	8.3
24	9.5	6.9	74	12.2	8.0
25	12.4	8.3	75	15.0	10.3
26	11.2	6.4	76	15.1	9.1
27	10.7	7.3	77	12.2	8.0
28	12.8	8.5	78	13.3	8.0
29	11.6	7.3	79	12.6	8.1
30	16.1	10.0	80	11.1	6.7
31	15.6	9.9	81	15.4	9.2
32	12.4	7.8	82	13.3	7.6
33	10.9	6.2	83	12.8	8.3
34	10.7	8.5	84	13.3	7.8
35	11.9	7.7	85	14.4	9.8
36	14.8	8.3	86	13.1	8.0
37	10.7	7.0	87	14.3	9.4
38	12.0	6.5	88	11.9	8.8
39	13.5	9.1	89	12.4	7.4
40	10.0	5.8	90	13.5	9.5
41	10.8	5.8	91	12.8	8.3
42	12.1	6.9	92	12.7	7.9
43	12.2	7.5	93	12.7	8.2
44	11.0	6.9	94	13.7	8.8
45	12.4	8.2	95	13.2	7.8
46	15.2	9.9	96	13.0	8.4
47	11.6	8.5	97	11.6	7.9
48	11.8	7.3	98	11.8	7.5
49	11.1	8.4	99	11.9	7.5
50	14.2	8.8	100	13.0	8.1
			Total	1273.0	815.6
			Mean	12.7	8.2

5. Leaflet measurements of the Seedling at Dr. P. Fry's home.

No.	Length	Width	No.	Length	Width
1	11.0	8.5	27	10.0	6.3
2	10.5	5.8	28	10.1	6.4
3	10.6	6.4	29	8.8	5.5
4	10.7	6.4	30	11.6	7.5
5	11.7	7.5	31	10.4	6.4
6	11.3	6.7	32	8.4	4.9
7	10.5	7.6	33	11.4	8.2
8	13.4	8.5	34	11.2	7.5
9	11.7	7.3	35	10.7	6.7
10	12.0	7.1	36	11.3	7.3
11	11.2	7.4	37	9.2	6.2
12	8.8	6.5	38	10.3	6.2
13	11.3	7.4	39	9.9	5.4
14	11.3	7.5	40	9.2	6.6
15	9.5	6.2	41	11.8	7.5
16	11.9	7.4	42	8.7	5.5
17	12.8	7.5	43	9.4	5.8
18	10.6	6.4	44	11.2	7.6
19	8.5	4.9	45	10.8	6.5
20	11.8	7.2	46	12.2	7.7
21	8.9	6.0	47	12.6	8.1
22	8.9	6.5	48	10.0	6.0
23	9.4	6.8	49	9.5	6.3
24	8.3	6.3	50	10.4	6.4
25	8.7	5.3	51	9.1	6.9
26	9.5	5.5			
			Total	533.0	342.0
			Mean	10.5	6.7

6. Leaflet measurements of the Seedling at Mr. Brent's home.

No.	Length	Width	No.	Length	Width
52	13.5	7.8	61	14.4	8.7
53	17.3	9.0	62	14.3	9.7
54	18.9	9.8	63	16.2	9.7
55	16.0	9.0	64	11.9	6.8
56	14.2	7.5	65	13.1	7.5
57	17.6	12.8	66	12.2	7.6
58	18.4	9.6	67	14.3	10.0
59	15.3	7.7	68	11.4	7.4
60	20.4	10.9			
			Total	259.4	151.5
			Mean	15.3	8.9

7. Leaflet measurements of the Seedling at Mr. Richardson's home.

No.	Length	Width	No.	Length	Width
69	17.2	12.0	86	16.6	13.5
70	11.3	7.9	87	13.7	9.5
71	12.5	9.3	88	11.7	8.5
72	14.3	8.4	89	12.0	8.8
73	15.9	10.9	90	10.8	6.8
74	11.6	9.0	91	10.7	7.2
75	10.6	7.5	92	8.6	6.0
76	17.6	12.1	93	11.9	8.2
77	13.4	8.2	94	10.2	6.4
78	12.4	8.3	95	12.0	8.1
79	14.2	9.2	96	17.0	11.2
80	17.1	11.2	97	12.4	6.3
81	13.2	9.3	98	10.6	5.9
82	14.5	11.9	99	17.4	12.2
83	12.7	8.1	100	12.6	9.1
84	10.4	6.5	101	11.8	9.0
85	12.9	9.6			
			Total	431.8	296.2
			Mean	13.1	9.0

8. Leaflet measurements of the Cutting at Dr. P. Fry's home.

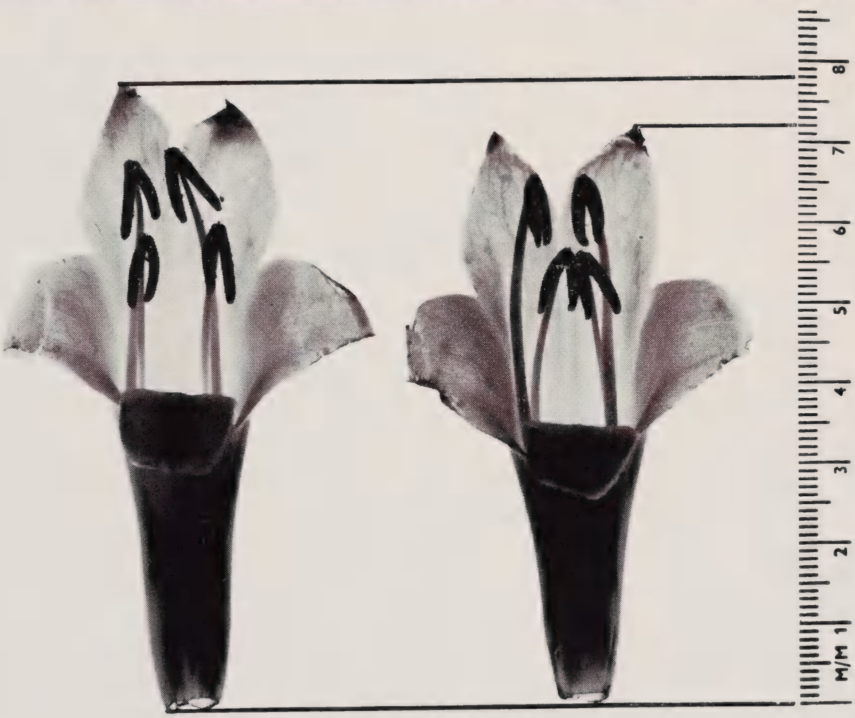
No.	Length	Width	No.	Length	Width
1	9.9	6.9	15	8.3	6.2
2	8.8	5.9	16	10.2	6.8
3	10.6	7.4	17	8.7	6.3
4	9.9	7.3	18	10.1	6.5
5	10.1	6.7	19	7.3	5.3
6	9.6	6.2	20	7.4	5.6
7	8.6	6.2	21	8.8	6.3
8	9.2	6.0	22	9.9	6.9
9	11.2	8.0	23	8.9	5.9
10	9.7	6.5	24	7.8	5.1
11	10.7	7.8	25	7.0	4.8
12	10.5	6.5	26	7.6	5.3
13	10.8	6.5	27	7.6	4.9
14	10.1	6.7			
			Total	249.3	170.5
			Mean	9.2	6.3

9. Leaflet measurements of the Cutting at the Auckland Domain.

No.	Length	Width	No.	Length	Width
28	9.3	7.7	45	10.1	7.0
29	8.8	7.2	46	10.7	7.0
30	7.6	5.8	47	11.5	9.2
31	8.0	5.9	48	9.9	6.8
32	7.9	5.8	49	11.9	9.7
33	8.4	6.0	50	8.8	6.9
34	10.7	7.8	51	10.7	7.9
35	10.5	8.9	52	7.1	5.6
36	12.0	9.7	53	10.2	8.2
37	9.7	8.0	54	9.7	6.8
38	9.0	6.2	55	12.4	8.8
39	10.1	7.7	56	9.0	7.5
40	10.2	7.8	57	9.3	7.8
41	10.2	8.1	58	10.8	8.7
42	9.1	6.2	59	11.7	10.0
43	7.8	6.0	60	11.5	9.5
44	10.8	6.9	61	13.9	10.7
			Total	339.3	259.8
			Mean	10.0	7.6

10. Leaflet measurements of the Cutting, University of Auckland.

No.	Length	Width	No.	Length	Width
62	6.5	6.1	82	12.4	8.7
63	9.6	7.5	83	11.3	8.7
64	9.7	8.0	84	9.9	7.7
65	10.2	7.0	85	11.6	8.7
66	12.8	8.7	86	12.3	9.2
67	10.7	8.5	87	10.7	7.7
68	11.4	8.9	88	11.9	9.2
69	12.5	8.8	89	9.9	7.6
70	9.0	6.6	90	11.8	9.0
71	7.5	5.7	91	12.0	8.4
72	12.6	8.8	92	11.2	8.8
73	12.1	8.5	93	10.1	7.5
74	11.6	8.2	94	12.5	9.2
75	11.0	10.3	95	11.5	8.2
76	10.9	9.4	96	9.5	8.5
77	11.3	8.7	97	11.5	9.6
78	9.2	7.3	98	11.4	7.6
79	10.6	7.7	99	9.6	7.9
80	10.8	7.8	100	9.4	7.4
81	9.7	6.8	101	10.6	7.6
			Total	430.8	326.5
			Mean	10.8	8.2



Tecomanthe speciosa W. R. B. Oliv.

1. Inflorescence with mature flowers (corolla tube shed), seven and five pinnate leaves.
2. Corolla tubes of seedling and cutting plant. (Mt. Albert seedling left, cutting right).

Mt. Albert Research Station,
S. Rumsey photos.

A New Genus and Three New Species of Trichoptera

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ABSTRACT

A new genus is erected for two *Pycnocentrodes* species (Family Sericostomatidae). One new species of *Hydropsyche* (Family Hydropsychidae) and two of *Polyplectropus* (Family Polycentropodidae) are described and a new synonymy in the latter genus is recorded.

INTRODUCTION

The purpose of this paper is to record one new genus, three new species, and one new synonymy.

The description of a new genus is given here to establish the name for use elsewhere. The two species placed in this genus are to be re-described in a future paper.

Two new species are described from specimens discovered amongst material collected in a light trap operated in the vicinity of Titirangi, near Auckland, in the Waitakere Ranges by Mr. C. R. Thomas. Another new species was collected in the Auckland environs by the author.

Mr. D. E. Kimmins, British Museum (Natural History), London, England, and Mr. A. G. McFarlane, of Christchurch, have kindly compared specimens and assisted with information.

FAMILY SERICOSTOMATIDAE

The two species, known as *Pycnocentrodes hamiltoni* Tillyard, 1924, (1924) and *P. olingoides* Tillyard, 1924, are not congeneric with other species of *Pycnocentrodes* Tillyard, 1924. A new genus, erected for these two species, is therefore described from specimens, including types, in the Cawthron Institute collection.

Confluens n.gen.

Ocelli absent; ♂ frons with a small hole on each side. Maxillary palpi, ♂, membranous, apparently two-jointed with transverse suture, as in *Pycnocentrodes*, but appearing as one in internal view; no brush of hairs from base. Wings, ♂ (fig. 1); anterior with a callosity at base, discoidal cell exceedingly narrow and long but abnormal apically, R_{2+3} and R_{4+5} rejoin to form a single stem from which apical forks 1 and 2 both arise, apical forks 1, 2, 3 and 5 present; posterior with R_{2+3} missing or only apical remnant present (as figured), discoidal cell open above, discoidal cross-vein and apical forks 1, 2 and 5 present. Wings, ♀, anterior as *Pycnocentrodes,* discoidal cell normal, apical forks 1, 2, 3 and 5 present; posterior as *Pycnocentria,* short discoidal cell present. Spurs 2. 2. 4.

Type species, *Pycnocentrodes hamiltoni* Tillyard, 1924.

The fusion of R_{2+3} and R_{4+5} beyond the discoidal cell distinguishes this genus from *Pycnocentrodes* and *Pycnocentria.* The two branches of

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R_s are very close in the basal portion of the discoidal cell and often fold together giving the appearance of a much shorter cell.

Material examined: *Pycnocentrodes hamiltoni* Till., ♂ holotype, ♀ allotype, 2 ♂♂, 1 ♀, all collected at the type locality, Tokaanu, on the same day.

Pycnocentrodes olingoides Till., ♂ holotype, ♀ allotype, collected at Gouland Downs; 2 ♂♂ collected at Nelson.

FAMILY HYDROPSYCHIDAE

Hydropsyche thomasi n.sp.

A species close to *H. fimbriata* McL. but smaller.

Anterior wing with pale irrorations giving a unicolorous ochreous effect in general view. Without the heavier irrorations and yellow patch on terminal setae of *H. fimbriata* McL.

Length of anterior wing, ♂♂, 9-10 mm. (Length of anterior wing of 27 *H. fimbriata* ♂♂, taken in the same light trap, 10.5-12 mm.).

Genitalia, ♂ (fig. 2). Usual elevation of the dorsal surface of the ninth segment is inconspicuous. Dorsal plate, from the side, with upper angle a rounded protuberance with marginal setae, lower angle produced obliquely downwards in a long point apically, a short inwardly turned point basal to this not visible in side view. Side pieces of ninth segment moderately produced. Penis with apex divided into an upper and lower portion, the upper portion divided by a vertical slit into two rounded lateral pieces. The lower portion of the apex, from beneath, is seen as a wide plate with strongly spinose distal margin, lateral angles not produced basally. Inferior appendages two-jointed, approximately equal in length. The apical joint is narrowed beyond half-way both dorsally and ventrally (less so laterally) resulting in a long apical finger.

Holotype ♂. Auckland: Titirangi, ex light trap 2.II.1953, *(C. R. Thomas)*.

Paratypes (all ♂♂). Auckland: Titirangi, ex light trap, 10.XII.1952, 3 spec.; 17.XII.1952, 1 spec.; —.XII. 1952, 1 spec.; —.I. 1953, 7 spec.; 2.II.1953, 1 spec.; 6.II.1953, 2 spec.; 17.II.1953, 2 spec.; —.II.1953, 4 spec.; 9.XII.1953, 1 spec. in alcohol; 10.XII.1953, 1 spec. in alcohol; 12.X.1955, 1 spec.; *(C. R. Thomas)*.

Other specimens. Auckland: Titirangi, ex light trap, 6.II.1953, 1 ♂ *(C. R. Thomas)*.

All specimens are in the Plant Diseases Division collection except specimens lodged as follows: Auckland Museum, 2 ♂ paratypes; Canterbury Museum, 2 ♂ paratypes; British Museum (Natural History), London, England, 2 ♂ paratypes.

FAMILY POLYCENTROPODIDAE

Polyplectropus puerilis (McLachlan)

1868 *Polycentropus puerilis* McLachlan, *Linn. Soc. Lond. Zool.*, **10:** 204, 213.

1958 *Polyplectropus penicillus* Wise, *Rec. Auck. Inst. Mus.*, **5 (1&2):** 57. n. syn.

Polyplectropus penicillus was described from specimens in the Auckland Museum collection.

Mr. D. E. Kimmins, British Museum (Natural History) has compared specimens, sent by the author, with specimens of *P. puerilis* and has advised that they are con-specific. It should be noted that the description and figure of the male genitalia in Mosley and Kimmins (1953) apply to the expanded penis and in Wise (1958) apply to the relaxed penis.

Polyplectropus waitakerensis n.sp.

A species darker than *P. puerilis* McL. Anterior wings dark chocolate brown with creamy yellow markings.

Length of anterior wing, ♂, 8-9 mm., ♀, 9-11 mm.

Genitalia, ♂ (fig. 3). Ninth segment membranous above, not produced in a dorsal plate. Two short inner processes of upper penis cover are widest at the obliquely truncate apex, in lateral view. Outer process with a broad lateral portion and with a long narrow spine arising above. Spine turned inward and downward near base with a bend before apex which is turned up almost horizontally. Penis from above with short apical slit forming two dorsal lobes, a single ventral lobe with rounded apex level with apices of dorsal lobes. Inferior appendage short, broad, obliquely truncate at apex, with strong dorsal concavity and definite dorsal apical angle. On upper surface, inner basal angle with two short darkened protuberances close together.

Holotype ♂. Auckland: Titirangi, ex light trap, 10.XII.1952 *(C. R. Thomas)*.

Paratypes. Auckland: Titirangi, ex light trap, 2.XII.1952, 1 ♂; 4.XII.1952, 1 ♂; 5.XII.1952, 2 ♂♂, 2♂♂ in alcohol; 10.XII.1952, 1 ♂; 20.XII.1952, 1 ♂ 1 ♀; —.XII.1952, 1 ♀; 15.VI.1953, 1 ♂; —.VIII.1953, 1 ♀; 11.X.1955, 2 ♀♀, *(C. R. Thomas)*.

Other specimens. Auckland: Titirangi, ex light trap, 15-24.XII. 1952, 5 ♂♂, 2 ♀♀ in alcohol *(C. R. Thomas)*.

All specimens are in the Plant Diseases Division collection except specimens lodged as follows: Auckland Museum, 1 ♂ 1 ♀ paratypes; Canterbury Museum, 1 ♂ 1 ♀ paratypes; British Museum (Natural History), 1 ♂ 1 ♀ paratypes.

Polyplectropus impluvii n.sp.

A small species. Anterior wings medium brown, unicolorous except for a few faint, pale marginal spots about apex.

Length of anterior wing, ♂, 7-7.5 mm., ♀, 8.5-9 mm.

Genitalia, ♂ (fig. 4). Ninth segment membranous above, not produced in a dorsal plate. Upper penis cover without inner dorsal processes. Outer process with a broad lateral portion, a long narrow spine arising above. In dorsal view spine appears to be slightly angled near base with a short setose inner projection at the angle. Penis with dorsal and ventral apical lobes truncate and with rounded lateral lobes. Inferior appendages moderately long, reduced before half way, thence slightly tapering, apex rounded. Dorsal basal area clear, almost transparent. On upper surfaces inner basal area with two quadrate plates.

Holotype ♂. Auckland: Mangere ex domestic water tank, 10.IX.1950, *(K. A. J. Wise)*.

Paratypes. Auckland: Mangere, ex domestic water tank, 10.IX.1950, 3 ♀♀; 21.IV.1951, 1 ♂; Mangere, at light, 6.II.1951, 1 ♀; Western Springs, 21.I.1950, 1 ♂, *(K. A. J. Wise)*.

Other specimens. Auckland: Mangere, at light, —.III.1951, 1 ♂; 28.V.1951, 1 ♀, *(K. A. J. Wise)*.

All specimens are in the Plant Diseases Division collection except specimens lodged as follows: Auckland Museum, 1 ♂ 1 ♀ paratypes; British Museum (Natural History), 1 ♂ 1 ♀ paratypes.

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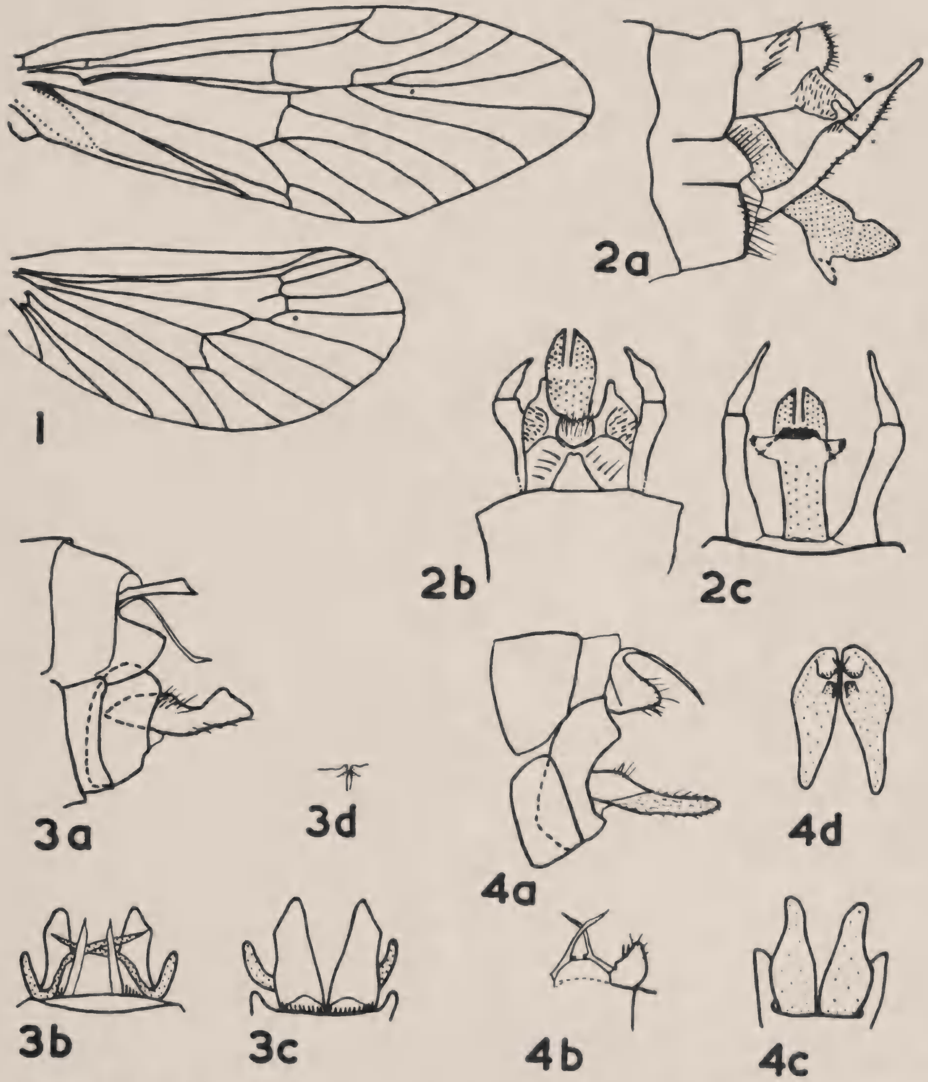

Fig. 1. *Confluens hamiltoni* (Till.). Wings.

Fig. 2. *Hydropsyche thomasi* n.sp. ♂ Genitalia; a, lateral; b, dorsal; c, ventral.

Fig. 3. *Polyplectropus waitakerensis* n.sp. ♂ Genitalia; a, lateral; b, dorsal; c, ventral; d, inner basal areas on upper surface of inferior appendages.

Fig. 4. *Polyplectropus impluvii* n.sp. ♂ Genitalia; a, lateral; b, dorsal (right side damaged, not shown); c, ventral; d, upper surface of inferior appendages.

The Ants of the Three Kings Islands

By R. W. TAYLOR

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INTRODUCTION

The ants reviewed below include specimens both from Great Island and South-West Island, most of the former collected by Mr. E. G. Turbott during April, 1946 or by Dr. J. S. Edwards during the summer of 1952-53; and the latter collected by Mr. Turbott during a brief visit to South-West Island in January, 1951. The material studied is from the collections of the Auckland Institute and Museum, and was originally made available to the author through the generosity of Mr. Turbott and the Museum Director Dr. G. Archey. The collectors are referred to in the discussion below by their initials.

Amblyopone australis Erichson

The extensive synonymy and the distribution of this highly variable and widespread Austro-Melanesian ant have been discussed by Brown (1958, 1960) and Wilson (1959). Its New Zealand range embraces the whole of the North Island and many of the offshore islands including Great Barrier, Little Barrier, Cuvier and Mayor Islands. New Zealand specimens cannot be consistently separated from Australian samples, and the species seems to be a relatively recent, but probably pre-European, arrival from Australia.

Material examined:—GREAT ISLAND: Castaway depot, a dealate queen from beneath a stone (E.G.T., 21/4/46). Eastern arm, Quadrat II of Turbott* (J.S.E., 1/1/53). Tasman Valley: north side, nest with cocoons, under stone in *Leptospermum* grove (E.G.T., 23/4/46); under rock (J.S.E., 30/12/52). No additional citation: (E.G.T., 15/4/46); (J.S.E., 30/12/52).

The Three Kings specimens show the same size range and frequency distribution (based on maximum head width) as mainland samples. The development of cephalic sculpturing differs, however, from that of workers from the Auckland area.

The latter show the following range of variation:—

1. Small workers (head width *circa* 1.6 mm) (fig. 1 a). Head capsule behind and lateral to the frontal carinae bearing coarse longitudinal costulae. These diverge outwards and extend to a point midway between the eyes and the occiput; they are effaced on the median and posterior parts of the head leaving a broad triangular median facial area free of costulae. The integument here is smooth and shining and bears scattered large setose punctures.
2. Large specimens (head width *circa* 2.0 mm) (fig. 1 c). The longitudinal costulae are much more extensive and almost completely obscure the shining median portion of the face.

*See Turbott, E. G., 1948, Effect of Goats on Great Island, Three Kings, with descriptions of Vegetation Quadrats., *Rec. Auc. Inst. Mus.*, 3: 259-272.

Workers of intermediate size are intergradient, the degree of sculpturing being directly proportional to individual size.

The Three Kings specimens differ in the following respects:—

1. Smallest worker (head width 1.61 mm) (fig. 1 b). The costulae do not extend as far back on the median or lateral parts of the head as do those of small Auckland specimens.
2. Largest worker (head width 2.18 mm) (fig. 1 d). The costulation is considerably reduced compared with that of large Auckland specimens; in fact, the large Three Kings workers closely resemble *small* Auckland specimens in this respect.

Regular gradation is present in workers of intermediate size.

It cannot be determined, with available material, whether clinal gradation in this character exists in intermediate Northland populations, or whether the Three Kings specimens differ consistently from all mainland ones. The former alternative is, however, strongly indicated.

Heteroponera brouni Forel

The synonymy and relationships of this ant have been discussed by Brown (1958). It is an endemic New Zealand species of Australian affinities, apparently restricted to bushland areas of the northern part of the North Island, and occurring as far south as Kawhai and Coromandel (Cumber, 1959). I have samples from Little Barrier Island (J.S.E.) and Fanal Island, Mokohinau group (R. A. Harrison).

Material examined:—GREAT ISLAND: Eastern arm: Quadrat II, nest in rotting wood under stone (J.S.E., 1/1/53); a male collected in sweepings of low herbage (J.S.E., 1/1/53). West Crater Head, ex Berlese funnel sample, leaf litter, *Pittosporum* grove (J.S.E., 7/1/53). SOUTH-WEST ISLAND: Summit Ridge, ex Berlese funnel sample, leaf mould, *Meryta* forest (E.G.T., 13/1/51).

The nest collected by Dr. Edwards on Eastern arm occupied a typical site for *H. brouni*, which is fairly common in some North Auckland areas, nesting in small twigs and wood fragments on the bush floor, or in rotten logs. Male and worker pupae were present in this colony, and a flying male was taken in the same area, also on 1/1/53, indicating a midsummer flight season. I have taken males and virgin queens from nests in the Auckland area during January.

Monomorium antarcticum (White)

The considerable taxonomic difficulties involving the New Zealand *Monomorium* have been discussed by Brown (1958), who applied the name *M. antarcticum* to what is very probably a complex of closely related species, widespread in New Zealand. The Three Kings specimens listed below conform to the "typical *antarcticum*" of Brown, which is common in most parts of the North Island.

Material examined:—GREAT ISLAND: Above Tasman Valley, foragers in dry grass, cliff edge (J.S.E., 4/1/53). Castaway depot: Nest with alate queens and males, under stone (E.G.T., 16/4/46); several foraging workers, beaten ex *Leptospermum* (E.G.T., 10/4/46). Eastern arm, sweepings from ground layer (J.S.E., 1/1/53). Summit ridge, (J.S.E., 3/1/53). Tasman Valley: sweepings from *Leptospermum* (J.S.E., 30/12/52); nest in humus under *Corynocarpus* (J.S.E., 3/1/53). From Loc. A (?), nest with alate queens and males (E.G.T., 14/4/46).

Monomorium smithii Forel

The status of this species was discussed by Taylor (1959). It is a New Zealand endemic, apparently widespread in both main islands.
Material examined:—GREAT ISLAND: North West Bay, Berlese funnel sample of *Corynocarpus* and *Myroporum* leaf litter (E.G.T., 15/1/51). Tasman Valley, north side, a single queen apparently collected with a colony of *Amblyopone australis* (E.G.T., 23/4/46).

This last specimen was originally located in the collection mounted on a point with one of a nest series of *A. australis*, and presumably it was collected with them. The dorsum of its alitrunk is considerably damaged, and it seems probable that this specimen was in the *Amblyopone* nest as prey. *A. australis* is known to feed on a wide range of small arthropods, including ants.

Strumigenys perplexa (Fr. Smith)

The distribution of this peculiarly widespread species has been discussed by Brown (1958), it occurs in south eastern and south western Australia, and Norfolk and Lord Howe Islands as well as in the North Island of New Zealand. I have samples of *S. perplexa* from a number of Hauraki Gulf islands and from Great Barrier and Mayor Islands. Both of the Three Kings series are from Berlese funnel samples.
Material examined:—GREAT ISLAND: West crater head, ex leaf litter, *Pittosporum* grove (J.S.E., 7/1/53). SOUTH-WEST ISLAND: Half way down north east slope, ex *Corynocarpus* and *Meryta* leaf mould (E.G.T., 13/1/51).

Prolasius advena (Fr. Smith)

This endemic species, of Australian affinities, is widespread in both the main islands of New Zealand.

Material examined:—GREAT ISLAND: Campsite, (E.G.T., December 1945). Saddle, (J.S.E., 2/1/53). Summit, a forager on *Leptospermum* (J.S.E., 3/1/53). Tasman Valley, north side, nest under stone in *Leptospermum* grove (E.G.T., 23/4/46). Valley E. div (?), nest under stones (E.G.T., 29/4/46).

Biology: Both of the nests collected by Mr. Turbott during April 1946 contained winged males.

The ant fauna of the Three Kings Islands has clearly been derived by chance introduction from the North Island mainland. The six species listed above are all common North Auckland elements and all are endemic to New Zealand, or else are very widespread, probably pre-European, introductions into New Zealand from Australia. The faunal constitution is fairly typical of most North Auckland habitats similar to the Three Kings, with the notable absence of members of the genera *Ponera* and *Mesoponera*, which are fairly common in most open parts of the North Island, but which have apparently failed to reach the Three Kings. The absence of representatives of the many more recent commercially introduced ant species is also notable, but not surprising in view of the rarity of visits to the Islands by man.

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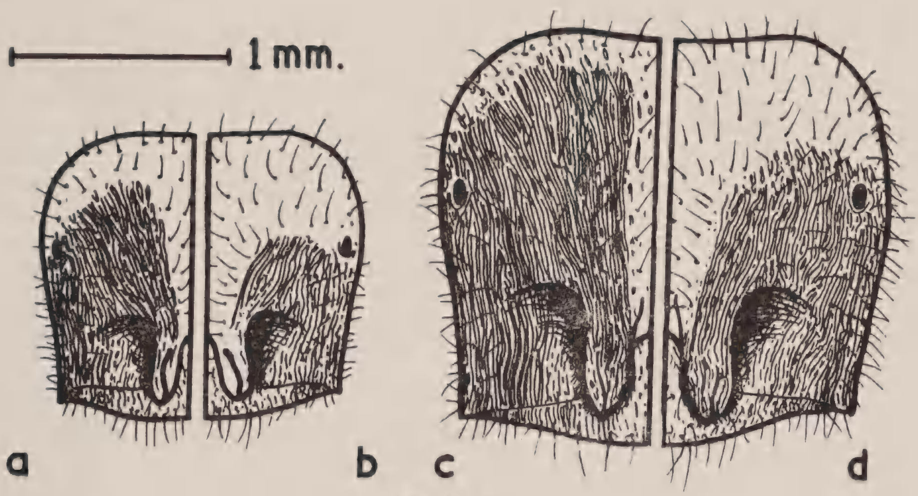

Figure 1

Amblyopone australis Erichson. Comparisons of head sculpture of small and large workers from the Auckland area, and the Three Kings Islands: *a* Small Auckland worker, *b* small Three Kings worker, *c* large Auckland worker, *d* large Three Kings worker. For further discussion see text.

Coleoptera from Hen Island (Taranga), Northland, New Zealand

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ABSTRACT

The topography and vegetation of Hen Island are briefly described. Some indication is given of the difficulties involved in determination of New Zealand beetles. Systematic, distributional and ecological notes, where relevant, are included under the name of each species in the species list.

Geographical distribution is discussed and it is concluded that fairly widespread common species predominate. The relationships of the fauna appear to be with that of the mainland opposite. The origin of the fauna is discussed and it is concluded that there have been several immigrations from the mainland during low sea-levels of the Pleistocene. The water barrier is apparently not sufficient to prevent active or passive migration of most species across it. This results in many cases in a continuous flow of genes from the mainland populations, preventing divergence of the island populations. Some island populations of wingless species appear to have diverged slightly.

Hen Island is of value as a sanctuary in that it provides natural habitats for rare species of animals which may become extinct on the mainland.

INTRODUCTION

Hen Island (Taranga) is situated 64 miles north of Auckland and about twelve miles east of Ruakaka Beach. The main axis is east-west and the island extends for three miles in this direction, varying in width from 2 chains to over one mile. A sharp central ridge extends along the axis and is roughly 1000 feet high for much of its length, rising to a number of andesitic pinnacles, the highest of which is 1420 feet, in the western part of the island.

Hen Island is a wild life sanctuary and is completely clothed in forest in varying stages of regeneration. The forest is mainly coastal (Type Q1 of McKelvey and Nicholls, 1957) with such species as Pohutukawa *(Metrosideros excelsa)*, Karaka *(Corynocarpus laevigatus)*, Puriri *(Vitex lucens)* being fairly plentiful. The northern side of the central ridge is covered mainly with Kanuka *(Leptospermum ericoides)* forest (Type R1 of McKelvey and Nicholls, 1957) with many other associated species. For a more detailed account of topography and vegetation see Cochrane (1954) and Cranwell and Moore (1935).

Collecting was confined to the western part of the island and covered two major types of habitat, these being the more or less typical coastal forest on the southern side of the main ridge and the more exposed forest on the summit and northern side of the ridge. The latter habitat was more productive in numbers of species, especially types normally found in places exposed to the sun, as would be expected.

Most beetles are found in fairly restricted habitats, many being confined to particular food plants, others occurring only under loose bark, logs, in rotten wood etc. Consequently, considerably more detailed information than the general type of forest habitat in which a species occurs, is necessary for the data to be of much ecological value. In the species listed below such information, when available, is noted for each species. No leaf mould or fresh water collections were made, but most other types of habitat were examined.

SPECIES LIST

The following species list includes all specimens collected by the present writer, and specimens collected by Mr. E. G. Turbott in the Coleoptera Collection of the Auckland Museum.

Where species have been identified by comparison with authentically determined specimens, chiefly from the Broun Collection (of which a few specimens are in the Auckland Museum Coleoptera Collection) then checked with the original descriptions, this is stated. In most cases, however, the specimens have been identified from the original descriptions alone. As Broun, who described the vast majority of New Zealand beetles, very rarely used keys or illustrations in any of his works, and the types of all except a very few of the species are in the collections of the British Museum, this task has not been easy. In some of the larger and more difficult genera the descriptions are not always adequate for the accurate discrimination of similar species, while in other cases a species has been described under two or more names. It frequently happens that the synonymous descriptions are more comprehensive than the earlier description of the same species, which generally results in specimens receiving the synonymous name when identified by reference to descriptions alone.

More serious is the possibility that an undescribed species may be determined as a similar previously described species, or that of two closely related inadequately described species, the wrong name may be applied to the specimens concerned. In cases where the identity of a species is in doubt, for any of the above reasons, this is stated.

Notes on distribution, ecology and systematics are included for many of the species. The superfamily and family classification followed is that of Crowson (1955).

Unless otherwise stated all specimens were collected during the Auckland University Field Club Scientific Camp of May, 1956, by the present writer. All Hen Island specimens of each species listed are at present in the writer's personal collection unless a statement to the contrary is made. Duplicates will eventually be placed in the Auckland Museum Collection.

SUBORDER ADEPHAGA

SUPERFAMILY CARABOIDEA

Family CARABIDAE

Subfamily CICINDELINAE

Cicindela tuberculata Fabr.

One specimen collected by E. G. Turbott, May, 1949; no further data. Specimen in Auckland Museum Collection. This species is widely distributed and fairly common.

Subfamily HARPALINAE

Ctenognathus bidens Chaudoir.

Two specimens amongst leaf mould and other debris in a small Nikau grove, south coast. Determined by comparison with specimens from Warkworth and Great Barrier Island identified by Dr. E. B.

Britton, British Museum (Natural History). This species is found frequently under logs in the vicinity of Auckland and most of Northland and also occurs on Little Barrier Island, but not apparently on the Poor Knights Islands.

Ctenognathus novaezelandicus Chaudoir.

Three specimens under boulders on boulder beach in the "supra-littoral fringe". Identified by comparison with specimens from near Bethels Beach, Great Barrier Island and Tawhiti Rahi, Poor Knights Islands, determined by Dr. Britton. This species is widely distributed in the Auckland Province, occurring at least as far north as Russell and the Poor Knights Islands, as far south as Port Waikato and east on the Coromandel Peninsula. The present writer has never found it more than about two miles inland. *C. novaezelandicus* and *C. bidens* occur near Bream Head with another species *C. cardiophorus* Chaudoir.

SUBORDER POLYPHAGA

SUPERFAMILY HYDROPHILOIDEA

Family HYDROPHILIDAE

Cyloma lawsonus Sharp.

Two specimens beaten from karamu *(Coprosma robusta)*. This species occurs at Tairua and Whangarei Heads (Broun, 1880), and appears to be rare, although this could well reflect lack of collecting in suitable habitats

SUPERFAMILY SCARABAEOIDEA

Family SCARABAEIDAE

Subfamily MELOLONTHINAE

Odontria xanthosticta White.

One specimen taken at light, camp. Also in the writer's collection are two specimens collected on Marotiri (Big Chicken) by E. N. Milligan in August, 1955. Specimens identified by Mr. B. B. Given, Entomology Division (D.S.I.R.), Nelson. This species has been found by the present writer at Whangarei Heads, Papatoetoe, Great Barrier Island, Poor Knights Islands, and at other localities near Auckland. The Great Barrier specimens were flying in November, the Poor Knights specimen in January. Given (1952) states that "this species appears to fly during the autumn and winter". *O. xanthosticta* apparently also flies during late spring and summer. It is possible that the season when the adults are flying begins earlier on offshore islands, but, as stated above, the adults have been found flying during May and August on the Hen and Chickens group. Perhaps the flying season is extended on offshore islands by the more equable year-round climate compared with the mainland. *O. xanthosticta* appears to be coastal in habitat (Given, 1952). This is supported by the collecting records of the present writer.

SUPERFAMILY ELATEROIDEA

Family ELATERIDAE

Corymbites sp.

A final instar elateroid larva was dug out of soil, south coast, and enclosed with some earth in a collecting tube. This was re-examined in

February, 1957, when an adult beetle was found to have emerged. Unfortunately it disintegrated on touch, thus making specific determination impossible.

SUPERFAMILY BOSTRYCHOIDEA

Family PTINIDAE

Ptinus speciosus Broun.

One specimen beaten from flower of *Senecio kirkii* on main ridge near "Old Man" pinnacle, about 1000 feet. Hudson (1934) states that it is — "Found amongst Kiekie *(Freycinetia)* but apparently rare." There is one specimen in the writer's collection from Tawharanui, near Matakana.

SUPERFAMILY CLEROIDEA

Family TROGOSITIDAE

Leperina nigrosparsa (White.)

One specimen collected by E. G. Turbott, May, 1949; no further data; in Auckland Museum Collection. Determined by comparison with specimen from Broun Collection. The insect is relatively small (10 mm. total length), but otherwise agrees with the description and the Broun specimen. The species is quite variable in size (10-16 mm.) and is the most distinctive of the New Zealand species. It has been found occasionally near Auckland and at Wellington; according to Hudson (1934) it occurs under bark. It has been collected from a fallen Nikau sheath on Little Barrier Island by the writer.

Leperina brounii Pasc.

One specimen under loose bark of Pohutukawa *(Metrosideros excelsa)* on south coast. Determined by comparison with specimen from Broun Collection. This species is the *Leperina wakefieldi?* Sharp of Watt (1957). Further material obtained since the former paper was written has satisfied the writer that the Great Barrier specimen, along with specimens from Tawharanui, near Matakana, Noises Islands, Poor Knights Islands and Horuhoru Island all belong to the one variable species, *L. brounii*. The size range is 6.5-10 mm. and individuals also vary in the intensity of punctation on the head and pronotum. The shape of the pronotum seems to be one of the most reliable characters for separating species of this genus, but unfortunately none of the original descriptions are illustrated. *L. brounii* generally occurs under the loose bark of Puriri *(Vitex lucens)* and Pohutukawa; Broun found the type specimen under the bark of Ngaio *(Myoporum laetum)* at Tairua, on the east coast of the Coromandel Peninsula north of Waihi (Broun, 1880).

SUPERFAMILY CUCUJOIDEA

SECTION CLAVICORNIA

Family NITIDULIDAE

Epuraea zealandica Sharp.

One specimen beaten from Taupata *(Coprosma retusa)* on south coast, one specimen in base of fallen Nikau leaf in Nikau *(Rhopalostylis sapida)* grove, near south coast. Determined by comparison with specimen from Broun Collection. Of the three native species in the genus

E. signatum Broun is the most comprehensively described and the type is stated by Broun (1880) to have been found on the Nikau at Whangarei Heads. Specimens from Mount Manaia, Moumoukai Valley and Bethels Beach, found in fallen Nikau leaves, all agree with the description of *E. zealandica*. It is not clear from the descriptions in what respects *E. zealandica* differs from *E. antarctica* White. It is possible that one or both of these species are synonyms of the extremely inadequately described *"Nitidula" lateralis* White (1846).

Family CRYPTOPHAGIDAE

Telmatophilus nitens Sharp.

One specimen beaten from Taupata *(Coprosma retusa)* on south shore, one beaten from flower of *Senecio kirkii* on ridge near "Old Man" pinnacle, about 1000 feet. Determined from description. Two specimens labelled *"Telmatophilus nitens,* Broun Coll." in the Auckland Museum Collection were found to be the allied species *T. depressus* Sharp.

In the present writer's collection there are specimens of *T. nitens* from Horuhoru beaten from Taupata (*?Cryptophagus* sp. of Watt, 1956), and a long series from the Poor Knights Islands (beaten from Taupata and *Carmichaelia* sp.). The type locality is Auckland and Hudson (1934) states that it is abundant in the flowers of speargrass during November near Wellington.

"Cryptophagus" rutilus cf. Broun.

Fourteen specimens beaten from Kanuka *(Leptospermum ericoides)* on main ridge, about 1000 feet. This is a small species (1.5 mm. in length). It appears to be identical with the species from Mayor Island (Watt, 1957). Mr. R. A. Crowson has stated (personal communication) that the New Zealand species do not belong to the genus *Cryptophagus.*

Family CORYLOPHIDAE

Sacina? sp.

Three specimens beaten from lichen-covered Pohutukawa on summit of highest pinnacle (1420 feet).

Family COCCINELLIDAE

Scymnus flavihirtus Broun.

One specimen beaten from Karamu *(Coprosma robusta)* on flat, south coast. This species is fairly variable and it is possible that there are two very similar species included under the one name by Broun as varieties. A revision of the native ladybirds is required when sufficient material has been collected. Specimens from the crater of Mayor Island were incorrectly determined as *?S. suffusus* Broun (Watt, 1957), which is a considerably smaller species than *S. flavihirtus.*

Scymnus acceptus Broun.

One specimen beaten from Taupata *(Coprosma retusa)* on south coast. Hudson (1934) states that this species is —"one of the commonest species of Coccinellidae in New Zealand", and figures the larva and adult.

Scymnus minutulus cf. Broun.

One specimen beaten from flower of *Senecio kirkii* on main ridge, about 1000 feet. The specimen is not *Stethorus bifidus* Kapur (1948), and agrees reasonably well with Broun's description of *S. minutulus.* Broun (1880) states that he found his specimens at Tairua and Whangarei Heads.

Family LATHRIDIIDAE

Corticaria sp.

One specimen beaten from Karamu *(Coprosma robusta)* on main ridge at about 1000 feet.

SECTION HETEROMERA

Family TENEBRIONIDAE

Cilibe elongata Brême.

One specimen in sleeping bag, camp, one specimen under stone, Marotiri Island ("Big Chick") collected by E. N. Milligan, August, 1955.

This species is the *C. humeralis* Bates of Watt (1956 and 1957) which latter apparently is found only near Wellington. *C. elongata* occurs frequently on most of the northern offshore islands, often being associated with *Muhlenbeckia complexa.*

Geographical variation in *C. elongata* will be discussed in detail in a revision of the genus at present in preparation. The 2 specimens from the Hen and Chickens resemble individuals from Ruakaka Beach to the west of the islands, but are more strongly sculptured. They fall within subspecies *elongata.*

Chrysopeplus expolitus (Broun.)

Three specimens cut from rotten log. *Chrysopeplus* is a *nomen novum* for *Leiopeplus* Broun nec Har. (Gebien, 1942). This species is fairly generally distributed on the east coast north of Auckland and on the offshore islands of this area. (Type locality Whangarei Heads: specimens in Auckland Museum Collection from Parua Bay, Mahurangi Heads, Cavalli Islands, Noises Islands; specimens in the writer's collection from Poor Knights Islands, Noises Islands, Rangitoto, Little Barrier Island, Warkworth, Tawharanui.) It occurs in rotten wood and under the loose bark of Pohutukawa *(Metrosideros excelsa)* and Puriri *(Vitex lucens). C. expolitus* appears to be a strictly coastal insect, not having been found more than a quarter of a mile from the sea by the present writer.

Family ALLECULIDAE (=CISTELIDAE)

Xylochus dentipes aff. Broun.

One female specimen on *Collospermum* on "Three Rocks" Pinnacle at about 1000 feet. In this genus it is necessary to have male specimens available for specific determination. The Hen Island specimen differs slightly from female *X. dentipes* from Rangitoto (found associated with males) and it is possible that it is the female of *X. spinifer* Broun. (Type locality: Moko Hinau Island.) Unfortunately no male specimens of *X. spinifer* are available to the present writer so the determination must remain in doubt until the female of the latter species can definitely be associated with the male.

Judging from the descriptions *X. tibialis* Broun is probably the male of *X. substriata* Broun, especially as the types of both "species" were found at Tairua (Broun. 1880).

Family SALPINGIDAE (=Pythidae in part)

Salpingus perpunctatus Broun.

One specimen beaten from Karaka *(Corynocarpus laevigata)* on main ridge. Determined by comparison with specimen from Broun Collection. According to Hudson (1934) this species may be generally distributed, at least in the North Island.

SUPERFAMILY CHRYSOMELOIDEA

Family CERAMBYCIDAE

Subfamily CERAMBYCINAE

Epheus costifer Broun.

One specimen in Nikau grove, resting on trunk of palm. This specimen agrees perfectly with Broun's description. It appears to be larger than normal, however (total length 24 mm.). The length quoted by Broun (presumably of the holotype) is 20 mm. and the range quoted by Hudson (1934) is 15-20 mm. Many species of cerambycids are extremely variable with regard to size. Hudson states that *E. costifer* is "a rare and beautiful species, so far only known from Wellington, Tuakau and Kaeo".

Subfamily LAMIINAE

Xylotoles griseus (Fabr.)

Two specimens beaten from Karamu *(Coprosma robusta)*, two specimens on tent wall at night, one specimen on grass, one specimen beaten from *Nothopanax arboreum* (ridge, about 1000 feet), three specimens collected by Mr. E. G. Turbott, May, 1949, in Auckland Museum Collection. Determined from revision of Breuning (1950). Some specimens of this species might key out as *X. lynceus* (Fabr.), but in the latter species the third antennal segment is distinctly longer than the fourth, while in *X. griseus* these two segments are equal in length and there are several other distinguishing characters. This species occurs on Mayor Island *(X. griseus* and *Xylotoles* sp. of Watt, 1957), Noises Islands, Rangitoto, Poor Knights Islands (records from writer's own collection) and according to Broun (1880) it is "tolerably common in both the larger islands". *X. griseus* appears to be predominantly a coastal insect. The offshore island specimens show some geographical variation, but it is doubtful whether any are worthy of separate subspecific status.

Xylotoles aegrotus Bates.

Four specimens beaten from Taupata *(Coprosma retusa)* on south coast, two specimens beaten from Karamu *(Coprosma robusta)* on central ridge (about 1000 feet). These specimens key out to either *X. parvulus* Bates or *X. pygmaeus* Bates according to Breuning's key, but differ from both in the relative length of the third and fourth antennal segments which are equal in length (third longer than fourth in *X. parvulus* and *X. pygmaeus)*. Breuning does not include *X. aegrotus* in his key but states in the description: "Très proche de *parvulus* White, mais avec le troisième article des antennes aussi long que le quatrième et les élytres plus densément ponctués jusqu'au milieu." *X. aegrotus* occurs on various local offshore islands and in coastal habitats on the mainland near Auckland.

Xylotoles nanus Bates.

One specimen beaten from *Coprosma robusta* on flat on south coast. This species, like the two preceding, is relatively common on offshore islands and the coast of the mainland near Auckland.

Family CHRYSOMELIDAE

Subfamily GALERUCINAE

Luperus vulgaris Broun.

One specimen beaten from flower of *Senecio kirkii* on main ridge (about 1000 feet). The present writer has no hesitation in determining this specimen as *L. vulgaris* in spite of the large number of similar species in the genus. A fairly long series in the writer's collection shows a considerable range of variation. Due to the soft integument the elytra of this species sometimes fold over latero-posteriorly and each apex comes to a point when mounted. This results in a shape precisely that described by Broun (1880) in his description of *L. attenuata*. There appears to be nothing in the descriptions of *Luperus thoracica* Broun and *L. nigripes* Broun differentiating these species from variants of *L. vulgaris*. The types are all, however, in the British Museum (Natural History) so it is not possible to check the suspected synonymy at the moment. *L. vulgaris* is common on flowering plants, especially Rangiora *(Brachyglottis repanda)*, from August to October in the vicinity of Auckland.

SUPERFAMILY CURCULIONOIDEA

Family CURCULIONIDAE

In the absence of a satisfactory subfamily classification of this family, that set out in the Systematic Index of Hudson (1934) has been followed, with the exception of Subfamily Eugnominae (see Marshall, 1938). The number of species of New Zealand weevils (about 1500 described) is great. This fact, together with what might well be called the taxonomic chaos of the local species of the family makes specific, and often generic, determination a matter of difficulty. Three species are not included in the following list at all for this reason.

Subfamily OTIORRHYNCHINAE

Catoptes sp.

One specimen beaten from Hangehange *(Geniostoma ligustrifolium)*, south coast.

Subfamily ERIRRHININAE

Praolepra sp.

Three specimens beaten from *Coprosma robusta* on ridge, about 1000 feet. These specimens do not agree with the descriptions of any of the described species, but are closest to *P. squamosa* Pasc. or *P. infusca* Broun (the description of the latter is inadequate). This species also occurs on the North Auckland Peninsula.

Neomycta rubida Broun.

One specimen beaten from Pohutukawa *(Metrosideros excelsa)*, highest pinnacle (1420 feet), one specimen beaten from *Coprosma robusta*, ridge (1000 feet). Determined by comparison with specimen from Broun Collection. Hudson (1934) states that this species is probably generally distributed in the North Island. The types were collected at Tairua on Pohutukawa (Broun, 1880).

Subfamily EUGNOMINAE

Tysius amplipennis Pasc.

One specimen beaten from flower of *Senecio kirkii*, one from Kohekohe *(Dysoxylum spectabile)*, south coast. This species is probably generally distributed throughout New Zealand (Hudson, 1934).

Stephanorrhynchus attelaboides (Fabr.)

One specimen collected by E. G. Turbott, May, 1949; in Auckland Museum Collection. This species occurs fairly frequently around Auckland.

Scolopterus penicillatus White.

One specimen beaten from *Senecio kirkii*, ridge, 1000 feet.

Scolopterus pectoralis Broun.

One specimen beaten from *Senecio kirkii*, ridge, 1000 feet. This species may be a synonym of *S. penicillatus*.

Pactola spp.

Three species, data as follows:—

(a) One specimen beaten from *Nothopanax arboreum*, ridge, 1000 feet.
(b) Four specimens beaten from *Dysoxylum spectabile*, ridge, 1000 feet.
(c) One specimen beaten from *Dysoxylum spectabile*, ridge, 1000 feet.

Subfamily CRYPTORRHYNCHINAE

Psepholax granulatus Broun.

One specimen collected by E. G. Turbott, May, 1949; in Auckland Museum Collection. Broun (1880) states that he cut some specimens of this species out of *Fagus* (presumably *Nothofagus)* at Tairua.

Mesoreda sp.

Three specimens collected by E. G. Turbott, May, 1949; in Auckland Museum Collection.

Tychanus sp.

One specimen beaten from *Coprosma robusta*, ridge, 1000 feet.

Acalles spp.

Three species, data as follows:—

(a) One specimen beaten from Pohutukawa, highest point (1420 feet).
(b) Three specimens beaten from *Nothopanax arboreum*, ridge (1000 feet).
(c) One specimen beaten from Kanuka *(Leptospermum ericoides)*, ridge (1000 feet).

Paranomocerus spiculus Redten.

One specimen beaten from flower of *Senecio kirkii*, ridge (1000 feet). Three specimens collected by E. G. Turbott, May, 1949; in Auckland Museum Collection. This conspicuous species, apparently rare, has been found at Tairua (Broun, 1880).

Subfamily COSSONINAE

Unless otherwise stated, the following species were determined from the revision of Broun (1908).

Sericotrogus subaenescens Woll.

Two specimens beaten from flowering *Senecio kirkii,* one from *Coprosma robusta,* ridge, 1000 feet, two specimens beaten from *Coprosma retusa,* south coast. Determined by comparison with specimens from Broun Collection. This species occurs frequently on various shrubs in coastal localities near Auckland and on Mayor Island (Watt, 1957).

Stenotrupis wollastonianum Sharp.

One female beaten from *Coprosma robusta,* ridge, 1000 feet. This remarkable species is common on *Rhopalostylis sapida* (Nikau) at Whangarei and Waitakere Ranges (Broun, 1908) and also occurs near Wellington.

Arecocryptus bellus Broun.

One male and four females in fallen Nikau leaf, south coast. This species is almost invariably associated with the Nikau *(Rhopalostylis sapida)* and appears to have the same distribution as that palm.

Arecophaga varia Broun.

Eight males and two females in fallen Nikau leaf, south coast. This species is apparently fairly rare; Broun (1908) states that it occurs at Parua and Hunua Ranges, on *Rhopalostylis sapida.*

GENERAL DISCUSSION

Distribution

The species included in the list above fall into a number of categories with regard to distribution as follows:—

1. Species common and generally distributed throughout the North Island, and in some cases, the South Island. (15 species.)
2. Species rare (although sometimes locally common) and generally distributed. (3 species.)
3. Species common and generally distributed in coastal habitats in the North Island. (4 species.)
4. Species common and confined, as far as is known, to North Auckland and/or the vicinity of Auckland. (8 species.)
5. Species rare and confined, as far as is known, to North Auckland and/or the vicinity of Auckland. (5 species.)
6. Species that it is not possible to classify satisfactorily into one of the previous categories with the available data. (13 species.)

This classification is, of necessity, somewhat arbitrary, as little is known of the geographical distribution of many New Zealand beetles. Further collecting will no doubt show that some have much wider ranges than at present known.

Despite these qualifications the preponderance of widely distributed species is clear. With regard to relative abundance common species dominate the list.

Relationships of the Fauna

The above species list includes only a fraction of the beetle fauna of Hen Island. Collecting has taken place only in May, when many species present probably do not occur in the adult stage. No leaf mould was examined, and some other habitats received little attention.

The writer's experience indicates that the species list contains a fairly representative sample of the common species normally occurring on northern offshore islands in the habitats examined, i.e. the shrub and small tree strata of coastal forest and scrub. Some less common species are also included. It should be emphasised, however, that the discussion of relationships is based on a sample of the beetle fauna, not on the beetle fauna as a whole. Further collecting may modify some of the conclusions drawn, but mainly with respect to that part of the fauna not discussed here.

As the majority of species collected on Hen Island are widely distributed, they provide no evidence of faunal relationships. The few remaining species indicate relationship with the fauna of North Auckland in the vicinity of Whangarei (type localities are either Whangarei Heads or Parua Bay). With regard to geology, topography, vegetation and probably also climate, the Whangarei Heads area is very similar to Hen Island. The distribution of many beetles is controlled more by ecological factors than by the presence or absence of relatively minor geographical barriers (a strait 12 miles wide in the case of Hen Island).

Of 43 species described by Broun (1893) from Moko Hinau Island or Fanal Island, not one is yet known to occur on Hen Island.

The present writer has collected over 100 species of Coleoptera from the Poor Knights Islands, including a number of undescribed species. The only species known to occur on both the Poor Knights Islands and Hen Island are fairly widely distributed.

The above evidence may reasonably be interpreted as indicating that the Hen Island beetle fauna, or at least that sample of it discussed here, is most closely related to that found in similar habitats on the east coast of the North Auckland Peninsula. No relationship with the endemic beetle faunas of the Poor Knights Islands and the Moko Hinau group is indicated by the available evidence. These conclusions are supported by the fauna of land Mollusca (Milligan, 1954 and 1957).

Dispersal of Terrestrial Animals to Islands

One of the most interesting problems associated with any particular island fauna is the possible method or methods by which the component species of such a fauna have arrived on the island from the nearest large body of land. The various means by which animals may be dispersed to offshore islands are tabulated below:—

1. Migration across land connections in the past between island and mainland. The land connections may be due to:
   (a) eustatic lowering of sea level associated with glaciation;
   (b) uplift of the intervening sea floor.
2. Chance dispersal by means of:
   (a) floating objects such as logs and vegetation rafts;
   (b) attachment to land birds, sea birds or possibly other flying animals;
   (c) floating on the surface of the sea.
3. Introduction by human agency, either by accident or by design.
4 In the case of winged animals, migration by flight. Migration may be a periodic (e.g. annual) event, or may be accidental, as a result of the flying animal being caught by strong offshore winds.

Evidence that Hen Island has been connected to the mainland at past times will be discussed below. The writer believes, however, that it is not necessary to postulate a land connection to explain the presence of most of the beetles collected. The water barrier separating Hen Island from the mainland is probably not sufficiently wide to prevent frequent accidental migration of many of the flying species. Apterous species such as *Cilibe elongata* and *Xylotoles griseus* seem to be subject to chance dispersal, probably during the egg or larval stage. It is difficult to estimate what part accidental transport by man may have played in the dispersal of beetles and other small terrestrial invertebrates to New Zealand's northern offshore islands, but the writer believes it is probably small

Geological History of Hen Island

Brothers (1954) states: "That the North Auckland Peninsula is non-seismic and apparently quite stable has been commented upon by several writers; the area has been free from differential warping movements during Pleistocene time when sea-level oscillations were taking place." He correlates marine-cut and marine-built terraces in the South Kaipara district with the European high sea-levels of interglacial times, i.e. Sicilian (350 feet), Milazzian (220 feet), Tyrrhenian (110 feet), Main Monastirian (50 feet) and Late Monastirian (20 feet). It will be noted that the highest sea-level is 350 feet but "it has been recognised in Europe that gradual withdrawal of the ocean from a position approximately 1200 feet higher than at present began in late Pliocene time and that the glacial period was entered with the Sicilian shore line at the 100 metre level" (Brothers, 1954). Consequently not only most of Hen Island but the majority of the North Auckland Peninsula may have been flooded in late Pliocene times, assuming lack of any substantial tectonic movement at that time.

During the Pleistocene glacial periods, in contrast to the interglacial periods, there is evidence that sea-level was much lower than it is now. The evidence is naturally scanty apart from beach deposits below present sea-level and submarine platforms, which indicate a sea-level of —100 metres during the Last Glaciation. It has been suggested that during one of the earlier glaciations the level was as low as —200 metres (Zeuner, 1950).

There is no good reason to suppose that these low sea-levels did not occur around the coast of North Auckland during the glaciations, especially in view of Brothers' correlations of the Kaipara marine terraces with interglacial periods. Suggate (1958) gives evidence, from well logs in the vicinity of Christchurch, that sea-level in that area was at least 200 feet below present sea-level during the Last Glaciation.

Examination of the Admiralty Chart in the vicinity of Hen Island shows average maximum of 25 fathoms (150 feet) between the island and the mainland, with the depth nowhere greater than 27 fathoms (162 feet). Thus it follows that the Hen was connected to the mainland during the Last Glaciation and almost certainly during earlier glaciations.

During the climax of phase 2 of the Last Glaciation sea-level stood at about —70 metres. The age of this phase is 72,000 years B.P. (Zeuner, 1950), consequently it may be fairly confidently stated that

Hen Island was connected to the mainland 72,000 years ago (and probably much more recently) and at earlier periods of varying duration and not more than 200,000 years apart in any one case. Hen Island is probably of Miocene age, or not appreciably younger (Milligan, 1960).

Origin of the Hen Island Fauna

It is clear from the geological evidence that during Pleistocene times terrestrial animals have had a number of opportunities to migrate to Hen Island via land connections. Land bridges at some time in the past are necessary to account for the presence of the large snails *Paryphanta busbyi* and *Rhytida tarangaensis*. With regard to these species, Milligan (1954) states that "chances of migration other than by land are very unlikely". A previous land connection may be necessary to account for the presence of some of the species of beetles collected, e.g. the two *Ctenognathus* spp. and possibly some of the weevils. Further evidence is required from islands which have definitely not been connected to the mainland in relatively recent times, but it may be fairly confidently stated that most large apterous Carabidae are not subject to chance dispersal across salt water. This subject will be discussed more fully in a later paper.

Among the molluscan fauna there is one known autochthonous endemic species, namely *Rhytida tarangaensis* Powell (1930), while there is no definite example among the known beetle fauna. Insufficient material is available for analysis of geographical variation of beetle species collected, and some of the problems discussed here will not be resolved until such material is available, both from Hen Island and from the mainland opposite. In one case, *Xylotoles griseus*, a species known to show considerable geographical variation, the 9 specimens from Hen Island show little individual variation, and although there are not enough specimens available from the mainland for comparative purposes of a statistical nature, it appears that the Hen Island population has diverged to some extent with regard to such characters as pubescence and punctation. It would be more difficult to explain the absence of geographical variation in isolated populations of such species than the presence of it. It is well known that isolated populations tend to diverge because of the evolution of adaptation to different environments due to selection, and also because of drift and/or the "founder principle" (see Mayr, 1942, 1954; Carter, 1954). A certain period of geographical isolation is essential for speciation to occur (Mayr, 1942, 1954). With regard to Hen Island, periods of isolation have been interspersed with periods of connection with the mainland, allowing unimpeded gene flow between populations in the latter case, but impeding or, in some species, completely stopping gene flow in the former case.

It appears that frequent gene flow across the water barrier between populations of species occurring on Hen Island and on the mainland must occur. It is apparent that most island populations have not diverged even to the extent of subspecific difference from mainland populations.

Thus, it appears that the major part of the Hen Island fauna as it is now constituted has arrived from the mainland in a series of immigrations during Pleistocene times. In most species, frequent exchange of genes with mainland populations has apparently prevented any great degree of divergence of the island populations.

CONCLUSIONS

Further collecting is required on Hen Island and on the mainland opposite for the following reasons:—

(A) The species list of Coleoptera from Hen Island is by no means complete.

(B) Insufficient material is available for statistical analysis and comparison of island and mainland populations.

Study of faunas from the northern offshore islands of New Zealand may be expected to throw additional light on such problems as the processes of geographical speciation and the capacity for dispersal of various species to islands. It is hoped that this paper has indicated some of the problems which require further investigation, and will serve as a basis for future research.

It would appear that the importance of Hen Island as a sanctuary, from the zoological point of view, does not rest on a great number of endemic species. The island provides several types of natural forest habitats free from destructive introduced mammals, in which rare species, while possibly becoming extinct on the mainland, will be able to survive.

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Spiral-Dominated Compositions in Pare (Door Lintels)

By GILBERT ARCHEY

It is fortunate for our studies in Maori wood-carving that the *tohunga* or craftsman knew so precisely what he was doing, and that he developed his designs and patterns almost logically from a few basic forms.

Ultimately he achieved complete abstractions which, standing by themselves or seen in isolation, give no indication of their origin: for example the pattern of spirals alone on a feather-box or the chevrons of the Kaitaia carving. Neverthless abstractions, if the word has meaning, have been drawn out from something, a something known to and understood by the artist; it is not surprising therefore to find in this art which so consciously and consistently stylised and abstracted from basic forms, certain phases of patterning which disclose the underlying realism. Attention was drawn to this in the writer's "Sculpture and Design" (1955; 2nd ed. 1960), and the theme has been further documented in more detailed studies.*

A preliminary glance through the photographic plates of the present contribution will disclose a greater uniformity among them than in the earlier described figure compositions (1960). With more than half presenting an almost uniform composition of three *tiki* (human figures) and six *pitau* (double spirals), (Plate 51), it might be thought redundant to illustrate so many. It has been done partly as a matter of record, but more to exemplify the manner of variation explored within one theme and the ingenuity displayed in manipulating natural forms as design elements.

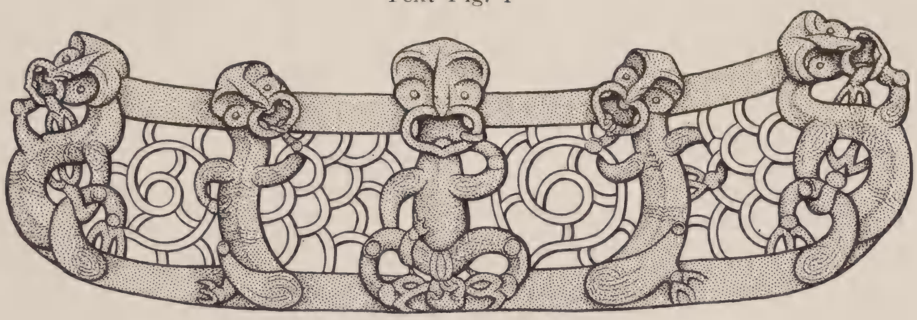
Just why this particular composition should have been so favoured we cannot say. It might have been because it portrayed some popular story or was symbolic of some firmly prevailing notion or belief; on the other hand it might have been simply an art-preference for a satisfying harmony of stability and rhythm. This question of content or form as the stronger inspiration, and the allied question of the relative importance of social pressure or individual enterprise in art creation, will be left for brief discussion later. It seems desirable first simply to examine these *pare,* to analyse their composition and to see if resemblances or differences among them are such as to establish groups or sub-types.

Nevertheless, although direct description would appear to be the obvious first step, it will be seen I think that the nature of the composition is best revealed by pointing out its relationship to the figure-dominant pattern described in my previous paper. In that paper (1960, pp. 209 and 210, figs 8 and 9), I pointed out the general compositional similarity between the well known Hauraki lintel and an Arawa *pare,* i.e. a composition of figures and interlocking loops or spirals in both, figure-dominated in Hauraki and spiral-dominated in Arawa.

I now present below (Figs. 1 to 4) a closer grading of steps linking the one to the other.

**Tiki and Pou*, 1958; *Taurapa*, 1938; *Tauihu*, 1956; *Pare* of Human Figure Composition, 1960.

Text Fig. 1



Text Fig. 2

Text Fig. 3

Text Fig. 4

The compositional relationship between these four lintels will be readily apparent. We have previously (1960, Figs. 8 and 10a) made comparison between the present text-figures 1 and 2. The elements are fewer in the Taranaki *pare*, five figures as against nine in Figure 1, but they are larger, as also are the decorative loops and double spirals between them.

The *pare* of Figure 3 also has five figures, each outer one a *manaia* profile, plus a large *manaia* profile at either end of the narrow basal bar. The figures are still in active attitudes as in the Hauraki carving, Fig. 1.

The composition of text-figure 4 is achieved by standing the three figures erect, enlarging the inner spirals, doubling the outer, and converting the already somewhat involved terminal figures of Fig. 3 into a light medley of stylized faces and limbs.

Figure 3 makes its first appearance, so far as I know, as this appropriate intermediate or connecting form. It is from a small photograph which Mr. C. Andrade of Bond Street gave me during a visit to London in 1937. On the back of the print is E1277/8 (a sale catalogue number?) which, with the photograph (Pl. 60 A) may help to locate the carving.

It is not suggested of course that the carvers of these four *pare* proceded patiently and methodically from one composition to the other. They were done by different carvers, no doubt at different times and places. What they do reveal is that a carver in full knowledge of the basic theme, whatever it was, and aware of design possibilities, could have produced any one of them at any time. Could have: though whether any one carver would have been so widely versatile in personal accomplishment is another matter. Development of a style would have been gradual; community conservatism would probably have restrained enterprise. Nevertheless, stages achieved by a *tohunga* would have been copied by his apprentices and followed in later years; this is how schools have arisen throughout the history of art.

To return to the 'type' spiral-dominated *pare design*, text-figure 4; (also Pl. 51).

This it will be seen comprises a basal bar or *pae-kawau** with a *manaia* at either end; standing on the *pae-kawau* are three erect figures with arms aloft. The upper margin is gently curved, the sides or ends almost straight. Large steadily turning spirals lie between the upright figures, and beyond each lateral figure is a pair of small *pitau*. Readers will note the design competence in the diminution of amplitude of movement towards the ends. A still lighter lateral termination is achieved by smaller elements in an open-work pattern that can readily be resolved into faces and limbs, with an inward turning of the members to prevent the ends from appearing ragged. A further detail to be noted is that balancing or opposing the much stylized and outdrawn full face that forms the central element of the terminal pattern, there is a similar full face, outward looking, i.e. in the wide triangle between the upright *tiki's* outer knee and the paired spirals. Another detail constantly present is the pattern of upright fingers of the hands of the main figures with their palms and thumbs appearing as *manaia*, whispering if you like in their owners' ears.

There is, as we have already noted, considerable similarity, almost uniformity, in these spiral-motive *pare*, and there is little need to particularise or discuss detail in respect to those illustrated in the first four pages of photographic plates.

The whole doorway, Pl. 51, is introduced to indicate the archi-

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*Mr. Pei Te Hurinui Jones advises that *pae-kawau* more correctly denotes a bar one would walk under; *paepae* is a threshold on the ground.

tectural-compositional function of the main figures, i.e. they continue the upward line of the door-jambs *(whakawae)*.

Variation may be noted in the terminal *manaia* of the basal bar; its mouth is drawn out and pointed in Pl. 52 B and all of Plates 53 to 55, except in Pl. 55 A, where it is formed by a spirally turned upper lip conforming with the almost circular eye-border; in Plate 51 we see an interlocking of two rounded mouths each with a row of teeth.

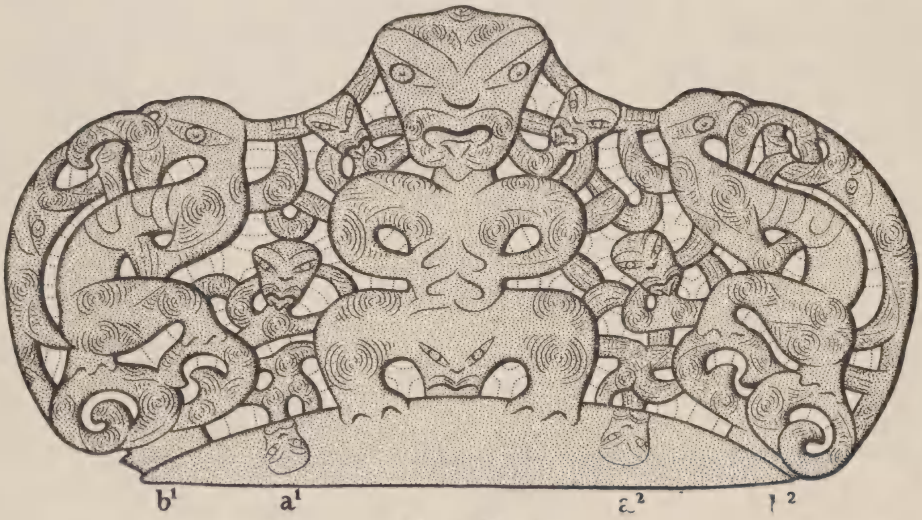
There must be some difference in meaning among these compositions because where, as usually, the sex is indicated, the three figures may be all male; male, female, male; female, male, female; or all female.

It may be parochial pride on my part but I have long thought that the Arawa *pare* of Plate 51 is the finest that has been preserved; the remark is introduced partly as an invitation to you to look and disagree if you will. I myself will admit the Dominion Museum (Oldman Collection) lintel of Pl. 52 A as a close contender, particularly in respect to the vigorous *manaia* profiles that rise from either end of its basal *pae-kawau* and the alignment of its outstretched arms with the curve of the spirals. In both *pare* of Pl. 52, the figures, by their alert stance and arm position, refuse to be subordinated to the spinning of the spirals. The *tohunga* to whom we are indebted for these fine examples of Maori art we may be sure found pleasure in doing as well as pride in achievement; we would hope he received approbation and acclaim from the *hapu*.

In the *pare* of Pl. 56 the area occupied by the spirals is greater, either by way of an increase in their size (A) or in number (B), but without, I suggest, thereby gaining in ascendancy, because in the one (A) they are overlain by the arms and in the other (B) the figures bulk larger. A detail, which I have seen in only two out of twenty spiral-motive *pare* known to me, is the lateral border pattern of Pl. 56 B, the door-lintel of our large Ngati Maru meeting house Hotunui. This border can be shown to be a close repetition of the hand and finger stylization that commonly terminates the *maihi* (barge-boards) of house fronts, or surmounts the shaft of digging sticks, *ko*.

In turning to text figure 5 (see also Pl. 57 B) we pass from small variations in detail to a considerable difference in composition. Here are *pare* with only one, central, upright figure; this is flanked on either side by only one double spiral; observe, too, that the composition is closed laterally by the 'opposed manaia' device, the same that is found commonly in figure-motive *pare* (cf. text figures 5 and 6).

Text Fig. 5



Text Fig. 6

Comparison of these two compositions as we see them here will reveal their fundamental similarity; the only difference is that in the one (Fig. 6) the design elements flanking the central figure are human figures and in the other (Fig. 5) they are double spirals *(pitau)*.

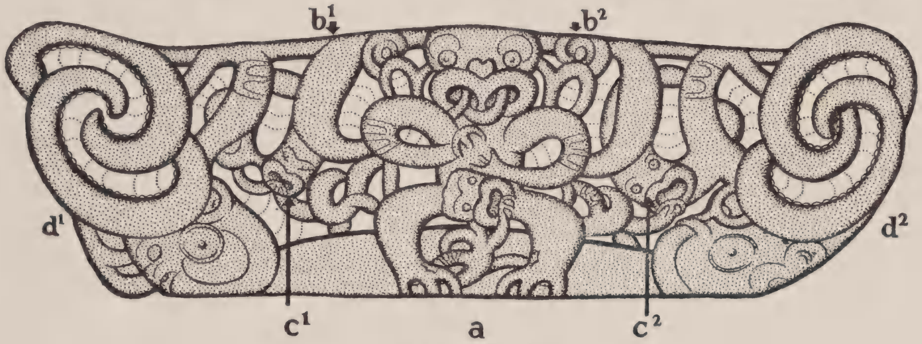
A similar alternation or interchange of these design elements can be seen in two other types of spiral-motive *pare* compositions. The first is in text figure 7 where the elements next to, i.e. outside the lateral

Text Fig. 7

Text Fig. 8

upright figures is a figure motive instead of the customary pair of double spirals as in Fig. 4. The lintel of Fig. 7 has another unusual feature: a single large *manaia* face profile at either end.

The second example, text figure 8, offers us a double comparison. In the first place it will be seen to match Fig. 5, except that at either end it has a large *manaia* face profile instead of the *manaia*-combat motive. Secondly, in respect to its terminal *manaia* face profile it can stand alongside Fig. 9, but differs in having large double spirals where Fig. 9, has a figure motive. Once again we see the place of figure details in the one composition being occupied by spirals in the other, and I submit that the interchange between these two design elements recurs too consistently in too many kinds of composition to be a coincidence. It occurs within the spiral motive group of *pare;* it appears as between



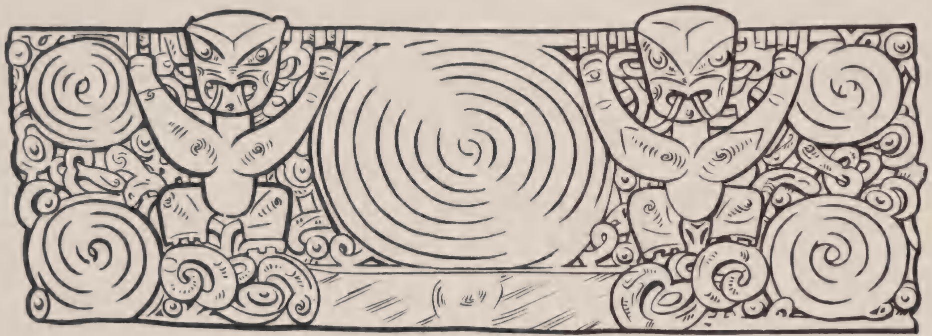
Text Fig. 9

the spiral design *pare* and the figure design lintels; a similar consistent interchange has been demonstrated in trapezoid canoe prows (Archey 1955 2 ed. 1960). These interchanges could hardly be without reason or significance, and, as I have commented previously *(ibid),* these repeatedly alternating elements must surely have meant the same thing to the Maori carver.

The version of the spiral dominant *pare* illustrated in Pl. 58 A is new in both senses, novel and present day. It is the door lintel of Takitimu, the great house at Wairoa, completed in 1939. It will be seen that its carvers Pine and John Taiapa not only made their large double spirals from elongated whole animals in *manaia* form known as *koropepe,* but lengthened the whole composition by placing small partial *manaia* (I count five) around them. The large terminals are not opposed *manaia* but a single one, with a foot or tail, also a *manaia,* which could, if you wish stand in place of the customary terminal *manaia* of the basal *pae-kawau.* While this may seem complicated in the reading, the details can be readily followed in the illustration.

In our final examples (Figs. 10 and 11) we see two degrees or stages of closing up the whole design. In Fig. 10 (also Pl. 59 A) the

Text Fig. 10



Text Fig. 11

full-sized naturalistic central figure has been reduced or squeezed out to allow room for the carver to make a pair of *pitau* his central feature. All that is left of the figure is a well-rendered openwork full face, and there is a subsidiary face filling the lower triangle between the spirals. The end detail of this pare seems to be a succession of eyes, not of fingers as in Pl. 56 B, or the uppermost loop could be a *manaia* eye and the remainder a chain of arms.

In Fig. 11 (also Pl. 59 B) we see no central figure, only a single much expanded *pitau*. Could it be said that the small figure elements above the *pae-kawau* (between the spiral and the remaining upright figures) represent the dismembered and displaced central figure? A further interesting detail is that the customary central face of the terminal end pattern of the *pare* is here supported by stylized limbs, without however a body. A second example of this composition is illustrated in Pl. 60 B.

Altogether I find this an interesting and pleasing design and I know I am supported in this view by one whose opinion I value, though I, myself, should have preferred the spiral in the first mentioned not to have been somewhat flattened. May it be agreed also that a design in which one great spiral becomes the leading element in the composition makes a not inappropriate ending to our series, a series which commenced you will remember, with a design where figures and spirals were in equal emphasis (Fig. 3; Pl. 60 A), a series, too, which is readily linked back to a troupe of lively naturalistic figures standing out from a background of lightly carved interlocking loops (Fig. 1).

Few of our *pare* are of known place of origin, and these are all from one area, the Rotorua-Bay of Plenty district; being also all of the "type" composition of three figures with six spirals, they merely inform us that the type was in favour in the district. The *pare* with a pair of central spirals and the one with a single central spiral came to the Auckland Museum with a large collection made mainly in the Rotorua district, but the smaller single-centre-spiral *pare* is of the Sir George Grey collection and might have come from anywhere. We are without evidence, therefore, for any regional affiliations or type areas for spiral-motive *pare,* such as we had, though in small degree, with figure-motive *pare* compositions.

Style areas, then, seeming not to be defined, our interest returns to the composition itself, to its general stability and its adherence to the basic arrangement of most Maori compositions, the *tiki-manaia* alternation.

All through the variation or variety within this group the fundamental composition of alternate figures and spirals is maintained, as we saw an alternation of naturalistic and stylized figures maintained in the group of figure-prevailing *pare*.

Once again we find our Maori carver exploring different avenues of design but always with logical or at least systematic adherence to his basic theme. This brings us to another issue: was there any firmly held meaning, any presentation of well established narrative or symbolism in this composition that has been so consistently followed?

In turning to enquire what, or who, these forms represent, we are at a disadvantage, even at a loss because, apart from the reply to leading enquiry that the *manaia* was a fabulous water monster, we have almost nothing on record to tell us.

The general arrangement or composition is the same in all *pare* — a central figure, a pair of opposed *manaia* at either end, with a succession of human figures or an alternation of figures and spirals in between. Where *manaia* are introduced, they participate in the alternation or rhythm, which may then be of figures and *manaia;* of full faces and heads in profile *(manaia);* of figures and spirals; or of figure-spiral-manaia-spiral-figure-spiral . . . and so on. In the more abstract renderings of this constant composition, the spirals themselves are sometimes merely interlocking loops, elsewhere large double-spirals, *pitau*.

In respect to meaning the possibilities are: either that all *pare* have one constant meaning or story,* the variations being purely in art design; or that it was customary or permissible to attach any story of present happening or of history or legend to this one general composition.

As an instance of contemporary events being depicted in a standard composition we refer to the then newly carved house at Taupo in Plate 25 of The New Zealanders Illustrated (1847). Angus tells us that it was built by the Chief Puatia to commemorate the taking of Maketu by Waharoa in 1836† (White, 1888). The carved figures of the house front stood for warriors who had distinguished themselves, but the prowess commemorated was not all of this engagement. Thus. Wakatau (topmost gable figure) fell at Maketu, but Puke (the figure immediately below him) was killed at Rotorua; the *amo* (upright side-supports of the veranda front) were the Ngaiterangi chief Tareha killed at Tauranga and Hikareia a Tauranga chief killed at Te Tumu. The lower figure of the centre-post was Taipari one of the outstanding fighters at Maketu; its upper figure was Tara, slain at Taranaki.

The significance here for meaning or symbolism lies not so much in this mixed recording of persons but in the fact that we have a narrative of the time superimposed on the long accepted symbolism of house-front decoration or construction. In this, as generally given, the paramount tribal leader or ancestor is the figure surmounting the apex

*Not altogether constant, with the sexes varying as they do: cf. *supra*, p. .

†For this date and for checking the spelling of some of the following names I am once more indebted to Mr. Pei Te Hurinui Jones.

of the barge-boards, or he may be the figure looking down from the front of the great ridge pole (Hotunui in our carved house of that name); the barge-boards *(maihi)* are his arms (or bosom as told me by Bishop W. L. Williams), the ridge-pole his back-bone, and the *poupou* (wall carvings) his ribs. In other words the house *is* the paramount leader with the succeeding tribal ancestors *(poupou)*. We were made well aware of this when, immediately after Ngati Maru had decided that Hotunui was to come to the Auckland Museum and we were discussing the problem of transporting the 80 ft. ridge pole, some one, a pakeha to be sure, said, "You'll have to cut it." "What!" was the aghast exclamation, "cut Hotunui's back-bone!"

And yet, notwithstanding this clearly understood symbolism of the house-front, it could also, if Angus had it aright in 1847, be persons involved in present day events.

The same liberty in the attribution of meaning was exercised four years ago at the ceremonial opening of the Naiterangi communal house, Tamateapokaiwhenua, when the naming of its carvings embraced cosmogeny, legend, and what might be called Maori national history as well as tribal ancestry.

The Souvenir Booklet (1958), tells us that the right hand *amo* (looking out from the front of the house) portrays Tane-mahuta separating the primal parents, Rangi and Papa: the left hand post presents exploits of Maui-tikitiki-a-Taranga; the *maihi* carry the story of the explorers Kupe and Ngahue chasing the pet octopus of the old Hawaiki *tohunga,* Muturangi. As a courtesy to the Tainui canoe, the central veranda post carvings commemorate Turongo and his wife, Mahinerangi, already well known as house names on the Turangawaewae *mare* at Ngaruawahia. Among the *poupou* of the porch are Kahungungu, a son of Tamatea-pokaiwhenua and founder of the great Ngati-Kahungungu tribe, and Taurikura a Ngaiterangi ancestress who sulked and turned herself into the first tuatara! The taiaha-armed figure surmounting the gable, Tahuri-wakanui, is a skilled warrior of not long ago.

The concept that the whole house is itself the tribe is maintained, according to an authority mentioned but not named in the booklet, by the *kowhaiwhai* (rafter patterns) linking the spirit of the *tahuhu* (ridge pole) with the carved ancestral figures of the *poupou* (wall posts).

While on the subject of symbolism in architectural decoration, we may refer to the quite obvious meaning of *pataka* barge-board design, i.e. of a long creature, whale, shark, or seal, being dragged up to the storehouse by three or four men, or *manaia.* Whether this was simply a standard narrative presentation of the idea of filling a food store, or whether it could also be given a specific individual reference to a particular event, we do not know; and it is to be hoped that the raising of the question will not result in the production of an 'explanation' from some doubtful legendary source.

Returning to the *pare,* we cannot but suppose that its composition carried some meaning and symbolism, either of tribal history or of some well established idea. But whether it was the same underlying narrative for all, or an independent symbolic presentation for each one, we cannot say.

Implicit in the problem of meaning in the present connection is the further question: as to whether community influence or individual enterprise is the stronger motivating force in art production. Contemporary painters and sculptors claim, or hope, that their work is creative self-expression, or assume that self-expression is their right as artists. While the latter will be generally conceded, there may be doubts among psychologists whether the former is invariably so; but in respect to primitive art we are constantly reminded by social anthropologists that the tribal community bears heavily upon its members.

'Meaning' here is a wide subject in fact and theory; its full consideration would call for a definition of the aesthetic object with a review of its characteristics and an enquiry into the nature of the aesthetic response. At the moment we will go no further than to offer a few conjectural or speculative comments which may serve to indicate some aspects of the problem.

On thinking of the meaning of an art object we early become aware of the two components of art, content and form, and, if we take cover from the difficulty of comprehending the 'significance' in Clive Bell's Significant Form, we see meaning expressed primarily in content. This content could be a group of persons, a narrative of events, a statement of a moral or a religious situation, any of which could be set forth in naturalistic realism hardly imbued with what could be called art expression.

We discern community influence in, say, a grouping of persons in respect to social status, the leader at the centre or made larger for prominence; grouping can however be done with a balance or rhythm that invokes aesthetic response, whereby we discern form and recognize art composition rather than social arrangement.

Form itself, having become a matter of interest — we do not at the moment suggest for whom — gains in importance and becomes developed in the categories of rhythm, decoration or ornament, stylization or abstraction.

Our question, then, is: by whose influence or whose initiative, by the community's or the artist's, does form gain this ascendancy? It is generally held that the simplified outline of a lion, with maybe some emphasis here and diminution there, is more acceptable on a heraldic shield than a natural drawing. Was it the community's need for clear and ready recognition that brought about this stylization, or was it the individual artist's own interest in winning form as such from out of the first seen realism?

As decorative complexity such as we have seen in our door-lintels develops and expands, is it the artist himself who goes one further and one still further in elaboration, or does the community's attention, interest, and enthusiasm for something richer hurry him along?

One can perhaps more readily see the community influence as conservative, as being more concerned to preserve easily recognizable meaning; but one can still ask: could the simplified or stylized form become more effective as symbolic expression, through the very aesthetic effect achieved by the artists abstraction?

On the other hand, could the artist, involved in ornament or constrained by the potential abstraction he envisages in form, *qua* form, come to find himself (or his public find him) remote from common understanding and acceptance? We can understand popular interest being taken in the complexity and liveliness of spirals in the *pare* we have been seeing; but had this overclouded the original meaning of the *pare* composition?

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Text Fig. 12

Or, turning to the Kaitaia lintel, could its carver have gone too far, either away from meaning or towards pure design? Could there have been members of the Maori community, who, Philistines before their own Henry Moore or Barbara Hepworth, and bemused by their inability to recognize meaning in the Kaitaia design, failed to discern its abstract rhythm? And would they be few or many?

The questions here posed could bristle with controversy, and leaving them unanswered may appear ineffective; but something is thereby left to think upon and perchance to study.

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Complete carved doorway. The *pare* is described (p. 273) as the 'type' of spiral-dominated composition.

Doorway: Rotorua. A.M. 184.
Length of *pare* 127 cm.

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A

B

A. Locality unknown. Dominion Museum, Oldman Coll.

B. *Pare* of house Rangitihi. Rotorua. A.M. 5152. L. 165 cm.

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A B

A. Locality unknown. British Museum.

B. Maketu. A.M. 5168. L. 112 cm.

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A

B

A. Locality unknown. British Museum.

B. Rotorua district. A.M. L. 190 cm.

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A

B

A. Locality unknown. University Museum, Philadelphia.

B. Locality unknown. A.M. 186. L. 135 cm.

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A

B

The spirals enlarged, but without dominating the figures.

A. Locality unknown. Dominion Museum.

B. Carved at Whakatane. Ngati Maru house Hotunui, in Auckland Museum. L. 376 cm.

For cultural reasons, these images have been removed.
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A

B

Pare with only one central figure and two spirals. The *manaia*-combat device at either end in B. is as seen in figure-motive *pare*; in A. it is replaced by a large open *manaia* profile.

A. Locality unknown. British Museum.

B. Locality unknown. A.M. 104. L. 98 cm.

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A

B

A. A modern (1939) variation of the single central figure composition (B).

A. *Pare* of house Takitimu at Wairoa. Carved by Pine and John Taiapa, 1939.
B. Locality unknown. Dominion Museum.

For cultural reasons, these images have been removed.
Please contact Auckland Museum for more information.

A B

Pare with a single large spiral, or a pair, as the central motive.

A. Locality unknown. A.M. No. 1. L. 122.5 cm.

B. Locality unknown. A.M. 3. L. 120 cm.

For cultural reasons, these images have been removed.
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A B

A. *Pare* with figures and spirals equally prominent. cf. text figures 1 to 4. Locality and present place of deposition unknown. Photograph, numbered E. 1277/8 on back; from Mr. C. Andrade, Bond St., London, 1937.

B. *Pare* with single spiral central motive. Locality unknown. A.M. 21884.1, Sir Geo. Grey Coll. L. 99 cm.