

A Further Commentary on New Zealand Molluscan Systematics.

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TWELVE years ago Iredale wrote a "Commentary" on Suter's "Manual of the New Zealand Mollusca" (*Trans. N.Z. Inst.*, vol. 47, pp. 417-497, 1915). Many subsequent notes were drawn up by him in connection with the collection in the British Museum (Natural History), but the war prohibited any sustained study and consequent publication. Examination of Roy Bell's Australian material developed a few cases of Neozelanic interest, and some have been published in the Report on the Twofold Bay collection (*Proc. Linn. Soc. N.S.W.*, vol. 49, pp. 179-278, 1924), hereafter referred to as "Iredale (1924)". In 1923 Iredale returned to Australia, and his intensive collecting around Sydney has been instrumental in indicating some relationships not previously recognized.

For some years the present author has been studying Recent and fossil New Zealand Mollusca, and many series of lineage forms linking up fossil and Recent shell-groups have been determined. Data have been procured proving the ancient development and separation of apparently closely-related Recent forms, and I would endorse Martin's dictum, "The species with which one has to deal in palaeontology are no physiological but morphological species. The individuals of such species of mollusca . . . agree in a single anatomical element, the shell. Such an agreement may exist, however, while other elements are absolutely different." (Martin, 1917). One may cite in illustration of this the heterogeneity of the Minolioid shells, the Buccinoid Mitras, and especially, in connection with New Zealand species, the case of *Diloma nigerrima* Sow., considered later.

Little close relationship in Recent times is determinable between the east Australian and Neozelanic molluscan faunas, relations whenever recognized being usually with the latter and Tasmanian species. A "List of Recorded Relationships between Australian and New Zealand Mollusca," dealing chiefly with the fossils, has

*As originally presented, this paper was under the joint authorship of T. Iredale and H. J. Finlay. It had been suggested and written by the latter after verbal discussion and some correspondence with Mr. Iredale, to whom it was subsequently submitted for revision and extension. Pressure of other work, however, unfortunately prevented Mr. Iredale from carrying out this part of the undertaking, and it has accordingly been agreed that the paper shall appear under a single name. The writer must therefore take all responsibility for its shortcomings, and desires to acknowledge his indebtedness to Mr. Iredale not only for some of the ideas and suggestions contained therein, but also for his generosity in permitting the publication of the paper in its present form.—H. J. F.

been published (Finlay, 1924g), but owing to the great confusion existing in connection with palaeontology in Australia, such correlation as may be necessary cannot safely be undertaken for many years. Apparent conchological affinities have proved on closer examination to be due to convergence only, and not to be radical. One may note in this connection the statement made by Marwick (1924, p. 330) that "In correlating Australasian Tertiary strata the stratigrapher will therefore have to deal with generic correspondence and specific resemblances rather than with specific identities." A recent visit to Australia, and the collecting and study of museum collections at Adelaide, Melbourne, and Sydney thus made possible, suggested to me the reconsideration of relationships previously, under the influence of earlier workers, taken for granted. A stay in Sydney where, with the material and literature available at the Australian Museum, the main points were discussed with Mr. Tom Iredale has led to the production of this paper, the principal features of which are the rejection of bad records, the proposition of new group-names for Neozelanic forms, and the indication of systematic and other errors. The group-names here introduced as generic may be regarded as such until a fuller appreciation of further material exactly values them. I note, in passing, Dr. J. Allan Thomson's opinion, "Some students object to the process of minute distinctions between genera, mainly on the ground that it renders the study more complex, and a matter only for the specialist. But the narrower definition of genera, if it is based on phylogenetic grounds, prevents the assimilation of apparently similar but historically distinct forms, and for the purpose of discussing geographical distribution and geological correlation becomes an instrument of the utmost utility." (Thomson, 1918, p. 53).

It may be understood also that, unless statement is made to the contrary, wherever reference is made to any species, I have studied either the actual type specimens or, when these were not available, topotypes of the species. The Tertiary and Recent types in the Dominion, Canterbury, and Otago Museums, and the New Zealand Geological Survey collection have been at all times readily made available for study, and I here desire to record my thanks to the curators and others in these institutions who have made this possible. Unfortunately, the types in Suter's own collection—now in the Wanganui Museum—are not so readily available. My own private collection, however,—a practically complete topotypic suite (and perhaps the largest yet made) of New Zealand fossil and living mollusca—has enabled me to overcome almost every difficulty in regard to types.

Since the publication of Suter's "Manual," workers have, as Iredale anticipated, been busy in connection with Neozelanic molluscs, and the keen interest shown by the younger workers is a great tribute to Suter's monument. Errors in Suter's work are found to be numerous, but when the magnitude of the work is contrasted with the many disabilities of the worker, in lack of both specimens and literature, Suter's accomplishment is prodigious. It is possible that if such a work were available to Australian conchologists more interest would be evinced, when at the present time the older

generation, Hedley, Verco, May, Pritchard, Gatliff, and Gabriel, seem to have no successors. The enthusiastic band of workers, (Allan, Brookes, Bucknill, Marwick, Miss Mestayer, Oliver, and Powell) at present in New Zealand is the best tribute to his work Suter would have desired, while the passing of Murdoch leaves a blank which one may hope to see filled, perhaps by still another student.

It has been the habit of austral palaeontologists, following Tate and Cossmann, to look for the affinities of austral shells, Recent and fossil, principally in the beds of the Paris basin—partly because the assemblage there exposed is so rich in generic forms, and partly because the many local workers and their possession of abundant illustrative resources have made that fauna so well known—but I believe that until the lineage of austral forms is definitely determined, such association will prove futile. An excellent example of the lengths to which exotic comparison may be carried is provided by Wilckens, who has remarked of the New Zealand Upper Senonian *Calliostoma decapitatum* Wilckens that “it is only to be compared with the living *C. zizyphinus* L. from the Mediterranean Sea, which very much resembles our species. Certainly this resemblance of a Cretaceous shell from New Zealand to a living form from the Mediterranean is surprising” (*N.Z. Geol. Surv. Pal. Bull. No. 9*, p. 5, 1922). This writer also compares his *Protodolium speighti* from the same beds with the living *D. galea* L. because of a resemblance in external sculpture; all these comparisons are made quite confidently in spite of the fact that the New Zealand fossils are crudely preserved and imbedded in hard matrix—such work calls for no comment. Etheridge is quoted by Benson (1923, p. 47, footnote) as approving of Uhlig’s principle, “I do not consider it wise to identify a form with a species described from a region thousands of miles distant, unless the agreement is so close as to leave no room for doubt as to their identity,” and Hedley wrote even in 1899 (p. 416) “Our increased knowledge develops distinctions more than affinities between the Central Pacific and the Tropical Atlantic.” The examination of the living species of Australia has shown so much discord with the living European forms that only more confusion must ensue if the attempt to use European group-names for austral fossils be pursued further. So much splitting has been done (probably correctly) in connection with European fossils by specialists such as Cossmann and Sacco, that a host of names has accumulated, and any attempt to utilize such names would necessitate autoptic examination of authentic series of specimens by each worker, with probably different results in every case, due to the personal equation. Cossmann’s work, because of his peculiar method of type selection, is difficult to comprehend, and the rejection of the whole of his extra-austral group-names would lead to less error than the attempted recognition of superficial resemblances, due more to convergence, chance similarity in the combinations of dominant and recessive factors, and like response of organisms to like environment, than to any real genetic (and therefore generic) relation other than, perhaps, common derivation from an ancient stock. In many of the cases in which Coss-

mann has provided data in connection with austral species he has been peculiarly unfortunate in his judgment of their affinities.

There are very strong geological and geographical reasons for the step I propose to take, and as much literature bearing on this point has accumulated within recent years, one may note here the views of some of the geologists, palaeontologists, and zoo-geographers who have dealt with these problems. Especially may one recommend study of the many important papers and summaries by Benson and K. Martin, and of the "Proceedings of the First Pan-Pacific Scientific Conference, Part 3."

It is to Suess that we owe the conception of the Tethys Sea—an ancient vast waterway that occupied the area now covered by the Gulf of Mexico, the Mid-Atlantic, the Mediterranean, and Southern Asia, and practically divided the dry land of much of later Palaeozoic and Mesozoic time into two huge continents, a Palae-arctic northern mass, and the austral "Gondwanaland," including Peninsular India. This period saw more or less free migration of forms to all the shores of Tethys, but with the breaking up of this immense Mediterranean the differentiation and localization of faunas proceeded apace. "The community of character of forms on either side of the Pacific was very marked in Lower Triassic times, indicating an intimate connection of the two regions, which became interrupted during the crust movements of Middle Triassic times. (Smith, 1904). We see, therefore, that the extension of the Tethyan coast to New Caledonia, but not to New Zealand, was a feature of Lower Triassic as well as of Permian times... As in New Zealand, so in the Malay Archipelago, the sea retreated early in the Cretaceous period, and great orogeny followed.... The last remnant of the Tethyan Sea was driven out from the region by these movements. Except for a few forms, the immigrant fauna appearing later in Cretaceous times was of the Indo-Pacific type*... at the close of Mesozoic times the various portions of Australasia ceased to have any striking unity of geological history. The fragmentation of the region became more active, and extending subsidence blocked it out into geographical elements, the remnants of which are now visible. These appear to have had very diverse histories during the Tertiary period,... and to have developed provincial faunas with little intermigration."† (Benson, 1923, p. 38 *et seq.*)

K. Martin (1914, pp. 732-734) has discussed the question "When was the Indian Archipelago separated from Tethys?"‡, and, but for

*"Up to this time (late Jurassic) the successive faunas were all closely related to Malayan and Tethyan faunas in general, with some circum-pacific elements, but now significant changes took place.... The new immigrant fauna (Senonian) was distinctly of the Indo-Pacific type, and apparently had a definitely marked affinity with that of New Zealand and the American Antarctic regions."—(Benson, 1924, p. 124.)

†Workers have hesitated to unite even Silurian austral fossils with superficially similar Northern forms. Thus, as regards corals, Benson (1923, p. 25, footnote) has noted that "Yabe is, however, inclined to explain the similarity of the Canadian, Baltic, and Australian forms (of *Halysites*) as the result of parallel evolution under analogous conditions from a common stock, rather than by a continuous intermigration of derived forms."

‡My thanks are due to Dr. Benson for kindly translating this paper from the original Dutch.

lack of space, his conclusions would here be quoted in full. He states that the East Indian-Philippine Tertiary deposits, extending from Eocene to Pliocene, are "stamped with a remarkable petrographical and palaeontological uniformity....one must conclude that during the whole period subsidence of the Indian Archipelago took place. It does not follow from this that this geosyncline was in connection with the Mediterranean Sea, the Tethys in the Tertiary period, or that a connection existed between Europe and the Indian Archipelago. All the faunal studies can give decisive evidence on this point. The fauna of the Eocene of Nanggulan in Java differs indeed completely from that of Europe....In the Neogene the differences are still greater....It follows that already during the deposition of the Nanggulan sediments....Java of the present day was no longer connected with Tethys, and the communication was not renewed at a later date....There is not the least reason to consider, as Noetling does, that the Eocene fauna of Europe had migrated to India. Apart from some interchange of species between neighbouring areas, one may consider the Tertiary fauna of the Indian Archipelago as autochthonous in the main." All these remarks apply with redoubled force to the far more isolated and much more distant province of New Zealand. In a later paper (1917, p. 801) the same author remarks, "From the Neogene fauna of Europe the (Lower Miocene) mollusca of the West-Progo Mountains (of Java) are entirely different....they clearly present an Indo-Pacific character....the whole character of the Tertiary fauna of the West-Progo Mountains is in complete agreement with the theory formerly developed by me, according to which the Javanese sea was separated from the Tethys since the Upper Eocene." It is the opinion of Wayland Vaughan (1921, p. 868) that "tracing from Europe to south-eastern Asia is possible for early Eocene, but it is not possible for later Eocene, Oligocene, and Miocene times." And again (p. 720), "The connection between the Pacific and Atlantic by way of Tethys appears to have been closed before latest Eocene times, and perhaps except for transitory communication there has been no connection across Central America between the two oceans since older Miocene time. Marshall's insistence on the isolation of the New Zealand fauna appears to me to be fully warranted."

The foraminifera one would expect to be more widely dispersed and to afford less definite information than the mollusca, but they nevertheless give evidence of a definite stage in the breaking down of the eastern margin of Australasia. The study of the Eocene foraminifera of New Caledonia by Piroutet and Deprat shows that they belong to a characteristic fauna which may be traced through New Guinea to the Malay Archipelago, and contains as one of its components some forms as yet indistinguishable from European species. This fauna is, however, quite unrepresented in New Zealand. (See e.g., Benson, 1924, p. 125.)

The case of the Brachiopods has been stated by Thomson (1918, pp. 37-61). The convergence of many lines of evidence has led to the conception of Gondwanaland, "a congerie of continental masses

lying south of the Tethys at the close of Palaeozoic times." (Benson, 1921, p. 57). Thomson has argued for the genesis of the southern stocks of Brachiopods almost solely on the shores of this old continent; "The most obvious explanation of all the above facts is that these two groups of the *Terebratulidae* originated on the coasts of Gondwanaland, on the remnants of which they now survive, and to which they are almost restricted." Though the dispersal of marine mollusca is more complex, by reason of different habits and embryonic stages, there appears to be little reason to doubt that this hypothesis will apply also to very many stocks of southern mollusca. Thomson remarks further, "The distribution of southern Recent Brachiopods, then, is satisfactorily explained by an ancestral distribution in the Miocene, and not only does it not call for any land bridges or shallow submarine connections between the various southern continents and islands since that date, but is distinctly opposed to any such means of intercommunication except between South America and the Antarctic. . . . The fact that the Gondwanaland element occurs both in New Zealand and Australia, but not in the Antarctic and South America, suggests that the intercommunication between New Zealand and Australia did not occur at the same time as that between New Zealand and the Antarctic, but that the latter was the earlier. . . . The circum-Pacific southern connections were all broken much as at present by the Miocene, and since that date there have been no renewed connections between the southern continents and island districts, except possibly between South America and the Antarctic and the adjacent islands." Hedley (1899, p. 398) has in like manner dealt with the distribution of mollusca along these ancient highways; "A centre of distribution has been described for New Guinea; another such occurs in New Zealand. . . . Along the tortuous route by which the Malayan forms crept south to New Zealand from New Guinea, there flowed a return current of Antarctic life. . . . It is to be noted that the Antarctic fauna which passed over New Zealand is quite distinct from, and probably far older than, that other Antarctic element, the Euronotian, which reached Australia through Tasmania." Tillyard, too, in treating of insect faunas, has quite recently (1924, pp. 407-413) stressed the fact that Antarctic connections with Tasmania and New Zealand were not synchronous, and that because of this time difference considerable dissimilarities in their faunas have arisen. "We are struck with the very great differences not only in the types of insects which reached Tasmania and New Zealand respectively about this time (early Tertiary), but also in the associated flora and fauna. This leads us to postulate two separate connections with Antarctica in early Tertiary times. . . . Tasmania, however, holds the largest share in the immigrants received through the Antarctic connections, and this gives its fauna its somewhat remote relationship with that of New Zealand."

Benson (1922, p. 60) has noted that "there is, however, no divergence of opinion in regard to the isolation of New Zealand since the middle of Tertiary times. . . . this seems to preclude the possibility of the formation of a temporary association of lands during the late Tertiary and Pleistocene orogenic and epirogenic movements in New Caledonia, New Zealand, and Eastern Australia, to which Cockayne

(1919) seems to be inclined to ascribe the entry of a presumably post-Mesozoic floral element in New Zealand." Though it is certainly true that the great majority of both New Zealand and temperate Australian mollusca have Tertiary ancestors, nevertheless the collector who has access to both Recent and Tertiary Australasian shells notices at once that apparently the Recent faunas of Australia and New Zealand are far more closely allied than are those of the "Miocene." Finlay, in discussing New Zealand Tertiary *Cymatiidae* (1924A, p. 465), has noted "The fact that none of our Tertiary species occurs in Australia is all the more significant since all our Recent species occur there*... the only explanation is that very different conditions were brought about for a short time after the close of the Wanganuiian, and allowed the passage of characteristic Australian forms into our waters." It should, however, be emphasized that the Recent faunas and those of the Tertiary are not directly comparable, since one of the most important elements of the Recent faunas—the conspicuous littoral and shallow water forms—is totally absent from almost all Australasian Tertiary faunas. A possible reason for this resemblance between the Recent faunas lies in the ocean currents. At Shell Harbour, some 80 miles south of Sydney, an insweeping ocean current brings to that one neighbourhood many typical Queensland forms, whose presence would be otherwise inexplicable. In like manner, the same Notonectian† current, sweeping southwards far past Tasmania, and then up the coasts of New Zealand, is probably responsible for the introduction of many forms of Maugean (i.e. East Tasmanian) affinity. Introduction by this means within quite recent times seems the most feasible explanation of the occurrence on New Zealand shores of most of our present *Cymatiidae*, and the few other species apparently identical with Peronian, Adelaidean, or Maugean forms. It is not known how long the influence of the Notonectian current has been at work, but it is quite possibly of recent development, and to the absence of this factor may be partly due the appearance of so very few Australian fossils in New Zealand Tertiary beds, as compared with apparently greater resemblances in the Recent faunas. Ashby (*Rep. Austr. Assoc. Adv. Sci.*, vol. 17, p. 371, 1926) has lately invoked the aid of ocean currents to explain the distribution of Australian chitons.

I have quoted the geological evidence at some length, partly because it forms a very stable foundation on which to raise a zoological and palaeontological superstructure, partly because the treatment of the New Zealand fauna as autochthonous would be only half justified without some indication as to its origins‡ and how it may have become modified by migrations from other sources, and partly because

*As will be seen later some of the New Zealand forms are represented in the Australian faunal provinces really by regional variants and not identical species; this, however, does not alter the relative closeness of affinity between the fossil and the Recent assemblages.

†Name proposed by Hedley (*Proc. Linn. Soc. N.S.W.*, vol. 35, 1910); rejected by Halligan (*Proc. Roy. Soc. N.S.W.*, vol. 55, p. 193, footnote, 1921). It is, however, a convenient term for an important distributional factor.

‡It should be well understood that indications alone are outlined here; the recognition of the distinctness of a fauna need not await demonstration of the actual origin of all its component parts.

the "Tethys sea," "Gondwanaland," and such like fundamental concepts convey unfortunately but little meaning to many neontologists and systematists. Yet they form an indispensable basis for the accurate tracing of faunal relationships, seriation lines, and "natural" genera in austral lands.

I propose, therefore, to deal with the Neozelanic molluscan fauna, Tertiary and Recent, as an entity, comparable only with Australian (and South American) species, and believe that European fossils should be given less consideration until a later date. Bather, in his Presidential Address to the Geological section of the British Association for the Advancement of Science at Cardiff in 1920, dealt with "Fossils and Life," an essay of even more importance to the systematic neontologist than to the members he addressed. Therein he sketched the difference between the work of the Palaeontologist and that of the Neontologist. The effect of the time-concept on principles of classification should be used as an introduction to all systematics, and it is important to emphasize the fact that lineage is the all-important concept. Dall has written of "Two groups which are represented side by side in all the Eocene horizons and still have representatives in the Recent fauna.... These distinctions seem hardly of sectional value.... The estimation of values in such cases is liable to a large personal equation, but it seems to me that historical and stratigraphical palaeontology will be benefited by regarding the differences as of subspecific rather than specific value." I would disagree entirely with this dictum, and would rather suggest that the fact of such differences remaining throughout so long a lineage is of itself sufficient evidence that probably not different subspecies but different genera are represented. When two superficially similar forms live side by side, the balance of probability is either that they are not closely related, or else that they represent a period of variation in the lineage of the genus alternating with more fixed species of the line directly preceding and following the variable "species."

Owing to the splendid series of fossiliferous horizons now known, in Neozelanic palaeontology it is almost always possible to secure series showing lineage down to existing forms. Dr. Allan Thomson has expressed the opinion that in connection with Neozelanic palaeontology "One (line of advance open) is the more detailed study of the species on evolutionary lines (such as I have been attempting in the brachiopods and limpets) with a view to defining valid species of limited range, and to arranging the species in evolutionary order." One may endorse this dictum, and add that the study of Recent forms, especially as to their variation geographically and bathymetrically, should precede palaeontological decisions. It must be emphasized that, as regards Mollusca at all events, there can be no Palaeontologist ignorant of Neontology, nor can the Neontologist safely determine faunas without recourse to Palaeontology*, yet in the past the two branches have been commonly treated as if they were distinct and alien subjects.

*Cf., for example, in the notes that follow, the cases of *Leucosyrinx thomsoni* Mestayer and *Cerithium invaricosum* Odhner.

If, therefore, lineage can be traced for a shell form back through the Tertiary, I propose to regard that group as of generic or at least subgeneric value, whether the group is represented by only one living species or by many. Where available, however, the living forms should first be studied, and the fossils then classified conchologically in seriation. Many cases will arise where the radular or opercular features of the living species will command a higher value than the conchological features.

As a means of indicating by nomenclature the recognition of seriation and lineage among mollusca, Iredale has proposed the use of trinomials of varying kinds (*Proc. Mal. Soc.*, vol. 15, p. 37, 1922), and this method seems to be of great value, there being many instances where its application obviates useless discussion as to the exact status of the affined molluscs, and a digest may be here given as applied to the Maorian Sub-Region.

Regional names in connection with Australian marine molluscs have proved of great value, and consequently the proposition of similar names for New Zealand is simply a matter of form. I have already (*Gedenboek Verbeek*, p. 168, 1925), following a MS. scheme of Iredale's, subdivided the Maorian Sub-Region into five provinces, as follows:—

Kermadec Province	.....	Kermadec Islands
Cookian Province	.....	North Island of New Zealand
Forsterian Province	....	South and Stewart Islands
Moriorian Province	.....	Chatham Islands
Rossian Province	.....	Subantarctic Islands, including Macquarie Island

Ornithologically these provinces may be distinctly characterized, botanically they are quite separable, structurally there are differences*, while conchologically the data is strong and important. I make the proviso, however, that the Cookian and Forsterian provinces as here defined may not be "natural" and may be subdivisible later—in which case the present names are to be retained for the southern portions of each island. Cook Strait has been adopted as a temporary dividing line purely for present convenience; many characteristic regional forms are known to range across it. The quite recent development of Cook Strait as a geomorphic feature may account for this. Cotton (1916, pp. 248, 319) has written that "The orogenic movements which followed the Tertiary deposition, and to which the present relief is entirely, or almost entirely, due, must have occurred in or about the Pliocene period.... Faults of late date appear also to have determined the outlines of at least some parts of the New Zealand coast, especially in and about Cook Strait." And again in a later paper (1918, p. 325), "This justifies the adoption of a tentative hypothesis that at the close of the orogenic movements which gave birth to the New Zealand land mass, the dividing strait was not in existence, and that the separation of the two islands has taken

*Cf., for example, Cotton (1918, p. 324), "The close political association of the two (main) islands is a result, no doubt, of their isolation from the rest of the world: it has come about in spite of striking physical differences between them."

place subsequently, as a result of subsidence of blocks, possibly contemporaneous with the partial subsidence of an adjacent portion of the South Island." Cockayne (*Trans. N.Z. Inst.*, vol. 39, p. 313, 1907) and lately Myers (*l.c.*, vol. 56, p. 455, 1926) have also noted in the case of plants and heteroptera respectively that "Cook Strait forms no line of demarcation." The former author has placed a boundary at latitude 42°S., that is, near the Clarence River. It is preferable, however, to create Regional names only where justifiable on present evidence; north of Hauraki Gulf there may possibly be a different provincial region (the Cape Maria van Diemen fauna seems notably distinct); some of the most marked Forsterian forms are traceable only as far north as Shag Point; and the molluscan fauna of the South Island north of Banks Peninsula is too indefinitely known to permit of analysis;—on the facts available I nominate Cook Strait in the meantime as a dividing line between two certainly distinct provinces, the great bulk of the North Island, and the Southern portion of the South Island, and anticipate that future research will provide more exact limits.

The Kermadec Province has been well discussed in these *Transactions*, thanks to Oliver and Iredale. The results of study of Chatham Island mollusca will be published at an early date—but it is pertinent to mention the significant fact that the further one goes back into the Cainozoic record there, the more does its fauna differ from that of the other provinces. The Cookian Province shows a series of northern mollusca which are absent from the Forsterian, and the latter has many forms allied to Rossian species which never reach the Cookian Province. And Hedley, from consideration of Antarctic and Subantarctic mollusca has observed, "The Subantarctic Islands differ in their marine fauna from Antarctica almost as much as they do from such temperate zones as those of New Zealand or Tasmania." The mollusca collected by members of the Mawson Antarctic Expedition were reported upon by Hedley in 1916, and included a collection from Macquarie Island which added to the known fauna many new species and records, all of which are discussed or mentioned in this paper. The circumpolar range allowed for some of the Subantarctic species needs re-consideration, for when series are examined valid differences are easily observed.

Where a species occurs in more than one Province, it will generally be found to differ subspecifically, and here ordinary trinomials may be used. When the form varies bathymetrically to such an extent that it becomes an arguable point as to its specific identity or distinction, a trinomial is used with the second name enclosed in simple brackets. When a fossil is found so closely related that its specific distinction is indefinite, and its Recent relation indubitable, a trinomial may be used, the second name being enclosed in square brackets. As a concrete example, the various forms of *Thoristella* may be taken as well illustrating this scheme:—

<i>Thoristella chathamensis chathamensis</i> (Hutton)	Moriorian Province
<i>Thoristella chathamensis dunedinensis</i> (Suter)	Forsterian Province
<i>Thoristella chathamensis oppressa</i> (Hutton)	Cookian Province
<i>Thoristella chathamensis aucklandica</i> (Smith)	Rossian Province

- Thoristella (chathamensis) benthicola* n. sp.* Deep water in some Province (Forsterian in this case).
Thoristella [chathamensis] fossilis n. sp.* Tertiary ancestral species.

This scheme can be enlarged in any way, as the deep water form could be referred to in the Cookian Province as *Thoristella (oppressa) benthicola*; and a species older than *fossilis* could be described as *Thoristeula [fossilis] profossilis* n. sp.

It may be noted that on the occasion of the first introduction to New Zealand of a trinomial system (Matthews and Iredale, "A Reference List of the Birds of New Zealand"; "Ibis" for April and July, 1913), one austral zoologist expressed his hearty commendation of the scheme, and its advantages cannot be better told than in his words: "It will be seen from a few examples that this is a very useful innovation, in that it indicates at once the close affinity between the different forms or subspecies of one and the same species which inhabit the different islands that constitute the New Zealand area. Systematic work in all groups nowadays is more and more closely correlated with geographical distribution than it used to be; and as classification is the expression of genetic relationships, the utility to the evolutionist of this trinomial system becomes manifest." (Benham, *Trans. N.Z. Inst.*, vol. 46, p. 189, 1914). I could not better epitomize my views and close this introduction than with these words.

The types of all new species described are in the Finlay collection; paratypes wherever possible have been deposited in the Australian Museum, Sydney.

All new genera proposed for New Zealand shells, or newly added to the fauna, and all additions made to the Recent fauna since the publication of Suter's "Manual," also all notes of interest on already described species, and references to most of the fossils (all, since 1922 inclusive) described since the publication of *New Zealand Geological Survey Palaeontological Bulletin No. 5*, 1917, will be found in this paper, which aims at being not only a more or less exhaustive revision, but also a work of reference to the scattered and now fairly voluminous molluscan literature which has accumulated on New Zealand forms since Suter's death. It is sincerely hoped that in both these categories it will prove useful.

Order POLYPLACOPHORA [P. 3]†

Iredale and Hull have published a "Monograph of the Australian Loricates" in the *Australian Zoologist*, the plan of which for accuracy, clearness of treatment, and general utility to both tyro and specialist it would be difficult to better. The general account of "Systematics and Structure" forming No. 1 (*Austral. Zool.*, vol. 3, pt. 5, pp. 186-194, 1923) is the introduction *par excellence* for any student starting work on this interesting group. Therein it is shown (p. 186) that the name *Polyplacophora* Gray, 1821, the

*Described later in the paper.

†As in the "Commentary," the references in square brackets give the page of the "Manual" referred to, and, also as before, the names at the head of the paragraphs are not always those used by Suter.

usage of which was based on priority, must give way to that of *Loricata* Schumacher, 1817, and they have suggested the use of the vernacular "Loricata" in preference to "Chiton," which is the name of one of the genera of the *Loricata**. Their classification differs a little from that used by Suter, and also from that of Thiele, recorded in the "Commentary" by Iredale (pp. 423-426). The new arrangement may be condensed thus: the suborder *Lepidopleurina* Thiele is abolished, as all the Lepidopleurids appear to be degenerate forms only (No. 4, p. 339), and nine families are admitted (No. 1, p. 193):—*Ischnochitonidae*, *Lepidopleuridae*, *Lepidochitonidae*, *Callistochitonidae*, *Loricidae*, *Cryptoconchidae*, *Cryptoplacidae*, *Plaxiphoridae*, and *Chitonidae*. The fourth and seventh of these are not yet represented in New Zealand waters. A useful key to these families is presented (p. 194), and also to the various genera and species as they are treated.

Besides this exhaustive monograph, numerous other papers on the Loricates have appeared recently. Ashby in his "Monograph on Australian Fossil Polyplacophora (Chitons)" (*Proc. Roy. Soc. Vict.*, vol. 37, N.S., pp. 170-205, 1925), and in his "Acanthoid Chitons of New Zealand" (*Proc. Mal. Soc.*, vol. 17, pp. 5-35, 1926) has proposed several changes in classification, and in the value and nomination of the higher groups, while in his "Regional Distribution of Australian Chitons (Polyplacophora)" (*Rep. Austr. Assoc. Adv. Sci.*, vol. 17, pp. 366-393) he suggests alteration of Hedley's Australian regional divisions and proposes the new names Indo-Australian and Tasmanian, suppressing Solanderian in favour of Dampierian (which he constantly misspells Damperian). It is unfortunate that these papers are marred by lack of lucidity and method, and the conclusions often obscurely worded; they frequently clash with those of Iredale and Hull, but in every case the opinions of the latter authors seem to merit more consideration than he has given. His regional divisions are not adopted here; further evidence as to their validity seems to be required.

Odhner (1924, pp. 5-9) has recorded a considerable number of species from many localities visited by the Mortensen Expedition, but the identifications do not always seem to be trustworthy. Finally, Miss Mestayer has contributed a couple of papers (*Trans. N.Z. Inst.*, vol. 53, pp. 176-179, 1921; *l.c.*, vol. 56, pp. 583-587) in which several new species are described. Two of her species (*Acanthochiton foveauxensis* and *Macandrellus oliveri*) have been anticipated by Ashby, who, while referring to her MS. account, has described and figured them in his paper (1926b, pp. 20, 18) as *Notoplax (Amblyplax) foveauxensis* and *Notoplax (Amblyplax) oliveri* respectively; his account and names have one month's priority.

***Lepidopleurus inquinatus* (Reeve, 1847). [P. 6]**

This is the species for which Ashby proposed (*Proc. Roy. Soc. Vict.*, vol. 33, N.S., p. 157, 1920) the new name *L. iredalei* through a mistaken idea; he has since rectified his error (*Trans. Roy. Soc.*

*Ashby has recently (*Rep. Austr. Assoc. Adv. Sci.*, vol. 17, p. 379, 1926) in an "Explanatory Note" rejected this name, but his reasons are inadequate, and the note not explanatory.

S.A., vol. 47, p. 217, 1923). Attention is here drawn to this as Finlay (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 342, 1923), Oliver (1923A, p. 529), and Odhner (1924, p. 5) have used Ashby's incorrect name.

The genus *Terenochiton* Iredale, 1914 (*Proc. Mal. Soc.*, vol. 11, p. 28) may be used for this species, and there are several others to be described in Neozelanic waters. Odhner (1924, p. 5), in identifying and figuring a valve from Campbell Island as *inquinatus*, has noted that it differs from Stewart Island specimens, also figured. Hedley (1916, p. 34) has added from Macquarie Island *Lepidopleurus kerguelenensis* Haddon, but this seems a doubtful identification from every point of view.

Genus *Callochiton* Gray, 1847. [P. 12]

Iredale and Hull (*Austr. Zool.*, vol. 3, pt. 8, p. 349, 1925) have noted that *Callochiton* auct. is not *Callochiton* Gray, 1847, of which the type is *Chiton laevis* Pennant. They have accordingly proposed the genus name *Levicoplax* for *Chiton platessa* Gould, and classed the Australian members of the Lepidochitonidae under this genus, *Icoplax* Thiele (for *Chiton puniceus* Couthouy), and *Eudoxoplax* Iredale and May (for *Chiton inornatus* T.-W.). The last named is not represented in New Zealand, but *Levicoplax* will include *platessa* (Gould) (I have recorded the finding of two specimens of this species at Taieri Beach: *Trans. N.Z. Inst.*, vol. 55, p. 517, 1924) and *Callochiton mortenseni* Odhner (1924, p. 6), from Campbell Island. *Icoplax* will cover the remaining New Zealand species, regarding which quite a number of notes have appeared, as follows:—

I. empleurus (Hutton). Miss Mestayer (*Trans. N.Z. Inst.*, vol. 53, p. 180, 1921) has supplemented Suter's description of the valves and has lately figured and given Oliver's description of the radula (*l.c.*, vol. 56, p. 583, 1926). I have recorded the species from the littoral in Dunedin Harbour (*l.c.*, vol. 55, p. 517, 1924), and Odhner records it from Campbell Island (1924, p. 6), though as he mentions differences in sculpture and slitting, he probably had a distinct species.

I. sulculatus (Suter). Recorded by Odhner (1924, p. 7) from North Channel, Kawau Island (misspelt "Kawaii").

I. kapitiensis (Mestayer) (*Trans. N.Z. Inst.*, vol. 56, p. 583, 1926). Described from Kapiti Island on the specimens Suter identified as *Chiton limans* Sykes.

Family *Plaxiphoridae* Iredale.

Add *Plaxiphora* (*Maorichiton*) *lyallensis* Mestayer (*Trans. N.Z. Inst.*, vol. 3, p. 176, 1921). Notes have also been given by Miss Mestayer on *P. zigzac* (Hutton) (*l.c.*, vol. 56, p. 584, 1926) and *P. ovata* (Hutton) (*l.c.*, p. 585), which she treats as distinct from *Fremblya egregia* H.Ad. Powell (*N.Z. Journ. Sci. & Tech.*, vol. 6, p. 285, 1924) has recorded *P. biramosa* (Q. & G.) from the Cookian Region.

Hemiarthrum setulosum Dall, 1876.

This extraordinary genus and species is added to the Neozelanic list by Hedley, as common at Macquarie Island (1916, p. 34); Iredale

has studied the specimens and suggests that *Hemiarthrum* may be a degenerate Plaxiphorid (see also *Austral. Zool.*, vol. 3, pt. 8, p. 339, 1925), "the unslit head plate being faintly striated, the sutural laminae of the median valves being more like those of *Plaxiphora* s.l. than of *Acanthochiton* s.l., while the little unslit projecting tail plate is like that of a young Plaxiphorid, and not at all Acanthochitonoid. Further, the sculpture agrees better with that of the former, and curiously enough, while Carpenter noted only four tufts around the head valve—the correct number for an *Acanthochiton*—Haddon pointed out that the specimen he examined had six, while the specimens in the Australian Museum prove to have *eight*, which pretty definitely determines the relationship.

The Macquarie Island shells appear to be a little different, the sculpture being finer and the mucro of the posterior valve nearly median and little elevated, while in the extra-limital shell the mucro is elevated and terminal." (in litt.)

Plaxiphora aurata (Spalowsky, 1795). [P. 21]

This name was incorporated in the "Commentary" as the correct name for the species Suter called *P. superba* and this conclusion has been accepted by Hedley in his Antarctic Report (1916, p. 35), where unfortunately he has spelt the specific name "*aureus*"; a long synonymy is there given, but Iredale writes me that "still another synonym has to be added with a somewhat humorous history, viz. *Chiton raripilosus* Blainville (*Dict. Sci. Nat.* (Levrault), vol. 36, p. 547, 1821). Attention was drawn to the identity of this species by Pelseneer, but was overlooked by Iredale. Subsequently Dupuis (*Bull. Mus. & Hist. Nat. Paris*, p. 535, 1917) recognised the type in the Paris Museum, and ignorant of both Pelseneer's and Iredale's papers proposed it as the valid name for the species. Then Ashby, glancing at the Loricates in the Paris Museum, noted (*Trans. Roy. Soc. South Austr.*, vol. 46, p. 576, 1922) that this species of Blainville's was quite foreign to him, not recognizing in it the type of *Plaxiphora*, a generic name he has recently preferred for Australian shells."

Family **Cryptoconchidae** Iredale.

This is Suter's "Family Acanthochitidae Fischer" [P. 25], and Ashby's "Family Acanthochitonidae Hedley" (*Proc. Mal. Soc.*, vol. 17, p. 10, 1926). Ashby does not accept Iredale's Family name, giving as his reason, "Under the International Rules, the law of priority does not apply to ordinal or family and subfamily names, the word 'type-genus' in Article 4 of those rules meaning 'Typical genus'." He then considers *Acanthochites* Risso as typical of the family, notes that it has been supplanted by *Acanthochiton* Gray (em. by Iredale, 1915, p. 422) and proceeds to derive new family and subfamily names from this source. Now Iredale has, in another connection, stated his views quite clearly as follows: "the family name... should be called Pyrenidae, not Columbellidae... I have been questioned as to my argument, the only rule in this connection reading "The name of a family is formed by adding the ending *-idae*

....to the root of the name of its type genus." The only type genus of a family I can recognise is the oldest genus admitted in the family. The selection of any other would cause as much confusion as there is in recognising the type species of a genus at present, and give rise to even more complications." (*Proc. Mal. Soc.*, vol. 12, p. 33, 1916). If any sort of stability is to be maintained, this is the only logical interpretation that can be given to the rule in question; the point is so manifest that it need not be laboured, and Ashby's contrary action must be rejected.

It has already been noted that two new Recent species of this family described by Miss Mestayer must be credited to Ashby as author. Ashby also sinks Miss Mestayer's *Acanthochiton foveauxensis* var. *kirki* (*Trans. N.Z. Inst.*, vol. 56, p. 586, 1926) as a synonym of the species itself; the variation is purely individual. A new genus *Lophoplax* has been created by Ashby (type: *L. finlayi* Ashby) (1926b, p. 29) for a curious form from 60 fathoms Otago Heads; also a new subgenus *Amblyplax*, for *Notoplax* (*Amblyplax*) *oliveri* Ashby (*l.c.*, p. 18). Several other new species are proposed, and some buried ones resuscitated by Ashby in the paper quoted. The carnivorous proclivities of *Cryptoconchus porosus* Burrow, 1815, have been made the subject of a note by Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 3, p. 117, 1920).

Genus *Rhyssoplax* Thiele, 1893.

Miss Mestayer has described a new species (*Trans. N.Z. Inst.*, vol. 53, p. 179, 1921) as *R. oliveri*; the unique type, however, appears to be a juvenile and is almost certainly a synonym of *R. aerea* (Reeve), and not related to the Australian *translucens* (H. & H.). This writer has also rejected *R. limans* (Sykes) from the New Zealand fauna, redescribing the specimens Suter so identified as *Callochiton kapitensis* (*l.c.*, vol. 56, p. 584, 1926). I have recorded (*l.c.*, vol. 55, p. 518, 1924) *R. canaliculata* (Q. & G.) from the littoral, Dunedin Harbour, an unusual occurrence. The obscure *R. huttoni* Suter has been recorded from several localities by Odhner (1924, p. 9), but the specimens he sent me so named were *Sypharochiton sinclairi* (Gray)!

Genus *Lorica* H. & A. Adams, 1852. [P. 45]

Miss Mestayer has shown (*Trans. N.Z. Inst.*, vol. 53, p. 177, 1921) that *Lorica volvox* (Reeve) has no place in the Neozelanic fauna, and has described our species as *L. haurakiensis*; later (*l.c.*, vol. 56, p. 587, Pl. 101, f. 10, 1926) she has figured its radula. I have recorded the species from a Forsterian locality (*l.c.*, vol. 55, p. 517, 1924). I now propose the new genus *Zelorica* for *Lorica haurakiensis* Mestayer, basing its distinctions chiefly on girdle characters. This was described originally as of "medium width, closely set with smooth convex scales, which vary slightly in size. There are no tufts of bristles; the posterior slit extends the whole width of the girdle." *Lorica* has a girdle covering of "large irregular striated scales and numerous spiculose tufts" (Iredale and Hull; *Austral. Zool.* 3, pt. 8, p. 357, 1925); the anterior valve is also not so prominently recurved. Neither *Loricella* nor *Kopionella* can be utilised, so a new genus becomes necessary.

Onithochiton subantarcticus Suter, 1907. [P. 49]

I have published a note on this form (*Trans. N.Z. Inst.*, vol. 55, p. 521, 1924), but, owing to lack of material, was unable to decide on its status. Since then Odhner has sent me specimens identified as var. *subantarcticus* from Campbell Island, and these are quite distinct from *neglectus*, so that the form should be recognised as a separate species.

Family **Cavoliniidae**. [P. 53]

This spelling is wrong, as the genus name is written *Cavolina*. It is a very doubtful point whether Abildgaard's name has preference over Bruguiere's proposition of *Cavolina* of the same year, but this cannot be settled at present.

Hedley has allowed his *strangulata* specific rank (1918, p. M 106) and this should be here followed, eliminating *longirostris*.

For *Cavolina trispinosa*, Hedley has used *Diacria* generically, a usage to be recommended, and adopted here.

Cavolina uncinata Rang appears to be a doubtful constituent of the New Zealand fauna, as no authentic record is cited by Suter.

Of *Cuvierina columnella* Rang, Suter wrote, "This is the only living species of *Cuvierina*," but Hedley has preferred *urceolaris* Moersch as a distinct species for the Australian form, and also revived the genus name *Vaginella*, proposed by Daudin generations ago; under this name Clark (*Trans. N.Z. Inst.*, vol. 37, p. 419, 1903) and Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 263, 1918) have described Tertiary species from New Zealand (see list after following note).

Four species of *Clio* have been admitted to the New Zealand Tertiary fauna by Suter (*Alph. List N.Z. Tert. Mollusca*, p. 10, 1918), viz., *annulata* (Tate), *rangiana* (Tate), *tatei* Suter, and *urenuiensis* Suter. The first of these cannot be definitely rejected at present, but probably will be when better specimens are available; the second, however, has already been written off by Marwick (*Rep. Austr. Assoc. Adv. Science*, vol. 16, p. 323, 1924). "*Clio tatei* Suter" seems to be a *nomen nudum*, it was apparently first introduced in 1915 (*Alph. Hand-List N.Z. Tert. Mollusca*, p. 7), perhaps as a new name for one of Tate's species; in the "Lists of New Zealand Tertiary Mollusca" (*N.Z. Geol. Surv. Pal. Bull.* No. 8, p. 50, 1921) there is only one occurrence of the name, in a list of fossils collected by Thomson and Speight at Trelissick Basin, but no legal definition of the species has been given. *Clio urenuiensis* Suter may from the figure be anything at all; specimens have not been seen.

Finally, Miss Mestayer (*Trans. N.Z. Inst.*, vol. 48, p. 124, 1916) has added to the New Zealand fauna *Styliola subula* (Q. & G.) (misspelt *sublata* in her paper), and Hedley (1916, p. 64) has identified some 20 specimens washed up on the shore of Macquarie Island after a gale as *Clidita caduceus* Q. & G. (*Ann. Sci. Nat.*, vol. 6, pt. 21, p. 74, 1825).

Genus **Limacina**. [P. 57]

Iredale has shown (*Proc. Mal. Soc.*, vol. 11, p. 295, 1915) that this genus name must give way to *Spiratella* Blainville, but probably

Embolus Jeffreys must come into use for the second species added by Miss Mestayer, *Limacina inflata* Orbigny (*Trans. N.Z. Inst.*, vol. 48, p. 124, 1916). Marwick has introduced a new genus *Lornia* (*Trans. N.Z. Inst.*, vol. 56, p. 316, 1926) for *Lornia limata* n. sp., a Waiarekan fossil with the facies of a *Spiratella*, but very much larger; it may not be a Pteropod at all.

A list of the present-known species of Pteropods from New Zealand, with their localities, would appear as follows:—

<i>Cavolina inflexa</i> (Lesueur, 1813)	.....	(off Great Barrier Island)
„ <i>strangulata</i> Hedley, 1907	..	(off Great Barrier Island)
„ <i>telemus</i> (Linné, 1758)	...	(Chatham and North Is.)
<i>Diacria trispinosa</i> (Lesueur, 1821)	....	(off Great Barrier Island)
<i>Spiratella australis</i> (Eyd. and Soul, 1840)		(Lyall Bay)
<i>Embolus inflatus</i> (d'Orb., 1836)	..	(off Big King and North Cape)
(?) <i>Lornia limata</i> (Marwick, 1925)	.....	(Waiarekan Tuffs, Eocene)
<i>Clio annulata</i> (Tate, 1887) (?)	.....	(Black Point, Eocene)
„ (?) <i>urenuiensis</i> Suter, 1917	.....	(White Cliffs, Pliocene)
<i>Chiodita caduceus</i> Q. & G., 1825	.....	(Macquarie Island)
<i>Styliola subula</i> (Q. & G., 1827)	.....	(off Big King Island)
<i>Cymbulia parvidentata</i> Pelseneer, 1888		(Cook Strait)
<i>Vaginella urceolaris</i> (Moersch, 1850)	.....	(off Great Barrier Island)
„ <i>aucklandica</i> Clarke, 1903	.....	(Orakei Bay, Pliocene)
„ <i>torpedo</i> Marshall, 1918	.....	(Kaipara, Oligocene)

Family ACMAEIDAE [P. 61]

A valuable account of the Recent and fossil New Zealand and Australian members of this family has just appeared from the pen of W. R. B. Oliver (*Trans. N.Z. Inst.*, vol. 56, pp. 547-582, 1926), and no more can be said on the subject here. He states that “The characters of the radula have been used in defining the genera and subgenera,” and further that, “Apparently the shell and radula characters do not always run parallel...species whose shells are alike have quite different teeth, while, conversely, the same radula formula is found in species having very unlike shells.” (p. 548). This is but further confirmation of what I have already stressed in my introduction (written before Oliver's paper appeared), and it is safe to assume that similar independence of shell and radula characters will be found in almost every molluscan family. Oliver creates the following new groups for Australasian Acmaeas:—

- Chizacmea* for *Patelloida flammea* Q. & G. (p. 558).
- Asteracmea* for *Helcioniscus illibrata* Venco (p. 563).
- Actinoleuca* for *Patella campbelli* Filhol (p. 567).
- Conacmea* for *Acmaea parviconoidea* Suter (p. 577).
- Thalassacmea* for *Notoacmea badia* Oliver (p. 579).
- Subacmea* for *Notoacmea scopulina* Oliver (p. 580).

the last three being treated as subgenera of *Notoacmea* Iredale. He also notes two changes in specific names of New Zealand species.

both introduced by Iredale: *Patella inconspicua* Gray, 1843 (*Dieff. Travels N.Z.*, vol. 2, p. 244) supercedes *Fissurella rubiginosa* Hutton (Iredale, 1924, p. 237), and the specific name *fragilis* is restored to the sole species of *Atalacmea*, *Patella fragilis* Sow., 1823 (*Gen. Shells*, pt. 21, pl. 140, f. 6, and text) antedating *P. unguis-almae* Lesson, 1830 (Iredale, 1924, p. 238). Oliver, however, retains *rubiginosa* Hutt. as a trinomial for the Moriorian form (p. 565), sinking *Acmaea cingulata* Hutton instead as an absolute synonym of *inconspicua* Gray.

Radiacmea macquariensis Hedley (1916, p. 41) and several new species and subspecies are added to the New Zealand "*Acmaea*" fauna in Oliver's monograph.

Genus *Nacella* Schumacher, 1817. [P. 76]

Suter admitted this genus and under the section *Patinigera* Dall ranged two species, *Nacella fuegiensis* (Reeve, 1855) and *Nacella illuminata* (Gould, 1846). The distribution of the former was given as Campbell Island and Macquarie Island, and of the latter as Antipodes Island, Auckland Islands, Campbell Island, and Macquarie Island. Under the genus *Helcioniscus* appeared *H. redimiculum* (Reeve, 1854) from the mainland, Chatham, Bounty, and Auckland Islands; and *H. strigilis* (Hombron and Jaquinot, 1841) from the mainland, Chatham, Antipodes, Auckland, Campbell, and Snares Islands. Iredale in his "Commentary" (p. 432) from study of mainland shells in Otago advised the lumping of the last two, since shells showing variation covering the two accepted types had been collected on the mainland, and the range was small.

A reconsideration of the facts has become necessary since Hedley published his account of the Mawson Expedition Mollusca. Therein he admitted two species only from Macquarie Island, referring both to *Nacella* and giving a good account of the animals and shells. Using *Nacella delesserti* (Philippi, 1849), given to a Marion Island shell, he synonymised Reeve's *redimiculum*, but doubtfully added Hombron and Jaquinot's *strigilis*. He concluded, however, that *Nacella illuminata* (Gould) from the Auckland Islands was a different species. The growth stages he figured of his "*delesserti*" agreed with the forms from the Auckland Islands described as *illuminata* by Gould and as *strigilis* by Hombron and Jaquinot. However, study of growth stages of *redimiculum* from the mainland reveals that, although it shows parallel stages to *illuminata* and *strigilis*, the juvenile is more coarsely ribbed and secondary sculpture is obsolete, in this respect showing an approach to the Tasmanian shell known as *limbata* and commonly referred to *Cellana*. This suggests study of the Tasmanian species, and also of the mainland New Zealand *redimiculum*, which is superficially a true "Nacelloid." Since *redimiculum* is separable, the reference to *delesserti* does not seem satisfactory, so that I propose to follow Hedley's first idea and introduce the new name *Nacella macquariensis* for the species so well described and figured by him (*Rep. Austr. Antarct. Exped.*, vol. 4, pt. 1, "Mollusca," p. 42, pl. 6, figs. 65-69), the type series being in the Australian Museum.

We have then a series of subantarctic and mainland forms,—

<i>Nacella macquariensis</i> nov.	.....	.....	.....	Macquarie Island
„ <i>strigilis</i> (H. & J., 1841)	=	<i>illuminata</i>	(Gould, 1846)	Auckland Island
„ <i>terroris</i> (Filhol, 1880)	.....	.....	.....	Campbell Island
„ <i>redimiculum</i> (Reeve, 1854)	.....	.....	.....	South Island

Before one can determine any further synonymy or localities, specimens must be examined, as *N. illuminata* has been recorded from Antipodes Island, *H. redimiculum* from Chatham, Bounty, and Auckland Islands, and *H. strigilis* from the whole of the mainland and all these places except Macquarie Island, while Hedley's adult shell from that locality would have been so named without question. Suter's *strigilis* from Tauranga is the most interesting record. For the kelp living form Hedley has preferred *Nacella kerguelenensis* Smith, proposed for a Kerguelen species, to *N. fuegiensis* Reeve used by Suter, observing that the Macquarie Island forms "agree generally with specimens from Kerguelen Island." In this case also it would have been better to have proposed a new name for the form under consideration.

***Helcioniscus radians* (Gmelin, 1791). [P. 81]**

In the *N.Z. Journal of Science and Technology* (vol. 2, Nos. 4 and 5, p. 264, 1919), Dr. Allan Thomson has provided some interim notes on "Polymorphism in the Common New Zealand Limpet, *Cellana radians* (Gmelin)," and his full conclusions have not yet appeared. The technical names, owing to their extremely involved nature, need careful consideration, but may really be left till the facts are established. However, it is as well to note that *Patella decora* Philippi undoubtedly refers to this group, and not to the *strigilis* species; Thomson (*l.c.*, p. 264) accepted Suter's recognition of a photograph of the original illustration, but the accompanying description giving details which apply to *radians*, not *strigilis*, was not considered by either Thomson or Suter. Thomson has written, "The high conical shells go through a depressed stage with an anterior apex. They are therefore more advanced in form than the depressed adult shells, and deserve specific recognition on this account. The species *perana* and *flava* belong here. Perhaps an intermediate species should be recognised. The type of *radians* is a depressed form." Most workers, however, will not agree that in the limpets form alone is of specific value. Intensive study of Australian limpets by Iredale has shown that, in confirmation of his former surmise, the shells do vary in this respect (as in others) according to the nature of the rock. To cite a concrete instance, on Long Reef, composed of the Narrabeen Shale, a long depressed shell is found, and on the sandstone boulders adjacent thereto a higher shell occurs, while in Freshwater Cove, three or four miles south, a much higher, more conical form lives on the sandstone. Series can be easily collected which would be valid species according to Thomson's dictum, but which we know are not recognisable variants. According to the exact position with regard to wave stress, variation in shape occurs and is not governed by locality. Thus at the Bottle and Glass Rocks

inside Sydney Harbour, on sandstone exposed to surf, the shells agree fairly closely with those from the Narrabeen Shale of Long Reef, save in colouring, which is much richer.

***Cellana stellifera* (Gmelin, 1791).** [P. 86]

Noted by Powell (*N.Z. Journ. Sci. & Tech.*, vol. 4, p. 204, 1921) as plentiful at Busby Head, Whangarei Heads. Suter gives this species a range from Cape Maria van Diemen to Campbell Island; this needs investigation. Bucknill (1924, pl. 2, figs. 10, a, b) has lately figured young and old examples. He has also figured (*l.c.*, figs. 8, 9) *Cellana ornata* (Dill.) and the subspecies *inconspicua* (Gray) admitted by Suter [P. 81]. But it has already been noted (see Note on Family Acmæidae) that *Patella inconspicua* Gray applies to the common mainland *Radiacmea*, and not to a limpet, so that the *ornata* variety is at present nameless. Iredale (1924, p. 238) doubts whether the form is worth distinguishing, and from what I have seen I am inclined to agree, but the matter must be left till someone can study large suites from many localities.

***Scissurella mantelli* Woodward, 1859.** [P. 88]

This species belongs to the genus *Schizotrochus*, a world-wide group of but few species. When Miss Mestayer described a fine shell as *Scissurella regia* nov. (*Trans. N.Z. Inst.*, vol. 48, p. 123, 1916), she noted that Hedley had suggested the possibility of her having found the long lost *mantelli*, and then said, "but it does not at all resemble that species, being more depressed, and quite differently sculptured." In these comparisons she was evidently judging from Suter's figure in the Manual "Atlas," which is almost the extremity of crudeness. Pilsbry (*Man. Conch.*, vol. 12, Pl. 57, f. 12) gives a much better copy of Woodward's figure, which portrays a shell very like that depicted by Miss Mestayer, allowing for different aspects of view and methods of illustration. When one remembers the paucity of species of *Schizotrochus* (only one species being usually present in a faunal area, and that species having generally a wide range), and the fact that both these forms were described from the North Island, it is not difficult to imagine that they represent the same thing, and from examination of paratypes in my possession I can affirm that this is so. *Schizotrochus mantelli* (Woodward) therefore becomes the name for the only Recent Neozelanic member of this genus, *regia* Mestayer falling as a synonym; I have seen fossil ancestral species. As regards other *Scissurellas*, Iredale has proposed the new genus *Scissurona* for the *rosea* type (1924, p. 215), and no true *Scissurella* has yet been described from New Zealand, though undescribed species are known to me.

Genus *Schismope* Jeffreys, 1856. [P. 89]

Suter admits three species and a subspecies, two of the species being identified with Australian shells. Both these records must be expunged, for reasons given below, where the Neozelanic species are described as new. Suter's figures are not drawn from New Zealand shells; that of *S. beddomei* is a poor tracing of May's drawing ("Revised Census of the Marine Mollusca of Tasmania," Pl. 24, fig.

24, 1901), while that of *S. atkinsoni* seems to be a careless copy of Watson's figure of his *S. carinata* (Chall. Rep., vol. 15, p. 119, pl. 8, fig. 6, 1886). There are at least two species of the *beddomei* group found in deep water off the Snares, but neither of these matches with Australian forms; there are other species of the same group from more northern localities.

Schismope lyallensis n. sp.

Shell generally similar to *S. atkinsoni*, but with less prominent keels. Sculpture above fasciole very inconspicuous, only some raised growth-lines and a few spiral grooves; below the sunken fasciole with its raised edges there is a broad concave almost smooth space, then another keel emerging from the suture; below this, base is lightly convex, and is scored by 8-9 shallow grooves, marking very low broad ribs, inner ones of which are in and on margin of umbilicus, which is wide and deep, defined by a blunt keel; above inner spiral rib there are numerous curved axial threads. Base nowhere angled by any of the ribs (there is a third keel in *atkinsoni*); whorls bulge out further past fasciole than in Tenison-Woods' species, and aperture is less oblique, due to narrower umbilicus. Whole of aperture bounded by curved lines, not straight as in *atkinsoni*. Anal perforation one-eighth of a whorl in length.

Height, 1.5 mm.; diameter, 1.8 mm.

Locality,—Lyall Bay, in shell sand.

Schismope laqueus n. sp. (Figs. 30, 31.)

Closely allied to *S. beddomei*, but differing, as Suter says, in larger size and more depressed shape, also in more numerous axial ribs. Spire hardly at all elevated, the smooth shoulder being very broad and horizontal, apex lightly concave. Constantly about 15 axial ribs (interstices about twice their width) on base below the smooth concave space under fasciole keel, and about the same number before the aperture on upper side, diminishing regularly in size, but remaining conspicuous till almost hidden by sinking of the upper whorls. Ribs on spire begin to encroach on shoulder about $1\frac{1}{4}$ whorls from aperture. About four narrow and distant spiral threads distributed over base. Umbilicus moderately large and deep. Other details as in *S. beddomei*.

Height, 1.25 mm.; diameter, 1.5 mm.

Locality,—Snares Island, in 50 fathoms.

Schismope iota n. sp.

More like *beddomei* in size, but less elate and with fewer axial ribs, and different aperture. Spire projecting, its sides formed by the rather high penultimate whorl, its lightly convex top by the much depressed earlier whorls; the smooth shoulder is not so wide as in previous species, and distinctly sloping. Constantly 9 narrow and distant axial ribs (interstices 3-4 times their width) on base, and about same number of prominent and still distant ribs before aperture on upper whorls, followed near apex by about half-a-dozen smaller and closer ribs. Ribs on spire encroach on shoulder when less than a whorl from aperture. About three almost obsolete spiral ribs very close together bordering umbilicus, which is narrow and very shallow.

Aperture suboval except for straight columellar edge, only slightly angled above, margins much thickened for so small a shell. Anal perforation smaller and with much less raised margins than in *beddomei* and *laqueus*.

Height, 0.9 mm.; diameter, 0.8 mm.

Locality,—Snares Island, in 50 fathoms.

Sinezona n. gen.

I propose this name for the *Schismope brevis* group, naming that species as type. The distribution of species in this group invites consideration, Hedley's *brevis* being recorded from Lyall Bay (type), Snares Island, in 50 fathoms, and Lyttelton Harbour; while the subspecies *laevigata* Iredale is given as from Sandfly Bay (type) and Lyall Bay. Examination of numerous specimens shows that there is but one species of *Sinezona* at Lyall Bay, differing from all the southern forms in its more central apex and inflated spire-whorls. *Laevigata* Iredale should be regarded as a distinct form, characterized by low and generally quite smooth spire, lateral elongation of the last whorl, less tumid whorls (noticeable especially on the base), and short fasciole. I have recorded it from Taieri Beach (*Trans. N.Z. Inst.*, vol. 55, p. 517, 1924), and it seems to be typically a Forsterian form, but Snares specimens are not at present separable; *brevis*, of course, does not occur at the Snares. Finally, *Schismope subantarctica* Hedley (*Rep. Austr. Antarct. Exped.*, vol. 4, pt. 1, p. 36, pl. 5, figs. 54, 55, 1916), from Macquarie Island, must be added to the Neozelanic list of *Sinezona*. Miss Mestayer (*Trans. N.Z. Inst.*, vol. 51, p. 130, 1919) has recorded this species from Lyall Bay and the Snares, but these records may be rejected without much hesitation; *subantarctica* is easily distinguished from the Lyall Bay *brevis*, while it differs from *laevigata* in being smoother, less elongate laterally, the last whorl rapidly descending downwards, and in having—in the unique type—no fasciole behind the perforation. The nearest approach to *subantarctica* I have seen is an undescribed species from the Chatham Islands. The absence of the fasciole-girdle suggests the name chosen for the genus and will afford a ready means of recognition; the whole facies, however, is peculiar. *S. lacuniformis* Watson (*Chall. Rep.*, vol. 15, p. 118, pl. 8, fig. 8), from off the West Indies is superficially like this group, but has a gaping umbilicus; in *Sinezona* this is generally sealed up by the inner lip.

Genus *Haliotis* Linnaeus, 1758. [P. 92]

In the *Proc. Mal. Soc. (Lond.)*, vol. 9, p. 260, 1911, Iredale pointed out that Montfort had selected as type of *Haliotis* the Linnean species *asininus*, and had introduced *Padollus* for a species *rubicundus*. If we admit that more than one genus is represented in the Linnean *Haliotis*, and if Montfort's action were upheld, the New Zealand shells would all fall into his *Padollus*. Iredale informs me, however, that reconsideration suggests that as *tuberculata* L. was the well-known species, and commonly regarded as such, being named *vulgata* and *vulgaris*, *Haliotis* may be retained in connection with it; a most desirable proceeding. The New Zealand species may thus, for the present, all be left in *Haliotis*.

***Haliotis australis* Gmelin, 1791. [P. 93]**

Add to the synonymy *Haliotis aleata* Bolten (*Mus. Bolten*, p. 14, 1798). In the synonymy Suter has included *Haliotis plicata* Karsten (*Mus. Leskeanum*, p. 297, 1789), which would have priority, but Karsten's names are unacceptable as they are simply quotations from binomial and also non-binomial authors, without any attempt to treat them all binomially.

***Haliotis varia* Linnaeus, 1758. [P. 94]**

This should be placed on a suspense list in the meantime. No authentic specimens are known to local collectors, and the New Zealand habitat of the specimens Suter recorded is open to doubt.

***Haliotis huttoni* Filhol, 1880. [P. 96]**

This form also occurs at Auckland Island, and may be trinomially treated as a regional development of *virginea* Gmelin. Odhner's record of *virginea* from Auckland Island (1924, p. 12) refers to this form; the differential characters given by Suter are quite good.

***Fissurella huttoni* Suter, 1906. [P. 97]**

From study of the type specimen in the Dominion Museum, Oliver has formed the opinion (private communication), which he has kindly allowed me to publish, that it is an exotic shell, probably *Diodora barbadensis* (Gmelin), and should share the fate of *Raeta perspicua* Hutton and other extra-limital species wrongly included in the New Zealand fauna by Hutton. Hutton originally gave no locality for his *Fissurella squamosa*, "Foveaux Strait" being added later; it may be noted that Oliver has written (*Proc. Mal. Soc.*, vol. 15, pt. 4, p. 186), "In his Manual, Hutton appears to have set himself the task of attaching localities to the species he had previously included in his Catalogue without any." The matter is, however, complicated by the fact that there are in the British Museum (*vide* Iredale) specimens, reputedly Neozelanic, referred to this species. These seem to be related to the Australian shell long known as *lineata* Sow., but which Iredale (1924, p. 220) has named *Elegidion audax*. The collecting and dredging of many years in New Zealand by both local and outside workers has failed to bring to light any further specimens, so that one may query the British Museum record, and the best course appears to be the relegation of this species in the meanwhile to the suspense list, with the probability that it will not be found to live in New Zealand.

Genus *Emarginula* Lamark, 1801. [P. 99]

Chapman and Gabriel have written (*Proc. Roy. Soc. Vict.*, vol. 36, N.S., p. 29, Dec., 1923) of *Emarginula wannonensis* Harris that "Suter (*Alph. Hand List N.Z. Tert. Moll.*, p. 9, 1915) has also given it as a living species in New Zealand, but so far we have not met with any occurrence recorded from that or any other area." The authors then proceed to comment on the long range possessed by this and other species, several times citing *wannonensis* as a Tertiary form now found living only in New Zealand. If, however, they had

thought to check their statement by reference to the later *Alph. List Tert. Moll.*, p. 13, 1918, or to any of the *Palaeontological Bulletins*, e.g. No. 9, appearing after 1915, they would not have made this error. Suter had no intention of recording Harris's species as a Recent New Zealand shell; the asterisk in the 1915 List is very evidently a typographical error; it is known that that list contains many such mistakes, and seems to have been compiled in haste. The Tertiary records of *E. wannonensis* are mostly based on specimens from the Kakanui and Waiarekan tuff horizon; they must be rejected also; the form in question is a new species of the *striatula* group, and there do not seem to be in New Zealand any members of the *wannonensis* type. Of the Australian Tertiary species discussed by Chapman and Gabriel, only *dennanti* and *delicatissima* seem to have affinity with Neozelanic forms.

Fissuridea monilifera (Hutton, 1873) [P. 105]

This species has nothing whatever to do with *Fissuridea*, which has the "animal capable of being contained entirely within the shell" to quote Suter's own definition, whereas the New Zealand animal is much too large for its shell. As a matter of fact it is closely related to the Australian shells such as *javanicensis* Lamarck, *nigrita* Sow., and *concatenata* Crosse and Fischer, each of which has proved, from examination of the radula and animal, to represent a distinct genus. Iredale (1924; pps. 182, 218, 219) has generically named these as *Amblychilepas* Pilsbry, *Sophismalepas* nov., and *Cosmetalepas* nov., and as the New Zealand shell has a different type of sculpture, and the genera are very local it would be wiser with our present knowledge not to attach the Neozelanic species to any one of these, but to propose the new generic name, *Monodilepas* for it alone. It may be noted here, however, that at least three species of *Monodilepas* inhabit the New Zealand area, one of which is known at present only from the Moriorian Province; there is also an undescribed older Tertiary species from the Clifden beds (Finlay, *Trans. N.Z. Inst.*, vol. 55, pp. 534-38, 1924), so that the lineage is evidently an ancient one.

Montfortula conoidea (Reeve, 1842). [P. 101]

Simultaneously with Iredale's report in the "Commentary," Hedley published some notes on this group (*Proc. Linn. Soc. N.S.W.*, vol. 39, p. 706, 1914 (Feb. 26, 1915)), and followed this up with a review of the genera *Tugalia* and *Scutus* (*Proc. Linn. Soc. N.S.W.*, vol. 41, pp. 695, 704, 1916 (Apr. 4, 1917)). In the "Commentary" Iredale suggested that, if association of the "*rugosa*" group were necessary, it should be with *Emarginula*, not with *Hemitoma* where it had been placed. Further study shows the *Montfortula* series to constitute a distinct development, the Sydney species, for which Iredale has revived Reeve's name as above, living and growing to a large size at high water mark, a station quite different from that occupied by the other groups, which live below low water. The New Zealand shell, misrecognized as *rugosa*, appears to be both rare and nameless. Only one authentic specimen from the mainland is at present known to local collectors; it is in Miss Mestayer's collection,

but has not been available for examination, so that unfortunately no details of its affinities can be given. There are, however, in the Finlay collection three specimens of a new *Montfortula* from the Chatham Islands; these differ in shape and sculpture from *conoidea* Reeve, and will be described in the Chatham Report. Also, from examination of the type, kindly lent by Mr. Bartrum, I have determined the lower Pliocene *Tugalia kaawaensis* Bartrum (*Trans. N.Z. Inst.*, vol. 51, p. 100, 1919) as referable to this genus.

***Tugali elegans* Gray, 1843 [P. 102]**

In his account of this genus, Hedley proposed for the shell *Suter* included as *S. parmophoidea* the new name *Tugalia bascauda* (*Proc. Linn. Soc. N.S.W.*, vol. 41, p. 698, pl. 52, fig. 47, 1916 (Apl. 4, 1917), a praiseworthy innovation, but he allowed Reeve's specific name *intermedia* for the second New Zealand species. Iredale (1915, p. 435) had indicated his distrust of the name, and it should be rejected in favour of the correct name above given almost simultaneously by Gray. Reeve's name was given to a Philippine Island species in the first place; the type was apparently lost, Sowerby synonymised it with *cinerea* Gould—a later name—and Reeve finally accepted the synonymy and gave a figure of a specimen in Sowerby's collection. It is obvious that if Reeve rejected his own species, there can be no reason for considering it in connection with the Neozelanic fauna, when there is an exact name of even date available. Iredale (1915, p. 432) has already noted that the generic name was originally introduced as *Tugali* (Dieff. "Travels," vol. 2, p. 259, 1843) and there seems to be no valid reason for rewriting it.

Thiele has proposed *Emarginula (Tugalia) suteri* nov. for a Chatham Island shell (*Conch. Cab.*, Bd. 2, Abth. 4a, p. 105, Pl. 12, figs. 17, 18, 1916), and this would anticipate Hedley's *bascauda*, but though Hedley recorded his species from the Chathams, he chose as type a shell found "under stones near Wellington." This is fortunate, for the Moriorian form regionally differs from the mainland shell in greater elongation, generally more parallel sides, and squarely, not narrowly, rounded anterior end. No perfectly fresh specimens of *suteri* Thiele have been available; it is probable that these would be still more easily differentiated from fresh *bascauda* Hedley.

Local workers have been puzzled as to the criteria for distinguishing some forms of *elegans* from very similar shells referable to *bascauda*, the general distinctions of smaller size and more netted sculpture in the latter often, apparently proving of but little use. This confusion is due to the fact that there are living in the New Zealand area not two but four—possibly five—species of *Tugali*, the name "*intermedia*" auct. covering two distinct forms, *elegans* and *colvillensis* n. sp. (q.v.). The only feature which always allows of ready distinction between the *bascauda* and *elegans* groups is the nature of the sinus rib (the median anterior raised cord which overlies the interior groove). In both species this begins as a single strong keel, which in *bascauda* and *suteri* soon bifurcates and remains so to the margin, while in *elegans* and *colvillensis* the sinus rib on breaking up at once becomes triple, often several more riblets being

intercalated before the margin is reached. *Colvillensis* simulates the *bascauda* group in having netted sculpture, and to this is due the confusion of the species, but its true affinities are at once shown by the nature of the sinus rib. I have myself made this error by recording *Tugalia bascauda* from the littoral, Dunedin Harbour (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924); I now withdraw this, as the trifurcate sinus-rib shows the specimen to belong to the *elegans* group, and though it is juvenile, the altitude, netted sculpture, and carination characterize it as *colvillensis*. *Bascauda* does not seem to enter the Forsterian region, but *elegans* has already been reported from Banks Peninsula by Iredale (*Trans. N.Z. Inst.*, vol. 40, p. 392, 1908) as "Dead shells in shell-sand";—these may have been *colvillensis* also.

Ancestral species to these *Tugalis* occur in the New Zealand Tertiary. I have described (*Trans. N.Z. Inst.*, vol. 56, p. 227, 1926) *T. phocénica* and *T. navicula* from the Pliocene and Miocene respectively, the former being directly ancestral to *colvillensis* n. sp., the latter of a rather different type, more like the Tertiary Australian *T. crassireticulata* (Pritchard) (*Proc. Roy. Soc. Vict.*, vol. 8, p. 125, 1896) from Table Cape.

***Tugali colvillensis* n. sp.**

Shell intermediate in size between *elegans* Gray and *bascauda* Hedley, high, laterally compressed and narrowly elongate, tapering slightly in front, where there is a very short truncation due to narrowness of interior groove. Front slope decidedly carinate medially, the central sinus-rib at first single, wide, and strong, but soon breaking into three narrow ribs which continue with sublinear interstices to margin. Sculpture netted, much as in *T. bascauda*; in the type the ribs are fairly wide and flattish, but most of the paratypes have narrow radial and concentric ribs, swollen at intersections, with tiny square pits between.

Height, 8 mm.; length, 21.5 mm.; width, 13 mm.

Locality,—Hauraki Gulf, dredged in 20-25 fathoms, near Cape Colville; also Dowling Bay, Dunedin Harbour, one specimen on the littoral, with *Emarginula*.

The specimens were kindly sent for examination by Mr. A. W. B. Powell of Auckland, and the paratypes are in his collection.

***Scutus ambiguus* (Chemnitz, 1795). [P. 103]**

Suter observed, "E. A. Smith has thoroughly revised the genus in an excellent paper in the *Quart. Journ. Conch.*, vol. 2, p. 250, 1879." It should be noted that this revision had taken place some thirty odd years previously, so that probably some emendations were necessary. In the place referred to in the preceding note, Hedley recorded some corrections in connection with Australian forms, and indicated *breviculus* Blainville (*Bull. Sci. Soc. Phil.*, p. 28, 1817) as the name for the Neozelanic species.

***Puncturella demissa* Hedley, 1904. [P. 104]**

Iredale has named this species as genotype of his *Vacerra* (1924, pp. 182, 221), which was provided "for the small austral forms ascribed to *Puncturella*, but which do not closely agree, even in superficial features with the type of that genus."

One may emphasize Iredale's former remark that "summaries are most helpful," and I would express my arrangement of the authentic Neozelanic Rhipidoglossate forms so far dealt with as follows,—

Genus SCHIZOTROCHUS Monterosato 1884 Type: *S. crispata* Fleming.

Schizotrochus mantelli (Woodward, 1859).

Genus SCISSURONA Iredale, 1924. Type: *S. rosea* Hedley.

Scissurona rosea (Hedley, 1904).

Genus SCHISMOPE Jeffreys, 1856. Type: *S. cingulata* Costa.

Schismope lyallensis nov.

— *laqueus* nov.

— *iota* nov.

Genus SINEZONA nov. Type: *S. brevis* Hedley.

Sinezona brevis (Hedley, 1904).

— *laevigata* (Iredale, 1908).

— *subantarctica* (Hedley, 1916).

Genus HALIOTIS Linnaeus, 1758. Type: *H. tuberculata* L.

Haliotis australis Gmelin, 1791.

— *iris* Martyn, 1784.

— *virginea* Gmelin, 1791.

— *huttoni* Filhol, 1880.

Genus MONODILEPAS nov. Type: *L. monilifera* Hutton.

Monodilepas monilifera (Hutton, 1873).

Genus INCISURA Hedley, 1904. Type: *S. lytteltonensis* Smith.

Incisura lytteltonensis (Smith, 1894).

Genus EMARGINULA Lamarck, 1801. Type: *P. fissura* L.

Emarginula striatula Q. & G., 1834.

Genus MONTFORTULA Iredale, 1915. Type: *E. rugosa* Q. & G.

Montfortula sp. nov.

[— *kaawaensis*]* (Bartrum, 1919).

Genus TUGALI Gray, 1843. Type: *T. elegans* Gray.

Tugali elegans Gray, 1843.

— *colvillensis* nov.

— *suteri* Thiele, 1916.

— *bascauda* Hedley, 1917.

[— *phiocenicæ*] Finlay, 1926.

[— *navicula*] Finlay, 1926.

Genus SCUTUS Montfort, 1810. Type: *S. antipodes* Montfort.

Scutus breviculus (Blainville, 1817).

Genus VACERRA Iredale, 1924. Type: *P. demissa* Hedley.

Vacerra demissa (Hedley, 1904).

Family Trochidae. [P. 105]

Much advance has been made in this group since Iredale's "Commentary" was issued. In connection with Australasian species Iredale has examined many radulae in the Gwatkin collection (now in the British Museum), including some results in his "Roy Bell" essay on Australian forms. Thiele has published a revision of the Trochids based solely on radular characters, but when these were

*In this and similar summaries the enclosure of a name in square brackets indicates that it is a fossil species and does not occur in the Recent fauna.

unknown he has fallen back on shell features. As this Revision will not be seen by many Neozelanic students and is a very important account, a digest (which I owe to the kindness of Mr. Tom Iredale) is here offered. Some startling associations are propounded, but when we realize that we are dealing with one of the most primitive groups of simply-coiled shells, our surprise at these is lessened.

Thiele admits three families: *Trochidae*, *Cyclostrematidae*, and *Turbinidae*, in his *Stirps Trochacea*, but his Subfamilies are better treated as Families, and his subgenera raised to genera, and thereby one can produce an arrangement more in accord with the lessons learned from palaeontology, which Thiele has ignored. Further, it becomes apparent that the southern Trochoids have developed very long ago, as we find in early Tertiary beds forms practically inseparable conchologically from their Recent descendants. As the separative characters are based almost entirely on animal characters, it is necessary to establish the Recent fauna first, and then associate the fossils with the living species in direct lineage, and with the strictest scrutiny, growth-stages providing the best guide.

Thiele's "Family *Trochidae*" embraces the subfamilies *Margaritinae*, *Calliostomatinae*, *Trochinae*, *Umboninae*, *Stomatinae*, *Angarinae*, and *Delphinoideinae* (= *Skeneinae*, corrected in MS. in the copy seen). The "Family *Cyclostrematidae*" is used as a receptacle for a few minutiae, and seems a poor proposition. The "Family *Turbinidae*" is subdivided into four subfamilies, *Liotinae*, *Bothropomatinae*, *Turbininae*, and *Phasianellinae*.

In the subfamily *Margaritinae* Thiele has associated northern and southern groups, somewhat incongruously if one may judge from shell characters. However, one can avoid argument, as the oldest genus name included is *Stomatella*, so that we can use the Family *Stomatellidae* for our southern mollusca, whether the northern ones are separated or not. Thiele has arranged *Margarella* as a subgenus of the northern *Margarites*, but here again, by accepting a higher value, and admitting *Margarella* as a distinct genus, one can obviate any discussion. *Photinula* is widely separated, being included in the subfamily *Calliostomatinae*. Following the *Margarites* series, Thiele places *Turcica* and its allies, *Calliotropis* (= *Solariellopsis* Schepman, not Gregorio), *Turcicula*, and *Lischkeia*. Conchologically these forms show no great disagreement among themselves, but have no likeness to the preceding *Margarites* shells. They are followed by *Perrina*, *Danilia*, *Euchelus*, and *Stomatella*, another good conchological arrangement, but the next form, *Solariella*, disagrees in every way in shell features, and its palaeontological age denies it very close relationship. Concluding this subfamily are the deep water genera *Basilissa*, *Seguenzia*, and *Gutterula*.

The subfamily *Calliostomatinae* is utilized for the genera *Calliostoma* and *Photinula* alone, including *Astele* as a subgenus, apparently for the Australian type and some quite unrelated American shells. The radular characters of the southern "Calliostomas" were probably unavailable to Thiele, as they show valid distinctions, and would have been utilized for separation. The reference of *Photinula* here does not seem in accord with the conchological features and southern range.

The subfamily *Trochinae* includes all the usual Trochoids with a few innovations and a few conservative groupings. Thus a "genus" *Gibbula* is admitted, covering "Sectiones (ad libitum)" ranging all over the world, and clutching the austral groups, *Eurytrochus*, *Calliotrochus*, and *Cantharidella*, but the group name would be *Phorcus* if Thiele's own association were accepted. A genus *Fossarina* is ranged next, with a section *Clydonochilus* and a subgenus *Synaptacochlea*. These three appear to be closely related, though the last named was introduced as a relative of *Gena*. Then follows a genus *Cantharidus*, with a section *Phasianotrochus*, subgenus *Jujubinus*, subgenus *Bankivia* with section *Leiopyrga*, subgenus *Thalotia* with sections *Alcyna* and *Odontotrochus*. The inclusion of *Jujubinus*, hitherto regarded as a subgenus (or genus) of *Calliostoma*, is noteworthy, but obviously it is a valid genus. *Leiopyrga* is also of generic value, while *Alcyna* is a very distinct genus, not closely related to this series at all. The importance of the reference here of *Jujubinus* is seen in the matter of the Australian "Calliostomas," as these appeared to be closely related to *Thalotia*, and this can now be accepted. The only unfortunate item in Thiele's Revision is his worldwide range for relationships, seen again in the next genus, *Monodonta*. This is made to include the European *Osilinus*, as well as the American *Diloma* and *Oxystele*. *Austrocochlea* (for *constricta*) is ranked as a subgenus of *Monodonta* s.str., while *Melagraphium* (for *aethiops*) and *Chlorodiloma* (for *crinita*) are ranged as sections of the subgenus *Diloma* (for the South American *nigerrima*). Then follow the genera *Chrysostoma*, *Tegula*, *Cittarium*, and *Norrisia*, which do not concern us at present. *Gaza* is doubtfully interpolated before *Clanculus*, which is followed by *Trochus* with many sections and one subgenus, *Tectus*, with two sections, *Cardinalia* and *Rochia*.

The subfamily *Umboninae* comprises a novel series, beginning with *Callumbonella* questionably referred here, then followed by a new genus *Nanula*, proposed for the Australian *Margarita tasmanica* Petterd, *Halistylus*, and then *Minolia*, with sections *Isanda*, *Umbonella*, and *Conotrochus*; *Monilea*, with section *Rossiteria* and subgenus *Priotrochus*; and *Ethalia* with a subgenus *Ethaliella*, concluding with *Umbonium*. This will be discussed further on.

The subfamily *Stomatiinae* begins with a doubtful form, *Stylobates*, then the genus *Stomatia* with sections *Microtis*, *Pseudostomatella* Thiele (for *papyracea* Chemnitz), and *Niphonia*; genus *Phaneta* questionably allied, and *Gena* with a section *Plocamotis*; concluding with genera *Roya* and *Broderipia*.

The subfamily *Angariinae* covers the genus *Angaria* alone; as a section *Angarina* being admitted, though its reference to the family has been disputed.

The last subfamily, *Delphinoideinae* (that is, *Skeneinae*), is a heterogeneous assemblage of minute forms, northern and southern forms being incongruously associated with numerous question marks, and is of little use. Thus, to the genus *Skenea*, a British form of definite status, is added as a subgenus with a "?" Adams' *Tubiola*, a well marked tropical group, the animal of which is unknown. The genus *Daronia* follows, also queried, and as a subgenus, again queried, is added *Cyclostremella*, a northern group quite unrelated. The

genera *Ganessa* and *Tharsiella* succeed, with, as sections, several probably allied groups, but the next series which concerns us consists of austral and Pacific forms, most of them queried. These are *Cirsonella*, *Lodderia*, *Teinostoma* (with sections *Pseudorotella*, *Calceolina*, and *Callomphala*), *Philorene*, *Leucorynchia*, *Haplocochlias*, *Morchiella* Thiele (for *Morchia* A. Adams, 1860, not Albers, 1850), and *Microthecla*. *Haplocochlias* is geographically dissevered, the remainder agree in geographical distribution. Thiele's blunder in proposing *Morchiella* is notable, as that is the genus name of a well known group of Rissoinids, and *Morchia* A. Adams is valid since Albers's name was not proposed until later on in the year 1860.

The Family *Cyclostrematidae* is a curious selection, as Iredale has shown that Marryat's *Cyclostrema* is indeterminate, but very probably a *Liotinid*. Attached hereto are *Vetulonia*, *Circulus*, *Zalipais*, *Brookula* with section *Liotella*, *Chunula*, *Cithna*, and *Lissotesta*, the last two and the first queried.

The Family *Turbinidae* begins with a subfamily *Liotinae*, based on *Liotia*, which Thiele uses for the forms Iredale referred to *Liotina*, the other genera included being *Mölleria* and *Leptothyra*, a few sections and subgenera being admitted. The subfamily *Bothropomatinae* is proposed for a new genus and species, *Bothropoma isseli*: this is an interesting form from the Red Sea, as, judging from Thiele's account, it is a small Turbinid shell with a Turbinid operculum, but with a fairly typical Trochoid radula. Probably many of our austral forms will show similar eccentricities when the animals are examined. In the subfamily *Turbininae* two genera only are admitted, *Astraea* and *Turbo*, with nearly twenty sections. In the subfamily *Phasianellinae* three genera are ranged, *Prisogaster* being here placed, though conchologically it appears quite unrelated; the other two being *Tricolia* and *Phasianella*. As sections of *Tricolia*, *Chromotis* and *Eulithidium* are allowed, but no sections of *Phasianella* are included.

The preceding synopsis will serve to show that radulae alone are not convincing, but in connection with conchological features and geographical distribution are of the greatest value, and palaeontologists must be guided by the lessons learned therefrom.

***Trochus tiaratus* Quoy and Gaimard, 1834. [P. 109]**

In Iredale's "Commentary" this was placed under the genus *Trochus*, section *Coelotrochus*, the species *T. viridis* being added under the section *Thorista* Iredale. Thiele has admitted the same values, but Cossmann has introduced *Neozelandia* for *Trochus conicus* Hutton, which he has renamed *huttoni*. I have dealt with this matter (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 99, 1924), and Iredale tells me that independently he had inquired into the proposition with exactly the same conclusions, that *Neozelandia* was unnecessary. At the place mentioned I also added *Trochus* (*Coelotrochus*) *huttoni* (Cossmann) to the Recent fauna. The fossil *Trochus* (*Anthora*) *avarus* Suter (*N.Z. Geol. Surv. Pal. Bull.* No. 5, p. 3, 1917), though not seen, would seem from the figure to belong here though the "2 smooth spirals, starting from the anterior part of the columella and descending into the umbilical excavation" are not quite in accord.

Thoristella carmesina (Webster, 1908). [P. 140]

Suter has placed this species with "*Solariella*" *egena* (Gould), but it does not seem related. I have seen no specimens of this species, nor do any seem to be available in other collections, but if one may judge from Webster's original figure and description (the travesty in the "Atlas" is useless), it seems to be a *Thoristella*. The only factor against this location is the open umbilicus, but this is approached occasionally in the other species, while the remaining details of columella and base can hardly indicate any other genus. The usual Cookian form is *T. oppressa* (Hutton), and it will be interesting if there is a second northern form. Suter records *carmesina* from Cape Palliser, at the not far distant Lyall Bay occur specimens apparently intermediate between *carmesina* and *dunedinensis*—certainly not *oppressa*. The exact valuation of these Cookian forms must be left till much more material is available.

Thoristella (chathamensis) benthicola n. subsp. (Figs. 7-10.)

Shell conic, high, with sharper spire than any of its congeners, sides almost straight, slightly stepped. Spiral sculpture constant; a strong basal keel (weaker than in *chathamensis*, stronger than in the other species) bisected by a deep groove and visible as a supra-sutural cord on spire-whorls; six flatly-rounded cords above keel (interstices linear), first and third from keel always much weaker; seven strong cords on base, inner ones closer and narrower, outer ones often with an intercalated thread between. Twenty blunt prominent vertical axial ribs (interstices narrower), rising suddenly from suture to form bluntly-rounded nodules on top spiral cord, remaining strong over next two ribs, which they render undulating, and very quickly fading out on reaching fourth rib, fifth rib only rarely undulated by their terminations, keel not crenulate: axials present on all but the two apical whorls which are spirally ribbed. Umbilicus very narrow, not deep, an outer rib forming its edge, an inner one almost obsolete except for slight columella swelling, above which pillar is slightly indented.

Height, 6 mm.; diameter, 7 mm.

Locality,—Dredged off Otago Heads in 60 fathoms (type). Also off Oamaru at same depth, and in 15 fathoms Foveaux Strait.

The sutural swellings give this form a striking superficial resemblance to *Gibbula magus* (L.).

Thoristella [chathamensis] fossilis n. subsp. (Figs. 11-14.)

Related to *aucklandica* and *dunedinensis*, but easily distinguished by basal characters. In all the Recent species the convexity of base is constant immediately past the keel, in the fossil species base slopes quickly up to peripheral keel which is moderately prominent, and shell has a concave outline above it. Six (rarely five) cords above keel (*chathamensis* never has less than 7, sometimes 8), both top cord and keel finely crenulate, occasionally the other spirals also, but there are no axial ribs, and the crenulations are much finer than in the other species, about 65 on peripheral cord (i.e. about five times as many as in *chathamensis*). Umbilicus narrower and deeper than in

Recent species, which all have a greater callus deposit filling it. An outer rib margins the pit, the inner one is inconspicuous, columella with a strong tubercle at top.

Height, 5.5 mm.; diameter, 7 mm.

Locality.—Target Gully Shell Bed (Awamoan,—“Miocene”); also Pukeuri.

This is a direct ancestor to the Recent forms.

***Thoristella dunedinensis* (Suter, 1897). [P. 108]**

A figure is presented (from a topotype) of this hitherto unfigured shell, for comparison with those of the two previous species and the other known forms. (Figs. 15, 16).

***Trochus ringens* Menke, 1843. [P. 112]**

This is a West Australian species of *Clanculus* which must be dismissed from the Neozelanic fauna. The shell that has been erroneously so identified is quite a rare one and differs at sight from Menke's species, as indeed Suter has already noted. The resemblance to *ringens* is entirely superficial, for the New Zealand shell is not even a *Clanculus*; no true members of this genus occur in the New Zealand area. Our shell is imperforate and differs radically from *pharaonicus* L.; it is now described as new.

***Paraclanculus peccatus* n. gen. and sp. (Fig. 17).**

Shell conic, trochiform, with quite straight sides, spire angle of 65°. Colour light yellow-brown, maculated on the two lower cords with regular, slightly oblique, chestnut brown rectangles, 18 on last whorl, base same colour, speckled with brown dots. Four nodulous spiral cords on all whorls, the lowest rapidly becoming strongest: four subequal cords (with narrower interstices) on body-whorl, a strong double keel at periphery, and six narrow cords (with wide interstices) on base. Whorls tabulated at suture which is slightly excavated. Base flat, suddenly expanded downwards near aperture. Aperture rhomboidal, outer lip thin and sharp, the silvery nacre inside with three or four heavy lirae; basal lip with three stronger and much coarser lirae. Outer half of shallow false umbilicus China-white with two smooth circling ribs, a strong projecting bifid denticle at base, with two tiny denticles below and one above it to left; inner half silvery nacreous with another faint rib on outer border and three moderate denticles on lower half.

Height, 11 mm.; diameter, 11 mm.

Locality.—Tryphena, Great Barrier Island.

Mr. Iredale remarks that there is a specimen in the Australian Museum from Mokohinau Island, presented by A. Hamilton; “it is a curious evolution, tall, with peculiar sculpture, not comparable with any other I have come across” (private communication).

***Clanculus takapunaensis* Webster, 1906. [P. 112]**

Mr. Iredale informs me that a co-type of this species in the Australian Museum is very close specifically to *Clanculus plebejus* (Phil.), the genotype of his *Mesoclanculus* (Iredale, 1924, p. 224); and is undoubtedly congeneric with it. “It is less closely related

to *Eurytrochus danieli* (Crosse) from New Caledonia, and is not comparable with *C. atypicus* Iredale from the Kermadecs, the columellar characters being decidedly different." (in litt.).

Genus **Monodonta** Lamarek, 1799. [P. 113]

This genus name, based on *Trochus labio* Linné, must be dismissed from Neozelanic systematics. The species named is a tropical form with a strongly-toothed columella, quite unlike any South Australian or Neozelanic species. As equivalent to *Monodonta*, Thiele has cited "*Trochulus* Mus. Calonn." which has priority, but Humphrey's name is a *nomen nudum*, "*Trochus labio*?" alone being cited. In the British Museum collection four groups are allowed, *Austrocochlea*, *Monodonta*, *Neodiloma* (= *Melagraphia*) and *Diloma*. The radulae in the Gwatkin collection are arranged in the same groupings, and Thiele also admits these. Consequently one can omit *Monodonta* without any arguing whether it be invalid through the prior *Monodon* or not. *Diloma* was furnished for the South American species, which, agreeing conchologically, show distinct animal features, so that it must be ignored also. This leaves *Austrocochlea* and *Melagraphia*, and the former being restricted to the endemic Australian series ranging about *constricta*, *zebra*, etc., *Melagraphia* Gray, 1847 is left as the only valid name for the Neozelanic forms. The type of *Melagraphia* is *aethiops* Gmelin, which is conchologically aberrant, so that new names must be given to the other conchological groups. The Neozelanic forms range themselves into four series, *aethiops*, *lugubris*, *excavata*, and all the remainder. In radular and conchological features the Australian species *melanoloma* (= *rudis*) and *striolata* (= *concamerata*) are apparently allied to the latter Neozelanic series. *Chlorodiloma* is so easily recognizable that it has commonly been separated without question, but the Neozelanic member of this group is of very doubtful status.

The Neozelanic Trochoids are worthy of much attention; they are generally easily procurable, the animals are not shy, and the radulae need careful study. It is noteworthy that Suter should write of *lugubris*, a peculiar form, "dentition unknown." As the four series mentioned are quite distinct and show no intergradation, they may all be regarded as genera, as follows,—

<i>Melagraphia</i> s. str.	Type: <i>Turbo aethiops</i> Gmelin
<i>Zediloma</i> nov. . .	,, <i>Zediloma digna</i> n. sp.
<i>Cavodiloma</i> nov. . .	,, <i>Trochocochlea excavata</i> Ad. & Ang.
<i>Anisodiloma</i> nov.	,, <i>Trochus lugubris</i> Gmelin

In *digna* and *arida* n. spp. (*vide infra*) the presence of a continuous nacreous band across the parietal wall, uniting the ends of the peristome, is a constant and useful feature, associated always with untoothed columella, more excavated base, and spreading aperture, and deserves subgeneric distinction. Accordingly, *Zediloma* s. str. may be kept for these two, and a subgenus *Fractarmilla* may be introduced for *corrosa* A.Ad., *subrostrata* Gray, *atrovirens* Phil., and *morio* Troschel, the first named being nominated as type.

Monodonta coracina (Troschel, 1851) [P. 114]

Reference to Philippi, who published Troschel's MS. name, shows a figure and description applicable only to the species later named *Trochocochlea excavata* by Adams and Angas, for which Philippi's name should therefore be used. *Labio porcifera* A. Ad., included by Suter in the synonymy of his *coracina*, has nothing to do with this species, so that the new name *Zediloma arida* is now provided for the species described and figured by Suter as "*Monodonta coracina*" (*Manual*, p. 114, Pl. 38, fig. 4). I have been informed by several who have had access to the Suter collection, including Dr. Marwick and the late Mr. Murdoch, that it is in a very unsatisfactory state, most of the original specimens being dispersed; the specimens from which the figures in the "Atlas" were drawn were never kept separate, so that it is necessary to select a neotype for the species; I therefore choose as neotype a specimen in the Finlay collection from Lyttelton Harbour, one of the localities mentioned by Suter.

Monodonta nigerrima (Gmelin, 1791). [P. 114]

The true *Turbo nigerrimus* Gmelin is the South American species, and the synonyms quoted by Suter, *Trochus araucanus* d'Orb., *Turbo quoyi* Kiener, and *Trochus gaudichaudi* Hupe all apply to the same form. The Neozelanic species is a southern form, very similar in shell features to the South American species, but with a different animal. The shell is well described by Suter, who has also figured the radula, but, for reasons given in the previous note, I select and figure a type in the Finlay collection from St. Clair near Dunedin (Figs. 24, 25) and name this very beautiful form *Zediloma digna* n. sp. Powell (*N.Z. Journ. Sci. & Tech.*, vol. 6, p. 285, 1924) has recorded the swarming of this species, but for only two months of the year, at Motutara, the first record north of Wellington.

Monodonta excavata (Adams and Angas, 1864) [P. 119]

As already pointed out, this species was described by Philippi under the name *Trochus coracinus* Troschel some years before the above name was proposed. Consequently the species must now be called *Cavodiloma coracina* (Philippi). The peculiar small trochi-form shell and almost totally excavated base render this genus conspicuous.

Mondonta lugubris (Gmelin, 1791) [P. 119]

The Cookian and Forsterian forms of this species are easily distinguished. North Island specimens have the three main cingulae stout and all heavily knobbed, especially the peripheral cord, and one weaker but still prominent cord in the interstices; the sides of the aperture are enormously thickened, and the smooth umbilico-columellar area is hardly wider than the band of nacre. Southern specimens, on the other hand, are more depressed, have weaker main cingulae (the upper two almost smooth), with only 3-4 fine smooth ribs in the interstices; the sides of the aperture are quite thin, and the callus-area in the middle of the base is much wider than the nacre-strip; the base is also flatter and less descending. As all the

synonyms of *lugubris* refer to the northern form, it is proposed to distinguish the Forsterian shell by the name *Anisodiloma lugubris lenior* n. subsp. The type chosen in the Finlay collection is from Taieri Beach, five miles south of the Taieri River, and measures (height) 10.5 mm. by (diameter) 14 mm.

This provincial form has been mentioned as an example; almost any of the species when collected in bulk and critically examined will show regional variation.

Monodonta subrostrata (Gray, 1835) [P. 121]

This is closely allied to *corrosa*, and represents this Forsterian form in the Cookian province; *rudis* A. Ad. is an Adelaidean ally. Similarly, *striolata* Q. & G. is a near Australian relative of *atrovirens* Phil.

Chlorodiloma crinita (Philippi, 1848) [P. 121]

This is another West Australian shell and must also be dismissed from the New Zealand fauna. Suter credits the record to Cheeseman; it is well known that some Australian vagrants had crept into Cheeseman's collections, e.g. *Bankivia fasciata*, *Thalotia conica*, etc., and the present species is but another of these. There are no authentic specimens in local collections; some "New Zealand" specimens so named in the Auckland and Canterbury Museums proved to be not even *crinita*, but the South Australian *adelaidae*. Quite recently Odhner (1924, p. 13) has re-recorded *crinita* from "Bay of Islands, muddy estuary, 7 specimens," but as he has not recorded the common northern *subrostrata* it seems probable that he has misidentified his specimens.* The type of *Trochocochlea mimetica* Hutt., said to be in the Otago Museum, cannot be found, but there are three specimens so labelled in his handwriting which are also *D. adelaidae* and I suggest that these and the type are all Australian specimens, very probably from Cheeseman's original lot, and that, till further information is forthcoming, Hutton's name should be synonymised with *Chlorodiloma adelaidae* (Phil.), and omitted from the New Zealand lists.

Genus **Cantharidus** Montfort, 1810 [P. 122]

The type of *Cantharidus* Montfort is the Neozelanic *Limax opalus* Martyn, and the group is a well defined one, to which may be referred the Southern Australian *Phasianotrochus*, a subgeneric value being apparently the most admissible.

Elenchus appears first in the *Museum Calonnianum* in 1797, but at that place the name is a *nomen nudum*, no references being given to the Neozelanic species named. Mr. Iredale has sent me the following interesting note: "Humphrey wrote '*Elenchus*' and Hermannsen gave as '*Etym. nom. apell. Conf. seq.*' with a footnote, 'Quamvis Swainson ubique *Elenchus* scribat, magis tamen arrideret *Eléuchus*, quod derivandum esset ab ἐλῆ, lumen; et ἔχω, habeo. Rectus

*Since the above was written, I have received specimens from Odhner labelled "*crinita* (Phil.)"; these are, as I suspected, *M. subrostrata* Gray. On the same basis I can now state definitely that many of his identifications are erroneous, and his records therefore not always trustworthy.

tum scribendum *Heleuchus*." It is curious how the learned err when they endeavour to force meanings out of names given in Natural Science without thought of the object on which the name was bestowed, as in this instance old Humphrey, who apologised for being but little acquainted with the learned languages, used a word found in Latin dictionaries of his age, "*Elenchus* *ελεγχος*. A pendant for the ears, consisting of three pear-shaped pearls hanging beside one another, and worn only by rich ladies of distinction," and as the vernacular for his *Elenchus*, gave "Poires, ou, Pendants d'Oreille—Ear-drop."

The small species allotted to *Cantharidus* form an easily recognizable group, for which I propose the new genus *Micrelenchus*, with *Trochus sanguineus* Gray as type; this group dates back at least to the "Miocene" in New Zealand (undescribed species in Geol. Survey and Finlay collection), but true *Cantharidus* is at present known only from the Pliocene onwards.

***Cantharidus dilatatus* (Sowerby, 1870) [P. 122]**

To the synonymy of this species should be added *Photinula suteri* Smith, based on a young stage of *dilatatus* and thus lacking the thickened and expanded outer lip. The two diagnoses given by Suter otherwise read word for word alike, and the two forms are always found together in seaweed-washings (especially in the neighbourhood of Wellington). It might be inferred from the ranges given by Suter (though these overlap) that *suteri* is the southern representative of *dilatatus*, but even this view does not seem tenable, for Sowerby's species ranges to Stewart Island, specimens from there being apparently inseparable from northern forms. It has not, however, been found between that locality and Banks Peninsula.

***Cantharidus sanguineus* (Gray, 1843) [P. 128]**

I have not seen Suter's var. *elongatus*, but *coelatus* Hutton, 1884 is a deep water Forsterian representative of Gray's species. Odhner (1924, p. 14) has described a shell from "Auckland Island, Carnley Harbour, 45 fms." as *Gibbula mortenseni* n. sp. This looks at first like a baby *Calliostoma*; from the shape and general appearance it could only be *spectabile* A. Ad., but the swollen pillar and the number of spirals at so early a stage negative its reference to this group. It is evidently a *Micrelenchus*, and appears closely related to *coelatus* Hutton. The latter species is very variable in the number and pustulation of the ribs; many specimens from 60 fathoms off Otago Heads agree generally with Foveaux Strait topotypes, and differ from Snarcs, Auckland, and Bounty Island specimens only in slightly taller shell and more flexed columella. The latter specimens agree well with Odhner's figure and description (though not always so granulose) so I would regard his species as merely a Rossian form of *sanguineus* Gray, and would write it as *Micrelenchus sanguineus mortenseni* (Odhner, 1924).

***Cantharidus tenebrosus* A. Adams, 1853 [P. 129]**

Suter included with this a subspecies "*huttoni* Smith," giving as "Hab.—The same as the species but more abundant." The distinc-

tion accepted by Oliver is gathered from his Ecological Essay in that he records (p. 525) *Cantharidus tenebrosus* from Shag Point, and (p. 536) *C. tenebrosus huttoni* from Otago Harbour, i.e. the species a rocky shore dweller, the subspecies an estuarine form.

To this species should probably be referred the New Zealand records of *Gibbula dolorosa* T.-W. Hedley has discussed this species, referring to it Fischer's *Gibbula scamnata* (*N.Z. Journ. Sci. and Tech.*, vol. 3, No. 1, p. 54, 1920), but it is not known to local workers, and had better be placed on the suspense list for the present.

***Photinula coruscans* Hedley, 1916 [P. 125]**

This was introduced for the species Suter included as *Cantharidus pruinus* subsp. *perobtus* Pilsbry. The reference to the genus *Photinula* does not seem a happy one, especially in view of the fact that it has been rejected in favour of *Margarella* (Iredale, 1915, p. 438). Since Hedley's proposal, Thiele has separated *Margarella* and *Photinula* into two subfamilies, each different from the *Cantharidus* series. Examination of the shells reported upon by Hedley leaves one in no doubt that they are simply relatives of *Cantharidus capillaceus* (Philippi) and that they should not be classed in *Photinula*. *Trochus capillaceus* Phil., *Cantharidus pruinus* var. *minor* Smith, and *Photinula coruscans* Hedley are all good species, and form a group noticeably differing from *Cantharidus* proper by the greater flexure of the pillar to the right, and the strongly convex early whorls, leading to a depressed dome-shaped apex; *C. opalus* and its congeners rise to a sharp point, the spire being often concave. The subantarctic group, too, has a uniformity of sculpture and colour ("leaden purple, which on the apex changes to bright rose") rendering it at once conspicuous. So far as is at present known the distribution is:—

<i>Capillaceus</i> and <i>minor</i> ..	Auckland and Campbell Is.
<i>Coruscans</i>	Macquarie and Antipodes Is.

The Snares and Bounty forms do not seem to have been recorded. Other members of the group probably exist and I provide for it the new name *Plumbelenchus*, with *T. capillaceus* Phil. as type, and would provisionally rank it as of subgeneric value under *Cantharidus*.

***Cantharidus fasciatus* (Menke, 1830) [P. 130]**

Although several localities are given for this Australian species, it seems justifiable to recommend that it and the genus *Bankivia* Beck should be struck off the faunal list. As in the case of *Chlorodiloma crinita*, there are specimens—probably of Cheeseman's "collecting"—in the Auckland Museum, and it is sufficient to remark that in the same box with them are two specimens of the Tasmanian *Phasianotrochus irisodontes* (Q. & G.). Northern collectors have never met with this species, and agree that it should be rejected.

***Cantharidus picturatus* (H. & A. Adams, 1863) [P. 130]**

Omit this from the list of Neozelanic mollusca. Wherever such a shell might have been found in New Zealand, Stuart (sic) Island is surely about the last place to locate it. Iredale, in his "Commentary," noted that Gould's name *lineolaris* has priority over the name

given above, and has since recorded the confusing nature of the Australian *Leiopyrgas* (1924, p. 225).

***Cantharidus conicus* (Gray, 1827) [P. 131]**

This is also an alien species which must be eliminated from the Neozelanic list. Suter gives "Auckland (T. F. Cheeseman)" and the "Chatham Islands" as the localities whence it has been received, but specimens must be re-collected before even the genus *Thalotia*, of which *conica* Gray is the type, can be admitted as Neozelanic.

***Margarella decepta* (Iredale, 1908) [P. 133]**

This now well-known shell has not yet been figured, and Oliver in his Ecological Essay, dealing with the molluscan associations at Shag Point, has included *Margarella antipoda* (1923A, p. 520) obviously intending this species, described from that locality. Since Oliver in that paper has altered several names without indication, one may conclude he intended to show that he considers *M. decepta* as a synonym of *M. antipoda*, but they are quite distinct.

There are four species of *Margarella* in the Neozelanic region—*M. antipoda* (H. & J.) and *M. macquariensis* Hedley (1916, p. 37) (Rossian), *M. decepta* (Iredale) (Cookian), and *M. fulminata* (Hutton) (Moriorian). This is one of the very useful regional genera, the species live under the roots of kelp, and are all absolutely littoral; the four mentioned constantly characterize their respective provinces. Differential characters may be given thus (*macquariensis* has not been seen and is therefore omitted from the key, but it seems, from Hedley's figure, to be more depressed and to have more clasping whorls than the other species; it is imperforate).

Shell constantly imperforate	<i>M. decepta</i>
" " perforate	
Depressed, generally with spiral colour-bands	<i>M. antipoda</i>
Fairly high, never with spiral colour-bands, but with zigzag colour-pattern	<i>M. fulminata</i>

There does not seem to be a Forsterian form, and the genus is evidently of southern origin. The distribution of the species as given by Suter calls for some comment. First, *Chrysostoma rosea* Hutton was described from "Stewart's Island," and is recorded from various subantarctic islands. The type is definitely determinable as *antipoda* on account of its open umbilicus, depressed form, and spiral red bands; it certainly did not come from Stewart Island, and should—as Iredale has already suggested (1915, p. 439)—be reduced to an absolute synonym of the subantarctic form. Secondly, *Chrysostoma fulminata* Hutton, described as from "Chatham Islands only," is credited by Suter to "Hauraki Gulf to Cook Strait, not common." I have never seen a North Island *Margarella*, and would regard these identifications as erroneous, referable probably to the young of "*Cantharidus*" *dilatatus* Sow. or "*Gibbula*" *nitida* A. Ad.; the true *fulminata* is apparently a very distinctive and restricted Moriorian form. It may also be noted that *decepta* apparently does not range north of Shag Point, Otago, the Southern limit being Stewart Island. To facilitate recognition of this beautiful species, figures are now offered of a specimen in the Finlay collection from kelp roots, Otago Penin-

sula (Figs. 3, 4). Since the type of *decepta* has been lost, I here select this figured toptype as neotype of the species.

Photinula nitida (A. Adams and Angas, 1864) [P. 134]

As suggested by Iredale in his "Commentary," this species appears conchologically referable to *Cantharidella*, founded upon the Australian *picturata* Ad. & Ang. The specific name of the Neozelanic form must be corrected, since Iredale tells me he noted in the British Museum a tablet labelled *tesselata*, upon the back of which was written, "*Margarita tessellata* A. Ad., P.Z.S., 1851, p. 191. Hab. ? Types." These were compared with the description and found to agree, and when contrasted with the type set of *nitida* A. Ad. & Ang. were broader and less elevated, but agreed entirely with specimens from Lyall Bay, Wellington. There is a tall form from the west coast of the North Island for which it may be possible to reinstate *nitida*, but since South Island shells agree in detail with Auckland and Wellington specimens, it seems better to admit in the meantime only one species, for which the correct name will be *Cantharidella tessellata* (A. Adams).

Gibbula tasmanica (Petterd, 1879) [P. 136]

What the species is that Suter records under this name is at present unknown. This note serves to point out that the true *Gibbula tasmanica* has proved to have a very anomalous radula, and Thiele has proposed for it a new genus *Nanula*, placing the genus in the family *Umboinidae*. *Nanula*, however, cannot, until further evidence is forthcoming, be included in the Neozelanic fauna.

Genus **Gibbula** Risso, 1826 [P. 135]

This disappears entirely from Neozelanic molluscan systematics. All the species included by Suter have been dealt with in the previous notes, except *Gibbula micans* Suter, and this, until further specimens are available, may be classed under *Micrelenchus*. A resume of the alterations in this genus reads,—

<i>Gibbula tasmanica</i> (Petterd)	Place on the suspense list.
— <i>fulminata</i> (Hutton)	<i>Margarella fulminata</i> (Hutton)
— <i>micans</i> Suter	.. <i>Micrelenchus micans</i> (Suter)
— <i>dolorosa</i> T.-W	.. Omit at present.
— <i>suteri</i> (Smith)	.. <i>Micrelenchus dilatatus</i> (Sow.) juv.

Fossarina rimata (Hutton, 1884) [P. 139]

Powell (*N.Z. Journ. Sci. & Tech.*, vol. 4, p. 204, 1921) has found this species living under oysters on rocks at the Bay of Islands.

Genus **Monilea** Swainson, 1840 [P. 140]

Since Iredale wrote in his "Commentary" that *Solariella* might be used to include all the Neozelanic species classed by Suter under the genus *Monilea*, a revolution has been effected in our knowledge of these simple Trochoids.

Peile investigated the radulae of three Australian species, and found that these were so different that shell characters became of secondary importance. The type of *Solariella* is a fossil from the

British Crags, and it is conchologically something like the Neozelanic *S. egenum* (Gould). Notwithstanding this similarity, probably no relationship exists; two Australian shells showing more likeness proved to cover very different animals. Consequently *Solariella* need not be further considered in connection with Neozelanic Recent shells, which have had long lineages of their own throughout the Tertiary. Thiele has used *Solariella* as equivalent to *Machaeroplax*, which is a mistake, as the latter genus is based upon peculiar features of the animal and radula. These peculiar radular characters can be traced throughout the world, in association with different conchological features, as in *Spectamen* from Australia. On account of these radular differences, Thiele has placed *Solariella* in the subfamily Margaritinae, interposing between *Margarites* and *Solariella* all the Eicheloid-Stomatelloid series. It may be that *Machaeroplax* is related to *Margarites*, but no close relationship to *Stomatella* can be easily seen. Thiele places *Minolia* in his subfamily *Umboniidae*, apparently judging the group from the radula of a species allotted to *Minolia* by shell characters, but the type of *Minolia* does not appear to have been examined for its radula yet. The Australian species that Iredale regarded as conchologically agreeing with the type of *Minolia* proved to possess a radula of the *Machaeroplax* style, another unexpected complication. It is quite impossible, therefore, to forecast the radular features of the Neozelanic series, and as they disagree conchologically with Australian shells, I consider the correct course to pursue is to propose new names for the different groups met with in New Zealand, and wait until the animal characters are available to ascertain definitely their generic or subgeneric value. When Iredale introduced the genus *Talopena* for a series of austral shells, he was not referring to Neozelanic forms, and Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 520, 1924) has wrongly utilized *Talopena* in that connection for a new Recent species. *Talopena* develops a tubercle at the top of the columella, and the genus has no Neozelanic representatives. The common species *M. egena* (Gould), proposed as a species of *Solarium* by its author, was the one that recalled *Solariella*, and for it I propose the new generic name *Antisolarium*. In direct lineage may be named *Solariella stoliczkai* (Zittel) from the Awatere beds. The remaining Recent species cannot easily be grouped together, the beautiful shell named *Minolia textilis* by Murdoch and Suter being generically separable from *Minolia plicatula* M. & S. and *M. semireticulata* Suter, while *Monilea carmesina* (Webster) has already in this paper been transferred to *Thoristella*.

For Neozelanic Minolioids I therefore propose the following genera,—

<i>Antisolarium</i> nov.	for	<i>Solarium egenum</i> Gould
<i>Zeminolia</i> nov.	for	<i>Minolia plicatula</i> Murdoch & Suter
<i>Zetela</i> nov.	for	— <i>textilis</i> Murdoch & Suter
<i>Conominolia</i> nov.	for	<i>Heliacus conicus</i> Marshall

The latter species, though also originally introduced as a Solarioid (*Trans. N.Z. Inst.*, vol. 49, p. 453, 1917), from the Palaeocene Wangaloa beds, is the first known member of a well marked early and middle Tertiary Neozelanic group. *S. sulcatina* Suter, from the Kakanui

Tuffs (*N.Z. Geol. Surv. Pal. Bull.* No. 5, p. 5, 1917), is the only other member at present described, but at least five new species are known to me from "Miocene" beds. *Antisolarium* seems to be a late development of *Conominolia*, both have the early whorls regularly diminished to a tiny inconspicuous embryo, a sculpture of only spiral cords or keels, of which three are often more prominent, a narrow but deep umbilicus with crenulated edge, and a peculiar aperture* and sinuous pillar; *Antisolarium* differs in its depressed instead of conic shell, few strong keels, and smooth band on the base. Until transition forms are found, it is preferable to regard these two distinct series as genera.

Zeminolia and *Zetela*, on the other hand, have a disproportionately large and bulbous embryo, and different umbilicus. *Zetela* is by far the older group; besides the type I include the "Miocene" *Solariella praetextilis* Suter (*N.Z. Geol. Surv. Pal. Bull.* No. 5, p. 4, 1917), and some undescribed Tertiary species; the beautiful sharp reticulate sculpture, developing on later whorls into numerous beaded ribs, and the narrower style of umbilicus amply distinguish the genus from *Zeminolia*, which has a very wide perspective perforation. The latter seems to be quite a Recent development, no fossil species being known at present; besides the type I include only *Minolia semireticulata* Suter. Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 45, 1926) has recently preferred *Spectamen* for this and the other New Zealand Recent species, and *Solariella* for the fossil *sulcatina* Suter, but for reasons given above I prefer to dismiss both these genera.

Genus *Calliostoma* Swainson, 1840 [P. 144]

Thiele's subfamily *Calliostomatinae* does not show whether he has studied the Neozelanic species or not. As he included *Astele* for Australian and American species, he had apparently little material, for the American species he names in connection with *Astele* has no close connection with the Australian type. Iredale has introduced the generic names *Salsipotens* and *Fautor*, for the large and small Australian "Calliostomas" respectively (1924, p. 230). The Neozelanic representatives of the *Fautor* series are the fossil *Calliostoma marwicki* Finlay and *C. cancellatum* Finlay† (*Trans. N.Z. Inst.*, vol. 54, pp. 102, 103, 1923), and the Recent *Calliostoma onustum* described by Odhner (1924, p. 16) from 50 fms. off Cape Maria van Diemen, but the other Neozelanic Recent "Calliostomas" belong to a group quite distinct from *Salsipotens*, which was provided for *armillatus* Wood. They may, for the present, all be classed in one new genus *Venustus* (for which I name *Trochus tigris* Martyn as type), with a subgenus *Mucrinops* nov., typified by *Zizyphinus spectabilis* A. Ad. In *Venustus* s. str. I also place *pellucidum* and *selectum*, together with the following Tertiary species,—*undulatum* Finlay (*Trans. N.Z. Inst.*, vol. 54, p. 104, 1923), *ponderosum* Hutton (*l.c.*, vol. 17, p. 322, 1885), *hodgei* Hutton (*l.c.*, vol. 7, p. 458, 1875) (these two are

*Powell's excellent figures of *egena* (Bucknill, 1924, Pl. 7, figs. 18, a) show this very well.

†Not *C. cancellatum* Schepman, 1908. I have since substituted *Calliostoma temporemuta* (err. typ. for *temporemutata*) nom. nov. (*loc. cit.*, vol. 55, p. 509, footnote, 1924).

possibly synonyms, but much material needs to be examined), *filiferum* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 3, 1917), *gracilis* Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 263, 1918), and *fragilis* Finlay (*l.c.*, vol. 54, p. 102, 1923); these forms have a rather sharply-angled periphery, somewhat inconspicuous sculpture, and usually a concave spire with styliform apical whorls, the coiling varying greatly with age. The shells of the subgenus *Mucrinops* have usually a rounded or but slightly-angled periphery, strongly-granulose prominent cords, and a straight or convex spire, the coiling being always regular; here I include *punctulatum*, *urbanior* n. subsp. (see later), *osbornei* Powell (*Trans. N.Z. Inst.*, vol. 56, p. 591, 1926), and among fossil species, *oryctum*, *waiparaense*, and *acutangulum* Suter (*N.Z.G.S. Pal. Bull. No. 5*, pp. 3, 4, 1917), and *suteri* Finlay (*Trans. N.Z. Inst.*, vol. 54, p. 101, 1923). The earlier forms in both groups are a little aberrant, e.g., the two last named have a sharp periphery, but they are small species, and on account of coiling and sculpture are better referable to the subgenus; they may be transition forms. In both groups, too, large size does not seem to have developed until "Pliocene" times, the older "Calliostomas" being mostly small shells. Oliver is describing some further new Recent species in a paper to appear shortly in the *Proc. Mal. Soc. (Lond.)*, but I have not seen these.

***Calliostoma pellucidum* (Valenciennes, 1846) [P. 145]**

This seems to be the only species of *Venustas* that has no Forsterian representative. The Upper Pliocene *C. undulatum* Finlay is extremely close to this species, and the acquisition of further material enables me to state that the differences given when I described it (*Trans. N.Z. Inst.*, vol. 54, p. 104, 1923) are not of value, but that since the fossil shells seem always to have lower ribs and weaker granules, the name may be retained as a trinomial, *Venustas [pellucida] undulata* (Finlay).

Odhner (1924, p. 15) has admitted to the New Zealand fauna *Calliostoma trepidum* Hedley, based on two small specimens, 3 mm. in height, dredged in Colville channel and off Cape Maria van Diemen. This record of a Capricorn species may be rejected without any hesitation whatever; apart from the extreme improbability of any sub-tropical Queensland form—much less a Trochoid—occurring in New Zealand waters, it is evident that Odhner had before him only young shells of *V. pellucidum* (Val.).

***Calliostoma punctulatum* (Martyn, 1784) [P. 146]**

The Forsterian and Cookian forms of this shell are quite distinct, and as the synonyms *diaphanus* Gmelin and *grandineus* Val. both apply to the northern shell, the southern form is now brought to notice as a new sub-species.

***Venustas punctulata urbanior* n. subsp. (Fig. 27).**

Close to the northern *punctulatum* (Mart.), but altogether a more delicate and graceful shell; not so crass; generally depressed rather than conic; whorls far more convex, leading to deeper sutures;

and spirals much thinner and wider apart, and with far finer granules, especially evident on base.

Height, 26 mm.; diameter, 28 mm.

Locality.—Type from 20 fms. Foveaux Strait, common anywhere in the Forsterian Province on the littoral and down to 30 fms.

Calliostoma selectum (Chemnitz, 1795). [P. 146]

This combination cannot be used, as Chemnitz was not a binomialist. Before this name had been used binomially, Griffiths and Pidgeon had published an excellent figure of the species with the name *Trochus cunninghami* ("Cuvier's Animal Kingdom," vol. 12, pl. 1, fig. 7; Index, p. 600, 1834). The plate is dated 1833, and this is the name and date that should come into use. I have recorded large examples of this species (and of *V. tigris*) from 20 fathoms off Otago Heads (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924); these are really separable from the typical form as a Forsterian representative, and as such I have described it elsewhere in this volume.

Calliostoma spectabile (A. Adams, 1885) [P. 147]

What Suter has figured for this species in the "Atlas" (Pl. 40, fig. 5), I do not know; but it is nothing like the original figure of Adams' species. As neither this nor any other accurate figure of the species is readily available to New Zealand workers, and as this form is the type of *Mucrinops*, I here present a figure of a beautiful specimen in the Finlay collection (Fig. 26), dredged alive in 60 fms. off Otago Heads. The locality "Chatham Islands" given by Suter should be deleted.

Genus Eichelus Philippi, 1847 [P. 148]

This genus may be replaced by *Herpetopoma* Pilsbry, 1890, the New Zealand species having a multispiral operculum, and otherwise agreeing generically with *scabriusculus* Angas, the type of this genus. Powell has recently described (*Proc. Mal. Soc.*, vol. 17, Pt. 1, p. 36, 1926) a second New Zealand member of the genus, from Whangaroa, as *Eichelus* (*Herpetopoma*) *larochei*; it is related to *scabriusculus*.

Eichelus Hamiltoni (Kirk., 1882) [P. 149]

Powell has recently figured the unique type of this species for the first time (Bucknill, 1924, Pl. 6, figs. 26, a). I have examined the type specimen, and conclude without hesitation that it is an abnormal form of *E. bellus* Hutton, specimens of which are frequently found with a more or less deep groove in the umbilical area; in the "*hamiltoni*" specimen it is only somewhat deeper than usual, and in all other details the two "species" coincide exactly.

Suter's record [P. 1048] of *E. baccatus* (Menke), which Iredale has shown should bear the name *Herpetopoma aspera* (Phil.) (1924, p. 230), must be rejected, the two New Zealand shells which he so identified representing an undescribed species, related to *aspera*, but differing in details.

Family Trochidae [P. 150]

Under this heading Iredale in his "Commentary" advised the admission of the genus *Angaria* to include the two species Suter listed

as *Liotia serrata* [p. 151], and *L. solitaria* [p. 152]. This is an error; Miss Mestayer has recorded that *solitaria* is the juvenile of *Astrea heliotropia* (Mart.), while *serrata* is a true Liotid, allied to *tryphenensis* Powell (see following note) and such Australian forms as *tasmanica* T.-Woods. *Angana* must therefore be dismissed from the Neozelanic fauna.

Munditia n. gen.

I propose this for the elegant shell described by Powell (*Trans. N.Z. Inst.*, vol. 56, p. 592, 1926) as *Liotina tryphenensis* n. sp. and name in conjunction with it *Liotia serrata* Suter* and the Tasmanian *L. tasmanica* T.-Woods. *Liotia suteri* Mestayer, and a host of Australian species such as *L. botanica* Hedley, *L. australis* Kiener, *L. subquadrata* T.-Woods, etc., possibly represent a different group, but may be included here at present. Iredale (*Proc. Mal. Soc.*, vol. 9, pt. 4, p. 258, 1911) has discussed the name *Liotia*, restricting it to the *cancellata* group; and later remarked (1915, p. 440) that "the type of *Liotia* agrees with *Cyclostrema macans* A. Ad. in every essential particular." This shell has a peculiar facies, a horny operculum, and a thin unvariced aperture. For the large solid Liotids with heavily variced aperture and spiral lines of calcareous particles on the outer side of the operculum (*Liotia* auct., typified by *L. peronii* Kiener) Iredale advocated the use of *Liotina* Fischer, 1885, based on the fossil *L. gervillei* DeFrance. As a near relative of *Liotina* was noted *Ilaira* H. & A. Ad. (*Proc. Mal. Soc.*, vol. 9, pt. 4, p. 260, 1911), proposed for *D. evoluta* Reeve, a discoidal shell with "whorls angulated, detached, the last entirely free." None of these groups exactly suits the majority of temperate Australian and Neozelanic Liotias, with their widely umbilicate depressed shells, moderately variced aperture, and simple multispiral horny operculum. Hedley's *Liotia affinis* (*Proc. Linn. Soc. N.S.W.*, vol. 33, pt. 3, p. 483, 1908), noted as having an operculum "similar to that figured for *L. peronii*," would fall very easily into *Liotina*, which seems to be a well marked tropical and sub-tropical group of extremely solid, not very depressed shells, with very narrow cylindrical perforation. Hedley's *Liotia botanica*, however, (*loc. cit.*, vol. 39, pt. 4, p. 710, 1914), typical of a large South Australian and Tasmanian series, seems to be a temperate relative of the warm water *Liotina*; it has a depressed less heavily ornamented shell, not strongly variced trumped-shaped aperture, and wide umbilicus; Hedley does not mention the operculum, but it is horny, multispiral, with but faint traces of granules. This group is probably separable from *Munditia* nov. s. str., which has a still more planorbid shell, with tendency to reduction of sculpture to knobs on the double keel, very wide perspective umbilicus, lightly variced aperture, and simple horny multispiral operculum.

Liotella incerta (Ten.-Woods)

Why Miss Mestayer has recorded this shell (*Trans. N.Z. Inst.*, vol. 48, p. 125, 1916) is obscure. New Zealand specimens are not like Tenison-Woods' species—which Tate and May (1901, p. 398)

*See nomenclatural note elsewhere in this volume.

have recorded as the immature form of *L. tasmanica* Ten.-Woods. There are many species of *Liotella* in Neozelanic waters, all endemic, and I remove this bad record by proposing for the shell figured by Miss Mestayer (*loc. cit.*, Pl. 12, fig. 5) the name *Liotella indigens* nov.

Family Cyclostrematidae Fischer [P. 152]

Suter has included a family of this name, but Iredale has proposed to reject the name altogether (1915, p. 440), counselling the admission of a Family *Liotiidae* Iredale, while pointing out that the usage differed from that usually accepted. Thiele has reverted to the former bad usage—bad because in a systematic revision based on radular characters the use of an indeterminate shell of unknown locality (and of which necessarily the animal is unknown), to typify a family, must be condemned. Thiele states that as he has studied a shell agreeing with Gray's description of his *Liotia*, Iredale's conclusions must be wrong. Iredale studied the type series of Gray's *Liotia*, so that it is more probable that Thiele's shells were wrongly determined. Further, Thiele omitted to deal with *Pseudoliotia* Tate, which Iredale rejected as exactly synonymous with Gray's *Liotia*, and which Thiele should have reinstated. It would not be wise to revive *Cyclostrema* until something definite is known about the type species. Iredale has suggested that if it ever be recognized it will replace the *Liotina* series. I therefore continue Iredale's family *Liotiidae*, and draw attention to Thiele's action with regard to *Elachorbis*; he states this is referable to *Vitrinellidae*, closely allied to *Rissoiidae* and *Adeorbidae*. This is quite incorrect, for the genus is obviously Liotid. It is recalled by some European Tertiary forms, but the resemblance is probably quite superficial, and I have already decided not to consider these in connection with austral forms (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 100, 1924).

Cyclostrema eumorpha Suter, 1908. [P. 153]

Iredale (1915, p. 444) advised that this should be placed with *subtatei* Suter in *Elachorbis*, but the examination of ample material shows that a better location would be in *Lodderia*; it is quite close to *L. lodderae* (Petterd) but is less depressed. As usual, Suter's figure is poor, and shows the aperture too high up. Further undescribed species of *Lodderia* are known to me from northern localities.

True *Elachorbis* is of considerable antiquity in New Zealand, *Circulus cingulatus* Bartrum (*Trans. N.Z. Inst.*, vol. 51, p. 97, 1919), *C. helicoides* (Hutton) (*l.c.*, vol. 9, p. 598, 1877), and *C. politus* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 5, 1917) all falling in line with *subtatei*, but I would dissociate from the group *C. inornatus* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 226, 1919), from the Hampden beds; I have not seen this species and do not attempt to place it from the ineffective figure and diagnosis. A second Recent species of *Elachorbis* has been described as *E. diaphana* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924).

Zalipais lissa (Suter, 1908). [P. 154]

May has reported this from Tasmania (P.R.S. Tas., for 1919, p. 68) but it is improbably the same species. I have described *Z. parva* from the South Island (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924).

Pseudoliotia imperforata Suter, 1908* [P. 156]

In Iredale's "Commentary," this species from figures and description was transferred to *Leptothyra*; later, recognizing the misuse of *Leptothyra*, Iredale proposed *Collonista* for the Kermadec shell determined as *Collonia picta* Pease, and Finlay has therefore referred to the Neozelanic shell as *Collonista imperforata* (Suter) (*Trans. N.Z. Inst.*, vol. 55, p. 497, 1924).

From Lord Howe Island, minute shells which agreed in every detail with such forms as *Collonia picta* Pease, have been traced to their adult stage, which proved to be *Turbo cepoides* Smith. The range of *Collonista* suggests a Stewart Island habitat as foreign to the genus, and this is fully justified when a series of specimens is examined. I have been able to trace *Pseudoliotia imperforata* Suter definitely as the juvenile of *Turbo granosus* (Martyn), so that *Collonista* and all matter relating to it should be omitted from New Zealand lists.

Juvenile Trochinae have frequently given trouble before, and may be expected to do so also in the future. Thus, in New Zealand, we have the following identities:—

Liotia (*Arene*) *shandi* Hutton, 1873 is juv. *Turbo granosus* (Martyn, 1784)

Pseudoliotia imperforata Suter, 1908 is juv. *Turbo granosus* (Martyn, 1784)

Turbo (*Lunella*) *radina* Webster, 1905 is juv. *Turbo smaragdus* (Martyn, 1784).

Risella kielmansegi Zeebeor, 1866 is juv. *Astrea sulcata davisii* Stowe, 1872.

Astrarium pyramidale Webster, 1905 is juv. *Astrea sulcata davisii* Stowe, 1872.

Liotia solitaria Suter, 1908 is juv. *Astrea heliotropia* (Martyn, 1784).

Photinula suteri Smith, 1894 is juv. *Cantharidus dilatatus* Sowerby, 1870.

Calliostoma trepidum Odhner, 1924 is juv. *Calliostoma pellucidum* Val., 1846.

We do not yet seem to know the very young stages of *Turbo smaragdus* or *Astrea sulcata*, while the Monodonts, Cantharidi, Calliostomas, and Euecheloids may all be expected to provide problems.

Genus Brookula Iredale, 1912.

I have recently dealt with the fossil members of this group (*Trans. N.Z. Inst.*, vol. 55, pp. 526-531, 1924), and proposed a division *Aequispirella* (type: *Scalaria corulum* Hutton) to cover the conic, narrowly-umbilicated, less-sculptured forms. It may be brought to notice here that *B. fossilis* Finlay was inadvertently included in this

*See nomenclatural note elsewhere in this volume.

division in the "Key to Species," (p. 531) whereas it is a true *Brookula*. It was also suggested, on the strength of a figure published by Miss Mestayer (*Trans. N.Z. Inst.*, vol. 48, Pl. 12, fig. 4, 1916), that *fossilis* should be admitted as a Recent shell. This is now withdrawn, topotypes of Miss Mestayer's shell showing valid distinctions in their more numerous axial ribs (about 36 on the last whorl in adults), taller shell, and weakening of the ribs on base till in the umbilicus they vanish altogether. The name *Brookula prognata* nov. is here advanced for the shell figured by Miss Mestayer (locality,—off Big King Is. in 98 fms.). *Brookula funiculata* Finlay also has a distinct Recent descendant, at present undescribed. Hedley has reported a "*Brookula* sp." from Macquarie Island (1916, p. 45).

Lissotesta errata n. sp. (Figs. 28, 29).

Shell close to *L. micra* (T.-Woods), but smaller, and with a not quite complete peristome. Spiral threads are occasionally visible over whorls, generally near suture; about four coarser threads with narrower interstices are developed in umbilicus, which has a sub-keeled margin. A rather wide flattish shoulder at suture, merging off imperceptibly into periphery. Suture almost canaliculate.

Height, 1.4 mm.; diameter, 1.3 mm.

Locality,—Snarcs Is. in 50 fathoms.

This shell has been misidentified as *L. micra* T.-Woods. Iredale, judging from figures and descriptions, associated with this species *Cirsonella granum* Murd. & Suter, and examination of topotypes of both species shows his judgment to have been correct. *Lissotesta* is also of considerable antiquity in New Zealand, the "Miocene" *Lissospira exigua* Suter being hardly separable even as a species from the form described above. *L. granum* also has early Tertiary representatives.

Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 46, 1926), in describing a new Recent species of *Cirsonella* (*C. parvula*, from 100 f. off Lyttelton), seems doubtful whether *Lissotesta* differs from that genus; but the groups are distinct in texture, altitude, umbilicus, aperture, and operculum, and should both be recognised.

Family Orbitestellidae Iredale.

Miss Mestayer has added this to the fauna by describing from the Snarcs *O. kinemoa* (*Trans. N.Z. Inst.*, vol. 51, p. 131, 1919), which I have recorded also from Bluff oyster scrapings (*l.c.*, vol. 55, p. 517, 1924). Another undescribed species of the genus, probably belonging to Iredale's second group (vide *Proc. Mal. Soc.*, vol. 12, p. 327, 1917) is known to me from dredgings from 12 fathoms, Doubtless Bay; and a third species from shell-sand, Lyall Bay.

Genus *Turbo* Linneus, 1758. [P. 161]

The type of *Turbo* L. is the tropical *marmoratus* L., and this is sufficiently unlike the Neozelanic shells—which are both unusual forms—to make the loss of the name a matter for no regret. *Helix smaragdus* Martyn falls into *Lunella* Bolten, while the quite peculiar *Trochus granosus* Martyn already has a name of its own in *Modelia* Gray, 1840. No Tertiary ancestors of either of these forms are at

present known, but this is certainly due to the almost total lack of quite littoral fossil deposits in New Zealand; the ancestors of such distinct shells must certainly have lived in the same locality.*

Suter admits six species to the Tertiary fauna (*Alph. List N.Z. Tert. Mollusca*, p. 29, 1918), and Bartrum has since added another by describing *Turbo postulatus* n. sp. from Kaawa Creek (*Trans. N.Z. Inst.*, vol. 51, p. 100, 1919). The latter form I have not seen and the figure provides no key to a generic solution. *Turbo superbus* Zittel must also be left alone till good material is available. *Turbo etheridgei* T.-Woods† is an Australian Tertiary form, and its inclusion may be justly doubted. *Turbo approximatus* Suter has been shown by Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 555, 1924) to be a Naticoid, and is now *Magnatica approximata* (Suter)‡. Of the remaining three species, two are the Recent forms, and the third, *Turbo marshalli* Thomson is peculiar. This species has been well described by Thomson and Suter (*Trans. N.Z. Inst.*, vol. 40, p. 103, 1907; and *N.Z. Geol. Surv. Pal. Bull. No. 3*, p. 3, 1915), and differs in opercular and shell characters from any named austral group, so I provide for it the new name *Incilaster*, and would provisionally associate with it *Astrea transenna* Suter (*N.Z. Geol. Surv. Pal. Bull.*, No. 5, p. 6, 1917; a close Australian ally is the Tertiary *Astralium flindersi* T.-W., from the Table Cape beds (*Proc. Roy. Soc. Tas.* for 1876, p. 95; see also May, l.c. for 1918, p. 71, pl. 10, fig. 11), erroneously referred by its author and by Cossmann (*Ess. de Pal. Comp.*, livr. 11, p. 145, 1918) to *Calcar*. As no illustration of *marshalli* is available in later publications, figures are appended of topotypes in the Finlay collection (Figs. 20-23). Rather curiously, what seems to be an exotic congeneric species—from the figures it would not be easy to separate it even specifically—is *Astralium bathyraphe* Smith (*Ann. Mag. Nat. Hist.*, ser. 7, vol. 4, p. 247, 1899) from the Indian Ocean. It has the same simple operculum.

***Argalista fluctuata* var. *immaculata* (Suter, 1908) [P. 165].**

This should be merged in *fluctuata*. The types of both species and variety are from southern localities, and live specimens from the Snares show absolutely the same range of colour and sculpture as Foveaux Strait specimens, which grow to just as large a size.

Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 46, 1926) has described *Argalista umbilicata* from 100 f. off Lyttelton; a Tertiary ancestral form, with the same wide umbilicus and prominent tongue, occurs at Target Gully together with the ancestor of *fluctuata*, so that the two species have long been differentiated.

Genus *Astrea* Bolten, 1798 [P. 166]

This also should have no place in Neozelanic molluscan systematics, our two well-known forms being both highly abnormal, and

*Cf. Marwick, who has just lately written of a similar case, "The most probable explanation seems to be that the ancestors of *Chione stutchburyi* and *Protothaca crassicosta* have lived in the New Zealand area since the Cretaceous, but owing to an unfavourable station they were not preserved." (*N.Z. Journ. Sci. and Tech.*, vol. 8, no. 5, p. 272, 1926).

†See nomenclatural note elsewhere in this volume.

only distantly related to *T. imperialis* Gmelin, the type of the genus. For *Trochus heliotropium* Martyn, Montfort's *Imperator* is available, while Lesson has provided *Cookia* for *Trochus sulcatus* Martyn. Of the latter species no Tertiary ancestors are yet known—for the same reason as advanced in the case of our Turbos—but (because of non-littoral habitat) forms closely similar to *heliotropia* are found from the "Miocene" onwards, while Suter's *Astrea bicarinata* (*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 6, 1917) may perhaps be located in *Imperator*. The Australian Tertiary *Astrea undosa* Chapman has been compared by its author (*Proc. Roy. Soc. Vict.*, vol. 25, N.S., p. 188, 1912) with *heliotropia*, while another Australian fossil ally is certainly *Imperator hudsoniana* Johnston (*Geol. Tas.*, pl. 29, figs. 12, 12a; see also Chapman, *Proc. Roy. Soc. Vict.*, vol. 35, N.S., p. 9, 1922). *Imperator* was thus common to both countries during the Tertiary, but seems to have now no Recent representative in Australia. *Cookia*, however, appears to be represented there by the beautiful *Astridium aureolum* Hedley (*Proc. Linn. Soc. N.S.W.*, vol. 32, p. 492, 1907), described from Mast Head Reef, Queensland, from a single living and adult example, compared by its describer with *sulcata*, and classed "as a second member of the subgenus *Cookia*." It may be noted that if the form *davisii* Stowe, admitted by Suter as a subspecies of *sulcata*, is really worthy of separation, and if Suter's synonymy is correct, the name it should bear is *Cookia sulcata kielmansegi* (Zeilebor, 1866); Stowe's name dates from 1872, and is thus six years too late. I have recorded juveniles of this form from Dunedin Harbour, on muddy weed-covered rocks (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924).

Astrea subfimbriata Suter (*loc. cit.*, p. 7, 1917), from the "Oligocene" of Pakaurangi Point, Kaipara, is an interesting form as making some approach to the Australian *Bellastrea* Iredale (1924, p. 232). As far as superficial resemblances go, the species is really nearer to *sinius* (Gould) than to "*fimbriata*" (Lamk.), but the relationship is quite distant. The peculiar ornament and base, with its relatively huge callus area, the extremely oblique curved pillar, and the curious nodulation under the periphery form an *ensemble* deserving generic recognition, and I propose *Opella* nov. for it alone. It may be a branch from the *Bellastrea* line, but the differences are too considerable to admit of close relationship.

Phasianella huttoni Pilsbry, 1888 [P. 169]

As already noted, Thiele includes *Prisogaster* in his subfamily Phasianellinae (which is better regarded as a family), with two other genera, *Phasianella* and *Tricolia*. For the latter, Humphrey's name *Eutropia* must be used, and the family name would become Eutropiidae, but the Neozelanic species does not belong to the genus *Eutropia*. Pilsbry has pointed out that the small Australian species have a radula of the Phasianellid style, not of the *Tricolia* (= *Eutropia*) form. Consequently one may propose for the Neozelanic species the new generic name, *Pellax*, associating with it the Australian *rosea* Angas, *virgo*, Angas, etc.

Family **Umboniidae** [P. 169]

As above noted, Thiele, by means of the radular characters has brought together a peculiar series in the family *Umboniidae*, and consequently amended Iredale's conclusions in connection with this family and generic values. It has been shown that a Minolioid shell may possess an Umbonioid radula, e.g., the common Australian shell previously known as *M. angulata* A. Ad.; but which Iredale has renamed *Ethminolia probabilis* (1924, p. 228). This is succeeded by another series such as *M. vitiliginea* (Menke) of Australian workers, which is a *Talopena*. Thiele has also included *Monilea* i.e. *Talopia*, and when these are all studied in connection with true *Umbonium*, *Ethalia*, and *Ethaliella*, the Neozelanic species with its angulate periphery is a little discordant. Iredale (1915, p. 446) stated that "*Globulus anguliferus* Philippi, given by Suter in the synonymy of "*Ethalia zelandica* Hombron and Jacquinot, 1854," was really published in 1853, and therefore has clear priority over the name assigned to Hombron and Jacquinot, but only published by Rousseau in 1854," and therefore used the name *Umbonium anguliferum* (Phil.) for the species. Unfortunately, this conclusion must be revised, as there is a prior *Globulus anguliferus* J. de C. Sow., 1840 (*Tr. Geol. Soc. Lond.*, vol. 2, pt. 5, expl. pl. 26). The specific name *zelandicum* must therefore be restored, whether it be credited to Rousseau or to A. Adams, who also proposed *Umbonium zelandicum* as a name for this species in the same year (*Proc. Zool. Soc.* for 1853, p. 188, 1854); which has priority is not at present known.

Cossmann has proposed *Ethaliopsis* for the Neozelanic shell (*Essais de Pal. Comp.*, vol. 11, p. 223, 1918), but that name had been used before by Schepman for a different mollusc. I accordingly propose *Zethalia* as a suitable substitute. This kind of shell is not known below the Pliocene in New Zealand, though plentiful in Nukumaruan beds. Powell (*N.Z. Journ. Sci. & Tech.*, vol. 4, p. 205, 1921) has found *zelandica* living in enormous numbers in the littoral zone at Marsden Point.

As a key to the somewhat extensive changes in these groups, a summary is presented of the locations here adopted of all New Zealand members of the Trochacea, both Tertiary and Recent,—

Fam. TROCHIDAE d'Orbigny.

Genus TROCHUS Linneus, 1758. Type: *Trochus maculatus* Linné.

Subgenus COELOTROCHUS Fischer, 1880. Type: *Trochus tiaratus* Q. & G.

Trochus tiaratus Q. & G., 1834.

— *huttoni* (Cossmann, 1916).

[— *avarus*] Suter, 1917.

Subgenus THORISTA Iredale, 1915. Type: *Polydonta tuberculata* Gray (i.e. *T. viridis* Gmelin).

Trochus viridis Gmelin, 1791.

— *camelophorus* Webster, 1906.

Genus THORISTELLA Iredale, 1915. Type: *Polydonta chathamensis* Hutt.

Thoristella carmesina (Webster, 1908).

Thoristella chathamensis (Hutton, 1873).

— — — *oppressa* (Hutton, 1878).

— — — *dunedinensis* (Suter, 1917).

— — — *aucklandica* (Smith, 1902).

— (—) *benthicola* nov.

— [—] *fossilis* nov.

Genus *PARACLANCULUS* nov. Type: *Paraclanculus peccatus* nov.
Paraclanculus peccatus nov.

Genus *MESOCLANCULUS* Iredale, 1924. Type: *Trochus plebejus* Phil.

Mesoclanculus takapunaensis (Webster, 1906).

Genus *MELAGRAPHIA* Gray, 1847. Type: *Trochus aethiops* Gmelin.

Melagraphia aethiops (Gmelin, 1791).

Genus *ZEDILOMA* nov. Type: *Zediloma digna* nov.

Subgenus *ZEDILOMA* s. str.

Zediloma digna nov.

— *arida* nov.

Subgenus *FRACTARMILLA* nov. Type: *Labio corrosa* A. Ad.

Zediloma corrosa (A. Adams, 1853).

— *subrostrata* (Gray, 1835).

— *atrovirens* (Philippi, 1851).

— *morio* (Troschel, 1851).

Genus *CAVODILOMA* nov. Type: *Trochocochlea excavata* Ad. & Ang. (i.e., *T. coracina* Phil.).

Cavodiloma coracina (Philippi, 1851).

Genus *ANISODILOMA* nov. Type: *Trochus lugubris* Gmelin.

Anisodiloma lugubris (Gmelin, 1791).

— — — *lenior* nov.

Genus *CANTHARIDUS* Montfort, 1810. Type: *Limax opalus* Martyn.

Subgenus *CANTHARIDUS* s. str.

Cantharidus opalus (Martyn, 1784).

— *purpuratus* (Martyn, 1784).

Subgenus *PLUMBELENCHUS* nov. Type: *Trochus capillaceus* Phil.

Cantharidus capillaceus (Philippi, 1848).

— *coruscans* (Hedley, 1916).

— *minor* Smith, 1902.

Genus *MICRELENCHUS* nov. Type: *Trochus sanguineus* Gray.

Micrelenchus sanguineus (Gray, 1843).

— — — *coelatus* (Hutton, 1884).

— — — *elongatus* (Suter, 1897).

— — — *mortenseni* (Odhner, 1924).

— *tenebrosus* (A. Adams, 1853).

— *huttoni* (Smith, 1876).

— *rufozonus* (A. Adams, 1853).

— *oliveri* (Iredale, 1915).

— *dilatatus* (Sowerby, 1870). (= *P. suteri* Smith)

— *micans* (Suter, 1897).

Genus *CANTHARIDELLA* Pilsbry. Type: *Gibbula picturata* Ad. & Ang.

Cantharidella tessellata (A. Adams, 1851).

Genus FOSSARINA Ad. & Ang., 1863. Type: *Fossarina patula* Ad. & Ang.

Fossarina rimata (Hutton, 1884).

Fam. STOMATELLIDAE nov. (=subfam. *Margaritinae* Thiele, pars).

Genus HERPETOPOMA Pilsbry, 1889. Type: *Euchelus scabriusculus* Ad. & Ang.

Herpetopoma bella (Hutton, 1873).

— *larochei* Powell, 1926.

Genus MARGARELLA Thiele. Type: *Margarita violacea* Sowerby. *Margarella antipoda* (Hombron & Jaquinot, 1854).

— *decepta* (Iredale, 1908).

— *fulminata* (Hutton, 1873).

— *macquariensis* Hedley, 1916.

Fam. CALLIOSTOMATIDAE Thiele.

Genus FAUTOR Iredale, 1924. Type: *Zizyphinus comptus* A. Ad.

Fautor onustus (Odhner, 1924).

[— *marwicki*] (Finlay, 1923).

[— *temporemotatus*] (Finlay, 1924).

Genus VENUSTAS nov. Type: *Trochus tigris* Martyn.

Subgenus VENUSTAS s. str.

Venustas tigris (Martyn, 1874).

— *pellucida* (Valenciennes, 1846).

— [—] *undulata* (Finlay, 1924).

— *cunninghami* (Griffiths & Pidgeon, 1833) (= *selectum* auct.).

— — *regifica* Finlay, 1927.

[— *ponderosa*] (Hutton, 1885).

[— *hodgei*] (Hutton, 1875).

[— *filiifera*] (Suter, 1917).

[— *gracilis*] (Marshall, 1918).

[— *fragilis*] (Finlay, 1923).

Subgenus MUCRINOPS nov. Type: *Zizyphinus spectabilis* A. Ad.

Venustas spectabilis (A. Adams, 1855).

— *osbornei* (Powell, 1926).

— *punctulata* (Martyn, 1784).

— — *urbanior* nov.

[— *waiparaensis*] (Suter, 1917).

[— *orycta*] (Suter, 1917).

[— *acutangula*] (Suter, 1917).

[— *suteri*] (Finlay, 1917).

Genus ZETELA nov. Type: *Minolia textilis* M. & S.

Zetela textilis (Murdoch & Suter, 1906).

[— *praetextilis*] (Suter, 1917).

Genus ZEMINOLIA nov. Type: *Minolia plicatula* M. & S.

Zeminolia plicatula (Murdoch & Suter, 1906).

— *semireticulata* (Suter, 1908).

Fam. UMBONIIDAE Adams.

Genus CONOMINOLIA nov. Type: *Heliacus conicus* Marshall.[*Conominolia conica*] (Marshall, 1917).[— *sulcatina*] (Suter, 1917).Genus ANTISOLARIUM nov. Type: *Solarium egenum* Gould.*Antisolarium egenum* (Gould, 1849).[— *stoliczkai*] (Zittel, 1865).Genus ZETHALIA nov. Type: *Umbonium zelandicum* A. Ad.*Zethalia zelandica* (A. Adams, 1854).

Fam. LIOTIIDAE Iredale.

Genus MUNDITIA nov. Type: *Liotina tryphenensis* Powell.*Munditia tryphenensis* (Powell, 1925).— *serrata* (Suter, 1908).— (?) *suteri* (Mestayer, 1919).Genus LODDERIA Tate. Type: *Liotia lodderae* Petterd.*Lodderia eumorpha* (Suter, 1908).Genus ELACHORBIS Iredale, 1915. Type: *Cyclostrema tatei* Angas.*Elachorbis subtatei* (Suter, 1907).— *diaphana* Finlay, 1924.[— *cingulatus*] (Bartrum, 1919).[— *helicoides*] (Hutton, 1877).[— *politus*] (Suter, 1917).Genus LIOTELLA Iredale, 1915. Type: *Liotia polypleura* Hedley.*Liotella polypleura* (Hedley, 1904).— *rotula* (Suter, 1908).— *indigens* nov. (= *L. incerta* Mestayer, not T.-Woods).— (?) *neozelanica* (Suter, 1908).Genus BROOKULA Iredale, 1912. Type: *Brookula stibarochila* Iredale.

Subgenus BROOKULA s. str.

Brookula prognata nov. (= *Brookula* sp.: Mestayer).

— sp., Hedley, 1916.

[— *fossilis*] Finlay, 1924.[— *funiculata*] Finlay, 1924.[— *pukeuriensis*] Finlay, 1924.[— *endodonta*] Finlay, 1924.Subgenus AEQUISPIRELLA Finlay, 1924. Type: *Scalaria corulum* Hutt.*Brookula corulum* (Hutton, 1884).[— *tenuilirata*] Finlay, 1924.[— *iredalei*] Finlay, 1924.Genus LISSOTESTA Iredale, 1915. Type: *Cyclostrema micra* T.-W.*Lissotesta errata* nov.— *granum* (Murdoch & Suter, 1906).[— *exigua*] (Suter, 1917).Genus ZALIPAIS Iredale, 1915. Type: *Delphinoidea lissa* Suter.*Zalipais lissa* (Suter, 1908).— *parva* Finlay, 1924.Genus CIRSONELLA Angas, 1877. Type: *Cirsonella australis* Angas.*Cirsonella densilirata* Suter, 1908.— *parvula* Powell, 1926.

(?)*Genus CONJECTURA nov. Type: *Crossea glabella* Murdoch.
Conjectura glabella (Murdoch, 1905).

(?)*Genus DOLICROSSEA Iredale, 1924. Type: *Crossea labiata* T.-W.
Dolicrossea vesca nov.

*Genus CROSSEOLA Iredale, 1924. Type: *Crossea concinna* Angas.
Crosseola errata nov.
 — *cuvieriana* (Mestayer, 1919).

Fam. ORBITESTELLIDAE Iredale.

Genus ORBITESTELLA Iredale, 1917. Type: *Cyclostrema bastowi* Gatliff.

Orbitestella hinemoa Mestayer, 1919.

Fam. TURBINIDAE Gray.

Genus ARGALISTA Iredale, 1915. Type: *Cyclostrema fluctuata* Hutt.

Argalista fluctuata (Hutton, 1883).

— *crassicostata* (Murdoch, 1905).

— *umbilicata* Powell, 1926.

Genus LUNELLA Bolten, 1798.

Lunella smaragda (Martyn, 1784).

Genus MODELIA Gray, 1840. Type: *Turbo granosus* Martyn.

Modelia granosa (Martyn, 1784).

Genus INCILASTER nov. Type: *Turbo marshalli* Thomson.

[*Incilaster marshalli*] (Thomson, 1908).

[— (?) *transenna*] (Suter, 1917).

Genus IMPERATOR Montfort, 1810. Type: *Trochus heliotropium* Martyn.

Imperator heliotropium (Martyn, 1784).

[— *bicarinata*] (Suter, 1917).

Genus COOKIA Lesson, 1832. Type: *Trochus sulcatus* Martyn.

Cookia sulcata (Martyn, 1784).

[*Opella subfimbriata*] (Suter, 1917).

Genus OPELLA nov. Type: *Astrea subfimbriata* Suter.

— *kielmansegi* (Zeilebor, 1866).

Fam. EUTROPIIDAE nov. (=subfam. *Phasianellinae* Thiele).

Genus PELLAX nov. Type: *Phasianella huttoni* Pilsbry.

Pellax huttoni (Pilsbry, 1888).

Incertae sedis: *Trochus circinatus* Hutton (*Cat. Tert. Moll.*, p. 15, 1873), *Trochus mutus* Finlay (= *T. nodosus* Hutton, preoccupied; *Proc. Mal. Soc.*, vol. 16, p. 99, 1924), *Trochus* (?) *antipodum* and *Calliostoma decapitatum* Wilckens (*N.Z.G.S. Pal. Bull. No. 9*, pp. 4, 34, 1922—Cretaceous forms), *Cantharidus fenestratus* Suter (*l.c.*, No. 5, p. 3, 1917), *submargarita* (?) *tricincta* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 227, 1919), *Talopena sublaevis* Finlay (*l.c.*, vol. 55, p. 520, 1924), *Circulus inornatus* Marshall (*l.c.*, vol. 51, p. 226, 1919), *Turbo postulatus* Bartrum (*l.c.* p. 100) and *Turbo superbus* Zittel (*Voy. "Novara," Palae.*, p. 39, 1865).

Nerita melanotragus Smith, 1884. [P. 172]

A paper entitled "Notes on the Radula of the Neritidae," by H. Burrington Baker, was published in the *Proc. Acad. Nat. Sci. Philad.*, vol. 75, pp. 117-178, 1923. As this will not be seen by many Neozelanic students, Iredale has kindly sent me a few notes on it

*See later under "Genus CROSSEA."

which may be here given in connection with the genus *Nerita*:—"Baker accepts Montfort's designation of the type of *Nerita* Linné as *peloronta* L., and divides the genus, which differs little from the customary acceptance, into two subgenera, *Nerita* s. str. and *Puperita*. The latter he divides into two sections *Puperita* and *Heminerita*, and the former into four, *Amphinerita*, *Theliostyla*, *Pila*, and *Nerita* s. str. The second named subgenus, proposed for *umlaasiana*, a variety of *polita*, is used to cover the Neozelanic *N. melanotragus*. Judging from the characters of the shell and operculum; this is probably correct, but he also notes that the Pacific species *morio* Sowerby, 1833 seems scarcely separable."

The type of the fossil *Nerita nitida* (Hutton, 1873), recently renamed *N. pomahakaensis* by Finlay (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 100, 1924), has been examined, with a quite unexpected result. Considerable collecting has never brought to light another specimen, and further, no shells from the Pomahaka marls show any traces of colour markings, so that the occurrence of a greenish Nerite with black stripes is more than suspicious. The broken unique type is in fact a Recent Pacific *Theodoxus*, certainly not found in New Zealand—let alone fossil at Pomahaka, and must be dismissed from the fauna.

Fam. *Cocculinidae* [P. 172]

It is questionable whether any of the Neozelanic shells referred to this family (which depends on animal characters) really belong here, since of all of them only the shells are known. From criticism of the North Atlantic typical species one may advocate the dismissal of *Cocculina* from the Neozelanic list, the conchological features disagreeing. Four species are included by Suter, *clypidellaeformis*, *compressa*, *craticulata*, and *tasmanica*. When Thiele monographed the group he was doubtful of the location of any of these, and suggested that *craticulata*, judging from the description, might be a *Phenacolepas*. Hedley has used Thiele's genus *Cocculinella*, provided for *minutissima* Smith, for his *coercita*, but Thiele did not so class it.

I would dismiss *Cocculina tasmanica* (Pilsbry) from the New Zealand list, and refer all records of this type of shell to *C. craticulata* Suter, which may be named as type of a new genus *Notocrater*, including therein *tasmanica* Pilsbry and *meridionalis* Hedley.

For the remaining Neozelanic species, *clypidellaeformis* Suter and *compressa* Suter, I propose *Tectisumen* nov., with the first named as type. Here may also be located *C. coercita* Hedley, *C. tasmanica* May, and *Tectisumen mayi** nom. nov. for *Cocculina clypidellaeformis*, May (*Illust. Index Tas. Shells*, Pl. 21, fig. 20, 1923), not of Suter. The outlines of the Tasmanian shell differ from those of New Zealand topotypes, while May, in his original record of the species (*Pap. & Proc. Roy. Soc. Tas.*, 1912 (1913) p. 43), remarked that his shells were "not quite so raised as the type."

*Finlay (*Austr. Assoc. Adv. Science*, vol. 16, p. 343, footnote, 1924) proposed *C. mayi* as a new name for *C. tasmanica* May, but as May's shell was described as a *Cocculinella*, and is not congeneric with *Acmaea tasmanica* Pilsbry, May's name will stand; in *Tectisumen mayi* nov. I perpetuate the intended compliment.

I have seen further undescribed Recent species of *Tectisumen* from New Zealand (e.g. what Miss Mestayer has recorded as *compressa*; *Trans. N.Z. Inst.*, vol. 48, p. 125, 1916); it has not been found fossil, but *Notocrater* occurs in early Tertiary beds.

***Littorina infans* E. A. Smith.**

"Some small sps., max.h. 1.3 mm., shaken from algae, Cape Maria van Diemen" are the basis on which Odhner (1924, p. 18) has recorded the above Sydney species. This does not need discussion.

***Littorina mauritiana* (Lamarek, 1822) [P. 188]**

Iredale, in preferring the name *Melarhaphe unifasciata* (Gray, 1826) for Australian shells (1915, p. 447) remarked that the New Zealand form seemed separable, and as no name has previously been given to it, I here act on this suggestion—which I am able to confirm—by describing it as new.

***Melarhaphe zelandiae* n. sp. (Figs. 18, 19).**

Shell related to *M. unifasciata* (Gray), but with shorter and less convex whorls, not so inflated. Much darker in colour, uniformly blackish outside, greyish-brown where corroded, inner part of base sometimes whitish; inside rich dark chocolate-brown with a white band below. Spiral sculpture much better marked than in Australian shells, especially on base, interstices not linear, and rendered prominent by their white colour. Peripheral subangulation better marked.

Height, 17 mm.; diameter, 10.5 mm. (type; harbour form).

Height, 11 mm.; diameter, 7.5 mm. (Taieri Beach rock form).

Locality,—Dunedin Harbour, on rocks at half and high tide level.

***Laevilitorina hamiltoni* (Smith, 1898) [P. 190]**

This form does not agree conchologically with *caliginosa*, the type of the genus. There is an undescribed closely-allied form at the Auckland Islands, and probably search at Campbell, Bounty, and Antipodes Islands would reveal further members. For this group is proposed *Macquariella* nov., with *Paludestrina hamiltoni* Smith as type, allowing it subgeneric rank under *Laevilitorina*.

Finlay, (*Trans. N.Z. Inst.*, vol. 55, p. 522, 1924) has recently recorded the genus from the mainland, describing two new forms, *L. micra* and *L. cystophora*. These looked conchologically aberrant, and are now shown to be widely sundered from *Laevilitorina*. This genus and *Macquariella* agree in having a paucispiral Littorinoid operculum, and Finlay has stated that this in his shells is "normal." Dissection of further specimens shows, however, that though appearing normal while deep within the aperture, the minute operculum in both species is really not spiral at all, but pyriform, with a medio-lateral nucleus. Many other undescribed species of this group, all minute, are now known from the mainland, while Brookes has described one from the North Island (*L. iredalei* Brookes; *Trans. N.Z. Inst.*, vol. 56, p. 589, 1926), and I signalize their distinction from *Laevilitorina*—which, so far as the Neozelanic region is concerned, is restricted to the Rossian province—by the proposition of a group name, *Zelaxitas* nov., naming *L. cystophora* Finlay as type.

Fam. **Fossaridae** Fischer [P. 192]

Odhner (1924, p. 18), in admitting the type genus to the Neozelanic fauna, has associated under it an incongruous assemblage of forms, covering at least three genera, none of which has anything to do with true *Fossarus*. For clearness' sake one may propose the necessary new genera now, and then proceed to discuss them,—

<i>Zeradina</i> nov.	for	<i>F. ovatus</i> Odhner.
<i>Nilsia</i> nov.	„	<i>F. conicus</i> Odhner.
<i>Scrupus</i> nov.	„	<i>F. hyalinus</i> Odhner.

Odhner's *F. ovatus* and *F. productus* may be regarded as congeneric, both having a blunt paucispiral embryo, a complete peristome, and a groove behind the inner lip; with these may be associated the Tertiary *Couthouyia concinna* Marshall and Murdoch (*Trans. N.Z. Inst.*, vol. 53, p. 80, 1921) and, provisionally, *Lacuna exilis* Murdoch (*loc. cit.*, vol. 32, p. 220, 1900) and *Aclis costellata* Hutton (*loc. cit.*, vol. 17, p. 319, 1885). The Recent *Couthouyia corrugata* Hedley is near to these but has a tiny apex, expanded whorls, and a deep, keeled umbilicus spreading from the groove; it does not belong to *Couthouyia*, and the new name *Radinista* may be supplied for it alone at present, taking subgeneric rank under *Zeradina*.

Odhner's third species, *F. conicus*, is quite a different kind of shell, having only the fine spiral sculpture in common with the previous series. The apex is minute, of several whorls, almost pointed, the peristome is considerably broken by the convex parietal wall, and there is no groove behind the inner lip. I nominate it as type of *Nilsia* nov., and place it at present near *Dardanula* in *Rissoinidae*; *Rissoina cuvieriana* Suter is apparently congeneric, and though Suter's figure and dimensions differ considerably from Odhner's, I suggest that when his unique type is examined it will prove to be the same species; if that is so, Suter's name has precedence.

Fossarus hyalinus, Odhner's last species, is about as far removed conchologically from *Fossarus* as it could well be. The thin hyaline test, depressed dome-shaped and glossy two-whorled apex, quite incomplete peristome, perforate umbilicus more or less filled by a callus-pad, deep sutural triangular sinus in the outer lip, deep rounded notch in the basal lip, and swollen subplication low down on the pillar, form a very curious combination of characters. I give it a name of its own in *Scrupus* nov. and provisionally associate with it *Cithna marmorata* Hedley, and perhaps *Fossarus minutus* Petterd,* locating the genus temporarily in the neighbourhood of *Cithna* which, in an exaggerated way, it somewhat resembles, except for the posterior sinus. Odhner's record of *F. minutus* from Hauraki Gulf cannot be accepted; identified specimens he has sent me belong to *Notosetia* (s.l.) and are in no way related to *Scrupus hyalinus*.

Planaxis brazilianus (Lamarek, 1822). [P. 194]

Definite evidence regarding the authenticity of New Zealand examples of this shell—which should be generically called *Hinea*—is not yet forthcoming, and till it is the species should be placed on the suspense list. It is, however, common at the Kermadecs.

*For nomenclatural note on this species, see elsewhere this volume.

Family Rissoidae Gray [P. 198]

I have given some account of the Tertiary Neozelanic species, with generic and specific keys (*Trans. N.Z. Inst.*, vol. 55, pp. 481–493, 1924) and have there added several new species and the Australian genus *Epigrus* Hedley (*Mem. Austr. Mus.*, No. 4, p. 355, 1903) to the Tertiary fauna.

The genus *Amphithalamus* must be rejected as Iredale suggested, for even if it were applicable to some Australian forms, the Neozelanic *hedleyi* is typical of a very distinct group, and for this species I therefore propose the new generic group *Nannoscrobs*. It may be noted that probably *Scrobs* is characteristic of an Australian Family, for many species are being discovered belonging to two or three distinct groups, one centering round shells like the American *Amphithalamus* (but probably not at all related), another of shells like Watson's *Scrobs scrobiculator* which appear to be of a slighter texture, and some smaller thinner species, rather like *Scrobs*, which constitute the group named *Nannoscrobs* above. The two former have not yet been recorded from New Zealand itself, though known from the Kermadecs. Odhner's *Rissoa semen* may be located in *Nannoscrobs*, but his *R. erosa*, with its squat shell and heavy ornament, is a different style of "*Amphithalamus*."

Hedley (1916, p. 46) has added *Eatoniopsis* to the fauna by describing *E. answorthi* from Macquarie Island. The fossil *Rissoa vana* Hutton (*Cat. Tert. Moll.*, p. 12, 1873) I have shown to be a subfossil *Potamopyrgus* (*Trans. N.Z. Inst.*, vol. 55, p. 491, 1926).

Elsewhere in this volume Powell describes sixteen new Recent species, a welcome addition to the fauna.

Rissoa cheilostoma Ten.-Woods, 1877 [P. 202]

This name must disappear from New Zealand lists, as Iredale has already suggested (1915, p. 449). Its place will be taken by *Merelina lyalliana* (Suter, 1898), described from Lyall Bay; as this shell has never been figured, illustrations of topotypes in the Finlay collection are appended (Figs. 35, 36). Numerous specimens of *Merelina* are known to me from New Zealand waters, representing two or three groups; I have already proposed (*Trans. N.Z. Inst.*, vol. 55, p. 483, 1924) the genus *Linemera* (type: *L. interrupta* Finlay = *Rissoa gradata* Hutton*) to cover forms with Merelinid sculpture, but a smooth glossy apex, while Powell (*l.c.*, vol. 56, p. 593, 1926) has introduced *Promerelina* for two extreme forms of this group, *P. crossaeformis* and *coronata* Powell, both Recent species. For shells like *Lironoba* in sculpture, but with a smooth glossy apex like *Linemera*, I have proposed *Nobolira* (type: *Lironoba polyvineta* Finlay) (*Trans. N.Z. Inst.*, vol. 56, p. 227, 1926).

Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 46, 1926) has added to the Recent fauna *Haurakia venusta*, from 100 f. off Lyttelton, stating that *Haurakia* has the protoconch "sculptured with exceedingly fine uneven spiral striae," and that his species has "a striking resemblance to Finlay's *Linemera*, which is only superficial, however, the nucleus being quite smooth and glossy in the latter genus." Nevertheless, I would refer *venusta* without hesitation to *Linemera*, as the

*See nomenclatural note elsewhere in this volume.

southern representative of the Cookian deep-water *pingue* Webster, which is a close ally of *gradata* Hutton, the genotype. I would restrict *Haurakia* at present in New Zealand to the type (*hamiltoni*), *huttoni* Suter, and the Tertiary *oamarutica* Finlay (my *H. mixta* should, I think, be dropped; the type was irreparably damaged during illustration, and the sole paratype proves to be a juvenile abnormal *Estea impressa*): when the austral Rissoids are monographed, *Haurakia* will probably become a monotypic genus, as *hamiltoni* differs in habitat and facies from all the other species referred here. I cannot understand Powell's description of the apex of this species and *venusta*. *Linamera* differs from *Haurakia* most noticeably in development of spiral sculpture, but both genera have a smooth and glossy paucispiral apex, that of *Haurakia* being more depressed, slightly inrolled at the tip, and with a less marked terminal varix. But under a high power, and in very strong sunlight, the shells and the apices of both groups are seen to be of a minutely porous structure (much as in *Terebratella* and other brachiopods), and the very fine dense punctures occasionally give the effect of running together in spiral lines. This is probably what Powell mentions as "spiral sculpture," and no more than this is visible in my topotypes of *hamiltoni* on the one hand, or of *exserta*, *pingue*, *gradata*, and *venusta* on the other. Quite different is the true spiral sculpture (often heavy) seen on the embryos of *Merelina*, *Promerelina*, *Lironoba*, *Anabathron*, *Attenuata*, and *Brookesena* (*vide post*).

***Merelina plaga* n. sp.** (Figs. 37, 38).

Shell similar to *M. lyalliana*, but of weaker build, though slightly larger. Number and disposition of spiral ribs the same, except that subsutural rib stronger, and the two on the periphery subequal, giving the spire-whorls a half-hexagonal instead of a triangular outline; body-whorl thus loses its angled periphery. All spiral ribs thinner, interstices three to four times as wide instead of same width, axial ribs slightly less numerous and weaker; nodules at intersections much smaller; axials and spirals thus enclose large square meshes instead of small rectangular pits. Aperture larger, more obliquely oval than subcircular. Other details as in Suter's species.

Height, 3 mm.; diameter, 1.3 mm.

Locality.—Snares Islands, in 50 fathoms.

***Rissoa incidata* (Fraunfeld, 1867) [P. 208]**

Omit this species; Suter's records apply to species of *Estea*; one that I have seen, from Lyttelton, is a *lusus* of *E. minor* which developed a groove for a short distance following a fracture. In passing, it may be mentioned that Odhner's record (1924, p. 22) of *Rissoa subfusca* Hutt. is, from examination of shells sent by him, based also on *Estea minor* (Suter), so that this species does not appear to be at all well understood.

***Rissoa roseola* Iredale (=rosea Hutton) and *Rissoa roseocincta* Suter. [P. 209]**

Transfer these species to *Dardanula*. In connection with *Dardanula fuscozona* (Suter), it may be noted that of two specimens so identified and sent to me by Odhner, one is a *Dardanula* n.sp., the other a *Zelaxitas* sp., cf *iredalei* (Brookes).

Ancestral to *D. limbata* is the Tertiary *D. rivertonensis* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 491, 1924).

***Rissoina hanleyi* Schwartz, 1860. [P. 219]**

Several species seem to be masquerading under this name. Odhner (1924, p. 23) has recently split off one good species as *Rissoina achatina* nov., but recorded *hanleyi* also; there are at least two others in the compound remaining, and in describing one of them I now dismiss this Philippine Island species from the New Zealand fauna.

***Rissoina anguina* n. sp. (Figs. 39, 40)**

Shell stout, shining, generally milky white with broad chestnut-brown band just below periphery, and a narrower subsutural one; sometimes there are several tawny-yellow bands instead, or the whole shell may be blackish-brown or orange-yellow. About 24 axials per whorl, interstices 2–3 times as wide; they have fairly wide bases but rapidly narrow and become sharp, obsolescent on body-whorl; whole shell with dense fine spiral grooving. Spire about $1\frac{1}{2}$ times height of aperture, outlines faintly convex. Other details as mentioned by Suter in his diagnosis of *R. hanleyi*.

Height, 5.5 mm.; diameter, 2.5 mm.

Locality,—Whangaroa Harbour

***Omalogyra bicarinata* Suter, 1908 [P. 229]**

This shell has no affinity with *Omalogyra*, but is closely related to the form described by Miss Mestayer as *Discohelix hedleyi* (*Trans. N.Z. Inst.*, vol. 48, p. 125, 1916). *O. bicarinata* was described from the Snares in 50 fms., and related forms are known to me from northern localities, while *D. hedleyi*, described from off Big King Island in 98 fms., has similar southern relatives. For this series I propose the genus *Zerotula* nov., with *D. hedleyi* Mestayer as type; no congeneric Australian forms are as yet known. The species are all small and discoidal, the shells usually somewhat shining and with a simple ornament of two or three strong keels on the periphery, otherwise smooth except for faint corrugations on the upper and lower surfaces and occasional weak serrations on the two outer keels; the aperture is squarish with a complete peristome. Miss Mestayer's location of the species in the Family *Architectonicidae* (*loc. cit.*, vol. 51, p. 132, 1919) seems reasonable, the apex being slightly inrolled. There may perhaps be relationship with *Discohelix*, or such *Discohelix*-like forms as *Omaxlaxis meridionalis* Hedley. The forms are certainly adult and not the juvenile stage of some Trochoid.

Genus *Tatea* Ten.-Woods, 1879.

Hedley (1916, p. 46) has introduced this genus to the Neozelanic region by describing *Tatea melvilli* nov. from Macquarie Island. Brookes has added a second species (*Trans. N.Z. Inst.*, vol. 55, p. 153, 1924), *Tatea hedleyi*, from Rangitoto Island, but Iredale informs me that this shell is really *Assiminea nitida* (Pease, 1865), (*Proc. Zool. Soc.*, 1864, p. 674), which is distributed throughout Polynesia, and has been recorded from the Kermadecs by Oliver (*Trans. N.Z. Inst.*, vol. 47, p. 522, 1915).

Melanopsis trifasciata Gray, 1843 [P. 236]

The genus *Melanopsis* is based on a European form, and all monographers have noted the distinction of the Neozelanic group without providing a distinctive name for it. As the genus is represented in the early Tertiary (by *Ancillaria pomahaka* Hutton; *Cat. Tert. Moll.*, p. 6, 1873; see also Suter, 1915A p. 6), I have no hesitation in proposing *Zemelanopsis* n.gen., naming this species as type. Another group of "*Melanopsis*" existed in the New Zealand Tertiary, of which *Coptochetus zelandicus* Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 265, 1918) and *Melanopsis waitaraensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 317, 1926) are members; Dr. Marwick has noted that they have the aperture of *Zemelanopsis*, but differ in their strong sculpture; this is of at least subgeneric importance in this group, so that I now separate them under the name *Pakaurangia* n. subgen., with *M. waitaraensis* Marw. as type.

Fam. Cerithiidae Fleming [P. 236]

The only members of this family admitted by Suter are referred to two genera, *Cerithidea* and *Bittium*, four species being allotted to the former, a tropical mangrove form, and six to the latter, a British type. Both generic names must be dismissed from the Neozelanic fauna, and some of the species also. First, the recognition that a Neozelanic species is establishing itself in Australia necessitated a criticism of the species, with the result that Suter's first species, *Cerithidea alternata* Hutton, was found to be based on an Australian specimen of *Cerithium australis* Q. & G., and not to be of Neozelanic origin. The type in the Dominion Museum has been examined, and this fact is evident. Secondly, Iredale tells me that the species name *bicarinata* Gray, 1843, is invalid, but that the substitute *lutulentum* Kiener was published in 1842, and was therefore the valid name all the time. Thirdly, the next two species must be lumped, since Hutton's *tricarinata* is simply an individual variant of Sowerby's *subcarinata*—this is the species that has gained an Australian foothold; it is extremely common and spreading rapidly at Freshwater, near Manly, Sydney. Lastly, the whole series, now reduced to two species, has nothing much to do with the genus *Cerithidea*—which was introduced by Swainson for a very different mangrove Cerithioid—and must be separated as a distinct genus, for which the new name *Zeacumantus* is proposed, Sowerby's *subcarinata* being named as type. In direct lineage may be noted *Ataxocerithium perplexum* Marshall and Murdoch (*Trans. N.Z. Inst.*, vol. 51, p. 254, 1919) and *Cerithidea tirangensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 317, 1926). Iredale tells me that the South Tasmanian species *diemenensis* Q. & G., referred at the present time to *Pyrazus*, a poor decision, is congeneric.

With regard to the genus *Bittium*, Suter wrote, "Operculum 4-whorled, with central nucleus," and of *Bittium exile* Hutton noted "Operculum normal." Suter also included *Bittium granarium* Kiener, 1842, and *Bittium lawleyanum* Crosse, 1863, in each case observing, "Operculum normal." These two well-known Australian species form no part of the Neozelanic fauna, and must be eliminated from the records. As a matter of fact, the operculum in these species is not "normal" in the sense used by Suter, but has proved to be

truly Cerithioid, and for the former Iredale has provided the genus name *Cacozelia* (1924, p. 246), while the specific name of the East Australian species Hedley has shown to be *lacertinum* Gould (*Proc. Linn. Soc. N.S.W.*, vol. 41, p. 310, 1923). Crosse's *lawleyanum* appears to be congeneric with this species. Suter has also included *Bittium cylindricum* Watson, 1881, a Port Jackson species, for a Foveaux Strait shell: this name must also disappear.

This leaves only three species, two of which are congeneric, viz., *Bittium exile* Hutton and *Bittium vitreum* Suter. For these a new name *Zebittium* may be introduced, the former being cited as type; the exact position of the group may be held over until further information regarding the operculum and radula is obtained. The early Tertiary *Cerithidea minuta* Marshall (renamed *C. marshalli* by Cossmann; see elsewhere in this volume) may perhaps be included here. *Bittium retiferum* Suter does not, however, belong to this group, but must be included in the following series.

The family *Cerithiopsidae* may be rejected since it is based purely on features of the animal of a British species, and there is not the slightest fact to connect this with the species allotted to the family by Suter, not even the operculum of any being recorded. A much safer procedure is to leave these under the family *Cerithiidae* until the animals are investigated, and to use definite group names for the series such as (a) *sarissa*, *acies*, and *subantarctica*, with a many-whorled reticulate apex* ending in a carina; (b) *retifera*, *canaliculata*, *marginata*, and *styliformis*, with a few-whorled smooth and rounded apex: and (c) *crenistris*, a peculiar form. Suter has included *C. cessicus* Hedley, a Tasmanian species, recording it from the Snares in 50 fathoms. The Tasmanian shell is referable to *Joculator* Hedley, but Suter has written, "Protoconch papillate, of $1\frac{1}{2}$ whorls, the first smooth and shining, the remainder distantly plaited," a description which does not apply to *Joculator*, so that the species name *cessicus* is inapplicable and must be rejected. True *Joculator* does seem to occur in northern New Zealand, and here may be provisionally located Odhner's new *Cerithiopsis dirempta* (1924, p. 26), the apex of which is not known.

Another name involved in this holocaust is *Newtoniella*, which Iredale has shown must be replaced by *Cerithiella*, but this latter also merits rejection as previously suggested by the same writer (*Trans. N.Z. Inst.*, vol. 47, p. 455, 1915). Odhner has described a shell (1924, p. 27) as *Cerithiopsis trizonalis* nov. which is congeneric with *Newtoniella stiria* Webster; he has supplied a good figure and full details of the apex, which begins with a smooth whorl, then has two more with axial costae, developing spiral keels towards its close. A fifth group is represented by a common Tertiary species, *Cerithiella fidicula* Suter, which has a very tall, cylindrical, polygyrate, perfectly smooth and glossy embryo. *Cerithiopsis aequicincta* Suter, another widely-spread Tertiary form, has a rather short, keeled, polygyrate, "Daphnellid" apex, and may be associated with the *sarissa* group. Finally, the Tasmanian *Cerithiopsis apicicostata* May

*Suter has described all these species as having a smooth protoconch; this is incorrect, well-preserved specimens showing Daphnellid reticulation on all whorls, the forwardly sloping curved threads stronger.

(*Pap. and Proc. Roy. Soc. Tas.*, p. 64, 1919) represents a group not yet recorded from New Zealand, but of which I have new species; the apex, well figured by its describer, is paucispiral, rather swollen and flattened on top, ornamented all over with quite strong axial ribs; this group may be near *crenistria*, but the latter has a much larger and more massive shell, different aperture and ornament, and a diverse type of axial ornament on the embryo, the ribs being heavy, wide, and flattish, on a bulbous, almost planorbid, few-whorled apex; as Suter's illustration was drawn from a juvenile and does not well show the canal, I refigure this fine species (Fig. 42) from a specimen, in the Finlay collection, dredged off Otago Heads in 60 fathoms. I propose to designate these groups as follows:—

<i>Specula</i> nov.	for	<i>C. styliiformis</i> Suter.
<i>Aipta</i> nov.	"	<i>C. crenistria</i> Suter.
<i>Mendax</i> nov.	"	<i>C. trizonalis</i> Odhner.
<i>Socienna</i> nov.	"	<i>C. apicicostata</i> May.
<i>Zachlys</i> nov.	"	<i>C. sarissa</i> Murdoch.
<i>Miopila</i> nov.	"	<i>C. fidicula</i> Suter.

Of these, the third and fourth are not yet known as fossils, but all the others have known or undescribed Tertiary representatives in "Miocene" and older beds in New Zealand. *C. mamilla* May and *C. turbonilloides* Ten.-Woods represent *Specula* in Tasmanian waters, while *C. semilaevis* Ten.-Woods and *C. danneviggi* Hedley can easily be referred to *Zachlys*.

Genus *Seila* A. Adams, 1861 [P. 250]

This name seems inapplicable to any of the Neozelanic forms, which, as in *Cerithiopsis*, fall into several groups, easily defined by apical characters. As the Tertiary species need further study, and some of these are not available to me, I defer full division of the group, and merely propose *Notoseila* nov. for the common *Cerithium terebelloides* Hutton (of which the protoconch is "long, cylindrical, of 4 convex and smooth whorls, the nucleus mamillate") and *Hebeseila* nov. for *S. bulbosa* Suter, which has the protoconch "globular, of 1½ smooth whorls, the first bulbous, of greater diameter than the next few whorls." *Notoseila* is the only group of *Seila* that extends throughout our Tertiaries, for here belongs *S. attenuissima* Marshall and Murdoch (*Trans. N.Z. Inst.*, vol. 52, p. 129, 1920), and there are several new "Miocene" species. The only other fossil species is the late Pliocene *S. huttoni* Suter (*N.Z.G.S. Pal. Bull. No. 3*, p. 6, 1915), but this is related to *S. chathamensis*, and these two may for the present be located in *Hebeseila*. *S. cochleata* Suter may be reduced to a synonym of *S. chathamensis* until the unique type (which appears to be based on a worn and distorted shell) is made available for examination. Fresh Whangaroa specimens, which I take to be practically topotypes of *cochleata*, do not differ from Chatham Island and Auckland specimens of *chathamensis*. The latter name has priority, being published in *Proc. Mal. Soc.*, vol. 8, p. 37 (April, 1908), while *cochleata* appeared in *Trans. N.Z. Inst.*, vol. 40, p. 361 (June, 1908). *Seila dissimilis* Suter, excellently figured lately by Odhner (1924, Pl. 1, f. 18) stands out from the other species, which have a characteristic uniformity of habit and sculpture, and differ mainly in apical

features; it has faint axial ribs and nodulations, and may be grouped at present near *Cerithiopsis styliformis* Suter, i.e., in *Specula*; but here again Suter's type must be examined before one can be quite sure of what he described. A somewhat similar Australian form seems to be *Cerithiopsis turbonilloides* May. Among other Australian species, *Seila albosutura* Ten.-Woods seems congeneric with *S. terebelloides*, while *S. halligani* Hedley may be located in *Hebeseila*. *Seilarez* Iredale (1924, p. 246), type: *Seila attenuata* Hedley, seems from the description related to *Notoseila*, but actual specimens differ widely in texture, facies, and features of aperture, and show that no close relation to any of the New Zealand groups exists.

Genus *Ataxocerithium* Tate, 1894.

Marshall and Murdoch have stated that the fauna of the Castlecliff beds "differs from the Recent fauna only in the presence of *Ataxocerithium*. . ."; this distinction has now been removed by Odhner, who has described *Cerithium invaricosum* from off Moko Hinau Island in 5 fathoms, and this species immediately falls into line with a series of Neozelanic fossil forms. Unfortunately Odhner was not acquainted with these, and was not able to compare his Recent specimen with Pliocene shells; this is to be regretted since topotypes of his shell are identical with the Castlecliffian *A. huttoni* (Cossmann) (*vide* Suter, *N.Z.G.S. Pal. Bull. No. 2*, p. 14, 1914). Odhner's figure and description might well stand for a Castlecliff shell, the apparently more sparse axials being due to the smallness of his specimen.

I have lately treated of the New Zealand members of this genus (*Trans. N.Z. Inst.*, vol. 55, p. 475, 1924), but the acquisition of further material enables me now to amend one or two erroneous conclusions there. The type of *A. pyramidale* subsp. *robustum* Finlay consisted of only some of the apical whorls; curiously enough, in the remaining unsorted material from the same locality the remainder of the shell was discovered, and it now proves to grow into *A. quadricingulatum* Finlay. The shell is worth full specific rank, and will bear the prior name *robustum* Finlay. This evidence also seems to warrant the union of the two "Miocene" forms described as *pyramidale* and *nodicingulatum*, both of Finlay, the former having priority. Doubt was expressed at the time as to whether one might not be the fully-grown form of the other, and I am now satisfied that it is. There can be little question that a direct lineage is represented here, — *pyramidale* (= *nodicingulatum*) [Miocene], *robustum* (= *quadricingulatum*) [Pliocene], *huttoni* (= *invaricosum*) [Uppermost Pliocene and Recent]. The first species is abnormal in occasionally showing a denticular plait on the middle of the pillar, but it is more usually absent, and in the later members never present; except for this feature these shells appear absolutely congeneric with *Cerithium serotinum* Adams, the type of *Ataxocerithium* Tate, and it may be noted that the Australian Tertiary ancestors of this species (e.g. *A. concatenatum* Tate) also occasionally possessed a rudimentary plait. *A. tricingulatum* Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 194, 1924) is probably an offshoot from this lineage.

Ataxocerithium suteri Marwick (*l.c.*, p. 195) has, however, little to do with this series; peculiar in form, and possessing always a strong medial columellar plait, it demands separate recognition, which is given by providing for it alone the name *Taxonia* nov.; ancestors and descendants have not yet been found.

Genus *Batillaria* Benson, 1842.

This was introduced into New Zealand Tertiary lists by Harris (*Cat. Tert. Moll. B.M.*, Pt. 1, p. 229, 1897) when he renamed Hutton's *Cerithium nodulosum*. I now reject it, and note that *B. pomahakaensis* Harris, *Cerithium hectori* Harris, and *Turritella ornata* Hutton, appear to be congeneric, and demand a new genus. This is provided in another paper in this volume.

Zefallacia n. gen.

I propose this for the Tertiary *Fastigiella australis* Suter (*Trans. N.Z. Inst.*, vol. 51, p. 68, 1919). This species has little affinity with *Fastigiella carinata* Reeve, an Antillean species, but is a member of a group of species occurring in early and middle Tertiary beds in New Zealand. Suter's records of *Nerinea* from the Tertiary (cf. *N.Z. Geol. Surv. Pal. Bull. No. 8*, p. 95; "*Nerinea* n. sp." from Chatton) refer to shells of this kind, and several undescribed species are known.

Genus *Triphora* Blainville, 1828 [P. 254]

That the complex covered by this name is polyphyletic has been admitted for long enough; as in the case of *Seila*, typical forms do not occur in New Zealand. There are many groups in Australasian Triphorids—and once again study of the apices seems to provide the best divisions—while the Neozelanic members fall into three series, *huttoni*, *lutea*, and the rest.

There is a well-marked austral group of Triphorids possessing a polygyrate apex with a sharp median carina crossed by numerous axial threads. *T. fasciata* Ten.-Woods, *granifera* Brazier, *innotabilis* Hedley, *tribulationis* Hedley, *infelix* Webster, and *fascelina* Suter all fall easily into this group, for which I propose *Notosinister* nov., with *T. fascelina* Suter as type. Odhner's record (1924, p. 28) of *T. tribulationis* Hedley, a north Queensland form, in New Zealand waters cannot be accepted. He mentions differences apparent even from the figure, and it is very probable that he was dealing with a fresh example of *T. fascelina* Suter.

T. huttoni Suter has a smooth several-whorled protoconch with a flattened dome-shaped top, and a strong medial groove on its later whorls; nodular sculpture is obsolete, and the shell has rather the appearance of a reversed "*Seila*." It may stand as type of a new genus *Teretriphora*, and with it may be placed the South Australian and Tasmanian *T. gemmigans* Verco; Suter states [p. 257] that *T. angasi* Crosse and *T. kesteveni* Hedley are also closely allied species.

T. lutea Suter, with which *T. obliqua* May may perhaps be grouped, has a characteristic apex with a short blunt asymmetrical point and two heavy spiral keels on all its whorls. I name it as type of *Cautor* nov. *Teretriphora* and *Cautor* may in the meantime be regarded as subgenera of *Notosinister*.

I append a summary of the classification of New Zealand Cerithioids here proposed as follows.*—

Fam. CERITHIIDAE Fleming.

Genus *Zeacumantus* nov. Type: *Cerithidea subcarinata* Sow.

Zeacumantus subcarinatus (Sowerby, 1855).

— *lutulentus* (Kiener, 1842).

[— *perplexus*] (Marshall and Murdoch, 1919).

[— *tirangiensis*] (Marwick, 1926).

Genus *Zebittium* nov. Type: *Cerithium exile* Hutton.

Zebittium exile (Hutton, 1873).

— *vitreum* (Suter, 1908).

(?) [— *marshalli*] (Cossmann, 1921) (= *minuta* Marshall).

Genus *Specula* nov. Type: *Cerithiopsis styliformis* Suter.

Subgen. *SPECULA* s. str.

Specula styliformis (Suter, 1908).

— *marginata* (Suter, 1908).

— *retifera* (Suter, 1908).

— *canaliculata* (Suter, 1908).

(?) [— *dissimilis* (Suter, 1908) (*Seila*).

Subgen. *MENDAX* nov. Type: *Cerithiopsis trizonalis* Odhner.

Specula trizonalis (Odhner, 1924).

— *stiria* (Webster, 1906).

Subgen. *SOCIENNA* nov. Type: *Cerithiopsis apicicostata* May.

Specula n. spp. not yet described.

Genus *ALIPTA* nov. Type: *Cerithiopsis crenistria* Suter.

Alipta crenistria (Suter, 1907).

Genus *ZACLYS* nov. Type: *Cerithiopsis sarissa* Murdoch.

Subgen. *ZACLYS* s. str.

Zaclys sarissa (Murdoch, 1905).

— *subantarctica* (Suter, 1908).

— *acies* (Suter, 1908).

[— *aequicincta*] (Suter, 1917).

Subgen. *MIOPILA* nov. Type: *Cerithiella fidicula* Suter.

[*Zaclys fidicula*] (Suter, 1917).

(?) [— *tricincta*] (Marshall, 1919).

Genus *JOCULATOR* Hedley. Type: *Cerithiopsis ridicula* Watson.

Joculator diremptus (Odhner, 1924).

Genus *NOTOSEILA* nov. Type: *Cerithium terebelloides* Hutton.

Notoseila terebelloides (Hutton, 1873).

(?) [— *attenuissima*] (Marshall and Murdoch, 1920).

Genus *HEBESEILA* nov. Type: *Seila bulbosa* Suter.

Hebeseila bulbosa (Suter, 1908).

(?) [— *chathamensis* (Suter, 1908) (= *cochleata* Suter).

(?) [— *huttoni*] (Suter, 1915).

Genus *ATAXOCERITHIUM* Tate. Type: *Cerithium serotinum* Adams.

Ataxocerithium huttoni (Cossmann, 1895) (= *invaricosum* Odhner).

[— *robustum*] Finlay, 1924 (= *quadricingulatum* Finlay).

[— *pyramidale*] Finlay, 1924 (= *nodicingulatum* Finlay).

[— *tringingulatum*] Marwick, 1924.

*Add to this also the new genus *Batullona* Finlay, proposed elsewhere in this volume for three more New Zealand Tertiary species of this family.

Genus *TAXONIA* nov. Type: *Ataxocerithium suteri* Marwick.
Taxonia suteri (Marwick, 1924).

Genus *ZEFALLACIA* nov. Type: *Fastigiella australis* Suter.
Zefallacia australis (Suter, 1919).

Fam. *TRIPHORIDAE* Jousseaume.

Genus *NOTOSINISTER* nov. Type: *Triphora fascelina* Suter.

Subgen. *NOTOSINISTER* s. str.

Notosinister fascelina (Suter, 1908).

— *infelix* (Webster, 1906).

(?) [— *aoteaensis*] (Marshall and Murdoch, 1920).

(?) — *ampulla* (Hedley, 1902) (?).

Subgen. *TERETRIPHORA* nov. Type: *Triphora huttoni* Suter.

Notosinister huttoni (Suter, 1908).

Subgen. *CAUTOR* nov. Type: *Triphora lutea* Suter.

Notosinister lutea (Suter, 1908).

Incertae sedis: *Cerithium inaequicostatum* Wilkens (*N.Z.G.S. Pal. Bull. No. 9*, p. 8, 1922); this Cretaceous species is based on a mere fragment, and might equally well be referred to the Scalidae.

Bittium oamaruticum Bartrum (*Trans. N.Z. Inst.*, vol. 51, p. 96, 1919) belongs to my genus *Notacursa*, and the name is therefore invalidated by the prior *N. oamarutica* (Suter), the genotype; the species, founded on a single worn and broken shell, is too obscure to be worth renaming, and may be allowed to lapse.

Genus *Serpulorbis* Sasso, 1827 [P. 259]

This is better replaced by *Vermicularia* Lamarck, 1799, which is used by both Hedley and May for *sipho* Lamarck and allied forms. Marshall and Murdoch have described the "Miocene" form as *Vermicularia ophioides* (*Trans. N.Z. Inst.*, vol. 53, p. 80, 1921), and Marwick (*l.c.*, vol. 56, p. 312, 1926) has described a still earlier ancestor as *Serpulorbis lornensis*.

Genus *Siphonium* Mörch, 1859 [P. 260]

This genus name is preoccupied by Browne (*Hist. Jamaica*, ed. 2, p. 396, 1789), and as *Stoa* is not available for the Neozelanic species, I propose the new genus name *Novastoa*, naming the Neozelanic species *Siphonium lamellosum* Hutton as type. The nuclear characters in this family (or families) show well-marked differences, and—when available—provide the best means of classification.

The name "*Siphonium planatum* Suter" appears in many of Suter's lists of Tertiary fossils, but considerable difficulty was experienced in tracing the name. The place of its introduction is nowhere referred to by Suter, and I had come to the conclusion that it was either a *nomen nudum*, or a substitute name, on some ground or other, for Hutton's *lamellosum*, when I dropped across the description of it and another species (which has been totally neglected, see the notes on Trophons, later) in *Rec. Cant. Mus.*, vol. 2, p. 57, 1913. It is a circularly involute adherent-planorbiform species, described from two examples from Kapiti Island; both are now in the Canterbury Museum. The species may be referred temporarily to *Vermicularia*, and not *Novastoa*, and all records of it from the "Miocene" would

be better referred to Marshall and Murdoch's *V. ophioides*, till the group as a whole is revised.

Stephopoma nucleogranosum Verco, 1904 [P. 262].

It is doubtful whether Neozelanic specimens are really identical with South Australian ones; in these variable shells the only safe guide is the apex, and there seem to be a series of these "nucleogranose" and "nucleocostate" forms. There is an Upper Pliocene ancestor to the New Zealand species found in the Castlecliff beds. These shells are not well placed in *Stephopoma*, the type of which is the Neozelanic *rosea* Q. & G., so I provide for them the group name *Lilax* nov., naming *S. nucleogranosum* Verco as type.

Siliquaria cumingi Moersch, 1860 [P. 263]

Omit this. Suter himself said that he was "inclined to consider the specimen in the Canterbury Museum as a variety of the next species" (*weldii* Ten.-Woods). I have seen the specimen and concur.

A Tertiary species has been described by Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 313, 1926) as *Siliquaria senex*.

Caecum digitulum Hedley, 1904 [P. 265]

Odhner has described a new species (1924, p. 29) from 35 fathoms, Colville Channel, as *Caecum suteri*, remarking, "This may be the same species as Suter (1913) mentions and (1915) figures under the name of *Caecum digitulum* Hedley, and which differs from Hedley's type in its less rapid tapering, according to a remark made by Iredale and quoted by Suter (*l.c.*, p. 265)." Odhner seems to have the impression that *digitulum* is an Australian species, whereas it comes from Lyall Bay. The rapidity of its taper is rather variable, and examination of many topotypes of both Hedley's and Odhner's species shows that the Lyall Bay and Hauraki Gulf forms are the same; Odhner's name will fall as a synonym of *digitulum*.

Genus **Turritella** Lamk., 1799 [P. 265]

This is in great confusion, specifically as regards the fossils, and generically as regards all the New Zealand representatives. Suter's descriptions of the Recent species contain many errors, especially concerning the apices and comparisons with exotic forms; his note on *T. tasmanica* Reeve (in the remarks on *T. fulminata* Hutton) has been corrected by Iredale (1924, p. 250). The latter writer has recently separated several genera for the Australian species, but many other groups can be distinguished. The austral genera at present recognised are as follows:—

Colpospira Donald, 1900; for *T. runcinata* Watson (= *accisa* Watson). Includes *sinuata* Reeve, *cordisimei* Watson (which Iredale says is either the southern stage of *sinuata*, or identical with *runcinata*), and the Balcombian *platyspira* Ten.-Woods. Closely allied to these in style of apex and sinus, but uniformly differing in general facies (unpolished, more solid test, with perfectly straight instead of lightly concave spire), more rugged sculpture, tending to develop three strong keels (the middle one weakest and frequently slightly beaded), and deeply-cut suture, is a mostly Eocene group containing the Australian *altingae* Tate (which Suter at one time identified from

New Zealand, but which Marwick has rejected) (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 328, 1924), *conspicabilis* Tate, *tristira* Tate, and the New Zealand *rudis* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 227, 1919) *waihaoensis* Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 328, 1924), and *tophina* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 313, 1926). For these is proposed the new genus *Spirocolpus*, with *T. waihaoensis* Marw. as type. The Australian shells have a slightly different appearance from the New Zealand forms here placed, and may later require separation.

Platycolpus Donald, 1900; for *T. quadrata* Donald. Includes *Colpospira guillaumei* Iredale. The latter author was at first of the opinion that *Platycolpus* merited only subgeneric status under *Colpospira* (1924, p. 247), but later ranked it as a genus (1925, p. 266). This is quite necessary, the protoconch and build of shell differing altogether from *Colpospira*, the deep sinus and rather weak sculpture being the only points in common.

Ctenocolpus Iredale, 1925; for *T. australis* Lamk. Includes the varietal form *C. australis diffidens* Iredale (1925, p. 267), and the fossil *T. pagodula* Tate, and *T. warburtoni* Tate. The latter superficially resembles some beaded specimens of *Spirocolpus rudis* (Marshall), but the essential details of apex and sinus place them in different groups.

Gazameda Iredale, 1924; for *T. gunnii* Reeve. Includes *tasmanica* Reeve (= *subsquamosa* Dkr.), while *clathrata* Kiener (see nomenclatural note elsewhere in this volume) and the fossil *acricula* Tate are, from the apical features, more or less closely allied, though representing diverse styles of sculpture and development. The group is quite peculiar in the large, obtuse, glossy, and almost Scaphelloid protoconch, as also, as Iredale notes, in viviparous habits. Iredale mentions that fossils labelled *T. murrayana* Tate showed lamellose sculpture as in the *oxyacris* form of *tasmanica* (1924, p. 250), but his specimens were evidently wrongly labelled, for *murrayana* shows no features of resemblance to *Gazameda*. This sublamellose ornament is occasionally seen also in the New Zealand *T. abscisa* Suter, but here again the affinity is purely superficial.

Glyptozaria Iredale, 1924; for *T. opulenta* Hedley. Includes the Balcombian *T. transenna* Ten.-Woods; widely different in facies from all the foregoing groups

Not a single New Zealand shell can be easily referred to any of the Australian genera, and it is necessary to create new names for the three main groups into which they fall. The largest group is typified by *T. vittata* Hutton, 1873 (= *carlottae* Watson), which may be named as type of a new genus *Zeacolpus*. With it can be associated the Recent *T. fulminata* Hutton and *pagoda* Reeve (which, though constant in habit, are both recognisably bathymetric or regional forms of *vittata*), and the Tertiary *lornensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 313, 1926), *albolapis* Finlay (*Proc. Mal. Soc.*, vol. 16, p. 101, 1924; new name for *concava* Hutton, preoccupied), *abscisa* Suter, perhaps *semiconcava* Suter, and many new species. *Zeacolpus* has a rather flattened apex of about one whorl, often developing a keel towards the end; the sculpture starts with two strong cords on the lower half, the upper stronger; two subequal

finer cords are soon developed above them, and there is a tendency for one or two of the spirals to become keels on later whorls; spire outline interrupted posteriorly by deep sutures, much less so anteriorly.

Also with a paucispiral apex, but with a different type of sculpture is *Stiracolpus* new genus, proposed for *T. symmetrica* Hutton, 1873; with which may be grouped the Recent *chordata* Suter (probably only a freak variant of the type species), and the fossil *waikopiroensis* Suter (*N.Z.G.S. Pal. Bull.* No. 5, p. 8, 1917), *kanieriensis* Harris (*Cat. Tert. Moll. B.M.*, Pt. 1, p. 241, 1897), and possibly the Australian Recent *T. godeffroyana* Donald, *atkinsoni* Tate and May, and *smithiana* Donald; many new Tertiary species are known to me. The apex of this group is one-whorled, without a keel, the sculpture starting with three subequal spirals, the median quickly becoming a little stronger; these three cords usually remain far the strongest, with not many interstitial riblets; the older Tertiary species have the lower two cords close and distant from the upper one, the later species tend to have the cords equally distributed.

The third group is represented by the common *T. rosea* Q. & G., which may be put forward as type of a new genus *Maoricolpus*; under this may also be ranged the Tertiary *cavershamensis* Harris (1897, p. 242) and many new species, and the Australian Tertiary *T. murrayana* Tate. The protoconch is polygyrate, papillate, and apparently sinusigeroid, the three to four tiny whorls being of distinctly smaller diameter than the following shell whorls, and thus noticeably projecting from them; the initial sculpture is of three ribs, the median strongest, the uppermost weakest; fine threads are intercalated on later whorls, which are relatively narrower between sutures than in the other groups, and tend to be concave; spire outlines straight, sutures very inconspicuous at all stages. *T. difficilis* Suter, I have noted elsewhere in this volume as preoccupied, but apparently inseparable from *rosea*.

The Cretaceous *Turritella solitaria* Wilck. (*N.Z.G.S. Pal. Bull.* No. 9, p. 35, 1922) cannot yet be located; its apex is unknown.

***Turritella carlotta* Watson, 1881 [P. 266]**

Odhner (1924, p. 30) has correctly resumed the use of Hutton's specific name *vittata* for this species; Murdoch and Suter (*Trans. N.Z. Inst.*, vol. 38, p. 292, 1906) dropped the name on account of supposed preoccupation by Lamarck, but that was an error, as has already been pointed out by E. A. Smith (*Brit. Antarc. "Terra Nova" Exped.*, vol. 2, No. 4, p. 80, 1915), who also records that the species grows to a length of 85 mm.

***Mathilda neozelanica* Suter, 1908 [P. 273]**

Suter has compared this species with the Australian *M. decorata* Hedley, but commented on the difference in apex. The resemblance between the two shells is curious but entirely superficial, *decorata* having a smooth bulbous embryo, abruptly set at right angles to the shell, while *neozelanica* has a heavily spirally keeled protoconch, marked off by a slight varix, but otherwise in the plane of the whorls, only the tip being slightly immersed (Suter's figure much exaggerates this feature). An exactly similar type of apex, differing only in

more numerous keels is shown by *Aclis succincta* [p. 327], described by Suter in the same year but not recognized as a near relation. In the absence of soft parts and operculum, it is difficult to know where to locate these shells, but the new genus *Brookesena* here proposed for them (with *M. neozelanica* Suter as type) may be provisionally located in *Rissoidae*, near *Lironoba*. The genus is named after A. E. Brookes of Matamata, a well-known conchologist.

Family **Struthiolariidae** Fischer [P. 273]

Dr. Marwick has recently published (*Trans. N.Z. Inst.*, vol. 55, p. 161-190, 1924) a comprehensive monograph of "The Struthiolariidae," this family being represented by 28 Neozelanic species in the Tertiary and Recent faunas. Since then, three further Tertiary species have been described: *S. prior* Finlay (*Trans. N.Z. Inst.*, vol. 56, p. 228, 1926), *S. nana*, and *S. praenuntia* Marwick (*l.c.*, p. 318). Marwick creates one new genus, *Monalaria* (p. 163), for *Struthiolaria tuberculata concinna* Suter; this is entirely a very early Tertiary group, of few species. Apart from this; all the New Zealand forms are included in *Struthiolaria* (*Struthiolariopsis similis* Wilckens, 1922, p. 17, a Cretaceous form, is shown to be not referable to the family), three groups being outlined but not named. They should have been, however; one of them at all events is quite distinct, for the following reasons: Marwick figures the curious apex of *Struthiolaria vermis* Mart. (p. 163), and remarks, "Well preserved examples of the Recent and Pliocene *S. papulosa* and *S. vermis* show, in most cases, a small, almost planorbid apex of one or two smooth volutions. This has always been considered as the protoconch; but a surprising condition was revealed by some specimens of *S. vermis* from the Wanganuiian Pliocene. In these the protoconch is a smooth, bulbous, capuliform structure, with its long axis at right angles to that of the shell. That this is the true protoconch is shown by the appearance of the same feature on specimens of *S. convexa* n.sp. . . . In withdrawing from the embryonic shell, the animal constructs numerous septa, so that, the hollow bulb being easily broken off, a planorbid apex is the result. It is probable that this type of protoconch prevails throughout the genus, for the smooth planorbid tip, generally seen in all well-preserved shells, is followed by a convex striated conch-whorl similar to that following the deviated protoconch of the examples cited above." Later (p. 167), he figures the apex of *S. papulosa* Mart., and examination of any perfect specimen will show that this small, glossy, planorbid embryo is certainly the true apex, and has not resulted from fracture. That the apex of *S. convexa* Marwick resembles that of *S. vermis* Mart., is to be expected, as both species belong to the same lineage. The protoconch of *S. subspinosa* Marwick, on the other hand, is identical with that of its lineal descendant, *S. papulosa*. This difference in the embryos is the best and surest evidence of the presence in New Zealand Tertiary beds of two radically different though superficially similar stocks of *Struthiolaria**

*In a later publication (*Trans. N.Z. Inst.*, vol. 56, p. 266, 1926) Marwick has himself made the statement, "The shape of the nucleus is a valuable guide in grouping related shells," and has adopted this as a principle in classifying the Volutes.

(comparison of the radulae of the two Recent species would be very interesting, and one may predict that it would but confirm the separation here made on apical features). Dr. Marwick has noted them as different groups, but, misinterpreting the observed embryonic differences, was not able to separate them with certainty from shell features alone. But I would now recognise them as distinct genera, so that *Pellicaria* Gray, 1857 (*Guide Syst. Distrib. Moll. B.M.*, p. 97) (type: *S. vernis* (sic) = *Buccinum vermis* Mart., vide Marwick, p. 170) returns to use as a generic name for the *vermis* lineage; forms of this group which converge towards *Struthiolaria* s.str. in shell formation are placeable easily and with certainty if the apex is examined. For the *Struthiolaria callosa* Marwick group I now provide the new subgenus *Callusaria*; it is probably not so distinct as the *vermis* line is from *Struthiolaria* s.str., but the four species included by Marwick form a rather compact assemblage, for which a group name is desirable.

Xenophora corrugata (Reeve, 1842) [P. 278]

In this case Suter's name of *X. neozelanica* must be used, as Reeve's species is quite distinct. The misunderstanding arose through the extreme range given to Reeve's shell, "Indian Ocean, Japan, etc." Mr. Iredale informs me that when the type of Reeve's species is examined, the Neozelanic shell is easily separable, and when Hedley suggested their identity, he referred only to Fischer's conception of Reeve's species.

The generic name must be *Onustus* Humphrey, as maintained by Moersch many years ago, the description and bibliographical reference enabling the exact recognition of Humphrey's genus.

I have described an early Tertiary ancestor to the Recent species (*Trans. N.Z. Inst.*, vol. 56, p. 228, 1926) as *Onustus prognatus*, showing that the *neozelanica* style of shell has lived in this locality for a long time.

Fam. Hipponicidae Fischer [P. 281]

The three species recorded from New Zealand, *Hipponyx hexagonus* Suter, *Pilaeopsis radiatus* Hutton, and *H. antiquatus* Linné have been discussed by Powell in a "Review of the Recent and Fossil New Zealand Species ascribed to *Hipponyx*" (*N.Z. Journ. Sci. and Tech.*, vol. 6, nos. 5 & 6, p. 282, 1924) and by Finlay (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 100, 1924) with the result that the Recent form disappears as a synonym of *Gadinia nivea* Hutton (q.v.), while, of the fossil shells, *radiatus* proves to be a *Crepidula*, its name being an available substitute for the indeterminable *C. striata* (Hutton), and *antiquatus* is rejected, the sole record for the family being now *Hipponyx* species from Kaawa Creek.

Fam. Calyptraeidae Broderip [P. 282]

Smith (*Brit. Antarc. "Tera Nova" Exped.*, vol. 2, no. 4, p. 83, 1915) has recorded the Australian *calyptraeformis* from New Zealand, but Peile, from examination of the radula, has distinguished the New Zealand shell as a new species, *terraenovae* (*Proc. Mal. Soc.*, vol. 16, pt. 1, p. 21, 1924). This species is common in the Cookian Province in depths of from 20–60 fathoms, where it seems to replace

S. novaezelandiae. In Peile's description, differential features were based mainly on the radula and he did not stress the chief conchological characters; in consequence his shell is not readily recognisable to those who have not abundant material. *Terraenovae* is easily distinguished from *novaezelandiae* by the absence of an open umbilicus, only a mere chink being present; its shell is more circular and has a less excentric nucleus, but it is proved to be a *Sigapatella* by the spiral grooves at the close of the protoconch. Peile does not mention the spiral ornament; this is not always present in either species, but when it is it serves as a ready means of identification; *novaezelandiae* has four coarse irregular low spiral cords (interstices about as wide), while *terraenovae* has numerous flat ribs (with sublinear grooves between) descending more or less rapidly to the margins. Since Peile did not illustrate his shell, figures are here appended of a specimen in the Finlay collection from 40 fathoms near Cuvier Island (Figs. 1, 2). The species does not occur in other provinces, *tenuis* and *novaezelandiae* occurring down to 60 fathoms in Forsterian localities from which dredgings have been seen.

Very distinct Tertiary members of *Sigapatella* are *Calyptraea maccoyi* Suter (*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 9, 1917), and its direct ancestor *C. vertex* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 314, 1926); these also have peculiar radial ornament. *Calyptraea solitaria* Wilckens (*N.Z.G.S. Pal. Bull. No. 9*, p. 6, 1922) possibly belongs to *Sigapatella*, but this Cretaceous species is worthless, being known to science by one internal cast.

It is probable that there are many forms of the "scutum" series, for Smith separated the Australian shells from the Neozelanic ones, calling the former *hedleyi*, the latter being *tenuis* Gray. Though never explicitly stated, the types of Smith's *hedleyi* were South Australian shells sent by Verco (information from T. Iredale). Shells of this style, tentatively named *hedleyi*, from Twofold Bay, are much higher than Verco's specimens. The radulae of these shells and the radula of the Neozelanic *tenuis* differ from that of the *Sigapatella* series. The central tooth approaches much more closely to that of *chinensis* Linné, the type of *Calyptraea* Lamarck, 1799 (a name which must give way to *Galerus* Humphrey of the *Museum Calonnianum*, p. 5, 1797, founded on the same type), and the shells are conchologically easily separable, so that for this group I propose *Zegalerus* nov., naming *Clypeola tenuis* Gray 1867 as type.

Here, too, may be located in the meantime *Calyptraea alta* (Hutton) (*Trans. N.Z. Inst.*, vol. 17, p. 329, 1885), based on a Pliocene fossil. This still lives as a Recent form in the Chatham Islands, but the Cape Maria van Diemen shells referred here are distinct. Hutton described the species as *Trochita alta*, but Conrad had, thirty years previously, employed the same name (*Proc. Acad. Nat. Sci. Philad.*, p. 259, pl. 15, fig. 3, Jan. 1855, where a reference is given to Waile's *Geol. Miss.*, p. 287, pl. 15, fig. 3, a, b, 1854, which has not been seen). I have to thank Mr. Iredale for these references, and I now provide for the Petane species originally described by Hutton the new name *Zegalerus crater*. As a species, this is not always readily separable from *tenuis* Gray; adults are easily distinguished by their much larger size and tall conical form, but juveniles of the two forms are

often deceptively alike. Careful scrutiny, however, always allows of separation, for *crater* has a much more solid shell of very coarse texture, the sides are almost straight, the whorls being more concealed than in *tenuis*, the growth lines appear from above rather as concentric circles than as logarithmic spirals, there is generally no tendency for the last whorl to flatten out (as is almost always the case in *tenuis*), and there is no hollow axis. The last feature, which is so conspicuous in true *tenuis*, is perhaps the safest for quick separation. Even young shells of *crater* can be distinguished from *tenuis* by the character and set of the embryonic whorls, which project laterally and obliquely, and have the inner whorl somewhat inrolled and hidden by the outer; the protoconch of *tenuis* rises in a more regular spiral, and juts more vertically, the inner whorl generally rising above the outer and not at all obscured by it. E. A. Smith's figures of Gray's type of *tenuis* (*Brit. Antarct. "Terra Nova" Exped.*, Moll., pt. 1; pl. 1, figs. 20-22, 1915) are a little puzzling, the side-view showing a shell quite like *crater*, though the internal aspect is that of what I am taking for *tenuis*; however, the actual size given shows that the type was a juvenile shell, and such are sometimes found with considerable altitude. The whole of Smith's descriptions and comparisons apply to the common South Island littoral and deep-water shell rather than to the very rare Moriorian and Pliocene *crater*.

Genus *Crepidula* Lamarck, 1799 [P. 286]

This genus name is later than, and exactly equivalent to, *Crypta* of the *Museum Calonnianum*, p. 4, 1797, both being based on the American *Patella fornicata* L. It is almost certain that the radula will show good differences in Crepidulid shells, but the Neozelanic group centering in *costata* Sow. is a very peculiar one, being confined to New Zealand, and having many fossil antecedent forms in the same country. Curiously enough, Suter mentioned as equivalent *aculeata* Gmelin, which is at present given a world-wide range, showing very little variation; it, however, has a notched septum, and otherwise differs considerably. In view of these facts I propose to erect a new genus *Maoricrypta*, naming *C. costata* Sow. as type.

Another group is represented by the series of slipper limpets that live inside dead shells; this is an extremely interesting one and needs detailed study. Whereas the apex in the *costata* series is smooth and glossy, passing directly into the crude corrugations of the adult sculpture, the *monoxyla* line has developed an intervening brephic stage which forms a large slightly raised ellipsoidal cap (with the flatly-coiled smooth embryo at one of the foci), ornamented all over with fine threads radiating from the embryo. The "Miocene" ancestor of *monoxyla* has the same feature, only the threads are fewer and wider; this stage has evidently developed long since, and never appears in the costate forms; I therefore emphasize the distinction of the parasitic group by providing *Zeacrypta* nov. for *monoxyla* Lesson at present allowing it subgeneric rank under *Maoricrypta*. The reference of the high, nonparasitic forms to *monoxyla* is doubtful; they seem quite distinct specifically, possibly generically, and may indeed be degenerate forms of *Maoricrypta*.

One may recommend investigation of this problem and I suggest that only the flattened parasitic forms are true *Zeacrypta monoxyla*.

Maoricrypta has numerous fossil members, *halotoidea* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 318, 1926), *radiata* Hutton (see note on *Hipponyx*), *densistriata* Suter (*N.Z.G.S. Pal. Bull.* No. 5, p. 10, 1917), *wilckensi* Finlay (= *incurva* Zittel, preoccupied) (*Proc. Mal. Soc.*, vol. 16, p. 101, 1924), and *hochstetteriana* Wilckens (*N.Z.G.S. Pal. Bull.* No. 9, p. 5, 1922), may all be cited in this connection; the last named carries the line back to the Upper Senonian.

Genus *Natica* Scopoli, 1777 [P. 288]

None of the known Neozelanic members of the family fall into the genus *Natica*, which has a spirally multisulcate calcareous operculum.

Natica australis Hutton was proposed as a *Lunatia*, and is now referred to Bolten's genus *Cochlis*, so that a new name is not necessary, unless there be another species *australis* in *Cochlis*, or another *L. australis* be unearthed. At present my substitute, *Natica maoria* (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 101, 1924), cannot be used, and the species name will revert to *australis* (Hutton).

Natica zelandica Q. and G. is also to be referred to the genus *Cochlis*. Dr. Marwick has published an account of the Tertiary and Recent Naticidae and Naricidae of New Zealand (*Trans. N.Z. Inst.*, vol. 55, pp. 545-579, 1924), and makes no mention of *Cochlis*, but till more is known of the opercula of the fossil species, all his species of *Natica* would be better classed as *Cochlis*.* In that paper he has added two species to the Recent fauna, *Natica denticulifera* Marwick (p. 552) (from unknown locality, type from the Pliocene), and *Uber* (*Euspira*) *barrierensis* Marwick (p. 571) (from off Great Barrier Island, 110 fathoms, while he places Suter's two species of *Ampullina*—*undulata* (Hutton) (see nomenclatural note and new substitute name elsewhere this volume) and *venusta* (Suter)—in his new genus *Globisinum*, proposed for *Sigaretus* (?) *drewi* Murdoch (pp. 575, 576). To the species included here by Marwick must be added *G. crassiliratum* Finlay (*Trans. N.Z. Inst.*, vol. 56, p. 230, 1926). The other new group names proposed by Marwick in this account are:—*Carinacca* (for *Ampullina waihaoensis* Suter), *Magnatica* (for *Polinices planispirus* Suter), and *Sulconacca* (for *S. vaughani* Marwick; see note under *Ampullina apora*, below); the genotypes of these three groups are all lower Tertiary shells. Besides these, the genera *Neverita* Risso and *Amauropsella* Chelot are added to the Tertiary fauna. I have since then added three further Tertiary species of *Magnatica* (*Trans. N.Z. Inst.*, vol. 56, pp. 228, 229, 1926) and proposed a new subgenus *Spelaenacca* for one of them (*M. altior*).

Powell has (elsewhere in this volume) added still another Recent species of *Cochlis* (from Whangaroa) to the New Zealand fauna.

*Since the above was written, I have recovered from two fossil species, *N. praecensors* Finlay and *N. notocenica* Finlay, opercula of the true *Cochlis* style.

Genus *Polinices* Montfort, 1810' [P. 290]

This has been displaced by *Uber* Humphrey 1797, of the *Museum Calonnianum*, in a recent study of the group by Hedley (*Rec. Austr. Mus.*, vol. 14, No. 3, p. 154, 1924). The species *Lunatia vitrea* Hutton is very probably distinct from Watson's *Natica amphiala*, the location and station being widely separated; this is discussed by Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 570, 1924) and the usage of *vitrea* Hutton may, at all events, be recommended for Forsterian shells. Marwick has used *Uber*, but seems to be dubious that the distinction between the horny and shelly operculate groups is definite. Study of the radulae of the Recent species shows valid differences.

One further Tertiary species of *Uber* has to be added to Marwick's list, *Uber laxus* Finlay (*l.c.*, vol. 56, p. 229, 1926), while Wilckens (1922, pp. 6, 7) has described two Cretaceous forms *selwyniana* and *ingrata*.

***Ampullina apora* (Watson, 1881). [P. 293]**

The Neozelanic shell referred to this Aru Island species of Watson may be a species of *Friginatica*. That genus has been recorded (in the form of *F. pisum* Hedley) from Macquarie Island (Hedley, 1916, p. 52), but Hedley's species does not, from the figure, seem congeneric with his genotype; a true fossil member is, however, known in *Lunatia suturalis* Hutton (*Trans. N.Z. Inst.*, vol. 9, p. 597, 1877). Marwick has proposed a new genus *Sulconacca* for *S. vaughani* Marwick, a close relative of this species, so that *Sulconacca* appears to be an absolute synonym of *Friginatica*. The characters on which *Sulconacca* was founded are all present in *Friginatica*, while the Australian Tertiary *F. polita* Ten.-Woods (*P.R.S. Tas.* for 1875, p. 23) is with difficulty separable even as a species from *S. vaughani* Marwick*, and (according to Hedley, 1916, p. 51) even from the genotype of *Friginatica*, *N. beddomei* Johnston (*Proc. Roy. Soc. Tas.* for 1884, p. 222).

The "Family Naricidae" used by Marwick must give way to Merriidae, while reference to the early Tertiary European *Micrescharcha* and its section *Macromphalina* would be obviated by the use of Hedley's *Naricava* (*P.L.S.N.S.W.*, vol. 38, p. 294, 1913), proposed for *Adeorbis angasi* A. Ad., to which *Micrescharcha huttoni* Marwick is very similar even specifically.

Genus *Lamellaria* Montagu, 1815. [P. 293]

To *L. cerebroides* Hutton and *L. ophione* Gray must now be added *Lamellaria verrucosa* Odhner (1924, p. 31), described from Auckland Island.

Genus *Trichotropis* Broderip and Sowerby, 1829. [P. 296]

This genus is based on an Arctic species with only a vague resemblance to the Neozelanic species, which Hedley suggested might be referred to *Sirius*, but a new genus would meet the case better, *S. badius* T.-W., the type of *Sirius*, being a much smaller shell, with different style of ornament and aperture. I therefore propose the new generic name *Trichosirius*, naming *Trichotropis inornata* Hutton as type.

*Dr. Marwick, having seen specimens, concurs in this view.

Iredale has indicated (1924, p. 251) that if the grouping be continued the family name must be *Lippistidae* on the score of priority, and he has also pointed out the confusion existing in connection with the species and specific names of *Lippistes*. The South African type has a similar appearance to the Neozelanic shell, but agrees less with the intervening Australian series. As Tertiary forms related to the Neozelanic type have been found within late years (*L. perornatus* Marshall and Murdoch, *Trans. N.Z. Inst.*, vol. 54, p. 121, 1923; and *L. pehuensis* Marwick, *Trans. N.Z. Inst.*, vol. 56, p. 319, 1926), there is probably only indirect relationship between the several Recent stocks, which perhaps sprang from a common ancestral dweller on the shores of Gondwanaland. One may, therefore, introduce a new generic name *Zelippistes*, naming *Separatista benhami* Suter as type.

Genus *Recluzia* Petit, 1863.

Powell has added this to the New Zealand fauna by recording *Recluzia lutea* (Bennett) from Great Barrier Island (*N.Z. Journ. Sci. and Tech.*, vol. nos. 5 and 6, p. 285, 1924).

Trivia australis (Lamareck, 1822). [P. 301]

Iredale has pointed out that the Lamareckian name is preoccupied and no substitutes are available, and has therefore described the Australian shell as a new species under the name *Triviella merces* (1924, p. 257). Upon examination it is found that Neozelanic specimens differ, so also require description as a distinct form.

Triviella memorata n. sp. (Fig. 73.)

Shell globose and inflated, high but not elongate. Milk white, with two central large red-brown patches meeting across dorsal groove, a small anterior and one or two posterior patches, ends of outer lip same colour. Whole surface with weak transverse ribs, meeting at a more or less faint dorsal groove, continued everywhere into interior except for a small smooth space at anterior canal. Sides curved, not even approximately parallel. Outer lip not much projecting beyond spire. Other details as in *T. merces* Iredale.

Length, 13.5 mm.; height, 8.5 mm.; width, 9.5 mm.

Locality,—Ahipara Bay, near Auckland.

Close to *T. merces* (a Sydney specimen of which is here figured for comparison—Fig. 74), but shorter, higher, and more globose, with larger colour-patches, and less produced outer lip. Not very close to any of the three Tertiary Neozelanic species, *zelandica* Kirk (*Trans. N.Z. Inst.*, vol. 14, p. 409, 1882), *pinguior* Marwick (*l.c.*, vol. 56, p. 314, 1920), or “*avellanoides* Tate” (*vide* Marshall, *Trans. N.Z. Inst.*, vol. 49, p. 461, 1917); the latter is of the same generic style, but the two former would be better referred at present to *Trivia*.

Genus *Erato* Risso, 1826.

Although living species are known from Australia and most other parts of the world, this genus is not yet represented in the Recent Neozelanic fauna, the nearest occurrence being *E. lachryma* Gray, recorded by Iredale from the Kermadecs (*Proc. Mal. Soc.*, vol. 9, p. 71, 1910). A Tertiary species, however, *E. neozelanica* Suter (*N.Z.*

G.S. Pal. Bull. No. 5, p. 12, 1917), has been known for some time, and has recently been redescribed and figured by Murdoch (*Trans. N.Z. Inst.*, vol. 55, p. 160, 1924). To this have now to be added several further species described lately: *antiqua* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 227, 1919), *vulcania* Marwick (*l.c.*, vol. 56, p. 314, 1926), and *senectus* Murdoch (*l.c.*, vol. 55, p. 160, 1924). The curious plaits running over the anterior part of the outer lip on to the base in the last-named species are evidently a specific character, as I have another specimen from Target Gully agreeing exactly in this respect with the previously unique type.

Family **Septidae**. [P. 302]

This name was amended to *Cymatiidae* by Iredale in his "Commentary," and some notes given on the classification of the group. Some further corrections may now be made in the species and group names.

Septa tritonis (Linné, 1758). [P. 304]

This is a very doubtful member of the fauna, and shells so called should be critically examined and compared with typical specimens. Smith (*Brit. Antarct. Exped.*, Moll., pt. 1, p. 84, 1915) has pointed out that a perfect apex dredged in 11-20 f. near North Cape differed in detail from that of true *tritonis*.

Septa rubicunda Perry, 1811 [P. 303]

Iredale advised the use of *Charonia lampas* (Linné, 1758), but informs me that, as in other cases of lumping, he has been compelled by study of more material to alter his decision. "When series of shells are studied, the variation is seen to be geographical as well as individual, and consequently races (or species) can be really determined. Thus, a dozen South African shells showed features of nodulation which differed from that seen in Australian specimens, though both series varied *inter se*. The few Kermadec specimens differ from a series of New South Wales shells, and the Neozelanic form is easily separable." (T. Iredale, *in litt.*)

I have recorded an Australian form, *euchia* Hedley, from off the Neozelanic coast (*Trans. N.Z. Inst.*, vol. 55, p. 462, 1924, but this proves different again, so that these Neozelanic forms are now described as new.

Charonia capax n. sp. (Fig. 67.)

Shell large and wide, with capacious aperture. Apex lost. Two strongly-noduled, broad spiral cords per whorl (9-10 nodules per whorl), and many variable narrow flattish riblets (interstices wider on shoulder, sublinear below); body-whorl with about nine strong cords, all with faint nodulation, 2-3 narrower weaker cords in interstices, canal with 10-12 cords. Colour pure white, with pale yellow-brown maculations on main cords, parts of shell suffused with a pinkish-brown tinge; inside of outer lip and lower part of columella glossy, greyish-brown, with occasional pale reddish-brown bars. Varices, about 150° apart, low, flattened, with little difference in level on either side. Spire a little shorter than aperture, sides straight; whorls with a submedian shoulder (slope about 45°, thence vertical);

sutures distinct, irregular but not undulating. Body-whorl considerably inflated, with an expanded outer lip which is thin and sharp, only slowly thickened inside, curving regularly, the wide and short canal hardly protruding beyond it. Pillar placed much to the left, considerably angularly excavated above the three or four weak basal plaits. A rather weak parietal tubercle distant from outer lip.

Height, 165 mm.; diameter, 90 mm.

Locality, off Otago Heads, in 20 fathoms.

Differs considerably from the Australian *rubicunda* in colour, higher shoulder, weaker and more numerous nodules, more excavated and sloping pillar, shorter and wider canal, much weaker parietal tubercle, expanded and regularly curved outer lip, not angled at shoulder, absence of teeth and chocolate-brown bars inside lip, and altogether larger and more inflated body-whorl.

Subsp. *euclioides* nov. (Fig. 68.)

In colour and general arrangement of sculpture similar to the species, but the whole ornament stronger; the nodules are smaller, higher, and more pronounced on all whorls, especially those on lower cord; cords on shoulder very much narrower, interstices 4-5 times as wide. Shell much thinner and taller, spire considerably higher than aperture, which is rather compressed, the outer lip (though broken) much less expanded. Parietal plait much stronger.

Height, 210 mm.; diameter, 90 mm.

Locality, off Otago Heads, in 40 fathoms.

Very similar to *euclia* Hedley, and recorded by me as such, but apparently of different colour, and with a taller, more compressed aperture and more excavated pillar; also it is evidently a derivative of *capax* nov., which differs considerably from the forms out of which *euclia* has sprung.

Cymatium parthenopeum (von Salis, 1790). [P. 305]

New Zealand specimens have a longer canal, a different outer lip, and a considerably smaller aperture than Australian shells, so that the use of Hutton's name *Triton acclivis* (*Cat. Mar. Moll.*, p. 13; plate fig. 8, 1873) may be counselled.

Cymatium exaratum (Reeve, 1844) and ***Austrotriton parkinsonianum*** (Perry, 1811). [pp. 306, 307]

Lack of comparative material at the present time prevents criticism of these species and their New Zealand records, though it may be noted that Powell has lately re-recorded them both (*N.Z. Journ. Sci. and Tech.*, vol. 6, nos. 5 and 6, p. 286, 1924). I present figures of actual New Zealand shells (*exaratum*, Figs. 83, 84; *parkinsonianum*, Fig. 85), but the few specimens I have seen do not show satisfactory differential characters from Australian shells, so that these two species may stand in the meantime. They and *Cymatium acclive* (Hutton) seem to be geologically quite recent immigrants to the New Zealand region; a species of *Austrotriton* (*maorium* Finlay) is common in the "Miocene," but the genus seems quite absent in the Pliocene. For a discussion of the New Zealand fossil species and

their relationships, with keys to genera and species, see Finlay, *Trans. N.Z. Inst.*, vol. 55, pp. 453-465, 1924.

***Argobuccinum argus* (Gmelin, 1791). [P. 309]**

Argobuccinum is not valid at the place quoted by Suter, viz., Hermannsen, 1846, but dates only from Moerh, *Cat. Conch. Yoldi*, 1852, where it exactly equals *Priene* H. & A. Adams, 1858 (*Gen. Rec. Moll.*, vol. 2, p. 654), which name it must replace. I therefore propose the new name *Gondwanula*, naming *Ranella tumida* Dunker as type. The existing members of this group seem to be confined to shores of the continents that once formed "Gondwanaland," and the stock would thus seem to be of very early origin and South Tethyan distribution.

I have elsewhere added *Priene retiolum* Hedley to the Neozelanic fauna (*Trans. N.Z. Inst.*, vol. 55, p. 462, 1924). The generic location of *retiolum* is in *Fusitriton* Cossmann, and the Neozelanic shell requires a new specific name. A beautiful specimen has lately been obtained from off Otago Heads in 40 fathoms, and since this permits of more accurate comparison than was possible with the fragment recorded from Taieri Beach, and proves to be distinct, it is now described.

***Fusitriton laudandum* n. sp. (Fig. 65.)**

Shell large, fusiform, thin and light. Colour whitish, marked with double yellow-brown bands on the spire-whorls. Apex lost. Sutures deep, spire a little higher than aperture and canal. Varices very weak and low, irregular, two or more to a whorl. Whole surface reticulated, four more-prominent double spiral cords per whorl, and about 19 axials, interstices about three times as wide in each case, so that there are square meshes with double nodules at each corner over the whole shell except base, axials rather abruptly fading out just below periphery; 16 spirals and 27 axials on last whorl. Aperture ovately pyriform, outer lip with a stronger varix than elsewhere, simple within; a channel posteriorly between outer lip and a low thick parietal plait; anteriorly a fairly long, straight, sloping canal. Inner lip smooth, distinctly limited. Pillar with a low blunt ridge at its base, above which it is deeply excavated.

Height, 100 mm.; diameter, 46 mm.

Locality.—Off Otago Heads in 40 fathoms.

The shell is smaller and the sculpture coarser than in *F. retiolum* (Hedley), which has 35 radials and 22 spirals on the last whorl of a shell measuring 130 mm. by 60 mm.

With this shell were dredged several living and very large specimens of *Gondwanula tumida* (Dkr.), the largest measuring 130 by 79 mm.; the maximum size given by Suter is 103 by 62 mm.

***Argobuccinum australasia* (Perry, 1811). [P. 310]**

For this species Iredale has proposed the genus *Mayena*, and an investigation of the forms would yield much of interest. There appears to be variation associated with geographical distribution, but this is somewhat masked by individual variation. From southern Australia specimens with two rows of nodules on the last whorl are

commonly met with, the majority of the Sydney shells show only one obsolete row, while from Norfolk Island a large shell with numerous nodules has been seen. As the New Zealand shell appears to differ also, having a subobsolete lower keel, and many nodules on the peripheral keel (about 9 between varices in specimen figured), I supply the name *Mayena zelandica* for the shell from Tauranga (in the Finlay collection) here figured (Fig. 66); a general diagnosis of the species is given by Suter under *Argobuccinum australasia*. The dimensions of the figured type are 90 mm. by 52 mm.

In treating of the New Zealand fossil Cymatiidae, I noted the distinctness of one of the groups (*Trans. N.Z. Inst.*, vol. 55, p. 458, 1924), and I now refer *C. kaiparaense* Finlay and *C. sculpturatum* Finlay to *Mayena*; these specimens were compared with the Australian fossil *Triton intercostale* Tate, and this species is also a *Mayena*. Two others (*revolutum* Finlay and *transennum* Sut.) that were included in this group now turn out to belong, as I suggested, to *Semitriton*; the former has been described and figured also by Marwick (*l.c.*, vol. 56, p. 315, 1926). My *octoserratum* (*loc. cit.*, p. 459), which I compared with *quoyi* and its congeners, will be referable to *Cymatiella* Iredale (1924, p. 253).

Phalium labiatum (Perry, 1811). [P. 312]

Iredale is reviewing the Australian species of this group in a paper to appear shortly in the *Records of the Australian Museum*. As he is incorporating there some remarks on New Zealand forms I have sent him, and describing some as new species, a revision must be postponed until his paper has appeared. Mention need be made only of the new genus *Euspinacassis* Finlay (*Trans. N.Z. Inst.*, vol. 56, p. 230, 1926) created for three Tertiary New Zealand shells—*E. pollens* Finlay (*l.c.*), *Phalium grangei* Marwick (*l.c.*, p. 319), and *Cassis muricata* Hector (*vide* Suter, *N.Z.G.S. Pal. Bull.* No. 3, p. 12, 1915)—somewhat resembling *Echinophoria* Sacco. In a recent paper on the "Cassididae of Western America" by Schenck (*Bull. Depart. Geol. Sci.*, vol. 16, No. 4, p. 72, 1926), *Echinophoria* (with type *Cassis intermedia* Brocchi) is placed as a section of *Bezoardica* with the definition, "Callus nearly smooth; nodosities almost covering whorl." *Euspinacassis* has a ridged callus, and appears, as one would expect, genetically related to the austral *Casmaria* (*pyrum* Lk., etc.) rather than to *areola* Gm., the type of *Bezoardica*.

Tonna variegata (Lamarck, 1822). [P. 314]

Hedley has separated New Zealand shells from the Australian *variegata* Lamk., and supplied for them the name *Tonna haurakiensis* (*Rec. Austr. Mus.*, vol. 12, No. 11, p. 331, 1919). Wilckens (*N.Z.G.S. Pal. Bull.* No. 9, p. 18, 1922) has proposed a new genus *Protodolium* for *Neritopsis speighti* Trechmann (*Geol. Mag.*, n.s., dec. 6, vol. 4, p. 300), an Upper Senonian fossil, and referred it to the *Tonnidae*, as an ancestor of *Dolium* (i.e. *Tonna*).

Family Architectonicidae H. and A. Adams. [P. 315]

General notes on the few New Zealand species of this family may be brought together under this head.

Architectonica reevei (Hanley, 1862) appears to claim a place in the Neozelanic fauna, Powell having lately figured New Zealand specimens gathered at Mt. Maunganui, Bay of Plenty (Bucknill, p. 57, Pl. 8, fig. 19, 1924). Tertiary species are *aucklandica* (Marsh.) (*v.i.*), *marwicki* Allan (*Trans. N.Z. Inst.*, vol. 56, p. 338, 1926) and *ngaparaensis* Suter (1917, p. 14); *inornata* Marshall (*Trans. N.Z. Inst.*, vol. 49, p. 452, 1917) I have made the subject of a nomenclatural note and the type of a new genus elsewhere in this volume.

Philippia Gray, 1847 should be given generic rank. *P. lutea* (Lamarck, 1822) seems also to have several authentic New Zealand records, and has also been figured from New Zealand specimens by Powell (*loc. cit.*, Pl. 8, fig. 20).

Helicacis variegatus (Gmelin, 1791) should probably be replaced by *H. stamineus* of the same author, if one may judge from Suter's description and figure; I have seen no adult New Zealand specimens. Apart from this rather doubtful record, the genus has no representatives in the Neozelanic fauna, though several Tertiary species have been described as such. *H. conicus* Marshall (*Trans. N.Z. Inst.*, vol. 49, p. 453, 1917) has already herein been made the type of *Conomionolia* nov. and referred to the Umboniidae; I have advocated the dismissal of *imperfectus* Suter as an unrecognizable species (*Trans. N.Z. Inst.*, vol. 55, p. 506, 1924); certainly not a *Helicacis*; *aucklandicus* Marshall (*l.c.*, vol. 50, p. 263, 1918) is an *Architectonica* close to *marwicki* Allan.

Omalaxis amoenus Murdoch and Suter, 1906 should, as Iredale has contended (1915, p. 461), be referred in the meantime to *Helicacis*, larger shells than the type showing the characteristic rounding and descending of the whorls.

Discohelix meridionalis Hedley, 1903 has been recorded by Miss Mestayer (*Trans. N.Z. Inst.*, vol. 48, p. 125, 1916), but further examination of the sole fragmentary specimen would probably lead to its identification with the previous species. As, however, these Agadinoids have a wide distribution, and I have not seen Miss Mestayer's shell, the record cannot be definitely rejected at present.

It has already been noted that the new genus *Zerotula* for *Discohelix hedleyi* Mestayer and *Omalogyra bicarinata* Suter should be placed in this family.

Genus *Epitonium* Bolten, 1798. [P. 319]

Powell has added a species by describing *Epitonium bucknilli* nov. (*Trans. N.Z. Inst.*, vol. 55, p. 138, 1924).

The earliest name is undoubtedly *Scala* Humphrey, 1797 of the *Museum Caloniianum* (p. 23) and the family name must revert to *Scalidae*, one of the pleasing changes that occur. The grouping of the Neozelanic species needs careful consideration; de Boury made a life study of these fascinating shells, but did not live to complete his monograph and see it published.

Epitonium parvicostata and *simplex* Marshall (*Trans. N.Z. Inst.*, vol. 49, p. 451, 1917) (which I have referred to *Tenuiscalia*; *Proc. Mal. Soc.*, vol. 16, p. 102, 1924), *tricinctum* Marshall (*l.c.*, vol. 50, p. 263, 1918), *tenuispiralis* Marshall (*l.c.*, vol. 51, p. 227, 1919), *Cirsostrema caelicola* Finlay (*l.c.*, vol. 56, p. 231, 1926), *C. angulata*

Marwick (*l.c.*, p. 320), and *Scalaria* (*Cirsostroma?*) *pacifica* Wilckens (1922, p. 8) (Cretaceous) must be added to the list of fossil species.

The beautiful shell named *Scala laevifoliata* by Murdoch and Suter is so distinct that it probably does not even belong to this family. It is quite unlike any of the groups indicated by de Boury, who would probably also have denied it relationship. I propose the new genus *Murdochella* (with this species as type) for this group, which also occurs in Australian waters, and of which there are at least three other distinct Neozelanic members, one of which I here describe. Hedley has identified an Australian shell with Murdoch and Suter's species, but in view of the slight differences between species in this genus, it is probable that re-examination would result in its description as new.

***Murdochella alacer* n. sp. (Fig. 41.)**

Shell similar to *M. laevifoliata*, but stouter and less slender. Apex of same style, but larger and wider, only the incoiled tip smooth, the rest with rather distant strong curved axial ribs, not becoming laminate toward the close; not so well marked off from the succeeding whorls. Lower two keels on spire-whorls much more prominent (in *laevifoliata* the upper and lower are subequal and the median strongest), only a faint suggestion of a fourth subsutural thread on body-whorl; a carina as strong as lower keels emerging from suture, and between this and pillar one more strong cord. Axial lamellae fewer, stronger, and more distant, not stopped by carina but passing over whole base. Other details as in *laevifoliata*.

Height, 4.7 mm.; diameter, 1.6 mm.

Locality.—Near Cuvier Island, in 40 fathoms.

Genus ***Crossea*** A. Adams, 1865. [P. 324]

The Neozelanic specimens referred to *Crossea cancellata* Ten.-Woods, 1878 and to *C. labiata* Ten.-Woods, 1876 are quite distinct from these species and I describe them as new.

Iredale has proposed two new genera, *Crosseola* for *C. concinna* Angas, which will include the first named, and *Dolicrossea* for the latter (1924, p. 251). The animal of the former has not yet been examined, but the operculum proves to be horny and multispiral, and the genus therefore referable to the family *Liotiidae*.

The species *Crossea glabella* Murdoch is not congeneric with either, and is an endemic and very peculiar form. For it may be proposed the new generic name *Conjectura*. Tertiary forms of *Crosseola* and *Dolicrossea* are known to me from New Zealand, but *Conjectura* has not been met with except as a Recent shell, which, however, has a wide Neozelanic range.

Till more is known of the animals of these little shells it will be safest to include all these genera in the Family *Liotiidae* Iredale (*vide antea*).

***Crosseola errata* n. sp. (Fig. 33).**

Shell related to *cancellata* Ten.-Woods, but differing in aperture and details of sculpture. Three strong spirals on spire-whorls, six and the umbilical cord on body-whorl; upper three by far the strongest, with interstices twice their width; lower three below aper-

ture, interstices much narrower than those above, but still about $1\frac{1}{2}$ times width of ribs; no trace of a seventh rib. Axial lamellations coarse and thick, interstices $1\frac{1}{2}$ -2 times as wide. Umbilical rib stout and crenulated. Spire as high as aperture, somewhat tabulated, outlines straight; whorls squarely convex. Aperture with thickened sides, interior quite circular, no angle above, and no canaliculation at base, but the thickened and produced pillar forms with basal lip a slightly-grooved triangular pad, enfolded by umbilical cord. Very narrow chink-like shallow umbilicus.

Height, 2 mm.; diameter, 1.9 mm.

Locality,—Awanui Bay, North Auckland, dredged in 12 fathoms.

***Dolicrossea vesca* n. sp.** (Fig. 32).

Shell small, globose, thin, and fragile. Sculpture of spiral sublinear grooves, about 8 on penultimate whorl and 30 on body-whorl; no narrow smooth zone above umbilical rim, but grooves continued over basal cord and weakly into umbilicus. Spire short, but little over half height of aperture, outlines straight. Whorls convex, base flattish. Suture distinct. Aperture obliquely pyriform, angled above, rounded below, with a very slightly canaliculate pointed anterior emargination. Peristome continuous. Outer lip thin and sharp, not reflexed or fringed. Basal lip hardly truncated, pointed at the pillar. A low wide cord encircles pillar and margins umbilicus which is narrow and short. Inner lip and columella as in *D. labiata*.

Height, 2.5 mm.; diameter, 2 mm.

Locality,—Lyall Bay, Wellington.

Abundantly distinct in tenuity, outer lip, relative proportions, spire, and aperture, from true *labiata*.

Genus ***Aclis*** Lovén, 1846. [P. 325]

This must disappear from Neozelanic literature. *Aclis succincta* has herein been placed in the *Rissoidae* in a genus *Brookesena*; and the Pliocene *Aclis costellata* Hutton has been referred to *Fossaridae* in (temporarily) my genus *Zeradina*; *Aclis semireticulata* Murdoch and Suter is just as aberrant. It belongs to a series that goes far back into the Tertiary, and there are other Recent forms known to me. I here describe three allied forms, and propose for the group *Powellia* n. gen. (after my able friend, A. W. B. Powell, whose fine work on New Zealand shells is so welcome), naming *P. lactea* n. sp. as type; owing to lack of knowledge of the animals, the genus is of uncertain affinities, but may be temporarily located in the Family *Rissoidae*.

***Powellia lactea* n.sp.** (Figs. 47, 48.)

Shell subulate, highly polished, milk-white. Apex blunt, sub-papillate, smooth, and polished, not marked off from true shell, which is also quite smooth, but with an indication of a subangle just above suture, forming periphery of body-whorl. Spire nearly twice height of aperture, outlines straight or a trifle concave. Whorls gently convex, most swollen near lower suture. Aperture pyriform, sub-angled above, distinctly pouting and emarginate below; outer lip very crass, backed by a wide rounded strong varix, inclined forward anteriorly, and set a little behind the edge; inner lip very thin,

distinct, peristome continuous. Umbilicus chink-like, not covered, and surrounded by a blunt angulation. Pillar excavated and produced.

Height, 3.3 mm.; diameter, 1.4 mm.

Locality,—Pukeuri sandy clays (Awamoan, i.e. "Miocene") near Oamaru. Fairly common.

Powellia comes n. sp. (Fig. 45, 46).

Shell like the preceding form, but smaller, more inflated, and less slender. Whorls more convex, with deeper sutures. Peripheral sub-angle marked by a thread, indications of other spiral threads present. Faint axial plicae on upper whorls. Spire about $1\frac{1}{2}$ times aperture in height, outlines a trifle convex. Outer lip and varix not nearly so crass as in last species, aperture suboval, less emarginate below. Umbilicus about same size, but less prominent, due to absence of encircling blunt angulation and rounder base.

Height, 2 mm.; diameter, 1.2 mm.

Locality,—Same as last species. Nearly related to the Recent *semireticulata* M. & S., but shorter, with weaker peripheral thread and umbilicus.

Powellia paupereques n. sp. (Figs. 43, 44).

Shell resembling *C. comes* in size, but with much less convex whorls, and heavily variced aperture. Distinguished from all the other species by the suture being submargined below as well as above. Only very faint traces of spiral threads over the polished surface, but the peripheral thread is strong. Traces of close axial ribs present. Whorls very lightly and regularly convex. Spire $1\frac{1}{2}$ times height of aperture, outlines convex. Aperture as in *comes* but more pressed against parietal wall; outer lip with a narrow heavy varix some distance behind edge, strongly inclined forward anteriorly. Umbilicus almost hidden.

Height, 2.4 mm.; diameter, 1.4 mm.

Locality,—Off the Poor Knights Islands in 60 fathoms.

Powellia semireticulata (M. and S., 1906). [P. 326]

As the figure of this species given in the "Atlas" (Plate 16, fig. 5) is not good, emphasising the sculpture far too much, I present another figure, (Fig. 49) taken from the type in the Dominion Museum. The dimensions of the type given by Suter are incorrect; they should be 2.8 mm. by 1.6 mm. Odhner has sent me specimens identified as this species, from 35 f., Colville Channel, North Is.; they are a n. sp., close to *Linemera gradata* (Hutt.), and not related to *Powellia*.

This species differs from *paupereques* in its thinner, less polished shell, stronger axial sculpture, taller spire (about twice height of aperture), more convex whorls, deeper sutures, and less heavily variced outer lip.

Genus **Eulimella** Jeffreys, 1847. [P. 329]

E. awamoensis M. & M. has been described from the Tertiary (*Trans. N.Z. Inst.*, vol. 53, p. 83, 1921).

***Syrnola pulchra* Brazier, 1877. [P. 331]**

This is not a constituent of the Neozelanic fauna, the single shell Suter so identified being easily distinguished, so I now describe it as new.

***Syrnola menda* n. sp. (Figs. 50, 51).**

Shell very tall and slender, polished, and shining, perfectly smooth except for inconspicuous growth-lines. Apex heterostrophe, set not quite at right angles to shell-whorls. Spire very high, slowly tapering. Whorls 11, subangled close to lower suture, then cut in sharply to suture, straight or faintly concave above subangle till very near upper suture, then suddenly rounded in to suture, which is thus deeply cut. Colour whitish-grey, with a brown band just above the subangle on all whorls, no second band on base, which is flatly convex, rapidly contracted below periphery. Aperture short, subrhomboidal, basal lip rounded into outer lip, elsewhere with straight sides, no lines of striae. Pillar with a moderately strong plait. Umbilicus narrow, open.

Height, 6.7 mm.; diameter, 1.3 mm.

Locality.—Near Cuvier Island in 40 fathoms.

Differs from *S. pulchra* Brazier among other things in longer and more slender shell, much more rapidly-rounded base and shorter aperture, absence of second colour-band on base, and weaker columellar plait.

A Tertiary species of *Syrnola* has been described as *S. semiconcava* M. & M. (*Trans. N.Z. Inst.*, vol. 54, p. 122, 1923).

***Pyramidella tenuiplicata* Murdoch and Suter, 1906. [P. 332]**

The type of this species is a mere apical fragment. It was absurd to describe it; Pyramidellids are difficult enough to identify from perfect specimens, and it is asking too much to expect recognition of one from type material so poor as this. The name must be neglected till topotypes are available, and even then may prove indeterminable. In the meantime no records of this species can be safely made.

***Odostomia bembix* Suter, 1908. [P. 335]**

This must give place to *Odostomia georgiana* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 319, 1885). The type shells of this Upper Pliocene species are not separable from abundant topotypes (and many specimens from other localities) of Suter's *bembix*. I would like to reduce *stygia* Suter also to a synonym of Hutton's species, but not having seen the holotype, refrain at present from uniting them; *stygia* may be retainable as a deep-water smaller representative of *georgiana* Hutton, though I feel considerable doubt about it.

***Odostomia impolita* (Hutton, 1873). [P. 343]**

This species must likewise be dropped. The type specimen consists of three unrecognizable fragments gummed on a slide. Hutton's original diagnosis contains no specific characters, and the type is said to come from Stewart Island where three or four *Evaleas* can be found, so that the only solution is to drop Hutton's *Rissoa impolita* as indeterminable. Suter has described *E. liricincta* from Port

Pegasus, Stewart Island; *chordata* Suter is a northern form; while the Upper Pliocene *huttoni* Suter (*Trans. N.Z. Inst.*, vol. 40, p. 368, 1907) and *obsoleta* Murdoch (*l.c.*, vol. 32, p. 217, 1900) will have to be noted when identifications are being made.

Genus **Pyrgulina** A. Ad., 1863. [P. 344]

Ancestral forms to *rugata* (Hutt.) await description; the Tertiary *pseudorugata* M. & M. (*Trans. N.Z. Inst.*, vol. 53, p. 83, 1921) is not in direct lineage, though closely allied; it represents another branch, of which I have several new species.

Genus **Menestho** Moeller, 1842. [P. 345]

This name must be dismissed from Neozelanic literature; it was bestowed on a Greenland species, and the sole member admitted by Suter has little alliance with the type. Following Dall and Bartsch, Suter admits *Evalea* for forms with simple grooves, and *Menestho* for shells which have the grooves traversed by thin axial threads. It is doubtful whether such a distinction is at all useful, for the growth-lines in species of *Evalea* frequently produce minute fenestrations in the grooves. One is, however, less concerned with this point than with the grouping of the New Zealand species, and it is to be noted that all well-preserved specimens of *Evalea liricincta* Suter and of what has been taken for *E. impolita* (Hutton) show more or less distinct axial threadlets in the interstices. Suter's *Menestho sabulosa* certainly should not be cut adrift from these species, in fact I would suggest that when the types are compared it may prove inseparable from *liricincta*, in which case *liricincta* has place priority; topotypes of the two species agree entirely. I conclude that *Menestho* is unnecessary in New Zealand, and would refer the following species to *Evalea*—*sabulosa* Suter, *liricincta* Suter, *chordata* Suter, *huttoni* Suter, and *obsoleta* Murd.

Genus **Turbonilla** Risso, 1826. [P. 332]

Several additions have lately been made to the sole representative of this genus included by Suter:—

T. (Pyrgolampros) blanda Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 522, 1924).

T. campbellica Odhner (1924, p. 33); from Campbell Island.

T. powelli Bucknill (*Proc. Mal. Soc.*, vol. 16, pt. 3, p. 122, 1924).

T. finlayi Powell (*Trans. N.Z. Inst.*, vol. 56, p. 594, 1926).

T. lamyi Hedley (1916, p. 63); from Macquarie Island.

T. suteri Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 47, 1926).

As regards Tertiary species, *T. oamarutica* Suter has been removed to the *Epitonidae* and made the type of a new genus *Notacirsa* (Finlay, *Trans. N.Z. Inst.*, vol. 56, p. 231, 1926); possibly *T. prisca* Suter should go with it, but its position must remain in doubt till the apex is known. This leaves the only fossil species so far recorded as *T. avamoensis* Marshall and Murdoch (*Trans. N.Z. Inst.*, vol. 53, p. 84, 1921) and *T. antiqua* Marshall (*loc. cit.*, vol. 51, p. 228, 1919) (renamed elsewhere in this volume).

Family **Eulimidae**. [P. 346]

The genus *Teretianax* Iredale, 1918 (*Proc. Mal. Soc.*, vol. 13, p. 39), considered by its author as doubtfully referable to this family, has been added to the Recent fauna by Powell (*Trans. N.Z. Inst.*, vol. 56, p. 596, 1926) with the description of *T. pagoda* nov.—the second known species—from several North Cookian localities.

Eulima itself has had three Tertiary species lately described, *aoteaensis* M. & M. (*Trans. N.Z. Inst.*, vol. 53, p. 84, 1921), *christyi* Marwick (*l.c.*, vol. 55, p. 195, 1924), and *waihaoensis* Allan (*l.c.*, vol. 56, p. 339, 1926).

Genus **Fusinus** Rafinesque, 1815. [P. 357]

The name *Colus* Humphrey, 1797 (*Mus. Calonn.*, p. 34) takes precedence over *Fusinus* Rafinesque, but the name is applicable in New Zealand only to some of the Lower Tertiary species. A full treatment of the Neozelanic forms is withheld, as there are so many new species to describe, and there are already several synonyms among the proposed species. The only living member of the group in this region, however (excepting *Columbarium suteri* Smith, 1915; *Brit. Antarc. "Terra Nova" Exped.*, vol. 2, no. 4, p. 87; see also Mestayer, *Trans. N.Z. Inst.*, vol. 48, p. 126, 1916), *Fusus spiralis* A. Ad., is so distinct from *Colus*, and represents the culmination of so well-defined a group that there can be no hesitation in proposing for it a new genus *Coluzea*. In lineage may be named *Fusus dentatus* (Hutton) (*Trans. N.Z. Inst.*, vol. 9, p. 594, 1877), *Fusinus maorium* Marshall and Murdoch (*l.c.*, vol. 51, p. 254, 1919), *F. climacotus* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 21, 1917), and many new species. The striking protoconch, of the genotype especially (bulbous, flat-topped, with whorls subangular at the top, strongly keeled at the end), the single, strong, serrate keel, and *Columbarium*-like facies, are all highly characteristic. *Euthriofusus tangituensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 320, 1926) is like a *Colus* in many respects but I have not seen actual specimens.

Family **Mitridae** A. Adams. [P. 359]

Much confusion centres round the New Zealand forms grouped here. "The shells referred to the Family *Mitridae* show so much diversity in the radular characters as to suggest polyphyletic origin. Troschel years ago divorced the series widely, but shell characters and *laisse faire* have ruled since, so that the Family "*Mitridae*," as shown for example in the British Museum, is an incongruous association of species. Cooke has recently reviewed the radulae (*Proc. Zool. Soc.*, 1919, pp. 405-422), and, ignoring the shells altogether, has simply grouped them by this means, and in Group 1—*Mitra* Martyn he includes *M. glabra* Swainson (Tasmania) and *M. rhodia* Reeve (Port Jackson)." (T. Iredale, *in litt.*). These shells closely resemble the species Suter includes [P. 361] as *Mitra carbonaria* Swainson (which is described below as *Mitra maoria* nov.) and the Tertiary species *Mitra hectori* Hutton (*Trans. N.Z. Inst.*, vol. 37, p. 473, 1904), *M. eusulcata* Finlay, and *M. elatior* Finlay (*loc. cit.*, vol. 55, p. 468, 1924), so that the genus name *Mitra* may be retained in Neozelanic literature.

Besides these fairly typical forms, other kinds of *Mitra* are known from New Zealand Tertiary beds. Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 266, 1918) has described three species from Pakaurangi Point as *Cymbiola masefieldi*, *nitens*, and *calcar*. Marwick (*l.c.*, vol. 56, p. 264, 1926) has noted that these are "not Volutes, but belong to the Mitridae, though none of the present genera fit them well." In shell features, however, they are not very far removed from *Mitra* s. str. though in radular characters they may have differed. There is an Australasian Tertiary group of fairly large Mitras with long aperture and snout and a tendency to suppression of the lower two plaits (sometimes in adult shells only the uppermost remains), as opposed to the Recent *glabra*—*rhodia*—*maoria* group with short aperture and pillar and four or more strong and regular plaits. For this group, which includes Marshall's three species, I propose the name *Diplomitra* nov., with *Cymbiola nitens* Marshall as type; here may be referred the Australian Tertiary *M. alokiza* T.-W. (*Proc. Linn. Soc. N.S.W.*, vol. 4, p. 9, 1880), *M. dictua* T.-W. (*l.c.*), and *M. monoploca* Finlay (new name given elsewhere in this volume to *M. uniplica* Tate, preoccupied). This group of *Mitra* is not at present known in New Zealand elsewhere than at Pakaurangi Point.

The use of the genus name *Conomitra* Conrad, 1865 for some austral Tertiary forms is due originally to Harris (*Cat. Tert. Moll. B.M.*, p. 129, 1897) who there classed *othone* (T.-W.), *dennanti* (Tate), and *ligata* (Tate). The last species is placed later in this paper in *Microvoluta*; the other two are closely allied, and have Neozelanic representatives in *Mitra inconspicua* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 326, 1885), *Vexillum apicicostatum* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 27, 1917), and *Conomitra othoniana* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 467, 1924). *Inconspicua* has been definitely localized by Allan (*l.c.*, vol. 56, p. 341, 1926) as occurring only in the Waimatean stage, and falsely recorded from the Awamoan, while I have compared it (*l.c.*, vol. 55, p. 468, 1924) with the Australian *complanata* Tate. All these species may be embraced in the new genus *Waimatea* here proposed, with *Mitra inconspicua* Hutton as type. *Mitra fusoides* Lea, the genotype of *Conomitra*, and the assemblage of Paris Basin shells placed in this genus by Cossmann differ in whorling and snout, and are more regularly biconic than these austral forms.

***Mitra albopicta* Smith, 1898. [P. 360]**

In the Dominion Museum is a tablet marked "*Mitra albopicta* Sm., co-type, Mohokinau, 453" on one side, but labelled "*Paratypes*" on the reverse. These are certainly authentic examples of Smith's species, agreeing in detail with his description and figure. But they also agree in detail with the type specimen of *Mitra obscura* Hutton, which is from the Bay of Islands, and which Suter records also from Mohokinau Island. Hutton's name has 25 years' priority, and must replace that of Smith. Cooke has compared *albopicta* Smith with *M. pica* Reeve, and this seems indeed to be a close ally.

Mitra hedleyi Murdoch, 1905, looks like a juvenile shell and may be a *Microvoluta*, but definite location must be deferred at present.

Mitra maoria n. sp. (Fig. 57).

A full diagnosis of this species cannot be given till better specimens turn up; all those found so far are much worn. Shell moderately large. Surface quite smooth, but very much rubbed; traces of linear spiral grooves visible. Spire about $1\frac{1}{2}$ times height of aperture. Whorls flatly convex, very faintly and bluntly shouldered at upper $\frac{2}{3}$, body-whorl oblique below this sub-shoulder, then bent in rather suddenly at base. Suture apparently narrowly canaliculate—at least in worn shells. Aperture sharply angled above, widely open below, outer lip almost vertical, basal lip horizontal, not notched. Pillar stout, markedly oblique, with five strong close plaits, decreasing in strength from top downwards, a trace of a sixth at the bottom. Colour light brown, with a yellowish tinge.

Height, 48 mm. (true height probably about 58 mm.); diameter, 17 mm.

Locality,—Tauranga beach.

Genus **Vexillum** Bolten, 1798. [P. 364]

Under this head Suter includes six species, but at least four good conchological groups are represented, while several alterations are necessary in the species names. First, *Vexillum marginatum* (Hutton) was erroneously used by Suter to replace the species he and Murdoch described as *Vulpecula biconica*; Hutton's shell is from the Upper Pliocene and is not only quite distinct from *biconica* (as Smith concluded ten years ago; *Brit. Antarc. Exped., Zool.*, vol. 2, No. 4, pt. 1, p. 85, 1915) but belongs to a different group; *marginatum* does not seem to occur Recent. Hedley wrote Iredale some years ago, "May not *Vexillum marginatum* Hutton be *Mitra novaezelandiae* Filhöl, *Mission Ile Campbell*, vol. 4, pt. 2, p. 554, 1885?" This name does not appear in Suter's work at all, and upon reference to Filhol's work it is found to be simply a new name for *Mitra zebra* Hutton, not Reeve. Filhol seems to have erred in ascribing such a name to Hutton, so that his substitute has no standing. *Columbella zebra* Gray was included by Hutton in his *Man. N.Z. Moll.*, 1880 (p. 61), and Filhol may have had this in mind.

Secondly, Suter has introduced a new species *pseudomarginata*, ranking his previously named *angulata* as a variety; if the forms deserved only varietal rank, *angulata* would have to become the species, and *pseudomarginata* the varietal name, but both forms are worthy of specific rank, and here again, when subdivision is fully carried out, will probably be placed in different groups.

Lastly, *Turricula planata* Hutton has also been misapplied by Suter: it is a Pliocene species, and though Suter commented on its large size, he used it as the name for a common northern littoral shell. The type of *planata* is quite distinct from "*planata*" auct., therefore I describe the Recent shell below as a new species.

The radulae of the *Vexillum* species show two very distinct styles; the distinguishing feature of the group is the unicuspid lateral, but while one series of *Vexillum* has a multicuspid rachidian tooth, the other has a regular tricuspid Buccinoid central tooth. The former of these is cited by Cooke for *V. tasmanicum* Ten-Woods, and *V. teresiae* Ten-Woods, both from Tasmania, and the latter for

V. australe Swainson from North Tasmania. Neither of these two shell types can be quite matched in New Zealand, and the Neozelanic groups seem to be aberrant even when gauged by the Tasmanian forms, which in themselves are not typical. It is, therefore, best to introduce new group names for the Neozelanic forms which are also known as fossils.

A full subdivision of the New Zealand species is not by any means carried out here; the time for that is not yet ripe; but the four groups proposed are the main ones and produce a satisfactory arrangement of most of the forms. They are as follows:—

Genus *Austromitra* nov. Type: *Columbella rubiginosa* Hutton.

This will cover a large and characteristic austral series, and, in New Zealand, includes besides the type *rubiradix* n. sp. (= *planata* auct.), *planata* (Hutton), *antipodum* (Brookes) (*Trans. N.Z. Inst.*, vol. 56, p. 588, 1926), *ambulacra* (Marwick) (*l.c.*, p. 320), *pseudomarginata* (Suter), *marginata* (Hutton) (not *biconica* M. & S.), and, provisionally, *angulata* (Suter) and *fracta* (Marwick) (*l.c.*, p. 321).

This group seems to have many Tasmanian allies, such as *analogica* Reeve, *legrandi* Ten.-Woods, *pumilio* May, *scalariformis* Ten.-Woods, *bellapicta* Verco, etc.

Genus *Microvoluta* Angas, 1877. Type: *M. australis* Ang., 1877.

In this genus, which was introduced in *Proc. Zool. Soc.* for 1877, p. 34, I include the Recent *Vulpecula biconica* M. & S., and the Pliocene *Turricula lincta* Hutton, from Petane, while I know of another new Recent species. The group is characterized by its twisted beak and weak irregular plaits, as opposed to the very strong plaits of *Austromitra*, which sweep over the whole base and regularly diminish from the top. The New Zealand shells are more allied to *M. royana* Iredale (*P.L.S.N.S.W.*, vol. 49, pt. 3, p. 269, 1924) than they are to the genotype, while the Australian Balcombian forms, such as *M. ligata* (Tate) (see also nomenclatural note elsewhere in this volume), are somewhat intermediate in character. Iredale (*l.c.*) notes that this genus really does belong to the Volutidae as Angas thought, and not to the Mitridae where it has been generally placed, the radula being very similar to that of *Scaphella undulata*.

Genus *Proximitra* nov. Type: *Vexillum rutidolomum* Suter.

A Tertiary series, comprising the type named (*N.Z.G.S. Pal. Bull.* No. 5, p. 29, 1917), *apicalis* (Hutton) (*Cat. Tert. Moll.*, p. 7, 1873), *enysi* (Hutton) (*l.c.*, p. 7), *suteri* (Finlay) (*Proc. Mal. Soc.*, vol. 16, p. 102, 1924=*ligata* Suter, preoccupied), *parki* (Allan) (*Trans. N.Z. Inst.*, vol. 56, p. 341, 1926), and possibly *plicatellum* (M. & M.) (*l.c.*, vol. 54, p. 123, 1923). The types of *apicalis* and *enysi*, regarded as lost by Suter, have been discovered, together with other "lost" specimens, by Dr. Marwick, who writes me regarding them: "*V. apicale* Hutton. Buchanan's drawing, published by Suter gives a very good idea of the appearance of this shell. The latter's statement that there are 25 nodules on the shoulder-angle was based on two specimens from Awamoa, mentioned as plesiotypes. They, however, differ much in shape from Hutton's holotype, and represent an undescribed species, wrongly identified by Suter at another time

(*N.Z.G.S. Pal. Bull. No. 8*, p. 75, 1921) as *V. linctum* Hutton. Locality, Awamoa (fide Hutton), also common at Pukeuri." "*V. enysi* Hutton. Distinguished from *apicale* by greater size, fewer knobs per whorl, and lower spire. Locality, Broken River (Lower)."

With this group, quite provisionally, may be associated *Mitra obscura* (Hutton) (= *albopicta* Smith), with, as has been mentioned, its Australian ally *pica* Reeve, and *Mitra mortenseni* Odhner (1924, p. 34).

Genus *Egestas* nov. Type: *Vexillum watei* Suter.

The type and a direct Tertiary ancestor, *V. fenestratum* Suter (*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 28, 1917) comprise this last group, widely sundered from the others by shell form and the possession of only three plaits. *Uromitra etremoides* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 469, 1926) and *Vexillum lornense* Marwick, 1926 (*Trans. N.Z. Inst.*, vol. 56, p. 314) also have three columellar plaits, but a quite different facies, and do not seem to belong to any of the groups here outlined.

***Austromitra rubiradix* n. sp.**

Shell similar to *rubiginosa*, but narrower and with different colour-pattern. Axial sculpture the same, but obsolete on most of last whorl; spirals much finer, dense minute grooves, a single strong cord beheading axials on shoulder. Colour uniformly blackish, with a slight purplish tinge, only the pillar and fasciole area reddish-orange brown, no bands on spire. Pillar plaits somewhat weaker than in *rubiginosa* (Hutton) and *antipodum* (Brookes), aperture more compressed, spire a trifle higher and more convex.

Height, 8 mm.; diameter, 3.5 mm.

Locality.—Whangaroa Harbour (type); generally distributed in the north of the Cookian Province and restricted to it.

This is the Recent species erroneously taken for *planata* (Hutton).

***Siphonalia nodosa* (Martyn, 1784). [P. 368]**

When Iredale wrote his "Commentary," he proposed *Aethocola* as a subgenus for Martyn's species. This form has been found to be well represented in the Tertiary, a number of species having been named and *Aethocola* raised to generic rank. Recently I have pointed out (*Proc. Mal. Soc.*, vol. 16, pt. 2, p. 102, 1924) that Martyn's specific name had been anticipated by Solander for a different species, an item overlooked by Iredale. Depending upon Suter's synonymy, I selected *raphanus* Lamarek as the next available name. Iredale, however, tells me that the species had been well figured by Chemnitz, and had been named *Drupa glans* by Bolten (*Mus. Bolten*, p. 56, 1798; for Chemnitz, 10, t. 163, f. 1558). Lamarek's *Fusus raphanus* was given in a *Liste*, p. 8, 1886 explanatory to the shells figured in the *Tabl. Encycl. Method*, Pl. 435, fig 1, and when he wrote his *Hist. Anim. s. Verteb.*, Vol. 7, 1822, p. 128, Lamarek included under his species name only the references to Martyn, Chemnitz, and the *Encycl. Meth.*, which may account for the neglect of Bolten's name.

It is unfortunate, too, that the decision regarding *Austrofusus* must be reversed, as it must come into use for this group. When Martens wrote up the early years of the Zoological Record, he used to make comments, and in the volume for 1881, Mollusca, p. 40, records "*Austrofusus*, subgen. n. of *Neptunea*, type *N. nodosa* (Martyn) = *raphanus* (Lamarck); Kobelt, J. B., mal Ges. 8, p. 321." This must be accepted, but why Martens selected this species, which simply figures midway in Kobelt's list, cannot now be ascertained. After many vicissitudes this species therefore comes to rest—one hopes finally—as *Austrofusus glans* (Bolten, 1798). This is typically a Cookian form, the Forsterian representative has been described elsewhere in this volume as *Austrofusus glans agrestior* Finlay.

For a further discussion of the Tertiary forms of *Austrofusus* and its allies, descriptions of new species and removal of the genus to the *Buccinidae*, see Finlay, *Trans. N.Z. Inst.*, vol. 56, pp. 232-238, 1926. Three group names were proposed for the fossils: *Neocola* (for *Austrofusus beta* Finlay) (p. 232), *Zelandiella* (for *Neptunea sub-nodosa* Hutton) (p. 232), and *Nassicola* (for *Neptunea costata* Hutton) (*l.c.*, vol. 54, p. 514, 1924). The sole species described since that account, *Aethocola cliftonensis* Marwick (*l.c.*, vol. 56, p. 321, 1926) may be located in *Neocola*.

***Verconella dilatata* (Q. and G., 1833) [P. 370]**

The recognition of this species has given much trouble. The shell that Quoy and Gaimard described was dredged in 25 fathoms in the Bay of Islands, and was pictured by them as having a short canal, rather squat and wide shell, and fine spiral lirae. Quoy and Gaimard's figures are so exact and careful that there is no reason to regard their illustration as incorrect in this case. The common littoral Northern shell disagrees in having coarse lirae and being altogether a more massive shell; this form should, as Hedley has pointed out (*N.Z. Journ. Sci. and Tech.*, vol. 3, no. 1, p. 54; no. 3, p. 170, and no. 4, p. 222, 1920) take the name *adusta* Philippi, but I do not approve of Hedley's action in deflecting Quoy and Gaimard's name to the large deep-water *Verconella* called *Megalatractus maximus* by Suter. This form is, though larger than any of the others, quite thin, with a very long canal and fine lirae. It evidently cannot be Quoy and Gaimard's shell, but may be regarded as a benthic form of the true *dilatata*, for which I now propose the trinomial *Verconella (dilatata) rex* n. subsp., and figure as type (Figs. 71, 72) a specimen in the Finlay collection (measuring 154 mm. by 65 mm.) from off Whakatane, Bay of Plenty, in 40 fathoms. The identity of true *dilatata* cannot be settled until exact topotypes are dredged, but in the meantime I advance as the best expression of Quoy and Gaimard's species I have seen a shell from the Castlecliff beds here figured (Fig. 70); this is obviously neither *adusta* nor *rex*, but has the short canal and fine lirae of *dilatata*. *V. mandarina* (Duclos), as Iredale has stated, undoubtedly goes generically with these forms, while in lineage may be named the Tertiary *Fusus crawfordi* Hutton (*Cat. Tert. Moll.*, p. 3, 1873), *Buccinum inflatum* Hutton (*l.c.*, p. 6; referred to *Verconella* by Finlay, *Proc. Mal. Soc.*, vol. 16, p. 103, 1924), and numerous undescribed species.

Powell has some further notes on this genus, and adds to it five more. Recent species elsewhere in this volume.

A large number of Tertiary species have been described under the name *Verconella*, but not one of them is really referable to it. Four are dealt with in the note (later) on *Siphonalia valedicta*; *V. delicatula* M. and M. (*Trans. N.Z. Inst.*, vol. 54, p. 123, 1923) is a *Colus*; while *spiralis*, *uttleyi*, and *formosa* Allan (*l.c.*, vol. 56, p. 340, 1926) are Turrids, belonging to a characteristic early Tertiary group, which contains also *Siphonalia senilis* M. and M. (*l.c.*, vol. 52, p. 131, 1920), *Surcula serotina* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 52, 1917), *Daphnella ovata* and *multicincta* Marshall (*l.c.*, vol. 49, p. 457, 1917), and *Belophos incertus* Marshall (*l.c.*, vol. 51, p. 229, 1919). The last named species, described from Hampden, is, from comparison of the types, a synonym of the earlier *Daphnella neozelanica* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 60, 1917), based on a fragmentary specimen from the "Esdaile Collection, Teaneraki;" this locality has been shown by Marwick (*N.Z. Journ. Sci. and Tech.*, vol. 6, p. 280, 1924) to refer really to the "greensand, McCulloughs Bridge, Waihao River," which is of the same age as the Hampden beds. Allan (*Trans. N.Z. Inst.*, vol. 56, p. 341; Pl. 76, f. 8) has lately figured an adult example from McCulloughs Bridge which perfectly corresponds with Marshall's *incertus*. For this group, which is somewhat like *Austrotoma* Finlay in facies and embryo, but has a Verconellid aperture, without trace of an anterior notch, and only a wide and shallow posterior sinus, I now propose the genus name *Marshallena* (with *Belophos incertus* Marshall=*neozelanica* Suter as type), as a mark of admiration for the magnificent pioneer work Dr. P. Marshall has done for New Zealand Palaeontology.

The genus *Iredalula* Finlay (*Trans. N.Z. Inst.* vol. 56, p. 231, 1926) for the Tertiary *Bela striata* Hutton, may perhaps be placed near the Verconellidae, but its affinities are at present obscure.

***Siphonalia caudata* (Q. and G., 1833). [P. 371]**

This is another of Quoy and Gaimard's species that does not appear to have been met with since their time; I suggest that when it does turn up it will be found to be either related to the "Miocene" *Siphonalia excelsa* Suter (*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 30, 1917), which I have (elsewhere in this volume) referred to *Austrosipho* Cossmann (*Ess. de Pal. Comp.*, livr. 7, p. 229, 1906); or a member of my genus *Zeatrophon* (*vide post*). I think the latter is more probable, as I have specimens of true *Zeatrophon* from deep water in Hauraki Gulf and off Otago Heads which closely resemble Quoy and Gaimard's figure, though not one of them is exactly like it.

Suter's obscure figure of *caudata* in the "Atlas" does not agree with the original one, but represents, Iredale informs me, the species named *Fusus vulpicolor* by Sowerby (*Thes. Conch.*, vol. 3, p. 78, Pl. 411, Fig. 73, 1880), which was described from New Zealand and then erroneously referred to the Falkland Islands, the type in the British Museum being labelled New Zealand. I have collected it alive in deep water in Otago, and Iredale's record of *valuedicta* (*Trans. N.Z. Inst.*, vol. 40, p. 383, 1908) refers to this species. It

seems almost certain that no one has troubled to investigate the apex of this shell, for it is so radically different from that of any other *Verconella* that it would surely have provoked comment. Suter says it is of "two smooth whorls, small and globose"—an extraordinary statement. I was fortunate in finding egg-capsules and all growth stages of this species in 60 fathoms off Otago Heads, and it proves to be viviparous. Inside a circular wafer-shaped horny egg-case are found about a dozen progeny, consisting of the embryo and a whorl or so of true shell. The embryo is pagodiform, very strongly carinate, rising to a crude tip; it is everywhere coarse and roughened which suggests that it also may have been cased in a horny capsule that was early lost. I have therefore no hesitation in providing for this elegant form the new generic name *Glaphyrina*, and as Suter's illustration is extremely poor, I refigure this species from a specimen in my collection dredged off Otago Heads in 60 fathoms (Fig. 80). A closely allied direct ancestor is found in the Upper Pliocene Castlecliff beds; it differs only in finer sculpture (the spirals being more even and less prominent, and the axials absent on the last three whorls), deeper suture and rather thinner test. For it I provide the name *Glaphyrina [vulpicolor] progenitor* nov., the type being in the Finlay collection.

***Siphonalia valedicta* (Watson, 1886). [P. 372]**

This likewise has not been met with again, but deep-water dredging will probably bring it to light. It seems to be a benthal relative of a series of shells well represented in the Pliocene, and of which several members have recently been described, viz., *Verconella marshalli* Murdoch (*Trans. N.Z. Inst.*, vol. 55, p. 159, 1924), *V. compta* Finlay (*loc. cit.*, p. 523), *V. dubia* Marwick, and perhaps *V. thomsoni* Marwick (*loc. cit.*, p. 196). The group seems related to *Verconella* s. str. by its apex (which, however, is much smaller) and canal, but shows constantly different whorling, and has a tendency, never shown by *Verconella*, to develop tubercles on the inner lip; palaeontological evidence shows that the two series have lived side by side for a long time. Accordingly, in my opinion, both are worth generic rank, and I provide for the *valedicta* group the new genus *Aeneator*, naming *V. marshalli* Murdoch as type.

Streptopelma henckmani Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 321, 1926) is somewhat allied to these forms but cannot be referred to either *Streptopelma* or *Aeneator*.

Genus *Euthria* Gray, 1850. [P. 373]

Oliver in his Ecological Essay (1923A) has reverted to *Euthria* for the whole of the Neozelanic forms, although the type of *Euthria* is a European shell of unlike shell characters and possesses a different radula. The smaller New Zealand "*Euthrias*" show a radula notably unlike that of "*Euthria*" *linea*, which more approaches that of the European type. Cooke has shown so clearly that the radula must be weightily considered in relation to shell characters that Oliver's retrograde step does not seem wise. If the whole series were to be lumped again, the name *Euthria* would also have to be rejected, on account of the prior *Buccinulum*.

It is very difficult to proceed to a natural grouping of the Neozelanic, "*Euthria*"—*Evarne* association, because (1) the style of shell and ornament is extremely simple and approximately the same throughout (2) there seem to be local colour-variants of several of the species, yet other forms which at first sight appear to belong to this category apparently have proved to possess different radulae—e.g., *E. flavescens*, (3) the forms being almost all littoral, there is a consequent dearth of available fossil members, so that the lineage in most cases cannot be traced.

First, the name *Evarne* must give way to *Buccinulum*, of which Iredale has designated *Buccinum lineatum* as type (*Proc. Mal. Soc.*, vol. 14, pts. 5-6, p. 208, 1921). Under this species Suter ranges two subspecies, *pertinax* von Martens and *traversi* Hutton. Von Martens' shell should at present be treated as distinct; it may remain in *Buccinulum* in the meantime till a range of specimens is available, but the few juvenile topotypes seen indicate that the form is possibly a *Euthrena*. *Fusus traversi* Hutton, however, must be removed from this neighbourhood altogether; the type proves to be an *Axymene* (*vide post*, under *Trophon*), and has nothing to do with the figure and interpretation given by Suter.

Near *Buccinulum* may be placed another group—that centering round *Cominella striata* Hutton (Pliocene), with which may at present be associated *Tritonidea fuscozonata* Suter, 1908, and the fossil *T. compacta* Suter, 1917 (with which I have united *T. elatior* Suter, 1917; *Trans. N.Z. Inst.* vol. 55, p. 503, 1924), and many new forms, though other groups will be separable when these are described. It is difficult to state absolute differential characters, but all have a large protoconch of several smooth whorls, showing more or less axial acceleration (though never a reticulate stage) before passing into the adult sculpture, which is typically prominently spiral (but the tendency is towards reduction of this in later members and littoral forms); a broad swollen varix occurs just before the aperture, the whorls are convex and inflated and not flattened as in *Euthrena*, and the canal is considerably longer than in that genus. *Buccinulum lineum*, though evidently related, stands out from this assemblage in its peculiar colour-pattern, smooth surface, still larger protoconch, and more gently wound columellar plait. *Euthrena*, on the other hand, has a very small protoconch, weakly axially ribbed at an early stage; before passing into adult sculpture (of low broad axials) there is a very well marked brephic stage of narrow strong axial and spiral cords producing a coarse reticulation, the points of intersection marked as blunt gemmules. For the *striata* group I therefore provide the name *Evarnula* nov., citing *Cominella striata* Hutton as type, and allotting it subgeneric rank under *Buccinulum*. Suter's type of *Tritonidea fuscozonata* is a badly beach-worn shell; I refigure the species from a fresh Whangaroa specimen in the Finlay collection (Fig. 77); from the same source are figured Castlecliff examples of *B. (Evarnula) striatum* (Hutton), since Hutton's original figure was very sketchy (Figs. 78, 79).

The remaining species may in the meantime be associated together under *Euthrena*, with *Fusus vittatus* Q. and G. as type, the

following points being noted. Suter's subspecies *costulata* is not close to *littorinoides*, but is far nearer to and may be identical with *vittata*, which itself appears to be a northerly form of the closely-related *martensiana*. The Chatham Island "*vittata*" is a peculiarly distinct form more sundered from true *vittata* than that species is from *martensiana* or than *littorinoides* is from *strebeli* and *flavescens*; for it must be restored Hutton's *Fusus bicinctus* (Cat. Mar. Moll., p. 10, 1873), described from "Chatham Islands only."

"*Euthria striata* (Hutton)" is admitted to the Recent fauna by Suter, but the Recent shell obviously differs from the Pliocene type. I here describe the species as new.

***Buccinulum sufflatum* n. sp. (Figs. 75, 76).**

Shell wide and solid. Embryo large, mamillate, smooth, tip flattened, central; a brephic stage of one or two axial riblets at its close. First two whorls after apex with 11-13 little stout axial riblets per whorl (interstices narrower), swollen on lower half, weak on shoulder; entirely absent on last three whorls. Spiral sculpture of moderately raised thickish cords with 1-4 weaker interstitial riblets; cords and interstitials stronger on base. Spire not quite as high as aperture with canal, outlines straight, hardly broken by sutures. Whorls gently concave on upper half, gently convex below, thus having a swollen and undulating appearance; body-whorl tumid on periphery, rapidly contracted on base. Suture distinct, slightly submargined below, the whorls clasping. Aperture pyriform, bulging, angled and channelled above, produced below into a moderately long open canal, flexed to left and faintly notched at base. Outer lip strongly convex, a little contracted near suture and at canal, with a sharp edge but rapidly thickened inside, and with many sharp strong lirae (roughly in pairs) situated well within, those near canal stronger and more distant. Inner lip well defined as a rather thick glaze over parietal wall and pillar, with about a dozen tubercles spread over its whole length, those on parietal wall elongated and ridge like, those below closer and suboval. Pillar deeply excavated in centre, with a strong twist below forming margin of canal. Fasciole fairly strong, slightly lamellose. Occasionally a tiny umbilical chink. Colour pure white, or with a yellowish-brown tinge.

Height, 35 mm.; diameter, 17 mm.

Locality,—Lyttelton Harbour.

Genus *Cominella* Gray, 1850. [P. 381]

I have already (*Trans. N.Z. Inst.*, vol. 56, pp. 238-244, 1926) treated of the New Zealand Tertiary and Recent species referred to this genus, and there is nothing further to discuss at present. The following divisions were proposed in the paper noted: *Eucominia* (for *Buccinum nassoides* Reeve), *Cominula* (for *Cominella quoyana* A. Ad.), *Procominula* (for *Cominella pulchra* Suter), *Zephus* (for *Nassa cingulata* Hutton), *Acominia* (for *Buccinum adpersum* Brug.), and *Cominista* (for *Buccinum glandiforme* Reeve = *luridum* Philippi). *Cominella* s. str. is restricted to *Buccinum maculosum* Mart. and its relatives. In *Acominia* will be placed *C. hendersoni* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 322, 1926), while *C. compacta* Marwick (*l.c.*)

is either a *Procominula* or a *Cominella* (more probably the latter), depending on the character of the columella; I have not seen it. Suter, in connection with *Cominella maculosa* [P. 388], has written, "The *Buccinum catarracta* Chemnitz is considered by Tyron to be a mere colour variety of this species, and, as far as I know, Chemnitz gives New Zealand as the habitat; Krauss (*Sudafric. Moll.*, p. 119), on the other hand, claims it for the coast of Natal but I suspect that he wrongly identified his specimens." Chemnitz's species name has been used for the South African shell resembling the Neozelanic *Lepsiella scobina* (Q. and G.), but Iredale tells me that upon reference to Chemnitz one finds that the description and figure apply exactly to the South African shell known as *Cominella delalandii*, which, though resembling the Neozelanic species, is quite distinct, and belongs to *Burnupena* Iredale (*Proc. Mal. Soc.*, vol. 13, pts. 1 and 2, p. 34, 1918).

***Cominella zealandica* (Reeve, 1846). [P. 390]**

This shell is not known to New Zealand collectors, and should be rejected at present as probably exotic. Iredale has withdrawn his record of *C. costata* (Q. and G.) (*Proc. Mal. Soc.*, vol. 13, pts. 1 and 2, p. 34, 1918), while Hedley has placed *Cominella quoyi* (Kiener) as probably a juvenile of *Pollia undosa* (L.) and therefore not Neozelanic (*N.Z. Journ. Sci. and Tech.*, vol. 3, no. 1, p. 55, 1920).

***Cominella campbelli* (Filhol, 1880). [P. 382]**

Iredale suggested, and Cooke afterwards proved by means of the radulae, that the Magellanic Euthrias belonged properly to *Cominella* s.l. (*Proc. Mal. Soc.*, vol. 13, pts. 1 and 2, p. 33, 1918). This, however, is only in a very broad sense; although *campbelli* and its congeners have the superficial appearance of the "*costata*" group of Cominellids, they lack the deep anterior sinus and corresponding strong fasciole. Such forms as *plumbea* Philippi, *magellanica* Philippi, *fuscata* Bruguiere, *rosea* H. and J., *campbelli* Filhol, etc., have a uniformity of texture, appearance, and shell formation that demands separation from *Cominista* proper. *Pareuthria* Strebel, 1905 (*Zool. Jahr.*, Bd. 22, Heft 6, p. 600) proposed for *fuscata* Brug. should be used generically for these forms; the series may be derived from *Cominista* (or *vice versa*); but has by now become considerably differentiated in virtue of a subantarctic habitat.

***Zephus otagoensis* n. sp. (Fig. 81).**

Shell small, rather elate, with strong axial and spiral sculpture. Apex of two smooth and glossy whorls, flatly dome-shaped, quite symmetrical; the pullus very minute, rapidly enlarging to the swollen next whorl; well marked off. Fourteen vertical and strong axial ribs per whorl (interstices a little wider), extending over whole shell, but weaker on shoulder and base. Numerous fine threads on shoulder: six strong spiral chords per whorl between shoulder and lower suture, ten on body-whorl, cords flatly rounded, with narrow interstices except on base where lowest two have wide spaces on either side traversed by fine interstitial threadlets. Spire more than $1\frac{1}{2}$ times height of aperture. Whorls shouldered at upper $\frac{3}{4}$, the

angle bluntly convex; shoulder narrowly concave, lightly convex and cut in below. Suture linear, distinct, undulated by axials. Aperture shortly pyriform, angled and narrowly channelled above, open below in a short oblique canal, deeply and narrowly notched behind. Outer lip thin and sharp, contracted at shoulder; inner lip a narrow distinctly limited milk-white glaze. Pillar straight, a trifle excavated above, with a strong narrow groove, and below it a raised narrow ridge bordering the canal. Fasciole narrow, raised, smoothish, margined anteriorly by a low sharp carina. Colour pure white.

Height, 18.5 mm.; diameter, 8 mm.

Locality,—off Otago Heads in 50 fathoms.

More elate and with a less angular shoulder than *Fax tenuicostatus* (Ten.-Woods); ornament also differs in details. For a note on this shell, and also the proposal of the genus *Zephos*, see Finlay, *Trans. N.Z. Inst.*, vol. 56, pp. 239, 240, 1926. No authentic specimens of Iredale's genus *Fax* have been available to permit of comparison between the two genera, and the present species may belong to *Fax* rather than to *Zephos*.

***Pisania reticulata* A. Adams, 1855. [P. 392]**

This shell, which Iredale has renamed *Fusus mestayerae* (1915, p. 466), may be retained in the fauna at present. Only juvenile specimens seem to have been found in New Zealand, but Mr. Powell informs me that his juveniles from Whangaroa match well with Tasmanian examples of *mestayerae*.

Genus *Cantharus* Bolten, 1798. [P. 393]

This has no Neozelanic representative. Iredale has stated that, of the two groups *Tritonidea* and *Cantharus* used by Suter, the latter is preferable for both New Zealand forms, but is antedated by *Pollicia* Sowerby, 1834 (1915, p. 466). However, neither of the two species recorded by Suter can be regarded as congeneric with *Triton undosus* Lamk., the type of *Pollicia*, and one of them, *T. fuscozonata* Suter, has already herein been referred to the subgenus *Evarnula* nov. of *Buccinulum*. The other, *Tritonidea colensoi* Suter has a Tertiary ancestor in *T. acuticingulata* Suter (*N.Z. Geol. Surv. Pal. Bull. No. 5*, p. 35, 1917), which I name as type of a new genus *Zeapollicia*, erected for these two shells, and for the Australian Tertiary *Ricinula purpuroides* Johnston (*Proc. Roy. Soc. Tas.* for 1879, p. 33) from the Table Cape beds (Janjukian), which is very close to *acuticingulata*. The two other Tertiary species referred by Suter to *Tritonidea*, viz., *T. compacta* Suter and *T. elatior* Suter (*loc. cit.*, pp. 35, 36) have been united by Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 503, 1924) and are now placed in *Evarnula* nov. (*vide antea*).

Latirus (*Peristernia*) *neozelanicus* (Suter) (*vide* Allan, *Trans. N.Z. Inst.*, vol. 56, p. 341, 1926) and *Latirofusus optatus* M. and M. (*l.c.*, vol. 54, p. 123, 1923) both need new generic locations but cannot be discussed at present.

***Alectrion fasciata* (Lamarek, 1822). [P. 397]**

Eliminate this from the Neozelanic fauna. Records that have been made of this shell probably refer to what E. A. Smith has

recorded (*Brit. Antarctic "Terra Nova" Exped. 1910*; Moll., p. 85, pl. 1, fig. 28, 1915) from 11-20 fathoms near North Cape, New Zealand, as *Arcularia coronata* var., citing *Buccinum coronatum* Bruguiere, 1789 as the prime entry. As Bruguiere's name is invalid through preoccupation by Martyn, I propose to name the New Zealand shell figured by Smith *Nassarius aoteanus* nov.

As regards "*Alectrion suturalis* subsp. *Dunkeri* Suter, 1908" [P. 398], Iredale has commented on the identification, (1915, p. 467), and doubtfully regarded Suter's shells as *N. spiratus* A.Ad., noting, however, that the diagnosis seemed to refer to a shell of the "*glans*" group. Powell and La Roche have collected one or two specimens, and these prove to be of the "*glans*" type, not like *spiratus*, but close to *particeps* Hedley. The name *dunkeri* must be dropped; it is merely a new name for *Nassa intermedia* Dunker and cannot be used for New Zealand shells.

Family Muricidae. [P. 399]

Iredale has given some account of the higher groupings in his "Commentary," but did not deal with the species. There is not very much to say when there are only three species to consider, but *Murex octogonus* Q. and G. does not occur in Australia, neither does *Trophon umbilicatus* Ten-Woods occur in New Zealand. What Suter has called *umbilicatus* is merely a grading form of *octogonus* and deserves no recognition; the size of the umbilicus is entirely variable. I have elsewhere in this volume advocated the use of *Murexsul* Iredale (1915, p. 471) as a full genus for this and allied species and added a new species, *Murexsul cuvierensis*, to the Recent fauna.

In place of *Murex angasi* Crosse, a common Sydney species, *Murex eos* Hutton must be cited, nothing like *angasi* occurring in New Zealand; the resemblance between these two is so superficial that the Neozelanic shell proves to be more closely related to the Tasmanian *Murex triformis* and referable to the subgenus *Pterochelus* (= *Alipurpura*, even as Suter placed both) instead of the subgenus *Poropteron*. The reference by Iredale in the "Commentary" to the closed canal of *Murex angasi* does not apply exactly to the Sydney species, and not at all to the Neozelanic species. There is a fossil New Zealand species, however, which was even named as a *Typhis* (*zealandica* Hutton, *Cat. Tert. Moll.*, p. 2, 1873) on this account; it is not uncommon in the Castlecliff beds and has wide frilled varices, and the canal completely closed, thus widely differing from the Recent *eos* Hutton, though Suter stated of the latter species that "This is *Typhis zealandica* Hutton." For this shell, Hutton's *zealandica* must of course be revived; *eos* does not seem to occur fossil, nor *zealandica* Recent. Curiously enough, the "Miocene" form (undescribed) is again of the *eos* style, with narrow shell and open canal. I present figures of both *eos* Hutton (Fig. 55) and *zealandica* (Hutton) (Fig. 56) in order that they may be contrasted.

Genus *Trophon* Montfort, 1810. [P. 404]

The comments necessary on this group more than make up for the little that could be said of the Murices.

Under this genus name Suter has arranged:—

Subgenus <i>Trophon</i>	<i>T. corticatus</i> (Hutton, 1873).
<i>T. ambiguus</i> (Philippi, 1844).	<i>T. curtus</i> Murdoch, 1905
<i>T. rugosus</i> (Q. & G., 1833).	<i>T. erectus</i> Suter, 1909.
Subgenus <i>Xanthochorus</i>	<i>T. inferus</i> (Hutton, 1873).
<i>T. cheesemani</i> (Hutton, 1882).	<i>T. paivae</i> (Crosse, 1864).
<i>T. patens</i> (H. & J., 1854).	<i>T. plebejus</i> (Hutton, 1873).
<i>T. squamatus</i> (Hutton, 1878).	<i>T. waipipicola</i> Webster, 1906.
Subgenus <i>Kalydon</i>	Subgenus <i>Trophonopsis</i>
<i>T. aucklandicus</i> (E. A. Smith, 1902).	<i>T. bonneti</i> Cossmann, 1903.
<i>T. convexus</i> Suter, 1909.	<i>T. crispulatus</i> Suter, 1908.
	<i>T. pusillus</i> Suter, 1907.

Before dealing with any of the species, one must dismiss the genus name *Trophon*. Though very superficially the species *ambiguus* is Trophonoid, actual comparison shows many differences; the radula figured by Suter, however, proves that the likeness must be minimised, since it is very different from the true Trophonoid radula, while the embryos of the two forms are strikingly dissimilar.

The subgeneric names *Xanthochorus* and *Trophonopsis* must also be eliminated as having nothing to do with Neozelanic shells.

To the Neozelanic fauna must be added what Hedley has determined as *Trophon albolabratus* Smith from Macquarie Island (1916, p. 60)* and *Trophon mortenseni* Odhner, described from Auckland Island (1924, p. 39). I have not seen either of these, but would place both at present in the *ambiguus* group. *Vitularia candida* H. & A. Adams (*Proc. Zool. Soc. (Lond.)*, p. 430, 1863) included by Suter as a synonym of *T. ambiguus* (Phil.) proves from examination of the type (fide T. Iredale) to be an American, not a Neozelanic shell.

Iredale, in his "Commentary," made three emendations in this group; *Trophon stangeri* Gray, 1843 in place of *T. rugosus* Q. & G. (preoccupied); *Xymene* gen. nov. for *Fusus plebejus* Hutton and its congeners; and *X. quirindus* nom. nov. for *Trophon paivae* Suter, not of Crosse. A careful study of the group suggests many further alterations.

The description of *T. stangeri* does not read at all well, but the figure cited seems sufficient to determine the species as the one customarily so called—though it may be noted that Hutton was dubious of the identity and described the so-called *stangeri* as a new species, *Polytropa retiaria* (*J. de Conch.*, p. 20, 1878).

Iredale wrote that "Suter's description does not apply to the types of *paivae* Crosse (= *recurvus* Philippi) nor *hanleyi* Angas, all of which I have examined in connection with this note." Suter's description, however, does not exactly apply to the Neozelanic shell, as it includes characters belonging to the Australian species and foreign to Neozelanic specimens. On the other hand, the words

*Hedley compares this species with *ambiguus* but does not report upon the apex. *T. albolabratus* Smith is a Kerguelen species and probably a true *Trophon*, while examination of the Macquarie Island species would, I think, demonstrate the presence of a conic polygyrate embryo as in *ambiguus*, so that this name must be queried.

"protoconch of two axially finely costate whorls, the nucleus small, pointed," do not apply to either Australian or Neozelanic forms, so that the diagnosis seems to be an indeterminate mixture; it is known that Suter was in the habit of drawing up conglomerate descriptions. At the time Iredale wrote, Suter's plates had not appeared, but the figure there given appears to be of an Australian shell. Under the circumstances I regard Iredale's *quirindus* as covering the Australian *paivae*+*hanleyi*+the New Zealand shell, and certainly not applicable to the New Zealand shell alone and would therefore drop it as indeterminate. For the Australian *hanleyi* group Iredale has proposed the name *Bedeva* (1924, pp. 181, 273); this genus does not occur in New Zealand.

The type tablet of *Polytropa squamata* Hutton has three shells affixed to it, in the manner indicated by Suter's figures ("Atlas," pl. 19, fig. 3). One of the shells (the uppermost of Suter's figures) is a specimen of *T. stangeri* Gray, while the other two are the commonly accepted *squamata*, reputedly from Dunedin Harbour; how the north Cookian *stangeri* came to be included in the same lot is inexplicable if the locality is correct. To save confusion I here select the centre specimen (middle one of Suter's figures) as lectotype of Hutton's species. The radula of the species has not been investigated, but it is inseparable in shell characters from *Lepsiella*, being evidently the Neozelanic representative of the Tasmanian *L. vinosa aurea* Hedley, just as the northern *L. scobina* is an ally of the Peronian *L. botanica* Hedley. While touching on *L. scobina*, one may note the record of this Cookian form from an isolated patch of rocks in Dunedin Harbour, a curiously anomalous occurrence (Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 518, 1924).

Trophon patens (H. & J.) is a puzzling form. Conchologically it is inseparable from *squamata* Hutton, and even seems to grade into it; there are no features in the apex, aperture, or shell which would serve for generic distinction, yet *squamata*, as has just been noted, is apparently a *Lepsiella*, while the radula figured by Suter for *patens* is Trophonoid. Since Suter, however, examined a wrong radula in several other cases, it is just possible that he did not have a *patens* radula at all, and as the shell agreement is so close, one may at present await confirmation or rejection of Suter's evidence, and temporarily locate both species in *Lepsiella*. It is of course quite possible that similarity in shell characters should once again cover a different dentition, and the apices of *Trophon* and *Lepsiella* are too much alike for ready distinction; if *patens* does prove to have Trophonoid rather than Thaitid affinities, it may be possible to associate it with *T. cheesemani* (Hutton). The examination of the radula in this and many other New Zealand species is a matter of importance and urgency, and may be recommended to the zoological student as a piece of work of great value and promise.

Euthria aucklandica Smith, 1902 has been referred by Suter to *Trophon* on account of the dentition; but here again it is questionable whether he examined the right shell. Suter's "*aucklandicus*" is probably a very different thing from Smith's type, which is possibly the same as "*Euthria lineata* var. *pertinax*" von Martens from the

same locality. In that case "*Trophon aucklandicus* Suter" would become available for the form described and figured by Suter in the "Manual," so that in the absence of certain knowledge of Smith's type, the problem would become complex and annoying. Fortunately, however, we can dispose of an awkward dilemma by regarding Suter's name as indeterminable. This is made possible on account of several factors, as follows. Auckland Island specimens differ specifically from mainland shells, and though Suter may not have had topotypes of Smith's species, he certainly included Preservation Inlet and Campbell Island shells in the species, as these localities are mentioned by him. The diagnosis is thus a compound one, covering features characteristic of both Forsterian and Rossian forms. The figure does not seem to be taken from an Auckland Island shell, but neither is it typical of mainland forms, and as it does not agree with his diagnosis (spirals too few, and this is a specific character) and the original is not preserved, I consider the correct course is to neglect it and dispose of Suter's name. This vexed problem cannot be entirely settled till Smith's type is reported on, but at present one may advocate the dismissal of the name *aucklandica* altogether—Smith's use being a probable synonym, Suter's indeterminable. Iredale intended his *quirindus* to apply to this style of shell, and as that name has been shown to be also indeterminable, I now put forward a new name altogether (*turbator* n. sp., see later) and thus place this common shell on a more satisfactory footing.

The type lot of *Trophon curtus* Murdoch contains specimens of a perfectly distinct species, which are responsible for parts of the diagnosis such as "very often both whorls (of protoconch) are strongly keeled." True *curtus* never has strong apical keels, the embryo being only sub-shouldered, with traces of a lower angle near its end. The species confused with it, though always distinct in apex and ornament, is congeneric with it, and very close to the shell that Suter three years later described as *Mangilia devia* from the Snares Islands in 50 fathoms.

Trophon bonneti Cossmann is an Upper Pliocene fossil, and does not occur Recent, Suter's records being based on new species. The union of *T. ambiguus pumila* Suter with this species is quite wrong, Suter's shell having nothing to do with either *ambiguus* or *bonneti*. It is a very variable shell and often simulates the *bonneti* type of sculpture, but has a radically different embryo and belongs to a widely removed group. It is, in fact, synonymous with my *Xymene robustus* (*Trans. N.Z. Inst.*, vol. 55, p. 520, 1924), over which it has priority, Suter's figure and identification of his shell with *bonneti* leading me to believe that *pumila* was of the *ambiguus* group; topotypes since obtained have demonstrated its true affinities.

The remark "Allied to the Pliocene *T. gouldi* Cossmann" which is added to the description of *T. crispulatus* should, of course, be transferred to the next species, *T. pusillus*. *Crispulatus* has nothing whatever to do with *gouldi*, while *pusillus* is very close. It may be noted that Powell has lately figured *pusillus* for *curtus* (Bucknill, 1924, Pl. 8, fig. 6). This appears to be the only marked error in this useful little book, though it is a pity the author has so assiduously followed the "Manual," for the resulting bad nomenclature robs the

book of some of its worth. The value of the work lies in Powell's illustrations, which are fine and natural, taken from authentic New Zealand specimens (the originals of which are preserved mostly in his own collection), and forming a far better guide for the casual collector than the "Atlas" or Moss's unpretentious work.

Marwick has lately fallen into error in a discussion of the validity of the name *gouldi* for the Petane shell called *crispus* Gould by Hutton; I have gone into the matter elsewhere in this volume and advocated the retention of the name *gouldi* for the New Zealand shell.

Trophon virginalis Suter is a species that seems to have fallen into oblivion since it was described in 1913 (*Rec. Cant. Mus.*, vol. 2, pt. 1, p. 58) along with *Siphonium planatum* Suter. Only list records of the latter appear elsewhere, and nowhere with a reference, but of the former not even these are available, and the name seems to have been forgotten entirely by its proposer and all other workers. The unique type specimen, which by the kindness of Mr. Speight I have been able to examine, is from Cape Maria van Diemen and has lost the protoconch and part of the outer lip. Enough remains, however, to show that it is a valid species, and that it belongs to the genus *Galfridus* Iredale (1924, p. 271), thus remaining in the *Muricidae*. It differs from the Sydney *G. speciosus* (Angas) mainly in much finer spiral sculpture; the state of preservation and appearance are exactly the same as other shells known to be from Cape Maria van Diemen.

The association now proposed contains many novelties, in both names and groupings, but it is based on lineage and nuclear characters, and is the result of long study of ample type and topotypic material. As in every other difficult group studied, I regard the embryo (taken in conjunction with build of shell and style of ornament) as of the highest importance in indicating true groups. One finds numerous cases of convergence, almost identical-looking shells having diverse apices, so that an attempt to classify Trophons without recourse to embryonic features leads at once to error; if, however, nuclear characters are used as a basis for division of the Recent forms, it is at once seen that the fossils fall readily into lineage and indicate that natural grouping has been accomplished.

Neozelanic Trophons may be primarily divided into two large groups, according to whether the apex is

- (a) of more than two whorls, conic and mamillate, symmetrical, the nucleus central and minute, or
- (b) of 1-2 whorls, papillate, asymmetrical, the nucleus lateral and large.

The first division contains the groups typified by *ambiguus*, *plebejus*, and *pusillus*; the second, those represented by *turbator* n. sp., *convexus*, *curtus*, *crispulatus*, and *crassiliratus*, also *Buccinum geversianum* Pallas, the genotype of *Trophon* s. str. The genera that I suggest, and the species grouped under them, are as follows (I give references only where they are not directly obtainable from the "Manual"). As before, a name in square brackets indicates an exclusively Tertiary form.

ZEATROPHON n. gen. Type: *Fusus ambiguus* Phil.

Fusus ambiguus Phil., 1844.

"*Trophon. albolabratus*" Hedley, 1916.

[*Trophon (Trophonopsis) bonneti*] Cossmann, 1903.

Trophon mortenseni Odhner, 1924.

(?) [*Trophon huttoni*] Murdoch, 1900 (*T.N.Z.I.*, vol. 32, p. 221).

Several new species from deep water in both Islands.

XYMENE Iredale, 1915. Type: *Fusus plebejus* Hutton.

Fusus plebejus Hutton, 1873.

Fusus inferus Hutton, 1873.

[*Trophon expansus*] Hutton, 1883 (*T.N.Z.I.*, vol. 15, p. 410).

[*Cominella drewi*] Hutton, 1883 (*T.N.Z.I.*, vol. 15, p. 410).

[*Trophon (Xanthochorus) pulcherrimus*] Suter, 1917 (*Pal. Bull. No. 5*, p. 38).

[*Cominella monilifera*] Hutton, 1885 (*T.N.Z.I.*, vol. 17, p. 327).

XYMENELLA n. gen. Type: *Trophon pusillus* Suter.

Trophon pusillus Suter, 1907.

[*Trophon gouldi*] Cossmann, 1903 (*Essais de Pal. Comp.*, livr. 5, p. 54).

[*Cymatium suteri*] Marshall and Murdoch, 1921 (*T.N.Z.I.*, vol. 53, p. 80).

[*Trophon (Kalydon) lepidus*] Suter, 1917 (*Pal. Bull. No. 5*, p. 37).

[*Trophon (Kalydon) minutissimus*] Suter, 1917 (*Pal. Bull. No. 5*, p. 37).

Many new Tertiary species; most of the "Miocene" forms belong to this group.

PARATROPHON n. gen. Type *Polytropa cheesemani* Hutton.

Polytropa cheesemani Hutton, 1882.

Fusus stangeri Gray, 1843.

Undescribed ancestral species.

AXYMENE n. gen. Type *Axymene turbator* n. sp.

Axymene turbator Finlay, 1927.

Trophon erectus Suter, 1909.

Fusus corticatus Hutton, 1873.

Fusus traversi Hutton, 1873.

Trophon waipipicola Webster, 1906.

Trophon ambiguus pumila Suter, 1899 (= *Xymene robustus* Finlay).

[*Trophon murchisoni*] Marwick, 1924 (*T.N.Z.I.*, vol. 55, p. 198).

New Pliocene species.

LENITROPHON n. subgen. Type: *Trophon convexus* Suter.

Trophon convexus Suter, 1909.

An ancestral new Pliocene species.

COMPTELLA n. gen. Type: *Trophon curtus* Murdoch.

Trophon curtus Murdoch, 1905.

Mangilia devia Suter, 1908.

New Recent species.

TEREFUNDUS n. gen. Type: *Trophon crispulatus* Suter.

Trophon crispulatus Suter, 1908.

Mangilia quadricincta Suter, 1908.

Leucosyrinx cuvierensis Mestayer, 1919 (*T.N.Z.I.*, vol. 51, p. 133).
New Recent species.

MINORTROPHON n. subgen. Type: *Daphnella crassilirata* Suter.

Daphnella crassilirata Suter, 1908.

The differences between *Zeatrophon* and *Trophon* s. str. have already been commented on. *Xymene* is a peculiarly distinct little group whose members have a uniform style of shell and gemmate spiral sculpture, the early whorls with low flattish cords cut up into beads, and with generally no distinct axial ribs, whereas *Xymenella* has the post-embryonic whorls strongly bicarinate, with pronounced axial ribs. Almost the whole of the "Miocene" forms belong to this latter group, which, except for *Terefundus*, contains the smallest Trophonoids. The apex of *Paratrophon* has not been seen, hence I may have erred in associating these two species together; they are both aberrant forms, and do not associate well, but the build of shell seems to be essentially the same in both *stangeri* and *cheesemani*, and, pending examination of unworn apices, it is preferable to place them together. *Axymene* and *Comptella* have a conspicuous feature in the strong oblique cord traversing the neck of the canal, but *Comptella* has a regular fenestrate ornament, with thin distant spirals and axials, and a very short canal, while *Axymene* consists of elate shells with strong coarse axial ribs and rather irregular spirals, the canal being pronounced. *T. pumila* and *T. murchisoni* are not typical forms of *Axymene*, but may, on account of their apices, be left here temporarily; the position of *T. huttoni* is also insecure as no perfect apex has been seen, but it probably belongs to *Zeatrophon*. *Leinitrophon* may be treated as of subgeneric rank under *Axymene*, as the apices are essentially similar; the shell formation differs in its gently convex unshouldered whorls and absence of stronger cord on canal. *Terefundus* is a very distinct group, characterized by minute size of shell, few and thin spiral cords with axial laminations, and totally smooth base and canal. *Minortrophon* has the same small shell and smooth base, but the facies of the shell is otherwise quite different, there being only heavy broad revolving cords, and an almost obsolete canal. The diversity of locations used for the species of *Terefundus* sufficiently attests the distinctness of the group. How *Leucosyrinx cuvierensis* Mest. and *L. thomsoni* Mest. could have been placed together in this genus, with the remark that the nearest ally of the one is the other, is beyond comprehension; they are totally unrelated. Miss Mestayer remarked that "they do not seem to be very closely allied to any other New Zealand species, either Recent or fossil." The danger nowadays of systematic work without a knowledge of the fossil faunas (and vice versa) is exemplified in this statement, for both forms are very closely related to previously described New Zealand species, the latter, in fact, being a synonym of *Turris nexilis bicarinata* Suter, while the former is barely separable from *Mangilia quadricincta* Suter.

Axymene turbator n. gen and sp. (Figs. 127, 128).

Shell small, dark coloured. Apex small, papillate, of $1\frac{1}{2}$ smooth whorls, the nucleus globose and asymmetric. 14-16 axial ribs per whorl, faint and thin on shoulder, thence prominent to lower suture (interstices narrow at bottom, subequal to ribs at top of ribs), rapidly vanishing on base. Four spirals on penultimate whorl below shoulder (which is smooth), nine on body whorl, cords thickish (with subequal interstices), undulated and faintly thickened by axials, the ninth on neck of canal, very prominent. Faintly lamellose growth-lines over the whole surface. Spire subequal to aperture with canal, outlines stepped but straight. Whorls strongly shouldered at upper third, shoulder lightly concave, straight below. Suture inconspicuous, margined below by a pronounced swelling, above by the lowest cord. Aperture trapezoidal, widely angled above, produced below into a moderately long narrow canal, flexed a little to left, not notched at base. Outer lip thin and sharp, vertical in middle, straight and oblique in opposite directions at shoulder and base. Inner lip defined as a narrow glaze. Pillar subvertical, twisted near inception of canal and thence narrowing to a long fine point. Fasciole weak, smooth except for growth-lines. Colour sienna-chocolate, outside with greyish tints, inside chocolate, pillar touched with white.

Height, 12.5 mm.; diameter, 6 mm.

Locality,—Dunedin Harbour, under stones at low tide.

Genus **Vesanula** Finlay.

For a curious Middle Tertiary shell of both Trophonoid and Fusid affinities, *V. chaskanon*, I introduced this genus name (*Trans. N.Z. Inst.*, vol. 56, p. 245, 1926), stating that *Pagodula vegrandis* M. & M. (*l.c.*, vol. 54, p. 124, 1923) "is superficially similar, but the embryo is radically different." This conclusion was based on an abnormal specimen, and study of further material of both species and of *V. tegens* (Hutton) (*l.c.*, vol. 9, p. 594, 1877) allows me to correct the mis-statement, and give a better description of the embryo of *Vesanula*. All the species have a two-whorled protoconch, smooth and glossy, the second whorl somewhat inflated and ending in a distinct curved varix, followed by a short brephic stage of similar but distant and stronger varices before there arises the median keel with its strong triangular open spines. There is some variation, however, in the initial whorl; in *chaskanon* and *tegens* it is minute, slightly asymmetrical, and very depressed, quite tiny in comparison with the much inflated second volution, in *vegrandis* it is much more loosely coiled, suberect and somewhat papillate, the second whorl relatively much less swollen. Nevertheless, there seems to be no fundamental difference shown, and the shells are so similar in facies that they can safely be grouped together. This is welcome, as it will remove the extra-limital genus *Pagodula* from New Zealand faunal lists. I cannot help thinking that *Columbarium maorum* M. & M. (*Trans. N.Z. Inst.*, vol. 54, p. 127, 1923) would be better placed in *Vesanula*; the characteristic aperture is unfortunately missing, but the embryo, though described as lightly carinated, is nothing like the large bulb of the Recent *C. suteri* Smith or the Australian Tertiary forms such as *acanthostephes* (Tate). *Vesanula* seems, on

the whole, to be better placed near *Xymenella* in the Trophonidae than near *Columbarium* in the Fusidae.

Genus **Typhis** Montfort, 1810. [P. 420]

Suter was able to record only a damaged and specifically indeterminate specimen of this genus from 110 fathoms off Great Barrier Island, but Miss Mestayer has now definitely added it to the fauna by describing *T. pauperis* (*Trans. N.Z. Inst.*, vol. 48, p. 127, 1916) from 60 fathoms Poor Knights Is., and 30 fathoms Hauraki Gulf. The Tertiary species *T. hebetatus* Hutton has lately been re-compared with Australian material (Marwick; *Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 328, 1924), and its asserted identity with *T. maccoyi* T.-W. decided to be well founded. I have added a second Tertiary species, *T. francescae* (*Trans. N.Z. Inst.*, vol. 55, p. 465, 1924).

Thais haustum (Martyn, 1784). [P. 422]

In his "Commentary" Iredale proposed to use for this genus *Haustrum*, of Perry, 1811, but *Haustrum* was a Humphrey name, published in 1797 in the *Museum Caloniannum*, where the only recognisable constituent of the genus is *Buccinum persicum* Linné (teste T. Iredale), so that Hutton's genus name *Lepsia* can be reverted to.

This species has been denounced as an oyster-borer (Hedley, *N.Z. Journ. Sci. & Tech.*, vol. 2, No. 6, p. 366, 1919).

Thais succincta (Martyn, 1784). [P. 423]

This species was localized as from New Zealand, but contemporary authorities recognized that it came from Botany Bay, New South Wales. When series of specimens are examined, this is very definite, as the form figured by Martyn is typical of the common Sydney shells and disagrees with the Neozelanic type. Several species prove to have been confused under the above name, and the Neozelanic species must bear the name *scalaris* Menke 1829 (*Verz. Conch. Samml. Mals.*, p. 33). New Zealand shells differ at sight from Sydney specimens, especially when juveniles are compared, in relatively much more capacious aperture, quite differently flexed pillar, and shorter and broader spire, besides differences in detail of sculpture.

The apex of *N. lacunosa* Bruguière needs examination to determine its nature; there is nothing to show at present that it is really Neothaitid, i.e., sinusigerid, horny, sharply conic, polygyrate, swollen at its base, and set somewhat obliquely on the shell.

Powell has recorded (*N.Z. Journ. Sci. & Tech.*, vol. 4, p. 205, 1921) a large specimen (36 mm. high) of *Lepsiella scobina rutila* (Suter) from Whangarei.

Thais tritoniformis (Blainville, 1833). [P. 424]

The correct name is *Agnewia tritoniformis*, but it must be noted that Suter gives no authority for the two localities he mentions, "Bay of Islands; Cook Strait," referring to Justice Gillies's introduction of it to the Neozelanic fauna. Mr. La Roche, of Auckland, has two specimens found by himself at Whangaroa; I have examined

these, and here figure one of them (Fig. 32), but as the species is a somewhat variable one more Neozelanic examples must be studied before a safe discrimination can be made. One may therefore admit it doubtfully to the fauna. The specimens possibly came from Australia in ballast; exotic shells have occasionally been reported alive in New Zealand waters, e.g. *Murex ramosus* L. (Moss; *Beautiful Shells of New Zealand*, p. 16, 1908) and *Conus marmoreus* L. (Mestayer; *N.Z. Journ. Sci. & Tech.*, vol. 1, p. 102, 1918; *Ericusa sowerbyi* Kiener also reported from a dead shell). These have, of course, no just claim to inclusion in the Neozelanic fauna.

Family Cancellariidae. [P. 429]

This has as yet only one Recent representative, but I have in my collection undescribed new species belonging to several genera.

The fossil species have considerably increased in number, and the following new genera have been proposed for them: *Oamaruia* Finlay (for *Admete suteri* M. & M.; *Trans. N.Z. Inst.*, vol. 52, p. 132, 1920) (*Trans. N.Z. Inst.*, vol. 54, p. 514, 1924), *Inglisella* Finlay (for *Ptychatractus pukeuriensis* Suter; *N.Z.G.S. Pal. Bull. No. 5*, p. 26, 1917) (*l.c.*, p. 513), *Maorivetia* Finlay (for *Turbinella brevirostris* Hutton; *Trans. N.Z. Inst.*, vol. 9, p. 596, 1877) (*l.c.*, p. 513), and *Procancellaria* Wilckens (for *P. parkiana* Wilck.; *N.Z.G.S. Pal. Bull. No. 8*, p. 21, 1922); the last is a Cretaceous genus and is a very doubtful member of the family. *Inglisella* seems to be allied to the Recent Australian genus *Microsveltia* Iredale (for *M. recessa* Iredale) *Rec. Austr. Mus.*, vol. 14, p. 265, 1925) and includes, besides the type, *cincta* (Hutton) (*Trans. N.Z. Inst.*, vol. 17, p. 327, 1885), *anomala* M. & M. (*l.c.*, vol. 52, p. 132, 1920) and the Australian Tertiary *etheridgei* (Johnston) and probably *caperata* (Tate). *Pepta* Iredale (*l.c.*, p. 266) another Recent Australian genus, proposed for *Admete stricta* Hedley, and including the Tertiary *turriculata* Tate, has no Neozelanic representative. Neither is *Cancellaria* proper represented in New Zealand, though *Cancellaria scobina* Hedley and Petterd, which Iredale has noted (1924, p. 262, and 1925, p. 266) should be "removed from *Admete* back to *Cancellaria* s.l." is quite like some members of the series *lacunosa* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 320, 1885), *maorium* M. & M. (*l.c.*, vol. 53, p. 82, 1921), *ovalis* Marshall (*l.c.*, vol. 50, p. 269, 1918), and *hampdenensis* M. & M. (*l.c.*, vol. 54, p. 124, 1923), for which the generic name *Bonellitia* Jousseaume—apparently a reasonable location—is at present in use in New Zealand. The Australian *Trigonostoma* series is represented in the New Zealand Tertiary by *T. waiakaiaensis* and *christiei* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 466, 1924). *Maorivetia* is at present restricted to the type species, while *Oamaruia* includes one New Zealand species (though others are known to me), i.e., *O. suteri* (M. & M.) the genotype, and several Australian species, *ptychotropis* and *tatei* (Cossmann) (= *gradata* Tate; see nomenclatural note elsewhere in this volume), and the Recent *pergradata* (Verco). The list of New Zealand Tertiary species is completed by the addition of three doubtfully located forms, *Aphera* (?) *scopalveus* Finlay (*Trans. N.Z. Inst.*, vol. 56, p. 246, 1926), *Uxia* (?) *marshalli* Allan (*l.c.*, p. 342), and "*Admete*" *cristata*

Marwick (*l.c.*, p. 323), the last named probably does not belong to this family.

***Admete trailli* (Hutton, 1873). [P. 429]**

The reference to the genus *Admete* is indefensible. Suter's description, "Protoconch of $1\frac{1}{2}$ smooth and convex whorls, the nucleus globular.... Columella vertical, with 3 low rounded and oblique plaits" should be contrasted with that of the type of *Admete*, with its sculptured complex protoconch and its smooth columella. I propose the new generic name *Zeadmete*, naming *Cancellaria trailli* Hutton as type.

Family Pyrenidae. [P. 430]

The forms referred to this family by Suter are placed in four genera, *Mitrella*, *Anachis*, *Alcira*, and *Atilia*. All these four names must be dismissed, and most of the species redistributed. Suter's basis of classification—length of the canal and the presence or absence of an oblique plait at the base of the pillar is useless as regards Neozelanic species; Suter himself could not use it, for there are several "Mitrellas" among his "Aleiras" and *vice versa*.

Before rearranging the forms into more natural groups, however, it is best to deal with three specific names that call for rejection; these are *Alcira sanguinea*, *A. inconstans*, and *Atilia biconica*.

Topotypes of *Alcira sanguinea* Suter agree absolutely with topotypes of *Mitrella rosea* (Hutton); as evinced by his generic location, Suter saw a basal plait in the Bounty Island shells, and therefore distinguished them from *rosea* which he had placed in *Mitrella*; but all specimens of *rosea* show a strong basal plait, while Hutton's original location in *Obeliscus* is sufficient evidence that he had not missed it.

Suter (*Trans. N.Z. Inst.*, vol. 38, p. 329, 1906) renamed *Columbella varians* Hutton *C. inconstans* nov., and (wrongly) changed *Lachesis sulcata* Hutton to *Columbella huttoni* nov. (*Index Faunae N.Z.*, p. 72, 1904), but the type material of the former—from the Upper Pliocene—is inseparable as a species from the two poor type specimens of the latter; *sulcata* has many years' priority. The confusion seems to have begun when Murdoch (*Trans. N. Z. Inst.*, vol. 37, p. 223, pl. 7, fig. 12, 1905) figured a Whangaroa shell which he took to be *huttoni*, i.e. *sulcata*; it hardly resembles it and belongs to a different group, but nevertheless this is the interpretation and illustration given to Hutton's species in the "Manual" [p. 440] and "Atlas" [Plate 20, fig. 1]. Murdoch at the same time gave a good description of his specimens, which represent a distinct form, so I rename it after him (see under *Paxula*), selecting a type here figured (Figs. 60, 61) from the same locality, in the Finlay collection.

Suter described *Atilia biconica* from Hauraki Gulf, in 25 fathoms, remarking that "The two specimens at my disposal for drawing up the above diagnosis do not appear to be quite full grown." This, no doubt, was the reason for a curious blunder; for the specimens are juveniles of the shell he had described three pages previously as *Mitrella pseudomarginata* from the Bay of Islands; I have specimens dredged in 25 fathoms in Hauraki Gulf. i.e., topotypes of *biconica*.

Mitromorpha suteri Murdoch was referred to *Alcira* by Suter; this was probably an accident as the shell has no plait on the pillar; however it has spiral sculpture. It is not a Pyrenid, and Murdoch's original location was quite good, considering what was known of *Mitromorpha* at that time; it is now removed again to the *Turridae*, and will be dealt with later.

Lumping all the *Mitrellas*, *Alciras*, and *Atilias* together, and resorting, I suggest the following grouping:—

Paxula n. gen. Type *Columbella paxillus* Murdoch.

With the type I associate *C. transitans* Murdoch, *Mitrella leptalea* Suter, *M. subantarctica* Suter, and *Paxula murdochi* nom. nov. for *Columbella huttoni* Murdoch, not of Suter (*vide antea*). This is a very compact little assemblage, all the members of which have a sharp straight spire, and highly characteristic aperture (well shown in Murdoch's original figures of *transitans* and *paxillus*) which has a medi-ally inflated shortly pyriform shape, a considerably excavated pillar, twisted below, but with no trace at any stage of a plait or groove, and a very short canal flexed to the left. Specific differences in the group seem limited to variation in spiral sculpture and slenderness of shell. The range of localities given by Suter for Murdoch's *transitans* is worth noting; it probably does not reach the South Island, while the Subantarctic records refer to *subantarctica*. The Pliocene *Columbella angustata* Hutton is, however, not referable here, but is a *Turrid*.

Liratilia n. gen. Type: *Daphnella conquisita* Suter.

This shell and *Alcira angulata* Suter, described the following year, are extremely close specifically, though one would not guess so from the crude figures. Suter's inability to recognize his own groups is frequently evident, especially to the palaeontologist (*cf.* Marwick, *Trans. N.Z. Inst.*, vol. 56, p. 310, 1926), but more to be regretted is his habit of retouching figures to conform with his generic locations. This is a matter that must unfortunately be brought to notice as it has caused so much confusion, and it must be repeatedly stressed that generic conclusions are drawn at great risk from Suter's figures. Dr. Marwick has frequently mentioned Suter's unreliability in both generic and specific identifications and the false impression often given by his figures; the point is noted again since European authorities are accustomed to place Australasian shells from figures alone, and in the case of Neozelanic shells this leads only to confusion. A much better figure of *D. conquisita* (though of a juvenile shell) is given by Odher under the misidentification and wrong generic location of "*Prosipho chariessa*" (1924, p. 37; pl. 1, fig. 25). Odhner mentions that "it is possible that also some of the spirally lirate species of *Alcira* from New Zealand belong to *Prosipho*," and notes that Hedley has referred some Australian species there. I doubt the applicability of *Prosipho* to any Neozelanic species, but it certainly does not apply to the present Pyrenid group, which again is little like the Australian *cassandra*, *pallidula*, etc. A third species of *Liratilia* is *Pleurotoma (Leucosyrinx) eremita* M. and S., described from 110 fathoms off Great Barrier Island; this differs from the other two chiefly in possessing faint axial riblets on the upper whorls; it is

certainly not a Turrid. I know of the genotype as a Castlecliff fossil, but otherwise the group is so far of only Recent occurrence.

Zemitrella n. gen. Type: *Lachesis sulcata* Hutton.

Here may be grouped the remaining New Zealand Pyrenids (except those placed in *Anachis*); *choava*, *pseudomarginata*, *stephanophora*, *websteri*, *laevigata*, *rosea*, the type, and (provisionally) *Atilia daemona* Webster. There is indication that more than one shell type is included here, but there is gradation, and till the fossil forms are better known I prefer not to split further. Marshall's *Mitrella inconspicua* (*Trans. N.Z. Inst.*, vol. 50, p. 266, 1918) and some undescribed Tertiary species (e.g., Suter's "*Alcira* n. sp."—*N.Z. Geol. Surv. Bull. No. 20*, pp. 89, 93, 1918) belong to this group, all the members of which show an oblique plait at the base of the pillar. *Choava* has the plait subobsolete, but all the others show it strongly, especially in juvenile shells.

The Neozelanic species of *Anachis* are divisible into two groups, one containing small shells with short beak, and the other—restricted to the Tertiary—larger shells with distinct canal. Neither of these exactly matches with *Pyrene gemmulifera* Hedley (the type of *Retizafra*) which is a minute *Mitrihara*-like shell from the Capricorn group, nor with the genotypes of any of the cancellate genera outlined by Iredale in *Proc. Mal. Soc.*, vol. 12, pt. 1, p. 33, 1916. The forms of both series seem to be sublittoral dwellers of southern development, and as no other austral group is suitable I provide names.

Macrozafra n. gen. Type: *Clathurella subabnormis* Suter.

Here would also be placed the only other Recent species included by Suter, *Clathurella nodicincta* Suter. But from the series available I would maintain *Columbella saxatilis* Murdoch as a third good form, very close to *subabnormis* but apparently distinct in its higher spire, stouter shell, and narrower and less flexuous axials; described from Takapuna, it would seem to be a northerly regional representative of the Lyall Bay *subabnormis*. Suter's poor figure in the "Manual" is quite different from his original illustration, and seems to have been taken from a northern shell; when the original figure is contrasted with Murdoch's picture of *saxatilis* (*Trans. N.Z. Inst.*, vol. 37, pl. 8, fig. 15, 1905) the differences are at once apparent.

There is a Tertiary ancestral (undescribed) species from the "Miocene," but otherwise no fossil species of this group are known. *M. nodicincta* would seem to be very closely related to the Tasmanian and South Australian *Pyrene calva* Verco. The Australian early Tertiary *Columbella balcombensis* Pritchard (*P.R.S. Vict.*, vol. 17, N.S., pt. 1, p. 324, 1904), though also nearly allied, represents a separable group.

Antizafra n. gen. Type: *Columbella pisaniopsis* Hutton.

The type, *C. cancellaria* Hutton, *Anachis speighti* Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 199, 1924), and two "Miocene" (undescribed) ancestors constitute this group in New Zealand, while *Columbella plexa* Hedley seems to be an Australian member.

Family **Volutidae** Gray. [P. 444]

Dr. Marwick has just recently published a revision of the "Tertiary and Recent Volutidae of New Zealand" (*Trans. N.Z. Inst.*,

vol. 56, pp. 259-303, 1926), in which 82 species are admitted to the New Zealand faunal lists, and the following groups proposed:—

Notoplejona for *Athleta necopinata* Suter (p. 270).

Mauia for *Galeodes maoriana* Suter (p. 271).

Waihaeia for *W. allani* Marwick (p. 274).

Teremelon for *Scaphella tumidior* Finlay (p. 279).

Pachymelon for *Waihaeia amoriaformis* Marwick (p. 281).

Spinomelon for *Lapparia parki* Suter (p. 283).

Metamelon for *Miomelon clifdenensis* Finlay (p. 285).

Fulgoraria Schumacher is dismissed altogether from this region, and *Alcithoe* used instead as a full genus. The only other previously known genus utilized is *Lyria* Gray, which I admitted to the fauna by describing *L. zelandica* (*Trans. N.Z. Inst.*, vol. 55, p. 470), and regarding which Marwick has remarked (p. 263), "The presence of an isolated but typical *Lyria* in Middle Tertiary (probably Oligocene) beds in New Zealand is rather surprising." Eight Recent species are allowed; seven of these are placed in *Alcithoe*, viz., *swainsoni* Marwick (new name for *elongata* Swainson, preoccupied by Solander), *larockei* Marwick (a new species from off Opotiki in 30 fathoms), *arabica* (Mart.), *jaculoides* Powell (*Proc. Mal. Soc.*, vol. 16, p. 108, 1924), *depressa* Suter, *gracilis* (Swainson), and *hedleyi* M. & S., while the eighth, Watson's *Cymbiola lutea*, is referred to *Waihaeia*, subgenus *Pachymelon*, but it is so sundered in time-occurrence from the other members of the genus, and especially the subgenus, that close affinity is doubtful. The formation of the whorls and beak, and especially of the columellar plaits is very different from that seen in *amoriaformis* and its allies. Watson says of the pillar plaits, "four not strong, equal, concealed, . . . very oblique teeth," *Pachymelon* has 5-6 very strong, unequal, prominently visible, not very oblique plaits; Watson's figure 3b (*Chall. Rep.*, vol. 15, pl. 15) shows the peculiar columella and general facies much better than his figure 3a, which Marwick has reproduced (*l.c.*, Pl. 63, fig. 3). I accordingly propose *Palomelon* n. subgen. of *Waihaeia* for Watson's species alone, to mark its conchological and chronological separation from the other members of that group; it is possibly not closely allied to them at all. *Waihaeia firma* was inadvertently described without locality in Marwick's paper; he has now given this as "shell-bed, Target Gully, Oamaru" (*N.Z. Journ. Sci. and Tech.*, vol. 8, no. 5, p. 304, 1926).

To Marwick's census must be added the genus *Microvoluta* Angas, 1877 (*vide antea*) with its two Neozelanic species *biconica* M. & S. (Recent), and *lincta* Hutton (Pliocene); also the extraordinary genus *Iredalina* Finlay (*Proc. Mal. Soc.*, vol. 17, p. 59, 1926), proposed for "A Volute without plaits," *I. mirabilis* Finlay, described from the unique type trawled in 40 fathoms off Otago Heads. The Australian *Ericusa sowerbyi* (Kiener) has been reported by Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 1, p. 103, 1918) from the beach at Evans Bay, Wellington Harbour, but is, of course, no true member of our fauna.

Genus *Ancilla* Lamarek, 1799. [P. 450]

Ancilla, at the reference given by Suter, which is correct, is based upon the figures of Martin, "*Conch.*, 2, p. 359, t. 65, fig. 722-724."

These figures are recognized by Pfeiffer in the *Krit. Register*, 1840, p. 20 as:—fig. 722, *A. candida* Lamarck; figs. 723-4, *Voluta ampla* Gmel.=*A. cinnamomea* Lamk. No true *Ancilla* occurs in New Zealand, living or fossil; *Baryspira* Fischer, 1883 (Type: *A. australis* Sow.) is available for Neozelanic forms, but at least three groups can be determined, and as numerous additions have been made to the Tertiary list within recent years, these are here outlined. First, however, it may be noted that two Australian Tertiary species, *papillata* Tate and *subgradata* Tate, have been dismissed from the Neozelanic fauna by Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 322, 1924), an Australian species which had been confounded with the Neozelanic *A. hebera* Hutton being renamed *A. tatei* Marwick at the same time (*l.c.*, p. 319).

Baryspira Fischer, 1883 (*Man. de Conch.*, fasc. 6, p. 600) should be used generically for the Recent species *australis* and *mucronata* Sowerby, and the fossils *spinigera* and *cincta* Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 267, 1918), *robusta* Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 322, 1924), *tirangiensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 324, 1926), and *waiakaiaensis* Finlay (*l.c.*, p. 251). Powell has recorded (*N.Z. Journ. Sci. & Tech.*, vol. 6, p. 285, 1924) the occurrence of numerous living specimens of *mucronata* on a sand-pit off Devonport, Auckland; the only instance of its having been found in the littoral zone.

Alocospira Cossmann, 1899 (*Ess. de Pal. comp.*, livr. 3, p. 92) may be employed subgenerically for the Tertiary *hebera* Hutton (*Cat. Tert. Moll.*, p. 6, 1873) and *subhebera* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 323, 1926), and perhaps the Recent *novaezelandiae* Sowerby. *Hebera* is a variable form, but many specimens show the characteristic callus and spiral ridges of the Australian Tertiary *papillata* Tate, the genotype of *Alocospira*. *Novaezelandiae* is rather difficult to place, but Iredale, in treating of Australian Recent *Ancillas* (1924, p. 261), has included the smooth-spined forms in *Alocospira*; there seems to be much gradation in this character, and *hebera* is frequently smooth.

Pinguispira n. subgen., type: *Ancilla* (*Baryspira*) *opima* Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 200, 1924) is proposed to include the remaining species; the Recent forms *depressa* Sow. and *crystallina* Brookes (*l.c.*, vol. 56, p. 589, 1926), and the Tertiary species (besides the type) *lata* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 325, 1885) (which should not be merged in *depressa* as Suter has done), *waikopiroensis* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 42, 1917), and *morgani* Allan (*Trans. N.Z. Inst.*, vol. 56, p. 342, 1926). This group is very distinct in its squat and inflated shell, and short and heavily thickened pillar, notably excavated and twisted anteriorly.

All the New Zealand species have been mentioned in the above summary.

Family Marginellidae. [P. 456]

Probably a large number of these shells will turn up in dredgings later, as Tasmania has over sixty species already listed, while New Zealand shows only fifteen. The major groupings are in a state of chaos, and Suter is to be congratulated upon attempting a scheme

of separation, though the grouping of the New Zealand forms is as confused as in the *Pyrenidae*. Suter recognises a genus *Cryptospira* of Hinds, 1844, subordinating to it a subgenus *Gibberula* Swainson, 1840. This arrangement must be reversed, but probably neither genus is correctly used. The five Australian species are very doubtful inclusions.

Odhner has added *Marginella coma* n.sp. from 50 fathoms off Cape Maria van Diemen, and the status of this form must remain in doubt till relatives turn up; it may be distantly related to *Peculator* Iredale (1924, p. 269), but is certainly no true *Marginella*. The only other addition to the Recent fauna since the "Manual" was published is *M. cairoma* Brookes (*Trans. N.Z. Inst.*, vol. 55, p. 154, 1924) from the north Cookian region. The Tertiary list, however, has been augmented considerably, and now stands as follows:—(group A), *conica* Harris (*Cat. Tert. Moll. B.M.*, p. 88, 1897), *whitecliffensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 324, 1926); (group B), *harrisi* Cossmann (*Ess. de Pal. comp.*, livr. 3, p. 88, 1899; see nomenclatural note elsewhere in this volume), *fraudulenta* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 42, 1917), *aveniformis* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 230, 1919); (group C), *dubia* Hutton (*Cat. Tert. Moll.*, p. 8, 1873; from Broken River, Lower beds; "Outline like *M. kirki* Marwick, but much larger and stronger, body whorl more inflated, and spire broader and lower"—Marwick, *in litt.*), *hectori* Kirk (*Trans. N.Z. Inst.*, vol. 14, p. 409, 1882), *kirki* Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 324, 1924), and *marwicki* Finlay (new name for *brevespira* Marwick, *Trans. N.Z. Inst.*, vol. 55, p. 201, 1924, preoccupied; see elsewhere this volume).

Marwick has rejected the record of an Australian Tertiary species *M. propinqua* Tate from the New Zealand Tertiary (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 324, 1924).

Family Turridae. [P. 468]

No comments on this family are offered here, as it is proposed to deal exhaustively with both the Recent and fossil forms in a revision now in preparation, and the many emendations necessary in Suter's arrangement will then be made. Attention may, however, be drawn to the following genera, lately created for New Zealand forms:—

Livacraea Odhner (1924, p. 44), for *Clathurella epentroma* Murdoch.

Rugobela Finlay (1924 c, p. 514), for *Ptychatractus tenuiliratus* Suter.

Parasyrinx Finlay (1924 c, p. 514), for *Pleurotoma alta* Harris.

Austrotoma Finlay (1924 c, p. 515), for *Bathytoma excavata* Suter.

Phenatoma Finlay (1924 c, p. 515), for *Pleurotoma novaezelandiae* Reeve.

Cryptomella Finlay (1924 c, p. 516), for *Leucosyrinx transenna* Suter.

Comitas Finlay (1926, p. 251), for *Surcula oamarutica* Suter.

Insolentia Finlay (1926, p. 252), for *Surcula pareoraensis* Suter.

Zemacies Finlay (1926, p. 252), for *Z. elatior* Finlay.

Speightia Finlay (1926, p. 252), for *Euthriofusus spinosus* Suter.

Fenestrosyrinx Finlay (1926, p. 254), for *Turris nexilis bicarinatus* Suter.

Stilla Finlay (1926, p. 254), for *Mangilia flexicostata* Suter.

Vexithara Finlay (1926, p. 254), for *Antimitra vexilliformis* Marshall and Murdoch.

Marshallena Finlay, 1927 (herein), for *Belophos incertus* Marshall.

Some specific name changes, mostly in connection with Tertiary fossils, have also been introduced by Finlay in two nomenclatural papers, (a) *Proc. Mal. Soc.*, vol. 16, pt. 2, pp. 103, 104, 1924; (b) elsewhere in this volume.

Hedley has recently completed his investigation of the Australian complex grouped under the name "Turridae," and he has suggested that the family is polyphyletic, and the species of heterogeneous origin; one thing is certain, that the austral groups have practically nothing in common with the northern series classed under this family name.

To the Recent fauna have to be added *Heterocithara mediocris* Odhner (1924, p. 43), the first (and a correct) record of this genus from New Zealand; *Guraleus tenebrosus* Powell (*Proc. Mal. Soc.*, vol. 17, p. 37, 1926), which is closely allied to *Drillia lyallensis* Murdoch [P. 482]; and *Mangilia huttoni* E. A. Smith (*Brit. Antarc. "Terra Nova" Exped.*, Zool., vol. 2, No. 4, p. 88, 1915), which Suter has nowhere mentioned.

Genus *Terebra* Lamarek, 1799. [P. 513]

This can be dismissed from the Neozelanic list, since, of the two species, *T. flexicostata* Suter (possibly a synonym of *venosa*, and not Neozelanic) is referable to the genus *Acuminia* Dall (*Nautilus*, vol. 21, p. 124, 1908), while the second may be an aberrant species of *Pervicacia* Iredale (1924, p. 262), or representative of a new group. Suter's subspecies *crassicostata* [P. 515] is not worth recognition; Lyall Bay forms do not differ from those found elsewhere. The Tertiary species are divisible into two groups; the first contains the smaller species, with blunt paucispiral embryo, related to *tristis* Desh., and comprises *costata* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 315, 1885) (which, as I have noted elsewhere in this volume, is pre-occupied, but seems to be inseparable from *tristis*, so may be dropped), *benesulcata* Bartrum (*l.c.*, vol. 51, p. 99, 1919), *omahuensis* Marwick (*l.c.*, vol. 56, p. 326, 1926), and numerous new species; for this assemblage *Pervicacia* may be used. The second group, which may at present be referred to *Acuminia*, consists of larger species with flatter whorls and a sharp polygyrate apex, and contains *orycta* Suter (*Trans. N.Z. Inst.*, vol. 45, p. 296, 1913), *pareoraensis* Suter (*N.Z.G.S. Pal. Bull.*, No. 5, p. 62, 1917), *biplex* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 327, 1885), *sulcata* Marshall (*l.c.*, vol. 51, p. 232, 1919), possibly *bicorona* Hutton (*l.c.*, vol. 17, p. 328, 1885; see also Marwick, *Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 327, 1924), and also many undescribed forms. Marwick, at the reference just quoted, has rejected the Australian Tertiary *T. catenifera* Tate, reported by Suter, as not of Neozelanic occurrence.

Genus **Conus** Linné, 1758.

This has no Recent representative in New Zealand (except for the occasional occurrence of an exotic species in the North Cookian region, e.g., *marmoreus* L. has been recorded alive from Farewell Spit by Miss Mestayer, *N.Z. Journ. Sci. and Tech.*, vol. 1, p. 102, 1918), but the number of Tertiary species is now quite respectable. They are as follows:—*armoricus* and *fusellinus* Suter (*N.Z.G.S. Pal. Bull.* No. 5, p. 61, 1917), *suteri* Cossmann (= *deperditus** Suter), *thorae* Finlay (= *convexus** Marshall), *marshalli* Finlay (= *lyratus** Marshall), *abruptus* Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 270, 1918), *pseudoarmoricus* M. and M. (*l.c.*, vol. 52, p. 135, 1920), *huttoni* Tate (= *ornatus** and *trailli** Hutton), *triangularis* Finlay (*l.c.*, vol. 55, p. 479, 1924), *rivertonensis* Finlay (*l.c.*, vol. 56, p. 255, 1926), and *tahuensis* Allan (*l.c.*, p. 344). The record of *C. catus* Hwass from "a well-digging 10 feet in depth, Chatham Islands" (Harris, *Cat. Tert. Moll. B.M.*, p. 35, 1897) can surely be dismissed. The specimen may have come from "Chatham Island" in Polynesia.

Actaeon craticulatus Murdoch and Suter, 1906. [P. 518]

Hedley, when describing *Acteon roseus* (*Proc. Linn. Soc. N.S.W.*, vol. 29, pt. 4, p. 536, April 12th, 1906) unwittingly gave a valid name to the New Zealand shell as well. He remarked that "There is a closely allied species from 110 fathoms off the Great Barrier Island, New Zealand, which my friends Messrs. R. Murdoch and H. Suter are about to describe as *A. cratericulatus*. The New Zealand shell differs by being much smaller, with sharper sculpture, the grooves being broader and deeper, and crossed by more distant and elevated threads." This comparison, taken in conjunction with the excellent figure and full description of *A. roseus* Hedley, amounts to a good diagnosis, and as Murdoch and Suter's name was not published till June, 1906, it must be displaced by *Actaeon cratericulatus* Hedley. I select the specimen examined by Hedley, in the Australian Museum collection (fide T. Iredale), as holotype of the species.

No Recent representative has yet been found of our large Pliocene Actaeons, such as *A. praestitus* Finlay (= *sulcatus* Hutton, preoccupied; *Proc. Mal. Soc.*, vol. 16, p. 105, 1924).

Genus **Pupa** Bolten, 1798. [P. 518]

There are several local names available for the local species, and it is unwise to employ one given to an Indo-Pacific shell. Therefore I reject *Pupa affinis* A. Ad. as inapplicable to Neozelanic shells, none of which show the peripheral groove emerging below the suture, or have the same outlines as Adams's shell. For the small *Actaeon*-like form common in northern deep-water dredgings, Hutton's *Buccinulus albus* is suitable; the type is lost, but there is only one small New Zealand species, and sufficient data is given in Hutton's diagnosis and measurements to indicate that he described this; as the shell occurs all round the Hauraki Gulf and its precincts, and it is advisable to have a type specimen, I chose as neotype a specimen in the

*See nomenclatural notes elsewhere in this volume.

Finlay collection, dredged in Hauraki Gulf in 25 fathoms. Suter's figure is too slender and has the base too regularly contracted.

Examination of type material in the Dominion Museum convinces me that *Buccinulus kirki* Hutton, 1873 is identical with and has priority over *B. gracilis* Kirk, 1882, but that *B. huttoni* Kirk, 1882 is possibly different. Too few specimens are available for a full investigation, but in the meantime I recommend that two large species be recognised under these names, and suggest that there may really be only one.

Genus *Triploca* Tate, 1894.

This has been added to the Tertiary fauna by Marshall and Murdoch (*Trans. N.Z. Inst.*, vol. 54, p. 128, 1923) with a new species *T. waihaoensis*, which is closely allied to the only other species of the genus, the Australian Tertiary *T. ligata* Tate.

***Leucotina pura* (A. Adams, 1855). [P. 521]**

From study of the type in the British Museum, Hedley recognised that A. Adams' species was a Sydney shell, and the ascription to New Zealand consequently erroneous; the record should be eliminated.

***Bullina scabra* (Gmelin, 1791). [P. 522]**

This name has already been changed by Iredale in his "Commentary," but unfortunately still another change is necessary, as *Voluta ziczac* Muhlfeldt, 1878, had been anticipated by Schroeter, 1804, so that the name to be used now appears to be *Bullinula lineata* Gray, 1825 (information from T. Iredale). Authentic New Zealand specimens have been collected in late years by Powell at Mt. Maunganui and Great Barrier Island (see also Bucknill, 1924, p. 78).

Genus *Ringicula* Deshayes, 1838. [P. 523]

To *R. uniplicata* Hutton, the sole Tertiary species recorded by Suter, must now be added *R. torquata* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 326, 1926); there are, however, many undescribed new species.

***Hydatina physis* (Linné, 1758).**

Powell has lately added this to the New Zealand fauna by recording the finding of a live specimen on Great Barrier Island (*N.Z. Journ. Sci. & Tech.*, vol. 6, Nos. 5 & 6, p. 284 with text fig., 1924).

Genus *Volvulella* Newton, 1891. [P. 529]

Hedley (*Proc. Linn. Soc. N.S.W.*, vol. 41, p. 716, 1916) has indicated that this must be replaced by *Rhizorus* Montfort, 1810, proposed for *R. adelaidis* Mont.—*Bulla acuminata* Brug.

The New Zealand species is at present unnamed. Suter identified Recent shells with the "Miocene" *Cylichna reflexa* Hutton, from White Rock River, though commenting (*N.Z. Geol. Surv. Pal. Bull. No. 3*, p. 46, 1915) that Recent specimens were somewhat larger than the type. This is constantly the case, but there are far more marked distinctions also. The fossil shell has a long and very sharp spire, notably concave at its base, which gives it the appearance of a projecting thorn, while the Recent shell has only a short and not

very sharp apex of fairly regular formation. The little chink-like perforation on the inner side of the spire is consequently much more drawn out in true *reflexus*, which also justifies its name in having the basal lip more reflexed, with a stouter, more oblique pillar-plait. Both shells have fine dense spirals all over, but the stronger grooves on base and apex are more numerous and closer in the fossil. In relation to width, the Recent shell is considerably more elongate, especially as regards the inner half of the body whorl as seen from the front. Suter has figured a Recent shell (though the pillar twist is too strong and the shell rather short), so I give the name *Rhizorus nesentus* nov. to the specimens dredged in 38 fathoms off Cuvier Island, selecting a type from that locality in the Finlay collection.

Genus *Cylichnella* Gabb, 1873. [P. 530]

Suter includes two Australian species, *pygmaea* A. Ad. and *thetidis* Hedley, stating that *arachis* Q. & G. does not occur in New Zealand waters, and that the type of Kirk's *C. zealandica* is lost. This is a mistake, for it and three syntypes are in the Dominion Museum, Wellington; Hedley, who examined them, left a note that the type was *C. arachis* and the syntypes *C. thetidis*. On the strength of this, Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 3, Nos. 5 & 6, p. 303, 1921) has identified some 50 examples sorted from Hauraki Gulf dredgings as *C. arachis* (Q. & G.). Two, at least, of these records of Australian shells must now be rejected. When Hedley returned Kirk's type material, he sent also Sydney specimens of *arachis* for comparison, but Miss Mestayer evidently did not use them, for differences are obvious, and could hardly have been overlooked. The Australian shells grow to more than twice the size of the New Zealand species, the top of the aperture rises much higher, the apex of the shell narrows in considerably so that the pit round the perforation is much narrower (the perforations are about the same size relative to width of shell, but the width of the pit border is much narrower in *arachis*), and the pillar plait in New Zealand shells is very much weaker, lower down, and with no groove behind it. *C. zealandica* Kirk must be revived for this form. As regards *C. thetidis* Hedley, Suter's figure in the "Atlas" seems to be a copy of Hedley's original fine drawing (*Mem. Austr. Mus.*, vol. 4, pt. 6, p. 395, fig. in text, 1903), but the little material available does not enable me at present to separate Australian and New Zealand specimens.

Cylichnella pygmaea A. Ad. does not occur in New Zealand, and it is hard to say what Suter's figure is intended to represent, for it is not like the New Zealand shell, yet does not well portray true *pygmaea*; it is probably a poor copy of some other figure. The New Zealand form is stouter and much wider on top than Adams's shell, and the perforation much larger; I describe it as a new species below. Hedley and May have placed these forms in *Cylichnina* Monterosato, and here may (at present) also be referred the remaining New Zealand species, *Cylichna striata* Hutton, which is a close ally of *C. iredaleana* Hedley.

Cylichnina opima n. sp. (Fig. 34).

Shell small, squat, but well inflated for its size, pure white. Sculpture of numerous close incised grooves over whole surface. Shell widest near base, but very little narrowed posteriorly. Apex hollowed out, the pit occupying only about one half area of top, with a blunt edge, perforation at its bottom narrow, open, about half width of bordering rim. Aperture longer than shell, a little projecting above, effuse below. Pillar straight, slightly bent to left, with no plait, but a distinct rounded truncation at its base.

Height, 3.3 mm.; diameter, 1.8 mm.

Locality,—Lyall Bay, in shell sand.

Bullaria adamsi (Menke, 1850). [P. 534]

This should be dismissed from the Neozelanic fauna. A shell which has borne the above name may occur in the extreme north, but it is improbably Menke's species, and further authentic specimens must be collected and examined before any conclusions can be drawn.

Bullaria australis (Q. and G.). [P. 535]

Gray's name was incorrectly rejected because, according to Suter, his "descriptions are quite inadequate and not accompanied by a figure." However, when Hedley referred New South Wales shells to Iredale for comparison with the types in the British Museum, although they agreed, Gray's name was found to be preoccupied; none of the recorded synonyms had reference to the Australian species, so Hedley proposed for it the new name *Bullaria botanica* (1918A, p. m 104, No. 1104). This name does not enter the Neozelanic fauna, since Gray's *Bulla quoyi* is sufficiently distinct to be separated; consequently the whole of the Neozelanic shells will bear the name *Bullaria quoyi* Gray, 1843, no variety being recognized, and *Bullaria australis* Q. & G. will be removed from the Neozelanic list.

Family Peltidae.

Odhner (1924, p. 46), in establishing a new genus *Runcinella*, with *R. zelandica* nov. (from Cape Brett, near Bay of Islands) as type, has added this to the Neozelanic fauna, as "Family *Runcinidae*"; the generic name *Pelta* Quatrefages, however, antedates *Runcina* Forbes, and is usually made the basis of the Family name.

Umbraculum umbellum (Martyn, 1786). [P. 549]

Iredale (*Proc. Mal. Soc.*, vol. 12, pts. 2 and 3, p. 89, 1916) noted that Solander's name *Patella umbraculum* (*Cat. Port. Mus.*, p. 178, April, 1786) had priority over Martyn's name, which occurred in the third volume (not second as printed in Iredale's paper), and this volume was not published until 1788. However, Hedley has named the Sydney form *Umbraculum botanicum* (*Proc. Linn. Soc. N.S.W.*, vol. 48, pt. 3, p. 315, 1923), and included under this name the form occurring at Lord Howe Island, Norfolk Island, and the Kermadec Islands. At the last named locality Iredale tells me that he collected a few specimens and noted that the shells and animals differed, and was unable to find any record of the explanation of these differences. The most feasible one was that they were sexual. Similar specimens

were shown Iredale by the late Mr. G. Gross at Brisbane, who had been similarly puzzled. Roy Bell sent the two forms of shell from Norfolk and Lord Howe Islands, and Iredale searched for them in the Sydney district. Collecting at Long Reef, near Manly, New South Wales, in September, 1924, Iredale and I found two specimens associated which showed these differences exactly and proved them to be sexual. The larger specimen was bluish, with massed nodules, the sole being pale bluish-white; the shell was large, flattened, the central portion clear of extraneous growth. The smaller one was distinctly yellowish, with dark bluish-green, rather more separated nodules, the sole being deep yellow; the shell was smaller, more conical, and entirely covered with growth.

Suter's record stood in need of confirmation, and this has lately been supplied by Powell (*N.Z. Journ. Sci. & Tech.*, vol. 6, nos. 5 and 6, p. 286, 1924) who has recorded the trawling of two live specimens of *botanicum* in 20-30 fathoms near the Hen and Chicken Islands.

Pleurobranchaea novaezelandiae Cheesman, 1878. [P. 553]

The carnivorous habits and spawning of this creature have been noted by Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 3, p. 170, 1920).

Suborder **NUDIBRANCHIA**. [P. 554]

This group will provide much novelty to the first student who takes an interest in it. Iredale collected many more species than Suter has included, though few of the recorded forms. These, he informs me, were sent to Sir Charles Eliot, but have never been reported on, and never will be now by Eliot, or probably anyone else in the near future.

The last molluscan work that engaged Iredale's attention in England was the establishment of Nudibranchiate nomenclature on a firm basis (vide Iredale and O'Donoghue, *Proc. Mal. Soc.*, vol. 15, pp. 195-233, 1923). From this point of view alone the following emendations are necessary; the page references being to the paper quoted:—

Tribe TRITONIOMORPHA must become Superfamily ZONABRANCHIATAE (p. 229).

Family TRITONIDAE must become Family DUVAUCELIIDAE (p. 229).

Genus *Tritonia* must become Genus *Sphaerostoma* Macgillivray, 1843 (p. 229).

Tritonia incerta must become *Sphaerostoma incerta* (Bergh, 1904).

Tribe DORIDOMORPHA must become Superfamily PHANEROBRANCHIATAE (p. 217).

Family GONIODORIDIDAE must become Family OKENIIDAE (p. 217).

Genus *Acanthodoris* must be referred to Family *Onchidoridae* (p. 219).

Family DORIDIDAE must become Family DORIDIGITATIDAE (p. 226).

Genus *Doris* must become Genus *Archidoris* Bergh, 1878 (p. 228).

Subgenus *Homoiodoris* must become Genus *Homoiodoris* Bergh, 1882.

Subgenus *Ctenodoris* must become Genus *Ctenodoris* Eliot, 1907.

Aphelodoris cheesemani must become *Aphelodoris luctuosa* (Cheesman, 1882).

Tribe EOLIDOMORPHA must become Tribe CLADOHEPATICA (p. 200).

Genus *Eolis* must become Genus *Æolidia* Cuvier, 1798 (p. 200).

Eolis leptosoma must become *Æolidia leptosoma* (Hutton, 1884).

Genus *Aeolidiella* must become Genus *Eolidina* Quatrefages, 1843 (p. 201).

Aeolidiella drusilla must become *Eolidina drusilla* (Bergh, 1900).

Aeolidiella faustina must become *Eolidina faustina* (Bergh, 1900).

Genus *Eolidia* must become Genus *Dolicheolis* nov., proposed for:—

Eolidia longicauda must become *Dolicheolis longicauda* (Q. and G., 1832).

Family PROCTONOTIDAE must become Family ZEPHYRINIDAE (p. 213).

Genus *Antiopella* must become Genus *Janolus* Bergh, 1884 (p. 213).

Antiopella novozealandica must become *Janolus novozealandicus* (Eliot, 1907).

Genus *Fiona* Hancock and Embleton, 1853, must become Genus *Fiona* Forbes and Hanley, 1851 (p. 212).

Fiona marina must become *Fiona pinnata* (Eschscholtz, 1831) (p. 212).

Tribe ELYSIOMORPHA must become Suborder ASCOGLOSSA (p. 197).

Family HERMAEIDAE must become Family STILIGERIDAE (p. 199).

But few incidental notes on the species have appeared since the publication of the "Manual." Young has recorded and described the spawning of *Archidoris wellingtonensis* (Abraham) (*N.Z. Journ. Sci. & Tech.*, vol. 7, No. 3, p. 189, 1924). Powell (*N.Z. Journ. Sci. & Tech.*, vol. 6, Nos. 5 & 6, p. 286, 1924), has recorded the finding of *Sphaerostoma incerta* (Bergh) in abundance at several localities in the North Island, while Odhner (1924, pp. 52-54) has identified seven New Zealand species in the material collected by Dr. Th. Mortensen, giving notes on the dentition of *Alloiodoris lanuginata* (Abraham) and *Chromodoris amoena* Cheeseman, and adding a genus to the Suborder as developed in New Zealand by describing *Cuthona zelandica* nov. He remarks that this is a true *Cuthona*, but compares it with *Eolis stipata* Alder and Hancock which is a *Cratena*.

Ophicardelus australis (Q. and G., 1832). [P. 590]

This name is used by Suter for the Neozelanic shell, but it was given to a shell collected at Western Port, Victoria and Hobart, Tasmania. For this Australian species Hedley has used *ornata* Ferussac, placing it in the European genus *Phytia*. One may unhesitatingly reject the latter genus name in favour of *Ophicardelus*, given to the austral forms. From Lakes Entrance, Gippsland, Ireland has received a large number of specimens collected by Roy Bell, and these showed three species, "*australis*," "*stutchburyi*," and "*quoyi*." The former proved to be the *ornata* shell, the second agreed with *sulcata*, which Hedley included in the New South Wales List, and with the types of *stutchburyi*, described from Port Curtis, Queensland, and the third with the types of *quoyi*, described from Moreton Bay, which Hedley did not include in the N.S.W. List, but suggested might be Neozelanic.

Mr. A. E. Brookes sent New Zealand specimens to Iredale, and these he tells me are very close to the Australian *quoyi*, and must be called *costellaris* (H. & A. Adams, 1855) (*Proc. Zool. Soc.* for 1854, p. 12; described as *Melampus*).

***Cremnobates parva* Swainson, 1855. [P. 594]**

The figure of this shell is a rather poor copy of one prepared by Hedley, and published by Hedley and Suter (*Proc. Mal. Soc.*, vol. 9, pt. 3, p. 152, in text, 1910); it was drawn from a South Tasmanian topotype, and Suter remarks that: "All the shells from the Antipodes have the spire considerably shorter than the aperture, but this would hardly appear to be sufficient reason for establishing a variety or subspecies. The type, figured by Swainson, has the height of the spire equal to that of the aperture: the total height is 7 mm." Further study of this group shows the differences to be of much greater value and fully specific. Odhner (1924, p. 86, "Addenda"), in proposing to call Auckland Island specimens (which he figures) "var. *striata* n.," notes a further difference in that the Subantarctic shells are spirally lirate, at least on the upper whorls. I therefore adopt Odhner's name as of full specific rank, so that *Marinula striata* Odhner will replace *Cremnobates parva* Swainson in New Zealand lists; the genus seems restricted in this Region to the Rossian province.

***Siphonaria australis* Q. and G., 1833. [P. 598]**

Oliver has made some remarks in his Ecological Essay on the relationships of this species and *S. zelandica* of the same authors. The former was described from Cook Strait as a small elongately oval shell, with 50 ribs, measuring 14.5 by 10.5 mm., and living on *Durvillea utilis*. The latter was only localized as from New Zealand, and said to be a large roundish shell measuring 19 by 16.8 mm., with twenty ribs.

If one judges from study of the Australian forms, these may be very distinct species, the station being a characteristic feature of the species in this genus, though the extent of the station may at first obscure the distinction. The chief difference recorded for the Neozelanic shells, is the form of the lateral teeth of the radula; if this be confirmed they must be regarded as distinct species. Re-examination of the dentition of New Zealand Siphonarias is urgently needed and may lead to the discovery of several new species.

Hedley has reported *Kerguelenia redimiculum* (Reeve) and (doubtfully) *K. lateralis* (Gould) from Macquarie Island (1916, p. 61). The Antipodes Island *K. innominata* Iredale (1915, p. 478) closely agrees, but *S. obliquata* Sowerby must receive a new generic name. Conchologically it is quite aberrant; Iredale, noting this, suggested its inclusion in *Kerguelenia* (1915, p. 478), but the *redimiculum* group is quite a large one and will not easily contain *obliquata*, which seems to be a more northerly development from that stock. I therefore propose it as type of *Benhamina* nov., naming this genus in tribute to one of New Zealand's best-known zoologists, William Blaxland Benham. Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 3, p. 171, 1920) has recorded the spawning of this form and given a good figure (in text) of a clean specimen.

Gadinia nivea Hutton, 1878. [P. 603]

Discussing the discovery of a "*Gadinia*" at the Kermadecs, Iredale concluded (*Proc. Mal. Soc.*, vol. 9, p. 71, 1910) that only one species occurred at the Kermadecs, New Zealand, and Australia. As usual, lumping necessitates revision, and radular characters now show that the New Zealand *nivea* is abundantly distinct. Hutton has published an account of his *Gadinia nivea* and gave the formula of the radula, which he figured (*Trans. N.Z. Inst.*, vol. 15, p. 144, pl. 17, figs. S-V, 1883) as $60-1-60 \times 150$, the central tooth multi-cuspid, the inner laterals twenty-one, the outer thirty-nine, all with toothed cusps. Claude Torr has figured (*Trans. Roy. Soc. S. Austr.*, vol. 38, p. 367, pl. 20, fig. 6, 1914) the radula of the South Australian form as $30-1-30 \times 100$, the central tooth with one large cusp, the inner laterals obscurely bicuspid, the outers unicuspid. The New South Wales form is being re-investigated when fresh material is procured, for Iredale found that the specimens in the British Museum showed a formula of about $40-1-40 \times 120+$. These figures are sufficient to show that different species are being confused, and that the specific name *nivea* Hutton should be reinstated for the Neozelanic form.

Genus Amphipeplea Nilsson, 1822. [P. 607]

Kennard and Woodward have recently noted (*Proc. Mal. Soc.*, vol. 16, pt. 3, p. 125, 1924) that the date of publication ascribed to Nilsson's *Historia Molluscorum* is incorrect and should be 1823, and that therefore *Myxas* (Leach) J. Sowerby, June, 1822 (monotype: *Helix glutinosa* Mont.) has priority over *Amphipeplea* Nilsson, and claims usage. This name must not be confounded with *Myxa* Hedley (*Mem. Austr. Mus.*, No. 4, p. 362, 1903), proposed for a Pyramidellid mollusc; the names are sufficiently distinct not to clash.

Genus Ptychodon Ancey, 1888. [P. 689]

The sole addition to the land molluscan fauna since Suter's death is *Ptychodon suteri* Murdoch and Finlay described from a subfossil deposit in the South Island (*Trans. N.Z. Inst.*, vol. 54, p. 133, 1923). It is to be hoped that some worker will soon come forward to fill the gap left in this branch by the loss of Suter and Murdoch; there is much work—descriptive, classificatory, ecological, and distributional—to be done.

Genus Dentalium Linné, 1758. [P. 817]

Two fossil and one Recent species have lately been added to the New Zealand list. The Recent form is *D. marwicki* Mestayer (*Trans. N.Z. Inst.*, vol. 56, p. 587, 1926), a form previously confused with *nanum* Hutton. The fossils are the Tertiary *D. otamaringaensis* Marwick (*l.c.*, p. 326), and the Upper Cretaceous *D. (Laevidentalium) morgani* Wilckens (*N.Z.G.S. Pal. Bull.* No. 9, p. 24, 1922), which its author states is unexpectedly plentiful for a Cretaceous *Dentalium*; later (*Trans. N.Z. Inst.*, vol. 55, p. 543, 1924) he regards the occurrence of a fragment so identified as sufficient evidence of the Upper Senonian age of the Green Island greensands! Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 319, 1924) has noted that the occurrence of the New Zealand Tertiary *D. mantelli* Zitt. in

Australian Tertiary beds is by no means beyond doubt, and that the Australian workers have confused several species. For a nomenclatural note on the Jurassic *D. huttoni* Bather (non Kirk) (*Geol. Mag.*, dec. 5, vol. 2, p. 532, 1905) see elsewhere in this volume.

***Cadulus teliger* n. sp.** (Figs. 52, 54).

Shell small, vitreous, lightly curved, smooth except for numerous growth-rings. First half of shell fairly quickly increasing in diameter, second half of practically uniform width till near anterior end, where there is a slight constriction near mouth, much better marked on inner side. Curve of shell almost uniform on outer side, but distinctly irregular on inner, curve of first third being regular, thence diminishing till for last half inner side is practically straight, giving an asymmetrically swollen appearance to shell. Aperture with a thin, sharp edge, outline almost circular, but a little compressed on outer side. Posterior opening of somewhat same outline, but edges not so thin, furnished on convex side of shell with a medial sharp projecting tela, in the shape of an isosceles triangle with the equal sides slightly convex and the apex narrowly rounded off.

Length, 4.7 mm.; diameter, 0.7 mm.

Locality.—Off Auckland Island in 95 fathoms.

This is the form Suter has admitted as *C. spretus* Tate & May—from which it differs in almost every particular.

***Nucula strangei* A. Adams, 1856.** [P. 833]

We must revert to this name for the New Zealand shell, for, though Iredale recorded Hedley's determination as against it (1915, p. 483), study of the types shows that no change is necessary, the other supposed synonyms being referable to the Australian species, which can be easily separated from the Neozelanic form.

Hedley has added his genus *Pronucula* by describing a new Macquarie Island species, *P. mesembrina* (1916, p. 17), and as Oliver has recorded the genus from the Kermadecs, also by a new species, *P. kermadecensis* (1915, p. 550), it is fairly certain that it occurs throughout the mainland. I know, at all events, of at least one new species occurring in 60 fathoms off Otago Heads.

Add *Nucula grangei* and *ruatakiensis* Marwick (*Trans. N.Z. Inst.*, vol., 56, p. 327, 1926) to the Tertiary fauna.

Family Nuculanidae. [P. 834]

For a peculiarly rostrate little form with curious radial sculpture, Marwick has introduced a new genus *Zealeda*, monotype: *Z. hamata* Marwick (*Proc. Mal. Soc.*, vol. 16, pt. 1, p. 25, 1924), from the Pliocene Awatere Beds. He has since (*Trans. N.Z. Inst.*, vol. 56, p. 328, 1926) described a second species as *Z. mutabilis*, noting that Dall considers *Zealeda* a synonym of his *Spinula*, but rightly pointing out the numerous differences that deny it close relationship. Several new congeneric species (including a Recent form) are known to me.

Two more fossil species of *Nuculana* (*ellisi* and *onairoensis*) have been described by Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 328, 1926), while Allan (*l.c.*, p. 344) has noted that I would here place *Sarepta solenelloides* Marshall, 1919 (*Trans. N.Z. Inst.*, vol. 51, p. 233) and

has described *N. belluloides* nov. from the McCulloughs Bridge greensands. From comparison of type material in my collection, I can affirm that this is a synonym of *Leda semiteres* Hutton, 1877 (*Trans. N.Z. Inst.*, vol. 9, p. 598), the types of both are ancestral *bellula* forms, and from the same locality.

Woods (1917, p. 17) has described an Upper Cretaceous species as *N. amuriensis* and notes the occurrence of a second species, figured but left unnamed.

Solenelloides seems referable to the subgenus *Pseudoportlandia*, recently created by Woodring (1925, p. 20) for *Leda clara* Guppy, a Miocene species from Jamaica; it closely resembles the genotype, and, if really belonging here, is only the third known species of this distinct group. The section *Jupiteria* Bellardi is known to me by undescribed Tertiary species in New Zealand, while *onairoensis* Marwick and *amuriensis* Woods should probably be referred here. The remaining species, *fastidiosa* A. Ad., *bellula* A. Ad., *ellisi* Marwick, and *semiteres* Hutton, may be placed in *Saccella* Woodring (*l.c.*, p. 15), proposed to replace *Ledina* Sacco, not of Dall, the genotype being the Mediterranean *Arca fragilis* Chemnitz.

Genus **Malletia** Desmoulins, 1832. [P. 836]

Marwick has noted (*Trans. N.Z. Inst.*, vol. 56, p. 329, 1926) that *Neilo* A. Ad., 1854, which Suter treats as a subgenus [P. 837] is so distinct from *Malletia* that it should be regarded as a full genus, and under this name four species have been added last year to the Tertiary fauna, *sinangula* and *awamoana* Finlay (*Trans. N.Z. Inst.*, vol. 56, pp. 255, 256, 1926) and *sublaevis* and *waitaraensis* Marwick (*l.c.* p. 329). Marwick, however, retains *Malletia*, in the form of the subgenus *Minormalletia* Dall, for a fifth species, *tenera* Marwick (*l.c.*, p. 328), but the specimens are not well enough preserved to allow of satisfactory generic location. Dall (*Bull. Mus. Comp. Zool.*, vol. 43, No. 6, p. 385, 1908) introduced *Minormalletia* (type *M. arciformis* Dall) with two species, defining it as "Shell small, blunt, plump, with amphidectic ligament, no resilium, the pallial sinus large, no radial depressions or sculpture." Marwick's shell is very flat, and the character of the pallial sinus, noted by Dall as not of the usual Malletinid type, was not determined, so that a new location (probably a new genus) will be required when better specimens are available.

To the species mentioned above must also be added the Palaeocene *M. elongata* Marshall (*Trans. N.Z. Inst.*, vol. 49, p. 458, 1917) (see nomenclatural note elsewhere this volume) and the upper Cretaceous *M. (Neilo) cymbula* Woods (1917, p. 18); both these are referable to *Neilo*, which thus has an extended lineage.

Poroleda lanceolata (Hutton, 1885). [P. 839]

The Recent Neozelanic form has been named *Poroleda pertubata* by Iredale, the correct reference to the generic name being given at the same time (1924, p. 185). I figure a Dusky Sound specimen (fig. 69) in my collection; *pertubata* differs from the mid-Pliocene *lanceolata* chiefly in greater elongation, the length being more instead of less than three times the height.

Genus *Sarepta* A. Adams, 1860.

This name has been used by Australian writers to cover the Tertiary *Leda obolella* Tate (*Trans. Roy. Soc. S.A.*, vol. 8, p. 129, 1886) and its Recent descendant *Sarepta* (?) *tellinaeformis* Hedley (*Rec. Austr. Mus.*, vol. 4, p. 26, 1901). The fossil species has been reported from New Zealand by Suter (*Alph. List N.Z. Tert. Moll.* p. 24, 1918), while Marshall has described three further Tertiary species. Of these, his *S. solenelloides* has just been dealt with under *Nuculana*, and his *S. tenuis* (*Trans N.Z. Inst.*, vol. 51, p. 233, 1919) seems to be identical with the species he describes immediately after it, *Limopsis hampdenensis*, a much better generic location; but his *S. aucklandica* (*l.c.*, vol. 50, p. 271, 1918) seems to be congeneric with Hedley's *tellinaeformis*, for which Iredale has now provided the genus *Ovaleda* (*Rec. Austr. Mus.*, vol. 14, no. 4, p. 250, 1925).

Anomia furcata Suter, 1907. [P. 842]

This species is under an extraordinary cloud. Oliver states that it is a *Monia*, that there are only two muscle-scars in the left valve, though Suter repeatedly referred to and figured three, and that Suter's statement that these muscle-scars could be seen in only one specimen is incorrect (*Proc. Mal. Soc.*, vol. 15, pt. 4, p. 180, 1923).

Suter states: "Colour whitish-yellow. Interior of same colour, and somewhat pearly, with a sharp and smooth margin." This is not characteristic of *Monia*, which is greenish-white outside and darker green internally. The muscle-scars of *Monia* are two, one nearly circular and striated, the other circular, smaller, and nearly touching or confluent; never is the (generally well-marked) muscle-scar "long, tongue-shaped."

Examination of the type and numerous specimens dredged off Otago Heads and elsewhere indicates that Oliver was correct in his description of the type shell, and that Suter's drawings are erroneous; the specimen in which Suter saw three muscle-scars may have been a young *Anomia*, or the effect may have been imaginary. As a species, I find *furcata* difficult to separate satisfactorily from *zelandica*, especially where juvenile shells are concerned; the muscle-scars in both are quite variable, the upper larger, suboval (sometimes in compressed shells rather elongate, but never to the extent Suter has figured), radially striate, and confluent with or separated from the lower. The interior is always dark-greenish centrally in fresh shells, and Suter's description of the colour of *furcata* is probably due to his handling water-worn shells. I can only note that *zelandica* seems to grow to a larger size than *furcata* (of which I have specimens over 40 mm. in length, i.e. nearly three times the size of Suter's), and has coarser radial sculpture and a larger byssal opening in the right valve. *Zelandica* has been accepted as the type of *Monia* by Winckworth (*Proc. Mal. Soc.*, vol. 15, pt. 1, p. 33, 1922).

Anomia undata Hutton, 1885* [P. 843]

This species has caused more trouble even than the last. The latest pronouncement on it is by Marwick (*Trans. N.Z. Inst.*, vol. 55,

*See nomenclatural note elsewhere in this volume.

p. 191, 1924) who has figured the type and an adult Pliocene example, comparing it with *trigonopsis*. I have grave doubts whether *walteri* can be retained as distinct from the latter species, the characters noted by Oliver (*Proc. Mal. Soc.*, vol. 15, pt. 4, p. 180, 1923) being inconstant, while the same variation is noticeable in "Miocene" specimens. But *undata* is quite distinct; Marwick notes the different formation of the muscle-scars, the lower being relatively huge. No localized Recent records have been made; I therefore mention that I have several specimens from Auckland Harbour.

Family Arcidae. [P. 846]

Oliver (*Proc. Mal. Soc.*, vol. 15, p. 182, 1923) has added the Australian *Arca trapezia* Desh. to the Neozelanic fauna from two water-worn valves from Spirits Bay, and a well-preserved valve from Muruwai; he states that "all these specimens are large, heavy shells, but I am unable to separate them as a species from Australian specimens of *A. trapezia*." This is an interesting record, but seems to call for further investigation before this Peronian species can be definitely accepted as a natural constituent of the New Zealand fauna. Marwick has stated (*Gedenboek Verbeek*, p. 370, 1925) "*Anadarcā* and *Scapharca*... In New Zealand these two subgenera are absent;" it may be noted that Woodring (*Carnegie Inst. Wash.*, Publication No. 366, p. 40, 1925) has supplied the new name *Diluvarca* (type: *Arca diluvii* Lk.) for "*Anadarcā* of authors, not of Gray, 1847," with which he unites "*Scapharca* of authors, not of Gray, 1847," and this is the group-name to be used for *Arca trapezia* above. Another group has been introduced into the Tertiary lists by the description of *Fossularca januaria* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 310, 1926). Woods (1917) has described "*Arca*" *hectori* and *Arca* (*Barbatia*) sp. from Upper Cretaceous beds, while his "*Nemodon* sp." (l.c., p. 19) has been referred by Wilckens (1920) to the Antarctic and South Indian Cretaceous genus *Nordenskjöldia* Wilck. (*Schweid. Südpol. Exped.*, Bd. 3, lief. 12, p. 26, 1910; type: *N. nordenskjöldi* Wilckens), and named *N. woodsi* Wilckens.

Brookes (*Trans. N.Z. Inst.*, vol. 56, p. 590, 1926) has added another Recent species by describing *Arca sociella* from the Bay of Islands. Contrary to his statement, the ligament is confined to a very oblique patch behind the beaks; and this, together with the characteristic reticulate sculpture, renders the species referable to *Acar* Gray (type: *Arca gradata* Brod. & Sow.; designated by Woodring, *Carnegie Inst. Wash.*, Pub. No. 366, p. 37, 1925). *Acar* is known to me from the Tertiary also, by new species from the mainland and Chatham Islands.

True *Arca* is represented in New Zealand only by the Tertiary *A. subvelata* Suter (*N.Z.G.S. Pal. Bull.* No. 5, p. 65, 1917) and an allied form which will be described by Marwick from the Chatham Islands.

Genus *Bathyarca* Kobelt, 1891. [P. 850]

Iredale (1924, p. 186) has written that *Bathyarca* "appears to be the southern degenerate deepwater relation of the tropical *Cucullaea*,

agreeing in most essential features." The sole New Zealand species is very common in Recent dredgings but is not known fossil.

As regards the Tertiary species of *Cucullaea*, it may be noted that *C. worthingtoni* Hutton (*Cat. Tert. Moll.*, p. 27, 1873) is identical with and has priority over *C. attenuata* Hutton (*l.c.*, p. 28), a more common name in Tertiary lists. Woods has added a Cretaceous species, *C. zealandica* (1917, p. 20), and Allan (*Trans. N.Z. Inst.*, vol. 56, p. 345, 1926) has described an early Tertiary species as *C. waihaoensis*.

Genus **Glycimeris** Da Costa, 1778. [P. 850]

Marwick has written a revision entitled "The Genus *Glycimeris* in the Tertiary of New Zealand," describing many new species. Elsewhere he has rejected *striatularis* Lk. as not Neozelanic (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 329, 1924). To Marwick's list of species has to be added the Palaeocene *G. concava* Marshall (*Trans. N.Z. Inst.*, vol. 49, p. 459, 1917) and the Upper Cretaceous *G. selwynensis* Woods, (1917, p. 20).

Genus **Limopsis** Sasso, 1827. [P. 853]

Add to the Tertiary species *L. hampdenensis* Marshall (*Trans. N.Z. Inst.*, vol. 51, p. 233, 1919) (which should probably be *L. tenuis*; see note on *Sarepta*, *antea*), *campa*, and *waihaoensis* Allan (*l.c.*, vol. 56, pp. 345, 346, 1926). *L. producta* Finlay and McDowall (*l.c.*, vol. 54, p. 112, 1923) I now regard as a distorted specimen of *zealandica* Hutton. Marwick has advocated the use of Hutton's name (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 329, 1924) instead of *aurita* (Brocchi), and of *zitteli* Iher. instead of *insolita* (Sow.), these extra-limital species names being rejected.

Family **Philobryidae**. [P. 856]

I have to thank Mr. Tom. Iredale for the following notes:—"Bernard's results and conclusions were never reviewed by that brilliant worker, his early death proving a calamity to malacological science, especially as regards Pelecypods. In every case, fuller knowledge has caused emendations, and in the case of these small bivalves there can be little doubt, judging from his published works, that Bernard would have seriously revised his first accounts.

Thus, *Hochstetteria* was first published by Velain in the *Comptes Rendus Acad. Sci. (Paris)*, vol. 83, p. 285, July 1876, in connection with three species, *H. crenella*, *aviculoides*, and *modiolina*, all from the Ile Saint Paul, and all *nomina nuda*, so that the name has no validity at this date. In the *Archiv. Zool. Experiment Generale*, vol. 6, "1877" (probably not published until 1878) the genus *Hochstetteria* was fully diagnosed, animal as well as shell characters being noted (p. 129) with the same three species, all figured: *H. aviculoides* p. 130, pl. 5, figs. 3, 4; "Very abundant on the littoral": *H. modiolina* p. 131, pl. 5, figs. 7, 8; "Dredged 35 M.": *H. crenella* p. 131, pl. 5, figs. 5, 6; "Dredged 35 M."; the observation being made that "*H. aviculoides* est la seule des trois espèces qui avait été recueillie avec l'animal." Consequently this species must be regarded as the type of the genus, and in his first essay Bernard used *Hochstetteria* in this sense,

describing *H. costata* and *H. meleagrina* from New Zealand. The latter seems to be very nearly allied to *H. aviculoides* in every detail, even to the station. Bernard afterward regarded the genus *Philobrya* of Carpenter as equivalent to this, so transferred the genus name *Hochstetteria* to species like *H. crenella* and thereafter described *H. trapezina* from New Zealand. This action, quite incorrect in every way, has been accepted and the name *Hochstetteria* used thus by Suter.

Hedley took up the study of these interesting bivalves, and noting the differences between the smooth capped and uncapped "Philobryas," used *Philippiella* for the latter. Recently, in his Antarctic Mawson Report (1916, p. 20), he dealt with the Subantarctic forms again, and restricted *Philippiella* to Antarctic forms, proposing *Notomytilus* for the Australian species previously so called." (*in litt.*) In the genus *Philippiella* he included *P. meleagrina*, adding a new species from Macquarie Island, *P. hamiltoni*. To this species the Rossian *P. modiolus* Suter (the figure of which in the "Atlas" is quite inadequate: I present new figures, taken from topotypes; figs. 86-89) is very closely allied. The essential point so far, then, is that *Hochstetteria* Velain = *Philippiella* Pfeffer, and Hedley, 1916, not Hedley, 1904, and is not *Hochstetteria* Bernard, 1897, and Suter.

The costate group, such as *costata* Bernard (which has been compared with the Australian *parallellogramma* Hedley; *Proc. Linn. Soc. N.S.W.*, vol. 30, p. 545, 1906), is a very distinct one in sculpture, form, prodissoconch formation, and hinge teeth. It appears to be nameless, so is here distinguished as *Cosa* nov., the type designated being *Hochstetteria costata* Bernard. As to the species *Hochstetteria trapezina* Bernard, it does not seem to belong even to this family; there seems to be confusion in regard to it, for all specimens so named by Suter are referable to *Lissarca*, and it may be that Bernard's shell does really belong there, but this cannot be settled till the type is re-examined.

Family Mytilidae. [P. 861]

"*Confusus*" has been recently revived for a small Neozelanic mussel, but it is more appropriate to the state of our knowledge of this family at present. The changes may be tabulated thus:—

Suter (Manual)	Iredale (Commentary)	Oliver. (Ecological Essay)
Genus <i>Mytilus</i>		
Subgen. <i>Eumytilus</i>	Subgen. <i>Mytilus</i>	
<i>M. edulis</i> L.		<i>M. planulatus</i> Lamk.
Subgen. <i>Chloromya</i>	Subgen. <i>Perna</i>	
<i>M. canaliculus</i>		
Subgen. <i>Aulacomya</i>		
<i>M. magellanicus</i>	<i>M. maorianus</i> nov.	<i>Brachyodontes maorianus</i>
Genus <i>Modiolus</i>		
<i>M. ater</i>	<i>M. neozelanicus</i> nov.	<i>M. pulex</i> Lamk.
<i>M. australis</i>	<i>M. areolatus</i> Gould	<i>M. confusus</i> Angas.
<i>M. fluviatilis</i>		

Oliver's emendations were introduced in the Ecological Paper already referred to (1923 A), and some of them more fully explained later in the *Proc. Mal. Soc.*, vol. 15, p. 181, 1923.

***Mytilus edulis* Linné, 1758. [P. 862]**

For the Neozelanic species so misnamed, Oliver has introduced a West Australian name, *M. planulatus* Lamk., but this may need reconsideration when long series are brought together and accurately compared. Odhner (1924, p. 60) has also noted differential characters in the muscle-scars between *edulis* L. and New Zealand shells.

***Mytilus magellanicus* Lamarek, 1819. [P. 865]**

For the Neozelanic species Iredale proposed *Mytilus maorianus*, but Oliver has used *Brachyodontes maorianus* without explanation. There does not, in any case, appear to be a valid one, as *Brachidontes* was diagnosed by Swainson thus, "Umbones prominent, not terminal; valves corrugated; hinge margin considerably angulated: teeth many small, crenate." Only species, "*sulcata*, *En. Meth.* 220, fig. 2." The latest workers on the Mytiloids have placed this and the *maorianus* series in different subgeneric groups, widely separated, *Aulacomya* being the group name for the latter. The "Miocene" *Mytilus huttoni* Cossmann (*vide* Suter, *N.Z.G.S. Pal. Bull.* No. 5, p. 84, 1917), and its (Oligocene?) ancestor *M. torquatus* Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 271, 1918) do, however, belong to the Australian "*Brachyodontes*" series, being quite like *hirsutus* and *rostratus*; for these shells Iredale has recently advocated the use of *Trichomya* Ihering (1924, p. 196).

***Modiolus ater* (Zeilebor, 1866). [P. 866]**

This preoccupied name was emended to *neozelanicus* by Iredale, but Oliver has preferred an Australian name, *M. pulex* Lamk., for the Neozelanic shore shell. An interesting complication appears in the fact that though some Auckland specimens are found fairly agreeing with some Tasmanian ones, the common South Island shells disagree notably. Is it wise to accept, under such circumstances, a Tasmanian name for the Auckland form, and then name the southern New Zealand shell as distinct? Such a procedure has nothing to recommend it, so it seems preferable to use the Neozelanic name for the whole of the New Zealand shells, and leave the Australian name for Australian specimens—at all events till the animals are anatomically critically compared. It may be noted that as a synonym of the Neozelanic "*ater*," Suter included *Perna confusa* Angas, which Oliver is now putting forward as the correct name for a different New Zealand species.

***Modiolus fluviatilis* (Hutton, 1878). [P. 867]**

Oliver has proposed to replace this with *M. confusus*, based on *Perna confusa* Angas, described from the Parramatta River, Sydney, New South Wales. In this case one has little hesitation in rejecting the Australian name, as Suter noted in his "Key to the Species" "Beaks a short distance from the anterior end," a feature well marked in all the forms of the Neozelanic species, but missing in

most of the Australian forms. It should be noted that these molluscs are variable according to their environment, and in some places colonies of constant forms may be collected, differing from their nearest neighbours more than from many distant colonies; a similar fortuitous likeness between a few specimens of two regional forms is insufficient evidence for uniting species described from localities nearly two thousand miles apart.

***Modiolaria barbata* (Reeve, 1858). [P. 868]**

For this shell Iredale has provided the generic name *Trichomusculus* (1924, p. 196); series of Australian and New Zealand forms should be compared, but I have so far failed to pick specific differences.

***Lithophaga truncata* (Gray, 1843) [P. 870]**

This shell is a *Lithophaga* only in the widest sense. In its anomalous shape, absence of radial sculpture except for a few scratches under the beaks, and bark-like epidermal layer, crassly thickened and produced posteriorly, it differs considerably from true *Lithophaga*. I provide for it alone the new generic name *Zelithophaga*; the "Miocene" *L. nelsoniana* Suter may possibly be congeneric, but I would not include *L. striata* Hutton, the figure of which is more like an *Amygdalum*; neither species has been seen.

***Pecten medius* Lamarck, 1819. [P. 874]**

An investigation made by Iredale (1924, p. 193) into the forms grouped under *Pecten medius* showed much of interest. The Lamarckian name was invalid, and a substitute had to be found. Study of the material in the British Museum showed certainly that recognizable forms, species, or subspecies, existed. Criticism of long series in Australia proved that the forms were well defined, so that Tate's early conclusions were fully confirmed. The Neozelanic species agrees neither with the Sydney form, *P. fumatus* Reeve, nor with the Tasmanian species, *P. meridionalis* Tate. Reeve's name of *Pecten novaezelandiae* (*Conch. Icon.*, vol. 8; Pl. 8, f. 36, 1852) is available and must be used; I have not noted any subspecific variation in New Zealand, but the Pliocene (Castlecliffian) ancestral form is notably different from the Recent shells. For *novaezelandiae* Reeve I propose the new group name *Notovola* to contain, the austral "*medius*" assemblage, as it cannot be satisfactorily referred to either *Pecten* s. str. or *Euvola* Dall. It seems rather nearer the former, though possessing characters of both groups, and as the austral forms occupy a homogeneous geographical region widely removed from the areas covered by *Pecten* (North Europe) and *Euvola* (West Indies and America), it seems best to mark the differences by a separate group name. Woodring (Miocene Molluscs from Bowden, *Carnegie Inst. Wash. Pub. No. 366*, p. 63, 1925) has lately stated that *Euvola* (Type: *Ostrea ziczac* L.) "differs from *Pecten* s.s. in having a more inflated right valve, weaker radial sculpture, and only one pair of cardinal crura." *Notovola* has the inflated right valve, but strong (though simple) radial sculpture, and especially is different, and more like *Pecten*, in having 3-4 pairs of cardinal crura. These are, however,

not quite so strong as in *Pecten*, the inner ones shorter and the outer ones considerably longer, due to the greater length of the whole hinge-line and auricles; the left valve is not at all inflated and has not the strong secondary radial ridges on the main ribs (*meridionalis* has very weak ridges, the other species are practically smooth); the right valve also has none of the strong secondary ridges characteristic of *Pecten maxima* L., the type of *Pecten*, the ribs are higher and flatter, and the interstices deeper, smooth, and narrower. The shells from the Kermadecs recorded by Oliver (*Trans. N.Z. Inst.*, vol. 47, p. 553, 1915) as *Pecten medius* Lamk. will almost certainly show, when re-examined, regional differences from *novaezelandiae* Reeve, which is probably endemic to New Zealand. Marwick has noted (*Gedenboek Verbeek*, p. 375, 1925) that this type of *Pecten* has appeared in New Zealand only since the Upper Pliocene, and has suggested that ocean currents may be responsible for this.

Genus *Chlamys* Bolten, 1798. [P. 875]

Three more Recent species have to be added to the Neozelanic list; *C. subantarctica* Hedley (1916, p. 23) (a very large species described from Macquarie Island and compared to the Australian *C. anti-australis* Tate); *C. campbellica* Odhner (1924, p. 61) (from Campbell Island, compared with the West Patagonian *C. patagonicus* King and the New Zealand Pliocene *Pecten triphooki* Zittel, which, however, is not a typical *Chlamys*); and *C. consociata* Smith (1915, p. 89) (from 70–100 f. north of New Zealand, compared with *zelandiae*, and apparently overlooked since its description).

For the specific name of one of the species Suter has wrongly written "*imparvicostatus*," the correct name for Bavay's shell is *Chlamys imparicostatus*.

A large number of new Tertiary species and notes on described species have been added lately, but as the generic grouping is in a chaotic state, and Dr. Marwick is outlining a more satisfactory arrangement in his Report on the Chatham fossils, mention of these would be superfluous and of little use here. Nomenclatural notes on several New Zealand Tertiary species will be found elsewhere in this volume.

Genus *Cyclopecten* Verrill, 1897. [P. 880]

True *Cyclopecten* has not yet been recorded from New Zealand, though an undescribed species like the Australian *favus* and *obliquus* is known to me from deep water in the North. The name "*Pecten aviculoides* Smith," included by Suter, may be easily dismissed; the type is from a locality a third of the globe distant, and Suter's identification is probably based on a juvenile *Chlamys convexus*.

Pecten transenna Suter has a peculiar facies quite different from that of true *Cyclopecten*; it is rhomboidal, the ears are not marked on the right valve and only slightly on the left, and both valves have the same sculpture of strong, rather distant nodulous ribs, while the texture of the shell differs from that of *Cyclopecten*, being similar to that of a young *Chlamys*. I supply for it the new generic name *Cyclochlams*, and mention as a second member a shell described and well figured by Miss Mestayer (*Trans. N.Z. Inst.*, vol. 51, p. 135,

1919), but misidentified by her as Suter's species; it differs from *transenna* in its much larger size, and in having about twice as many ribs. I propose for it the name *Cyclochlamys secundus* n. sp. Suter's drawing of *transenna* gives the appearance of his species quite well, and his specimens were adult, numerous topotypes I have examined not reaching any larger size.

Genus *Spondylus* Linné, 1758.

This does not occur in the Recent fauna, but Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 271, 1918) has described a Tertiary member, *S. aucklandicus*; other species are known to me, and Woods (1917) has reported a *Spondylus* sp. from Upper Cretaceous beds.

Lima lima (Linné, 1758). [P. 883]

Sowerby described a *Lima zealandica*; (*Proc. Zool. Soc.* for 1876, p. 754); this has wrongly been lumped in with *Lima squamosa* = *L. lima* (L.), but it is a very distinct species, quite unlike any of the other species confused under the name *L. lima*. Suter seems to have described the Neozelanic species, but his remarks, "This species has a wide range of distribution, etc." must be omitted altogether.

Suter includes [P. 884] "Subsp. *multicostata*" from the "Bay of Islands" without authority, and this must also be omitted, with all the extract referring thereto. The so-called "*multicostata*" is a common variable Sydney shell, which is certainly a very distinct species from the egregious *L. lima*, and has been renamed *Lima nimbifer* by Iredale (1924, p. 195).

In the Dominion Museum is a specimen from Foveaux Strait named *Lima multicostata*, and this proves to be identical with *L. mestayerae* Marwick (*Trans. N.Z. Inst.*, vol. 55, p. 192, 1924), originally described as a Pliocene fossil from the clays below the limestone at Petane; all Recent specimens of "*multicostata*" from New Zealand are probably this species. A closely-allied ancestral form is *L. watersi* Marwick (*l.c.*, vol. 56, p. 329, 1926). Woods (1917) has described a Cretaceous species as *L. marlburiensis*.

Lima angulata Sowerby, 1843. [P. 885]

Mantellum, H. & A. Ad., 1858 should be used generically for this kind of *Lima*.

The specific name given by Sowerby proves to have been anticipated by Munster (*Beitr. Petref. Kunde*, vol. 4, p. 73, 1841), and the next name, if the species be widely dispersed, is *basilunica* Ad. & Reeve, 1850 (*Voy. "Samarang"*, pt. 7, p. 75), as cited by Suter. But Powell (*Rec. Cant. Mus.*, vol. 3, pt. 1, p. 48, 1926) has recently preferred the name *Lima murrayi* Smith (*Proc. Zool. Soc.* for 1891, p. 444) for shells from 100 f. off Lyttelton. This name (of which *Limea acclinis* Hedley—misspelt *Lima acclinis* by Powell—is a synonym) was given to Australian shells from much deeper water, but seems preferable to any other at present. The species is not uncommon in 60 f. off Otago Heads, where it reaches a length of 14 mm.; most specimens are relatively longer than Powell's figure. The Tertiary forms identified as *L. angulata* by Suter represent, as Powell has noted, a different branch of *Mantellum*, which is appar-

ently unrepresented in our Recent fauna; he has described the Castle-cliffian form as *Lima marwicki* (l.c.), while a direct ancestor to this has been described by Marwick as *Mantellum inconspicuum* (*Trans. N.Z. Inst.*, vol. 56, p. 311, 1926), and a related Tertiary Australian species by Tate (*Trans. Roy. Soc. S.A.*, vol. 8, p. 119, 1886) as *Lima polynema*. Suter and others wrongly give the type of *Mantellum* as *Ostrea hians* Gm.; it should be *O. inflata* Gm., as pointed out by Woodring (1925, p. 80).

***Lima bullata*. (Born, 1780). [P. 886]**

The specific name was given to a West Indian shell, and Hedley has preferred *strangei* Sowerby for the Australian species. Curiously enough, Thiele, when monographing the group, admitted *bullata* as an Australian shell, ranking *strangei* as a synonym, and then for a young individual introduced a new species *jacksonensis*. *Limatula* S. V. Wood, 1839 should be applied generically to this group, and the New Zealand shell must receive a distinct name for it differs at sight from the Australian *strangei*.

***Limatula maoria* n. sp. (Figs. 104-106).**

Shell close to *L. strangei* Sow., but differing in outline, being less slender, more oblique, and more evenly rounded basally. Sides not nicked in so much below auricles, so that these are less prominent; dorsal margin straighter. Radial ribs lower and blunter, closer and more numerous, 25 as against 19 in Australian shells. Internally, a median sulcus is absent or very feeble in *strangei*, but is distinct in the new species at all stages of growth.

Height, 33 mm.; diameter, 20.5 mm.

Locality.—Castlecliff beds (Upper Pliocene), type (fig. 106); off Otago Heads in 60 fathoms, figd. paratypes (Figs. 104, 105), not uncommon throughout New Zealand in water of moderate depth.

The median sulcus has been responsible for the identification of juveniles of this species as *L. suteri* Dall by both Suter and later workers; but the latter species has about 16 ribs on each valve, the termination of sculpture on each side is less well defined, and the sulcus is external, so that the interior shows a strong medial rib with another strong one on each side; *maoria* shows a medial groove with a strong rib on each side. As ancestral to this species in New Zealand may be named *Limatula trulla* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 311, 1926) and *Lima* (*Limatula*) *huttoni* Woods (1917, p. 26), a Cretaceous form which has been renamed *L. woodsi* by Suter on account of preoccupation; see note elsewhere in this volume. An Australian form ancestral to *strangei* Sow., *L. jeffreysiana* Tate has rightly been rejected by Marwick from the New Zealand Tertiary fauna *Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 323, 1924); the differential features between *maoria* and *strangei* seem to be continued throughout the lineages.

Genus *Limea* Bronn, 1831.

I have added this to the Tertiary fauna by recording the Australian *L. transenna* Tate from Ardgowan (*Trans. N.Z. Inst.*, vol. 55, p. 509, 1924); I have had no further opportunity since then of

deciding whether my record was correct, but comparison with actual Australian specimens would probably show the New Zealand shell to be new. The form seems somewhat like the Recent *Limea acclimis* Hedley (*Rec. Austr. Mus.*, vol. 6, p. 46, 1905) later placed as a synonym of *Lima murrayi* Smith, in this form referred to *Limea* by Hedley (*Check-List Mar. Fauna N.S.W.*, p. M 10, 1918), but transferred to *Mantellum* by Iredale (1924, p. 194). Perhaps the fossil species is a *Notolimea* (Iredale, 1924, p. 194; proposed for *Lima australis* Smith), but I have seen no specimens of this genus.

Genus **Ostrea** Linné, 1758. [P. 887]

I am supplying some notes on this in a Report on the Chatham Island Recent shells, so merely record here that Oliver (*Proc. Mal. Soc.*, vol. 15, p. 182, 1923) has discussed the species *angasi*, *tatei*, *corrugata*, and *reniformis*; Hedley (*N.Z. Journ. Sci. & Tech.*, vol. 2, No. 6, p. 365, 1919) has given his impressions of the rock-oyster fishery of Auckland, identifying the species concerned (which Suter has called *glomerata* Gould) as *O. cucullata* Born; Iredale (1924, p. 192) has rejected this last name as exotic, and reverted to the use of *glomerata* Gould for the sheltered shore and mangrove form, *mordax* Gould applying to the ocean reef species, and has noted that the New Zealand shell called *angasi* appears to be a distinct species; and Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 324, 1924) has removed two Australian Tertiary species *arenicola* and *manubriata* Tate from New Zealand faunal lists. Woods (1917, p. 25) has identified a Cretaceous species as *Ostrea* sp. cf. *dichotoma* Bayle.

Pinna zelandica Gray, 1835. [P. 893]

Hedley (*Rec. Austr. Mus.*, vol. 14, p. 142, 1924) has written, "Suter has unfortunately transferred *Pinna zelandica* Gray to *Atrina*, whereas it really is, as Gray said, a *Pinna*. On the other hand, *P. senticosa* Gould is probably an *Atrina*." Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 518, 1924) and Bucknill (1924, p. 95) have recorded that the species reaches a larger size than given by Suter. Murdoch (*Trans. N.Z. Inst.*, vol. 55, p. 157, 158, 1924) has dealt with and figured the two Tertiary species (*P. distans* Hutton and *P. lata* Hutton) so far described from New Zealand. Woods (1917, p. 28) has recorded, but not named, a species from the Upper Cretaceous, which Wilckens (1920) states is also found in South Patagonia and Antarctica.

Hedley's statement needs investigation. There seems at present to be no evidence of the occurrence of a true *Pinna* in New Zealand; only one member of the Family seems to be known to collectors, and that is the common *Atrina* which has always been regarded as *A. zelandica*. The two fossil species are both *Atrinas*.

Modiolarca trapezina (Lamarek, 1836). [P. 896]

The original spelling was *trapesina*, but that does not concern us much since Hedley (1916, p. 25) has described the Macquarie Island shell as *Gaimardia trapezina* var. *coccinea*, and the examination of many specimens from the Falkland Islands convinces one that the

Neozelanic shell is easily recognizable as a distinct species, *Gaimardia coccinea* Hedley.

***Modiolarca tasmanica* Beddome, 1881. [P. 896]**

The Bounty Island shell so determined by Suter differs from the typical Australian shell, which Odhner (1924, p. 66) has determined as a *Neogaimardia*, while the New Zealand forms so called are true *Gaimardia*. Two closely allied species occur, one from Auckland Island, the other from the mainland, both described below.

***Gaimardia forsteriana* n. sp.**

Shell very similar to *G. tasmanica*, but considerably smaller (none of a large number of specimens examined reaches 5 mm. in length), rostrum narrower and placed lower down, the base much less sinuous, only slightly bulging downwards past the rostrum; no signs of posterior sulcations.

Length, 4 mm.; height, 3 mm.; width (2 valves), 2.2 mm.

Locality,—Taieri Beach, South Island, in seaweed at half tide.

***Gaimardia aucklandica* n. sp. (Figs. 122-124).**

Shell closely related to the previous species, but much less inflated, with a still less developed rostrum. Anterior dorsal margin straight, hardly excavated below the beaks, this makes the rostrum almost completely triangular. Basal margin adds to this effect by being still less sinuated. Colour lighter brownish-red than in *forsteriana*, and the beaks more anterior.

Length, 4.5 mm.; height, 3.3 mm.; width (2 valves), 2 mm.

Locality,—Auckland Island, common. Also Bounty and Antipodes Islands (rather more inflated than type).

This is what Odhner has misidentified as *M. acrobeles* Suter, and this explains his puzzling reference of that species to *Gaimardia*; all his remarks on the anatomy and shell of *acrobeles* refer really to *aucklandica*, and in his work this name should be everywhere substituted for *acrobeles*.

Genus *Kidderia*

This genus has been used by Hedley to include a new species from Macquarie Island, which he named *Kidderia macquariensis*, and Gould's *Mytilus pusillus*, described from Patagonia, which he refigured from Macquarie Island (1916, p. 26; Pl. 2, figs. 23-27). Suter included *Modiolarca pusilla* Gould from "Cape Saunders (Iredale), Antipodes Island, Campbell Island, and Macquarie Island." In the British Museum are specimens of Gould's species "named from the typical shells," and these differ according to Iredale from the ones he collected on the Otago Coast. As Macgillivray (*Hist. Moll. Anim. Aberd.*, p. 206, 1843) had anticipated Gould in his usage of *Mytilus pusillus*, I propose to name the Macquarie Island specimens described and figured by Hedley, *Kidderia hamiltoni* n. sp. I would further include in the genus *Modiolarca smithi* Suter, also figured by Hedley (*loc. cit.*, p. 24; Pl. 2, figs. 17-19), and *M. acrobeles* Suter. Odhner (1924, p. 66) refers to and figures the hinge of the latter

species as a *Gaimardia**, but topotypes (two of which are here figured: figs. 102, 103) show it to be close to *hamiltoni* in shape, while allied to *macquariensis* by the occasional presence of a few weak threads across the centre of the shell. Odhner has added another closely allied species, *K. campbellica* nov. (1924, p. 67), so that there are now five species recorded from the Neozelanic region, *macquariensis* Hedley, *hamiltoni* Finlay, *campbellica* Odhner, *acrobeles* (Suter), and *smithi* (Suter)—all restricted to the Rossian province.

Costokidderia n. gen.

I propose this for the shell Odhner has described as *Kidderia costata* nov. from Auckland Island (1924, p. 68). This species shows as Odhner has remarked, affinity with *Kidderia* in its shape and hinge, but has strong radial sculpture. True *Kidderia* has only occasionally a few weak threads across the centre of the valve (e.g., *macquariensis* and *acrobeles*), in the new genus the shell has strong ridges over the whole surface except for a small smooth anterior area. The genus has probably been overlooked as the young of *Cardita* which it much resembles, but there are several Neozelanic members, of which two are described below. Shells very close to *C. costata* occur on the mainland (littoral seaweed-washings from Taieri Beach), but will probably prove separable when ample material is obtained. Odhner has noted "fourteen strong radiating costae," five in the middle and nine on the posterior end, but he had only one specimen, and this sculpture is not the normal one in Auckland Island shells; there are usually about six very strong posterior and dorsal ribs, with 4-6 almost obsolete central ribs; occasionally the ribs are subequal in strength, and often there are only the few prominent posterior ones. I refigure the species from topotypes to show this variation (figs. 99-101).

Costokidderia pedica n. sp. (Figs. 96-98).

Differs from *costata* Odhner in being less elongate, more expanded posteriorly, and more finely sculptured. Fourteen subequal ribs strongly pectinate the margins; interstices sublinear (ribs of *costata* hardly extend beyond the edges and have subequal interstices). Interior as in *costata*.

Length, 3.8 mm.; height, 2.8 mm.

Locality,—Snares Islands, in 50 fathoms.

Costokidderia pedica n. sp. (Figs. 96-98).

Allied to the last in its fairly wide shell, which, however, is far more regularly quadrilateral, all four sides being fairly straight, so that the basal margin is much more distinctly angled posteriorly than in *pedica*. Anterior end is more produced and less rostrate. Sculpture coarser, more as in *costata*, but the ribs of even strength. Twelve subequal ribs, those in centre hardly weaker, interstices a little narrower. Other details as in *costata* and *pedica*.

Length, 3.7 mm.; height, 2.7 mm.

Locality,—Lyal Bay, in shell-sand.

*Since this was written, I have received specimens from Odhner, so identified, which explain this discrepancy, for his shells are not *acrobeles* at all, but *Gaimardia aucklandica* Finlay.

Genus *Neogaimardia* Odhner, 1924.

This is constituted by Odhner (1924, p. 64) for the Australian *Kellia rostellata* Tate, which at the same time he records from New Zealand. Actual specimens sent by Odhner from Cape Maria van Diemen do not agree in shape with Tate's original figure, nor with Odhner's own illustrations—probably, drawn from Australian material. I therefore reject the record, and regard the New Zealand species as at present undescribed.

The acceptance of *Neogaimardia* solves another much disputed problem. The status of *Modiolarca minutissima* Iredale (*Trans. N.Z. Inst.*, vol. 40, p. 387, 1908) has caused an amount of debate remarkable for so tiny a shell. Oliver has lately summarized the position (*Proc. Mal. Soc.*, vol. 15, p. 183, 1923) as follows:—"Iredale described this species as a *Modiolarca*. Suter reduced it to *Lasaea miliaris*. Iredale next asserts that his species is a *Modiolarca*, and a valid species, and lists it as *Gaimardia minutissima*. If, before making this statement, Iredale had examined specimens, he could not have repeated his error. The species is correctly placed by Suter under *Lasaea*, but is certainly not *Lasaea miliaris*." Now the type of *Lasaea* is the British *Cardium rubrum* Montagu, to which the Australian *L. australis* is very similar, and these shells differ so much in hinge, texture, shape, and general facies from *minutissima* (of which I have author's paratypes), that one is tempted to remark that if, before making his statement, Oliver had compared specimens he could not have made this error. Iredale's location in *Gaimardia* is much nearer the truth, but the form is, of course, atypical, and differs from *Gaimardia* s. str. in the very details which make it referable to *Neogaimardia*. It may be remarked that Tate's original figure of *K. rostellata* resembles much more the Forsterian *minutissima* than it does the Cookian shells Odhner has referred to *rostellata*.

A fossil species (Pliocene) occurs at Titirangi, Chatham Islands, and will be described by Marwick in his report.

***Crassatellites bellulus* (A. Adams, 1854). [P. 898]**

Powell has lately recorded this shell from off Great Barrier Island in 30-40 fathoms (*N.Z. Journ. Sci. & Tech.*, vol. 6, nos. 5 and 6, p. 286, 1924), and under the name *Crassatella aurora* Ad. & Ang.—a record that I reject—Odhner has described and well figured the same species (1924, p. 72; Pl. 2, figs. 40, 41), adopting Lamy's restoration of the name *Crassatella*. Iredale has, however, shown (1924, pp. 202-204) that there are several austral series included under "*Crassatellites*" auct., all separable from Northern groups. He has provided *Talabrica* for *C. aurora* Ad. & Ang., and this name can be used for *bellulus* A.Ad., and for the Tertiary *Eucrassatella media* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 311, 1926), and probably *C. cordiformis* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 72, 1917). *Salaputium* Iredale, given to a large series of Australian minute forms, has as yet no Neozelanic representative. *Eucrassatella* Iredale was bestowed on the large crass forms, *C. kingicola* Lk. being taken as type, and here will be located the Tertiary species *amplus* Zittel (*Voy. "Novara," Pal.*, p. 46, 1865) and *attenuatus* Hutton (*Cat.*

Tert. Moll., p. 24, 1873). For the remaining Neozelanic forms and a number of new species I have introduced a fourth genus *Spissatella* (*Trans. N.Z. Inst.*, vol. 56, p. 256, 1926), with type *Crassatella trailli* Hutton.

Cuna delta (Tate and May, 1900). [P. 902]

Suter's figures are rough copies of Hedley's drawings in *Rec. Austr. Mus.*, vol. 4, no. 1, p. 23, 1901, and therefore represent the Australian shell, with which New Zealand examples do not agree. To eliminate this record I describe one new species from the Snares Islands, but there are several in New Zealand waters awaiting description.

***Cuna laqueus* n. sp.** (Figs. 90-92).

Shell similar in general style to *C. delta* (T. & M.), but relatively much wider, larger, and less inflated. 9-10 weak radiating costae, interstices narrower but widening towards margin, where ribs flatten out and become obsolete; ribs clearly visible in interior as strong grooves. Shell as wide as high, flattened.

Height, 2.6 mm.; width, 2.6 mm.; thickness (2 valves) 1 mm.

Locality,—Snares Islands, in 50 fathoms.

Cardita calyculata (Linné, 1758). [P. 903]

There are at least two Recent species of *Cardita* in New Zealand, neither of which can be merged in the Linnean *Chama calyculata*, and this name should be erased from the lists. I describe both these as new species; the northern one (*Cardita brookesi*) is nearest *C. variegata* Brug. but is distinct, while the southern one (*C. aoteana*) is allied to the Tasmanian form called *calyculata*, but again is distinct. Both species are easily separable from the Peronian form by the wider interstices between the ribs; in Sydney shells the ribs, especially anteriorly and on the upper half, are separated by linear grooves, in New Zealand specimens the ribs are narrow, and have always interspaces almost their own width.

***Cardita brookesi* n. sp.** (Figs. 116-118).

Shell like *C. variegata*, but smaller and with a much more deeply indented basal margin and byssal excavation; not maculated with brown spots, but uniformly light-tawny coloured. 18 ribs as against about 23 in *variegata*, not minutely serrated along their edges; interstices narrow but not linear. There are only three ribs below lunule down to basal margin, and the ribs over the posterior swollen angulation are almost straight instead of curved inwards as in *variegata*. Shell rather short dorso-ventrally, but very inflated; basal margin deeply concave and the valve edges much sunken at byssal area.

Length, 12 mm.; height, 6.5 mm.; width (2 valves) 7 mm.

Locality,—Whangaroa Harbour, collected by A. E. Brookes.

***Cardita aoteana* n. sp.** (Figs. 114, 115).

Shell rather large, winged posteriorly, with coarse ribs, rusty-sienna coloured. Beaks generally quite anterior; anterior side vertical, basal margin only slightly concave, and with very little byssal

excavation, dorsal margin rising posteriorly and forming a Mytiloid wing. 14 coarse ribs, interstices almost as wide over whole shell: lunule lanceolate, with only one rib between it and basal margin, next six ribs low and weak, then three very strong and broader ribs on posterior swollen angulation, then four progressively weaker ribs on wing; ribs weakly lamellose, with rather distant low tubular spines.

Length, 27 mm.; height, 15 mm.; width (2 valves), 16 mm.

Locality.—Dunedin Harbour, attached to rocks on the littoral at low water (type). Throughout New Zealand, and down to 60 fathoms in the South Island.

The Tasmanian form (*Mytilicardia tasmanica* T-Woods) has a quite different contour and apparently still fewer ribs, which, however, have (as in *aoteana*) wide interstices.

Genus *Venericardia* Lamarek, 1801. [P. 904]

Some corrections are here necessary in the specific values. It has been questioned whether *V. difficilis* Deshayes should be regarded as a distinct species from *V. purpurata* Desh.; the difficulty may be settled by regarding *difficilis* trinomially as a bathymetric form of the littoral *purpurata*, for one is evidently a derivative of the other. Judging from the extensive series I have examined there is no difficulty in picking a shore shell from a dredged one, the ribs are constantly narrower and sharper and with stronger prickles in the bathymetric form. An ancestral form is *V. urutiensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 330, 1926).

V. amabilis Desh. should be unhesitatingly dismissed from the fauna; though originally recorded from "New Zealand," it is an Australian species, and an error of localization must have occurred.

Cardita zelandica Desh., 1854 is not preoccupied by *Venericardia zelandica* Potiez and Michaud, 1838, the different generic location being sufficient to validate Deshayes's name. Consequently, Hutton's name *lutea*, proposed as a substitute for *zelandica* Desh. on this account, is unnecessary, and though Hedley (*Trans. N.Z. Inst.*, vol. 38, p. 73, 1906) and Iredale (1915, p. 487) both used *lutea*, I regard retention of the original name as correct.

Venericardia bollonsi Suter, 1907 cannot be even trinomially separated from *V. zelandica* Desh. Topotypes and numerous specimens from off Otago Heads (the other locality given by Suter) have been compared with extensive series from localities all over the Dominion, and there is no doubt that all the shells belong to one species, extending in range from North Cape to Stewart Island. I have not yet met with it, however, in either the Moriorian or Rossian provinces, though it probably occurs in the former; the numerous specimens seen from the latter all belong to *Venericardia marshalli* Marwick. This name was rightly provided (*Trans. N.Z. Inst.*, vol. 55, p. 192, 1924) for Stewart Island shells referred to the European *V. corbis* Phil. by Suter. It is essentially a deep-water Rossian and south Forsterian form, common off Auckland, Snares, and Stewart Islands, and Otago Heads, but I have not met with it any further north. In the North Island occurs an allied new species to which Suter's Hauraki Gulf records probably refer. Whereas *zelandica* (= *lutea*) has commonly

18 (sometimes 16 or 17) ribs, with numerous small horizontally elongate granules, *marshalli* has usually 12 (occasionally 11 or 13) ribs, often ill-developed, and rather weakly granose.

***Loripes concinna* Hutton, 1885. [P. 912]**

Although Iredale in his "Commentary" indicated the rejection of the name *Loripes* in favour of *Lucinida*, he did not question the reference of the Neozelanic species to the genus. Upon examining the species one finds that it has little relationship with the named genus, but that it is allied to the Australian shells formerly classed in *Myrtaea*, for which Iredale has proposed the name *Notomyrtea* (1924, p. 206); specifically it is quite close to the South Australian *Myrtaea bractea* Hedley (*Zool. Res. Endeavour*, pt. 1, p. 99, 1911). *Bractea* and *concinna* differ somewhat from the type of *Notomyrtea* (*botanica* Hedley) in having no radial sculpture, and may later prove separable; a quite typical species has, however, been described from Tertiary beds—*Myrtaea* (*Eulopia*) *papatikiensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 330, 1926)—and others are known to me.

A series of New Zealand shells, however, including *Cyclina dispar* Hutton (= *Lucinida laevifoliata* M. & M.; vide Marwick, *Trans. N.Z. Inst.*, vol. 55, p. 193, 1924), *Lucinida tirangiensis* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 330, 1926), *Chione auriculata* Bartrum (*Trans. N.Z. Inst.*, vol. 51, p. 97, 1919; vide Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 538, footnote, 1924), and *Loripes laminata* Hutton (*Trans. N.Z. Inst.*, vol. 17, p. 331, 1885) need subgeneric recognition on account of peculiar sculpture, large shell, and anterior wing; for these I suggest the name *Pteromyrtea* nov., naming *C. dispar* Hutton as type. Suter's figure of *laminata* (*N.Z. Geol. Surv. Bull.*, No. 3, Pl. 8, figs. 19a, b, 1915) is very little like this species, and really represents an undescribed species of *Notomyrtea* common in Oamaru "Miocene" beds. Ancestral new species to both this and *concinna* are known to me from as far back as the Palaeocene in New Zealand.

Woods (1917, p. 29) has described a Cretaceous Lucinoid as *Lucina cantaburiensis*.

***Montacuta triquetra** Suter, 1913. [P. 918]**

The genus to which this shell is referred was founded on a small British bivalve which is but little like the New Zealand form. I know of at least two other undescribed Recent allies, while a form directly ancestral to *triquetra* occurs in the Pukeuri "Miocene" beds, so one need not hesitate to found a new genus *Parvithracia*, with *M. triquetra* Suter as type. The pallial line is not "continuous and simple" as Suter describes, but has a deep sinus; the whole aspect of the shell is that of a miniature *Thracia*, near which genus I would provisionally place it.

Family Diplodontidae. [P. 915]

The genus *Diplodonta* may be dismissed from the Neozelanic fauna. There is a prior *Diplodon*; and it may be noted in passing

*See nomenclatural note and new name elsewhere in this volume.

that Dr. Allan Thomson has erroneously used *Diplodon* in one of his papers instead of *Diplodonta* (*Trans. N.Z. Inst.*, vol. 52, p. 391, 1920). I propose the new generic term *Zemysia*, naming *Lucina zelandica* Gray as type and quoting *Diplodonta infrequens* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 312, 1926) in lineage. There may be more than the three species allowed by Suter, but these comprise two series and the names need correction.

Although Hedley, May, and Suter decided that Gray's *Lucina zelandica* was conspecific with *Diplodonta tasmanica* Ten.-Woods, more material has negated the conclusion. There are constant differences in outline and inflation, and since ancestors of these species are found in the Tertiary with the same characteristics, it is evident that different species have developed. I have not the material to institute sufficient comparison between *D. tasmanica* Ten.-Woods and *D. ampla* (Hutton) (*Trans. N.Z. Inst.*, vol. 17, p. 323, 1885), but the latter Pliocene form would seem to be a closer ally to the Tasmanian shell than is *D. zelandica*.

"*Lucina novae-zelandiae* Reeve" appears in Reeve's work really as *Lucina novo-zelandica*, and the reference should be to Plate 9, fig. 14, where a globose shell with a brown epidermis is described; it looks like a *Joannisiella*, and is certainly not the Neozelanic shell recorded as *D. striata* Hutton. Hutton's name was simply proposed as a substitute for Reeve's name, on account of the prior *zelandica* Gray, so that the species needs description as new; I describe it below as *Zemysia striatula* nov.

"*Diplodonta globularis* Lamarck, 1818" included by Suter, is here also described as a new species (*Z. globus* nov.), for Lamarck's shell was named from King George's Sound, W.A., and is quite different, the Eastern Australian representative known as *globulosa* A.Ad. being different again. These three and *Z. striatula* nov. form an easily recognised branch of the *Zemysia* line (or *vice-versa*), having a hemispherical thin and inflated shell, submedian and inflated beaks overtopping a very narrow hinge-line, and small short teeth, and one may emphasize these differences by providing a new sub-generic name *Zemysina* with *Z. globus* nov. as type. This group also goes far back in the New Zealand Tertiary.

***Zemysia (Zemysina) globus* n. sp. (Figs. 109-111.)**

Shell thin, inflated, subequilateral, horny outside; interior white, dull centrally, shining at margins. Beaks moderately inflated, a little forward of middle; dorsal margins sloping away at subequal angles from umbo, both ends equally rounded, basal margin gently and regularly curved. Sculpture of fine and close growth-laminations. Other details as in *globularis*.

Length, 26 mm.; height, 23.5 mm.; width (1 valve), 8.5 mm.

Locality.—Stewart Island (type). Common in deeper water.

***Zemysia (Zemysina) striatula* n. sp. (Figs. 112, 113).**

Shell small, inflated and globose, not so thin as preceding species. Beak slightly forward of middle; dorsal margins very slowly descending; shell subcircular in outline, but a little vertically compressed. Sculpture of irregular flattish concentric ridges, lamellate near

margin. Shell less shining than *globus*, in specimens of same size more inflated, and with a shorter ligament. Other details as given by Suter under "*Diplodonta striata* Hutton."

Length, 14.5 mm.; height, 13.5 mm.; width (1 valve), 6 mm.

Locality,—Auckland Harbour.

Genus **Thyasira** Lamarek, 1818. [P. 918]

Add the Tertiary *T. planata* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 331, 1926).

Erycina parva (Deshayes, 1856). [P. 922]

The introduction of Deshayes' species name into Australian lists appears to have been a pure blunder, and Hedley's *acupuncta* has been revived by himself in his *Check-list of the N.S.W. Mollusca*, (1918, p. M 19) while Iredale has commented upon the use of the Lamarekian genus *Erycina*. He concluded that in every case it was inadvisable to continue the usage of that generic name in connection with Australian Recent mollusca, and therefore introduced the generic name *Melliteryx* for Hedley's species alone (1924, p. 207). With this must be associated the Neozelanic *parva* (for which I have recorded a littoral habitat, Dunedin Harbour; *Trans. N.Z. Inst.*, vol. 55, p. 517, 1924), but *Kellia bifurca* Webster belongs to a different series. Though Suter wrote that he had never seen it, Webster's species is a common shell both Recent and fossil, and proves to be a close ally of the form Hedley has described as *Erycina helmsi* (*Proc. Linn. Soc. N.S.W.*, vol. 39, pt. 4, p. 701, 1915). There are several undescribed fossil forms, while a characteristic of the species seems to be the frequent formation in adolescence of two interior thickened limy patches; I provide for the group the name *Arthritica* nov.; naming *Kellia bifurca* Webster as type.

Genus **Kellia** Turton, 1822. [P. 922]

A Tertiary species has been described as *K. antiqua* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 312, 1926), but the generic location was made with some doubt.

Genus **Neolepton** Monterosato, 1875. [P. 924]

This is another British group-name wrongly used to cover a compact little assemblage of austral forms, and I propose *Notolepton* nov. to replace it, naming as type *Kellia antipoda* Filhol, of which *K. sanguinea* Hutton is very possibly a synonym. There is considerable variation in shape in one and the same species in these shells, and I cannot satisfactorily separate topotypes of the two species, though there is evidence that more than one form exists. It may be noted that whereas Suter describes *antipodum* as having the anterior end slightly longer, his figure (which is a copy of Hedley's good drawing in *Trans. N.Z. Inst.*, vol. 37, pl. 1, fig. 5) shows it if anything slightly shorter. *N. citrinum* Hutton is a distinct form, while *N. novacambrica* Hedley (*Proc. Linn. Soc. N.S.W.*, vol. 29, p. 701, 1915) would easily enter *Notolepton*. Odhner has given some anatomical details for *N. sanguineum* (Hutton) (1924, p. 75).

Genus *Lasaea* Leach, 1827. [P. 926]

Odhner (1924, p. 78) makes the curious statement that "Oliver (1923) maintains the identity of *L. miliaris* of Suter and *Modiolarca minutissima* of Iredale, as well as the specific distinctness from *L. miliaris* of Philippi." This is not what Oliver intended; all he maintained was that *minutissima* was a *Lasaea*, but was distinct from the species Suter called *miliaris*. This matter has already been discussed under *Neogaimardia*. *Miliaris* is a Mediterranean shell and must be rejected; in the meantime its place may be taken by *L. consanguinea* Smith, added and figured by Hedley from Macquarie Island (1916, p. 32), but the mainland shells will require a new name. *L. scalaris* Phil. should also be omitted. These matters are dealt with, and new species proposed, in a paper on the Recent Mollusca of the Chatham Islands, shortly to be published.

Myllita stowei (Hutton, 1873). [P. 929]

This species shows a very different facies from the Australian species, which are all circular in shape, though they vary from almost smooth to strongly sculptured forms with extraordinary "ears." I therefore propose to separate this form under the new generic name *Zemyllita*, and suggest its great distinction from the Australian species.

Another discrepant form has lately been described by Marwick as *Myllita finlayi* nov. (*Trans. N.Z. Inst.*, vol. 55, p. 194, 1924), with the remark, "The generic location under *Myllita* is only provisional. The outline and ribbing are not the same as in that genus, but the whole group will be revised later. A closely related unnamed species occurs at Castlecliff." It seems that Dr. Marwick was judging the genus from *M. stowei*, which I have just noted as quite atypical: as a matter of fact *M. finlayi* is quite like *M. tasmanica* in shape and pattern of sculpture, but is a much smaller and far more fragile shell. The style of divarication is that of *Divaricella* rather than that of true *Myllita*. Since *M. finlayi* is known from but a single specimen, I name as type of the new genus *Myllitella* which is now proposed for this group, *M. vivens* n. sp. (Figs. 119, 120, 121), from 25 fathoms off the Hen and Chicken Islands. This Recent form appears to differ from *finlayi* only in smaller size and slightly different contour, but as the intervening Upper Pliocene form from Castlecliff differs again in its more transverse shell, and as a still more transverse form is known to me as a mid-Pliocene fossil from the Chatham Islands, I conclude that further Petane specimens will show abundant differences from the Recent form, and better diagnostic characters may then be given. I know of ancestral forms back to the "Miocene" in New Zealand, but do not at present know of any Australian species that could be included here.

Genus *Rochefortia* Velain, 1878. [P. 930]

Iredale has shown that this genus name, preferred to *Mysella* on the score of priority was not published until later and must be rejected in favour of Angas's name.

Odhner has, by a curious error, provided a name for the Neozelanic shell wrongly recorded by Suter as *R. donaciformis* Angas. Regarding some Stewart Island shells as distinct from *Montacuta triquetra* Suter, he described them as *M. unidentata* nov. (1924, p. 76), failing to see in them Suter's *R. donaciformis*. Even going by the figures, it is hard to see how one could confound the two groups, but though Odhner's choice of genus was poor, his specific name is acceptable, and the New Zealand shell may now be separated from *donaciformis* under the name *Mysella unidentata* (Odhner). Hedley has added from Macquarie Island *R. charcoti* (Lamy) and *R. macquariensis* nov. (1916, p. 32), and these may be classed in *Mysella*, as, provisionally, may also be the second species of *Montacuta* described by Odhner, *M. tellinula* (1924, p. 77). *R. reniformis* Suter (which I have noted as not uncommon on the littoral, Taieri Beach and Dunedin Harbour; *Trans. N.Z. Inst.*, vol. 55, p. 517, 1924) is, however, a different style of shell; with superficial resemblance to shells Hedley called *Bornia*, it differs in texture, solidity, and somewhat in hinge, so that I give it *Rochefortula* nov. as a generic name for itself, and anticipate the discovery of Tertiary ancestors.

Genus *Cyamium* Philippi, 1845. [P. 932]

This and the sole representative *C. oblongum* Smith, included by Suter, have been rejected by Hedley (1916, p. 26), the shells so determined being there described as *Kidderia macquariensis* nov. (*vide antea*, under *Kidderia*).

Family *Galeommatidae*.

Neozelanic representatives of this family have been known for some time, but Odhner has now definitely introduced it with a new species, *Spaniorinus zelandicus*, from 35 fathoms, Hauraki Gulf, and 45 fathoms, Auckland Island (1924, p. 78). Very full details of anatomy and shell are given, and these show disagreement with *Spaniorinus*, so that it is legitimate to propose *Scintillona* nov. for Odhner's species. The Australian shells called *Solecardia* are close allies, but have a better developed hinge.

Genus *Corneocyclas* Férussac, 1818. [P. 934]

The introduction of this, with a section *Pisidium* Pfeiffer, 1821 [P. 936], is due to Dall's initiative; *Pisidium* is now considered as of generic value, but the New Zealand species need re-examination, especially as to their anatomy.

Family *Tellinidae*. [P. 945]

Considerable rearrangement of the species is necessary here, for Suter's groupings are quite unnatural. I would dismiss *Tellina* s. str. as inapplicable to any New Zealand species, the following association having more affinity with *Macoma* Leach, 1819:—*eugonia* Suter, *huttoni* Smith and var. *sterrha* Suter, *gaimardi* Iredale, *edgari* Iredale, *spenceri* Suter, and the "Miocene" *robini* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 474, 1924).

T. charlottae Smith cannot be classed with this group, having different cardinal teeth, and two subequal valves hardly flexed or

angled anywhere; the free, short, and rapidly ascending sinus prevents reference to *Eurytellina* Fischer, which it otherwise somewhat resembles, nor has it the facies of *Elliptotellina* Cossmann, which has a somewhat similar sinus. It does not seem referable to any austral Tellinid group, and is therefore named as type of a new division *Maoritellina*.

The Australian representative of *T. liliana* Iredale (*T. deltoidalis* Q. & G.) has also been classed as a *Macoma* by Hedley and May, but it differs considerably from the previous group in its hinge, which is far closer to that of *Tellina disculus* Desh.; I would place these two forms near that species, but propose for them the group name *Macomona* nov., with *T. liliana* Iredale as type; the Australian Tertiary *T. basedowi* Tate, which has been compared to *deltoidalis* (*Trans. Roy. Soc. S.A.*, vol. 25, p. 148, 1901), may also be located here. Odhner has for no apparent reason reverted to the usage of *T. deltoidalis* Q. & G. for New Zealand shells. Iredale and E. A. Smith, studying long series, unhesitatingly separated the two forms, and the British Museum recognizes their distinctness; in the face of this action by an austral worker and one of the greatest authorities on bivalves, it is not the wisest course for an extra-limital worker, studying scant material, to unite them, and Australasian students will hardly endorse the action. As, however, it is not known what shell Suter figured, I take this opportunity of illustrating authentic New Zealand examples of *M. liliana* from Stewart Island (figs. 107, 108).

It may be noted that for a peculiar late Tertiary species with heavy hinge, pronounced posterior lateral teeth, and no anterior laterals, Marwick has introduced a genus *Barytellina*, type *B. crassidens* Marwick (*Proc. Mal. Soc.* vol. 16, pt. 1, p. 25, 1924) and I have since described a second member *B. anomalodonta* (*Trans. N.Z. Inst.*, vol. 55, p. 473, 1924).

***Tellina disculus* Deshayes, 1855. [P. 951]**

Oliver has counselled the rejection of *Arcopagia* for this species, and the substitution of *Pseudarcopagia*. But *disculus* is no close relative at all of *Tellina decussata* Lk. (i.e., *P. victoriae* Gat. & Gab.), the type of *Pseudarcopagia*, as the radial sculpture is practically absent, the hinge is not quite in accord, and the pallial sinus shows differences, which are exaggerated by reference to other New Zealand Tellinids. I have already noted that the hinge of *disculus* is quite like that of *Macomona liliana*, which suggests that as a shell form it is a derivative of the older *Macomona*, and may have nothing to do with *Pseudarcopagia*. Accordingly I name *T. disculus* Desh. as type of *Zearcopagia* nov., and suggest that *Pseudarcopagia piratica* Hedley (*Proc. Roy. Geogr. Soc. Aust., S.A. Branch*, p. 7, 1918) is a similar development in West Australian waters.

Genus *Leptomya* A. Ad., 1864 and *Macoma suteri* Smith, 1898. [P. 955]

From consideration of topotypes I would class this in *Leptomya*, as a very near relative of *L. perconfusa* Iredale. From the series seen, I admit it at present as a distinct species, differing slightly in

shape and in much less prominent radial sculpture, but I do not feel at all certain that the comparison of further material will support this, as *perconfusa* is variable in shape, and the Lyttelton shells are somewhat rubbed. Should they prove synonyms, the correct name for the species will be *Leptomya retiaria* (Hutton); the type specimens of *Tellina retiaria* Hutton, 1885 (*Trans. N.Z. Inst.*, vol. 47, p. 322), from the upper Pliocene beds at Castlecliff are in the Canterbury Museum, and are the same species as he described from Recent shells as *Tellina lintea* (*Cat. Mar. Moll.*, p. 67, 1873). This name having been used previously by Conrad, Iredale (1915, p. 489) proposed *L. perconfusa* nom. nov. as a substitute, but this must give way to Hutton's equivalent and earlier *retiaria*. No difference can be picked between Petane (Mid-Pliocene) and Recent shells, nor can regional subspecies be satisfactorily determined in the Recent specimens; it may be noted in this connection that Hedley (1916, p. 29) has reported *perconfusa* from Carnley Harbour, Auckland Is. An older Pliocene form has, however, been differentiated as *L. simplex* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 331, 1926).

***Mesodesma subtriangulatum* (Gray, 1825). [P. 957]**

Suter admitted three species, *M. subtriangulatum* (Gray), *M. ventricosum* (Gray), and *M. australe* (Gmelin), placing each in a separate subgenus. Iredale reviewed the group in his "Commentary," eliminating *Mesodesma*, preferring *Amphidesma*, and allowing four species, with two subgenera; *A. gaymardi* Desh., *A. quoyi* Desh., and *A. ventricosum* Gray under the subgenus *Taria*, and *A. australe* Gmelin under the subgenus *Paphies*. In the footnote, *A. gaymardi* was corrected to *A. subtriangulatum* Wood. Oliver has since dealt with the matter (*Proc. Mal. Soc.*, vol. 15, pt. 4, p. 186, 1923), but as he has confused distinct forms, his notes require some revision. Suter's confusion as cited by Iredale depended upon Suter's written work, not upon how shells were privately labelled by him. This appears to be clear from Iredale's review, but seems to have been misinterpreted by Oliver. Thus Iredale pointed out that apparently Suter had confused *quoyi* with *ventricosum*, since Suter, in the diagnosis of his *Taria*, which included only the latter, had written, "pallial sinus well marked, sometimes deep." The pallial sinus in true *ventricosum* is always deep, so that only one conclusion is possible to account for the use of the word "sometimes," and that is that a species with a short pallial sinus had also been examined. As regards *subtriangulatum*, Oliver apparently wishes to show that the Northern shell ("*quoyi*" Iredale) differs only subspecifically from the southern one ("*gaymardi*" Iredale), because shells from the Chatham Islands indicate variation. Oliver then suggests a usage of the known names which cannot be followed, on account of the fact that all the names were given to the northern form. This is certain from study of the figures alone, so that the southern form, interpreted quite wrongly by Iredale, following Lamy, as *subtriangulatum*, is nameless. The confusion seems to have arisen on account of the fact that there are two bicarinate species; not only *ventricosum*, but its associate *subtriangulatum* also, has in the adult shell a second carina bisecting the posterior dorsal area, whereas the southern form

has none. This solves all the difficulties, for we can now understand how *subtriangulatum* was sometimes lumped with the southern shell (on account of shape and sinus), and sometimes, by Suter, with *ventricosum* (on account of the two carinae); and it further allows one to settle definitely not only the specific distinctness of the form, but also the form referred to by the various figures. Judged by this and other criteria, Wood's figure of *subtriangulatum* certainly represents the northern shell, which must therefore bear his name, with *quoyi* Desh., *latum* Desh., *spissa* Reeve, and *gaymardi* Desh. as synonyms. Further, Oliver's statement that his Upper Pliocene *pliocenica* nov. is "more distinct from the two Recent forms than they are from each other," is negatived, for *pliocenica* possesses no second ridge, and is evidently directly ancestral and quite close to the southern shell, while *subtriangulatum* is considerably different. The mid-Pliocene *crassiformis* M. & M. (*Trans. N.Z. Inst.*, vol. 52, p. 136, 1920) is a still earlier ancestor, also having no second ridge. For sake of convenience, and to obviate further error, I now present a key to the species:—

Shell inequilateral

Adult shell posteriorly bicarinate.

Pallial sinus deep
" " shallow

ventricosa
subtriangulata

Adult " shell " posteriorly unicarinate,
sinus shallow.

Shell very high and crass, posterior
dorsal area cut straight in

crassiformis

Shell high but not crass, posterior
dorsal area moderately cut in

pliocenica

Shell neither high nor crass, pos-
terior dorsal area rather ex-
panded

forsteriana n. sp.
australis

Shell subequilateral, not carinated

I propose the name *Amphidesma forsteriana* n. sp. for the southern species, characterized by inequilateral rather small shell, not high nor crass, nor inflated; rather short anterior end in comparison with *subtriangulata*, and more produced posterior end, the beaks being therefore much less posterior; wing-like expanded posterior dorsal area, not sharply cut in, and with no distinct second medial carination, the bordering main carination being itself weak; and short pallial sinus. A holotype (69 mm. by 48 mm. by 19 mm.—two valves) is selected from Warrington beach, near Dunedin, in the Finlay collection. This species is so distinct from *subtriangulata* at every growth stage that one cannot understand how the two have ever been confounded.

Miss Mestayer (*N.Z. Journ. Sci. & Tech.*, vol. 4, no. 2, p. 84, 1921) has supplied some "Notes on the Habits and Uses of the Toheroa" and states, "there are also one or two beds in the South Island. These may, however, contain a closely allied species." It is probable that she had in mind *A. forsteriana* nov., but on the other hand, a form of *ventricosum* certainly does occur in the Forsterian region. The few examples I have from Moeraki and Riverton (where I am told it is common) appear to differ trinomially from the Cookian form in the shape of the posterior end, but separation may be left till more material can be compared. Miss Mestayer presents a figure of *ventri-*

cosum which is unnatural, a much better illustration is given by Bucknill (1924; Pl. 12, f. 12) who also gives a good idea of *subtriangulatum* (Pl. 12, p. 13) except that the second carina is indistinct in both cases. I have seen Forsterian examples of the latter species also; they may, however, prove trinomially separable.

Mesodesma australe (Gmelin, 1791). [P. 969]

In his Ecological Essay, Oliver has sometimes used *Amphidesma australe*, at others *A. novaezelandiae* without indication as to whether emendation is intended or merely a slip made. It is a little unfortunate that Oliver in this essay has, without published explanation, introduced so many nomenclatural changes, sometimes unnecessary, and occasionally incorrect. Name changes are always annoying, but, however necessary, should really not be introduced in the absence of simultaneous adequate explanation. Apart from this, the wealth of information stamps Oliver's work as one of the best that has appeared on this subject, and one that will undoubtedly stimulate much fruitful search. As regards *Amphidesma australis*, no specific change is, of course, necessary, but the use of *Paphies* generically may be advocated, while the Auckland Is. var. *aucklandica* is almost distinct enough to be regarded as a second good species. If regarded as of only regional subspecific rank, it should be written trinomially, *Paphies australis aucklandica*.

Genus Raeta Gray, 1853. [P. 969]

Oliver (*Proc. Mal. Soc.*, vol. 15, p. 184, 1923) has dismissed the Recent species admitted by Suter (*perspicua* Hutton) as based on a specimen of the exotic *R. canaliculata* (Say), but the genus name is still present in the fauna by reason of the Tertiary *Raeta tenuiplicata* Bartrum (*Trans. N.Z. Inst.*, vol. 51, p. 97, 1919); no specimens of this have been available for examination.

Family Veneridae Leach.

A full revision (by Dr. Marwick) of the New Zealand members of this family appears elsewhere in this volume; many new genera are proposed. It therefore need only be noted here that Oliver (*Proc. Mal. Soc.*, vol. 15, p. 186, 1923) has dismissed *Bassina disjecta* (Perry) [P. 989] from the New Zealand fauna, and Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 322, 1924) has similarly treated an Australian Tertiary form recorded by Suter, *Clausinella subroborata* (Tate).

Dosinia caerulea (Reeve, 1850). [P. 977]

Oliver (*Proc. Mal. Soc.*, vol. 15, p. 188, 1923) has provided *Dosinia maoriana* nov. for the New Zealand shell incorrectly determined as Reeve's species.

Genus Macrocallista Meek, 1876. [P. 981]

This will be replaced by *Notocallista* Iredale (1924, p. 210), proposed for the austral forms, with *Callista kingi* Gray as type.

Cytherea creba (Hutton, 1873). [P. 984]

The correct spelling is *crebra*, as appears in the synonymy. When Iredale furnished some remarks on the nomenclature of Venerids, he

followed Suter's acceptance of facts, carefully noting that he did so, pointing out in the case of *C. zelandica* that the species did not appear correctly referable to *Antigona*. Oliver has written (*Proc. Mal. Soc.*, vol. 15, pp. 184-5, 1923) on this matter, and has stated his opinion that *zelandica* and *crebra* should be united, and *oblonga* admitted, and then has added, "As a species, *A. oblonga* is doubtfully distinct from *A. zelandica*." This conclusion had been arrived at by Deshayes very many years before, from study of the actual types, and had been endorsed by E. A. Smith in the *Voyage of the "Erebus and Terror,"* (p. 6, 1874) fifty years ago, as cited by Suter. Since Suter has also intimated the distinction of the group, I introduce the new generic name *Dosinula*,* naming as type *Dosina zelandica* Gray, of which *Venus oblonga* Gray is a synonym. The name *crebra* Hutton may, however, be conveniently retained as a name for the shells which have very broad and inflated beaks with a peculiarly erect set. They are quite distinctive, and occur at Lyall Bay and Hauraki Gulf together with *zelandica*, but are much rarer; I have not seen the form in the South Island, though *zelandica* is plentiful in 30-50 fathoms. As a fossil, *crebra* occurs in the Pliocene of Castle Point, but never at Castlecliff or Nukumaru. These distributional facts seem to warrant its separation. Smith's figures (from types?) of *zelandica* and *oblonga* in *Voy. "Erebus and Terror"* do not include *crebra*.

Chione subsulcata Suter, admitted to the Recent fauna in the "Manual" [P. 985], has nothing to do with this group; it is a restricted mid-Pliocene fossil of the *spissa* type, and must be omitted from the Recent fauna. Suter's Recent records refer to a totally unrelated new species, which has also occurred in deep water off Otago Heads.

***Chione stutchburyi* (Gray, 1828). [P. 987]**

I provide the new generic name *Austrovenus* for this species. It compares well with no other *Chione*, and is a distinctive Neozelanic evolutionary product. It is found fossil from the mid-Pliocene onwards, produced a crass and tumid offshoot in *C. crassitesta* Finlay (*Trans. N.Z. Inst.*, vol. 55, p. 478, 1924), and has a "Miocene" (or earlier) relative in *C. acuminata* Hutton (*N.Z. Geol. Surv. Pal. Bull. No. 2*, p. 51, 1914).

The *spissa* group has had an addition made to it in the form of *C. mawsoni*, described by Hedley from Macquarie Island. (1916, p. 33). This species, *spissa* Desh., and the Pliocene *subsulcata* Suter are related to a well marked Australian series for which Iredale has proposed the genus name *Chioneryx* (1924, p. 210), naming *Erycina cardioides* Lk (= *Antigona striatissima* (Sow.) auct.) as type, but are not quite the same, and have been separated by Marwick.

***Paphia fabagella* (Deshayes, 1854). [P. 994]**

This species, originally named as a *Tapes*, was described from New Zealand, then commonly found in Australia and the Neozelanic habitat rejected as fictitious, then re-found in New Zealand. There

*The new genera of *Veneridae* here proposed were erected before Dr. Marwick's paper was written up, but, owing to delay in publication, appear simultaneously with it.

is still doubt as to the exact identity of the Neozelanic form, but New Zealand specimens in the Australian Museum, assigned to this species, do not agree with Australian forms, having a much longer sinus, and longer and more prominent teeth; the type figured by Reeve is the Tasmanian form, which is like the New Zealand shell, but (though much larger) still with a shorter sinus. Hedley, following Jukes Browne, has classed this species under *Venerupis*, but this seems a bad location. Jukes-Browne included *fabagella* and *galactites* under *Pullastra*, and then added "two species generally assigned to *Venerupis*, viz., *V. rugosa* and *V. siliqua*. . . are better placed under *Pullastra* than under *Venerupis*." Oliver has proposed *Notopaphia* for *Venerupis elegans*, citing as diagnostic "the characters of the teeth" and the possession of "a well defined lunule," using the other New Zealand forms as true *Venerupis*, as he follows by stating that *V. reflexa* and *V. siliqua* are inseparable and should be lumped. The extraordinary variation in the teeth makes it difficult to utilize this feature, and the best characters for separating *elegans* appear to be the lunule and the crenulation of the margins. However, as Jukes Browne pointed out, the other austral species are not true *Venerupis*, and as that name is also doubtfully valid for any group, I propose *Irona* nov., naming *V. reflexa* Gray as type, and *Paphirus* nov., naming *Venus largillierti* Phil. as type. This ill-sounding name may have to replace the familiar *Venus intermedia* Q. & G., which Iredale tells me is preoccupied; but since he has sent no details I am unable to verify this statement.

***Protocardia pulchella* (Gray, 1843). [P. 1000]**

The type of *Protocardia* (*C. hillanum* Sow.) is a European Cretaceous form, while the section *Nemocardium* (type: *C. semiasperum* Desh.; Eocene, Paris Basin) is Suter's location, from perusal of Dall's "Tertiary Mollusks of Florida" (*Trans. Wagn. Free Inst. Sci.*, vol. 3, pt. 5, p. 1078, 1900; Dr. Marwick has kindly pointed out to me that both Dall and Suter wrongly give the page reference to *Nemocardium* Meek as p. 172, whereas it should be p. 167). This stock lived in Australian and New Zealand seas throughout the Tertiary, giving rise to a large series of forms, to cover which Iredale has introduced the genus name *Pratulium* (1924, p. 207), provided for *Cardium thetidis* Hedley, originally proposed merely as a variety of *striatulum* Sow. (= *pulchellum* Gray). Iredale, however, did not consider *Nemocardium*, which seems to cover the austral forms so well that the use of *Pratulium* may be postponed until differential characters are adequately pointed out. In direct lineage in New Zealand may be named *Nemocardium semitectum* Marwick (*Trans. N.Z. Inst.*, vol. 56, p. 312, 1926) and new species extending back to the Palaeocene. Oliver (*Proc. Mal. Soc.*, vol. 15, p. 183, 1923) has noted that *pulchella* does not occur at the Kermadecs, the shells he so identified (*Trans. N.Z. Inst.*, vol. 47, p. 556, 1915) being really *Cardium maculosum* Wood.

Some large Tertiary species referred to *Protocardia* will probably prove separable from *Nemocardium*, but may be referred there temporarily. Suter has allowed three species, *patula* (Hutton) (*Cat. Tert. Moll.*, p. 23, 1873), *sera* Hutton (*l.c.*); and *alata* Suter (*N.Z.*

G.S. Pal. Bull. No. 5, p. 78, 1917), but I have noted that there may be only one (*Trans. N.Z. Inst.*, vol. 55, p. 498, 1924). *Cardium patulum* Hutton was described from two localities, Waipara, and Broken River (Lower); I now nominate the latter as the type locality, and this will render *sera*, from the same locality, an absolute synonym; *alata* is from Mt. Brown, and may prove separable when more material is available.

Cardium (Glans) kaiparaensis Marshall (*Trans. N.Z. Inst.*, vol. 50, p. 272, 1918) I have determined (*l.c.*, vol. 55, p. 538, footnote, 1924) as a synonym of *Venericardia subintermedia* Suter (*N.Z.G.S. Pal. Bull. No. 5*, p. 74, 1917).

Soletellina biradiata (Wood, 1815). [P. 1083]

Suter has admitted this Australian form from a single specimen found by Brookes in Manukau Harbour. Mr. Brookes, in sending the shell for examination, wrote as follows: "The label is in Suter's writing; he did not consider it the above species, and asked me to allow him to send it to the British Museum. It does not agree quite well with my specimens of *S. biradiata* from Tasmania, the contour of the shell is different, and is less inflated, and the teeth are somewhat different." My own Sydney specimens show numerous differences, the nymphs being very much weaker and shorter, the teeth feebler and differently placed, the muscle scars quite different in size and shape, and the pallial area smaller and differently inclined. The specimen evidently cannot bear the name *biradiata* (which should therefore disappear from New Zealand lists), but what it really is remains doubtful at present. It has the appearance of an abnormality, and may be an extra-solid distorted overgrowth of *siliqua*. On the other hand it may be a perfectly distinct new species; decision must be deferred until further similar specimens are found.

Genus **Solecurtus** Blainville, 1824.

I have added this to the fauna by describing three Tertiary species, *bensoni*, *evolutus* and *chattonensis* (*Trans. N.Z. Inst.*, vol. 55, p. 472, 1924). The reference to the generic name is *Dict. Sci. Nat. (Levrault)* vol. 32, p. 351, and the type (*vide* Iredale, *Proc. Mal. Soc.*, vol. 11, p. 306, 1915), *Solen strigillatus* L.

Corbula gibba (Olivi, 1792). [P. 1008]

This European species can be dismissed without hesitation. Suter wrote in connection with it, "The peculiarity of distribution it shares with several other bivalves—viz., *Arca reticulata*, *Lima lima*, *Cardita calyculata*, *Venericardia corbis*, *Thyasira flexuosa*, etc. As has been shown, comparison of actual specimens does not support these records; *Arca reticulata* does not occur in New Zealand, *Lima lima* and *Cardita calyculata* have perfectly distinct Neozelanic representatives, *Venericardia corbis* has been rejected by Marwick, and, when sufficient comparative material is at hand, *Thyasira flexuosa* will probably also disappear. However, in the case of *Corbula gibba*, the record appears to be simply one of a common European shell accidentally included among endemic forms.

As regards Tertiary species, I have recorded (*Trans. N.Z. Inst.*, vol. 55, p. 499, 1924) that *C. humerosa* Hutt. is equal to and has priority over *C. canaliculata* Hutt.

***Saxicava artica* (Linné, 1767). [P. 1012]**

It would be better to follow the example of Hedley and May with regard to this species, and use Lamarek's name *Saxicava australis* in preference to admitting one world-wide species. Hedley has enlarged the genus in the Neozelanic region by recording *Saxicava antarctica* Phil. from Macquarie Island (1916, p. 33), and I know of still another species representing the aberrant Australian *S. subulata* Gat. & Gab.

Genus *Panopea* Ménard, 1807. [P. 1012]

The correct spelling is *Panope*, as used by Hedley, May, and others.

Dr. Marwick writes me that as regards the Tertiary forms, he would recognize three species as follows: *zelandica* Q. & G., Recent and Wanganui in occurrence, with large shell, length generally a little under twice the height, irregularly folded and waved; *worthingtoni* Hutton, Oamaruan in occurrence, length over twice the height, with regular concentric folds, 6-7 per centimetre; and *orbita* Hutton, Oamaruan in occurrence, length much less than twice the height, with regular concentric folds, 3-5 per centimetre. Woods (1917) has admitted three further species to the Upper Cretaceous fauna, *awaterensis* Woods, *malvernensis* Woods, and *clausa* Wilckens. Marshall has given figures of *worthingtoni* (*Trans. N.Z. Inst.*, vol. 49, Pl. 33, f. 4) and *orbita* (*l.c.*, Pl. 37, f. 50), but his usage of the specific names should be reversed. Marwick (*Rep. Austr. Assoc. Adv. Sci.*, vol. 16, p. 320, 1924) has denied the occurrence of *orbita* in Australia, and his reproduction of Tate's figure of a supposed *orbita* fully supports this contention. As specimens I have lately seen from the Australian Tertiaries are quite constantly like Tate's figure and widely different from any New Zealand form, I finally dispose of this bad record by giving the name *Panope ralphii* n. sp. to the shell originally figured by Tate (*Trans. Roy. Soc. S.A.*, vol. 9, Pl. 18, f. 3, 1887); this specimen was from the River Murray cliffs. It is more nearly allied to the Table Cape *Panope agnewi* (T.-W.) than to *orbita* Hutton.

***Teredo bruguieri* Delle Chiaje, 1828. [P. 1019]**

Suter rejected *Teredo norvegica* Spengler, 1792 as "not binomial," but this erroneous conclusion, through non-access to the literature itself, has been pointed out by Calman (*Proc. Zool. Soc. Lond.*, 1920, p. 394) and Spengler's name should come into use.

Iredale has noted (1924, p. 214) that the genus *Bankia* Gray, 1842 should be used to cover the second species erroneously called *T. saulii* Wright, the correct specific name being *australis* Calman, 1920 (*loc. cit.*, p. 397), described from Brisbane, the syntype being from Auckland.

Genus *Thracia* Blainville, 1824. [P. 1023]

The Australasian species previously referred to *Thracia* appear to differ appreciably from the European type, and as the status of

Thracia itself is in doubt, a change seems necessary. Iredale has shown that two series have been confused in Australia, one showing an external ligament, the other without this feature. For the latter, *Thraciopsis* was available, and for the former *Eximiothracia* was introduced (Iredale, 1924, p. 199). The two Recent Neozelanic species, and also the Tertiary forms *vegrandis* M. & M. (*Trans. N.Z. Inst.*, vol. 51, p. 258, 1919) and *magna* M. & M. (*l.c.*, vol. 53, p. 77, 1921) and the Cretaceous *haasti* and "*Thracia* sp." Woods (1917, pp. 34, 17) seem referable to the last named.

Genus **Myodora** Gray, 1840. [P. 1028]

Dealing with species of *Myadora* (the earliest spelling), Iredale noted the restricted geographical range of the species (1924, p. 200) and one may therefore advise the rejection of several of the names included by Suter. Captain Bolton's specimen of "*brevis*" is probably the immature shell of some other species, while C. Traill's Stewart Island records of Sydney shells are of course all wrong. Traill apparently received a collection of common Sydney forms, and these were presented (probably, inadvertently) to the British Museum, and are there all labelled "Stewart Island," though obviously not from that locality (information from T. Iredale). Through ignorance of the Neozelanic fauna, some of these have been recorded as from Stewart Island, as in the case of the next species, *Myadora crassa* Stutchbury, which must certainly be rejected. Suter notes, "I have not seen this species," but it is not a very rare Sydney shell.

Myadora pandoriformis (Stutchbury, 1835), the commonest Sydney species, also depends in the first instance on Traill's Stewart Island record. Misled by this, Suter has recorded the species from Port Pegasus, Stewart Island, and Iredale included it from Banks Peninsula. The name must be rejected, the records probably referring to one of the other described species, such as *M. antipoda* Smith.

Myadora rotundata Sowerby, 1875, was erroneously described from New Zealand; the type in the British Museum proves to be *tasmanica* Ten.-Woods, a Tasmanian species, so that the name must be expunged from New Zealand lists.

Chamostrea albida (Lamarek, 1819). [P. 1033]

Iredale in his "Commentary" showed that *Cleidotherus* must be used as the generic name in place of *Chamostrea*, but did not deal with the forms confused under the above name. Collecting at Sydney, he tells me he observed that the local form, named *C. chamoides* by Stutchbury, disagreed slightly with the South Tasmanian form, the typical *C. albida* of Lamarek. While considering the advisability of separating these, he noted that the Neozelanic form was obviously a distinct species, and I had independently arrived at the same conclusion. I therefore now describe it as:—

Cleidotherus maorianus n. sp. (Figs. 125, 126).

Shell differing from *C. chamoides* in being less compressed, i.e., the valve is shallower and muscle-scars further apart, the pallial line in the New Zealand shell being thus much longer. It has also a distinct indication of a sinus, more evident in the flat valve, the pallial line being indented and broken up into several separate scars at the

posterior muscle-scar; in the right valve the pallial line is sharply sub-medially angled, the anterior portion being horizontal, the posterior sloping steeply straight up to meet the muscle-scar. These features are not seen in Australian shells. Muscle-scars of left valve sub-parallel, not markedly divergent as in *chamoides*. Anterior end of shell much less (often not) pointed; erect portion of shell considerably higher.

Diameter (ant.-post), 63 mm.; (dorso-vent.), 70 mm.; width of attachment (right valve), 45 mm.; height of erect portion, 55 mm.

Locality.—Kawhia Harbour.

***Sepia apama* Gray, 1849. [P. 1058]**

This was described from Southern Australia, and Iredale, by intensive collecting in the Sydney district, has proved that these animals are very local, so that the Neozelanic species may be quite different. The good description and figures given by Suter are copied without alteration from McCoy's account of Victorian specimens, the typical *S. apama*.

Iredale has lately published in the *Rec. Austr. Mus.* a monograph of the Peronian forms, but this has not yet been seen. Species are quite numerous round the Australian coasts, and individuals often extremely abundant, but no small species is yet known from New Zealand; their absence here is very striking to anyone fresh from the Sydney beaches.

In this essay I have proposed the following new generic and specific names:—

- Zelorica* n. gen. for *Lorica haurakiensis* Mestayer.
Nacella macquariensis n. sp. for "*Nacella delesserti*" Hedley.
Schismope lyallensis n. sp. for "*Schismope atkinsoni*" Suter.
Schismope laqueus n. sp. for "*Schismope beddomei*" Suter.
Schismope iota n. sp.
Sinezona n. gen. for *Schismope brevis* Hedley.
Monodilepas n. gen. for *Lucapina monilifera* Hutton.
Tugali colvillensis n. sp.
Thoristella (chathamensis) benthicola n. subsp.
Thoristella [chathamensis] fossilis n. subsp.
Paraclanculus n. gen. for *Paraclanculus peccatus* n. sp.
Zediloma n. gen. for *Z. digna* n. sp.
Zediloma digna n. sp. for "*Monodonta nigerrima*" Suter.
Zediloma arida n. sp. for "*Monodonta coracina*" Suter.
Fractarmilla n. subgen. for *Labio corrosa* A. Ad.
Cavodiloma n. gen. for *Trochocochlea excavata* Ad. & Ang.
Anisodiloma n. gen. for *Trochus lugubris* Gmelin.
Anisodiloma lugubris lenior n. subsp.
Micrelenchus n. gen. for *Trochus sanguineus* Gray.
Plumbelenchus n. gen. for *Trochus capillaceus* Phil.
Antisolarium n. gen. for *Solarium egeum* Gould.
Zeminolia n. gen. for *Minolia plicatula* M. & S.
Zetela n. gen. for *Minolia textilis* M. & S.
Conominolia n. gen. for *Heliacus conicus* Marshall.

- Venustas* n. gen. for *Trochus tigris* Martyn.
Venustas punctulata urbanior n. subsp.
Mucrinops n. subgen. for *Zizyplinus spectabilis* A. Ad.
Munditia n. gen. for *Liotina tryphenensis* Powell.
Liotella indigens n. sp. for "*Liotella incerta*" Mestayer.
Brookula prognata n. sp. for "*Brookula* sp." Mestayer.
Lissotesta errata n. sp. for "*Lissospira micra*" Suter.
Incilaster n. gen. for *Turbo marshalli* Thomson.
Opella n. gen. for *Astrea subfimbriata* Suter.
Pellax n. gen. for *Phasianella huttoni* Pilsbry.
Zethalia nom. nov. for *Ethaliopsis* Cossmann.
Notocrater n. gen. for *Cocculina craticulata* Suter.
Tectisumen n. gen. for *Cocculina clypidellaeformis* Suter.
Tectisumen mayi nom. nov. for *Cocculina clypidellaeformis* May, not of Suter.
Melarhaphe zelandiae n. sp. for "*Litorina mauritiana*" Suter.
Macquariella n. subgen. for *Paludestrina hamiltoni* Smith.
Zelaxitus n. gen. for *Laevilitorina cystophora* Finlay.
Zeradina n. gen. for *Fossarus ovatus* Odhner.
Radinista n. subgen. for *Couthouyia concinna* Hedley.
Nilsia n. gen. for *Fossarus conicus* Odhner.
Scrupus n. gen. for *Fossarus hyalinus* Odhner.
Nannoscrobs n. gen. for *Amphithalamus hedleyi* Suter.
Merelina plaga n. sp.
Rissoina anguina n. sp. for "*Rissoina hanleyi*" Suter, *partim*.
Zerotula n. gen. for *Discohelix hedleyi* Mestayer.
Zemelanopsis n. gen. for *Melanopsis trifasciata* Gray.
Pakaurangia n. subgen. for *Melanopsis waitaraensis* Marwick.
Zeacurmantus n. gen. for *Cerithidea subcarinata* Sow.
Zebittium n. gen. for *Bittium exile* Hutton.
Specula n. gen. for *Cerithiopsis styliiformis* Suter.
Mendax n. subgen. for *Cerithiopsis trizonalis* Odhner.
Socienna n. subgen. for *Cerithiopsis apicicostata* May.
Alipta n. gen. for *Cerithiopsis crenistria* Suter.
Zaclys n. gen. for *Cerithiopsis sarissa* Murdoch.
Miopila n. subgen. for *Cerithiella fidicula* Suter.
Notoseila n. gen. for *Cerithium terebelloides* Hutton.
Hebeseila n. gen. for *Seila bulbosa* Suter.
Taxonia n. gen. for *Ataxocerithium suteri* Marwick.
Zefallacia n. gen. for *Fastigiella australis* Suter.
Notosmister n. gen. for *Triphora fascelina* Suter.
Teretriphora n. subgen. for *Triphora huttoni* Suter.
Cautor n. subgen. for *Triphora lutea* Suter.
Novastoa n. gen. for *Siphonium lamellosum* Hutton.
Lilax n. gen. for *Stephopoma nucleogranosum* Verco.
Spirocolpus n. gen. for *Turritella waihaoensis* Marwick.
Zeacolpus n. gen. for *Turritella vittata* Hutton.
Stiracolpus n. gen. for *Turritella symmetrica* Hutton.
Maoricolpus n. gen. for *Turritella rosea* Q. & G.
Brookesena n. gen. for *Mathilda neozelanica* Suter.
Callusaria n. subgen. for *Struthiolaria callosa* Marwick.
Zegalerus n. gen. for *Calyptrea tenuis* Gray.

Zegalerus crater nom. nov. for *Trochita alta* Hutton.
Maoricrypta n. gen. for *Crepidula costata* Sow.
Zeacrypta n. subgen. for *Calyptraea monoxyla* Lesson.
Trichosirius n. gen. for *Trichotropis inornatus* Hutton.
Zelippistes n. gen. for *Separatista benhami* Suter.
Triviella memorata n. sp. for "*Trivia australis*" Suter.
Charonia capax n. sp. for "*Septa rubicunda*" Suter.
Charonia capax euchioides n. subsp. for "*Charonia lampas euchia*"
 Finlay.

Gondwanula n. gen. for *Ranella tumida* Dunker.
Fusitriton laudandus n. sp. for "*Priene retiohum*" Finlay.
Mayena zelandica n. sp. for "*Argobuccinum australasia*" Suter.
Murdochella n. gen. for *Scala laevifoliata* M. & S.
Murdochella alacer n. sp.
Conjectura n. gen. for *Crossea glabella* Murdoch.
Crosseola errata n. sp. for "*Crossea cancellata*" Suter.
Dolicrossea vesca n. sp. for "*Crossea labiata*" Suter.
Powellia n. gen. for *P. lactea* n. sp.
Powellia comes n. sp.
Powellia paupereques n. sp.
Syrnola menda n. sp. for "*Syrnola pulchra*" Suter.
Coluzea n. gen. for *Fusus spiralis* A. Ad.
Mitra maoria n. sp. for "*Mitra carbonaria*" Suter.
Diplomitra n. gen. for *Cymbiola nitens* Marshall.
Waimatea n. gen. for *Mitra inconspicua* Hutton.
Austromitra n. gen. for *Columbella rubiginosa* Hutton.
Austromitra rubiradix n. sp. for "*Vexillum planatum*" Suter.
Proximitra n. gen. for *Vexillum rutidolomum* Suter.
Egestas n. gen. for *Vexillum waitei* Suter.
Verconella (dilatata) rex n. subsp. for "*Megalatractus maximus*"
 Suter.

Marshallena n. gen. for *Belophos incertus* Marshall.
Glaphyrina n. gen. for *Fusus vulpicolor* Sow.
Glaphyrina [vulpicolor] progenitor n. subsp.
Aeneator n. gen. for *Verconella marshalli* Murdoch.
Evarnula n. subgen. for *Cominella striata* Hutton.
Buccinulum sufflatum n. sp. for "*Euthria striata*" Suter.
Zephos otagoensis n. sp. for "*Phos tenuicostatus*" Suter.
Zeapollia n. gen. for *Tritonidea acuticingulata* Suter.
Nussarius aoteanus n. sp. for "*Alectrion fasciata*" Suter.
Zeatrophon n. gen. for *Fusus ambiguus* Phil.
Xymenella n. gen. for *Trophon pusillus* Suter.
Paratrophon n. gen. for *Polytropa cheesemani* Hutton.
Azymene n. gen. for *Azymene turbator* n. sp.
Azymene turbator n. sp. for "*Trophon aucklandicus*" Suter.
Lenitrophon n. subgen. for *Trophon convexus* Suter.
Comptella n. gen. for *Trophon curtus* Murdoch.
Nerofundus n. gen. for *Trophon crispulatus* Suter.
Minortrophon n. subgen. for *Daphnella crassilirata* Suter.
Zeadmete n. gen. for *Cancellaria trailli* Hutton.
Paxula n. gen. for *Columbella paxillus* Murdoch.

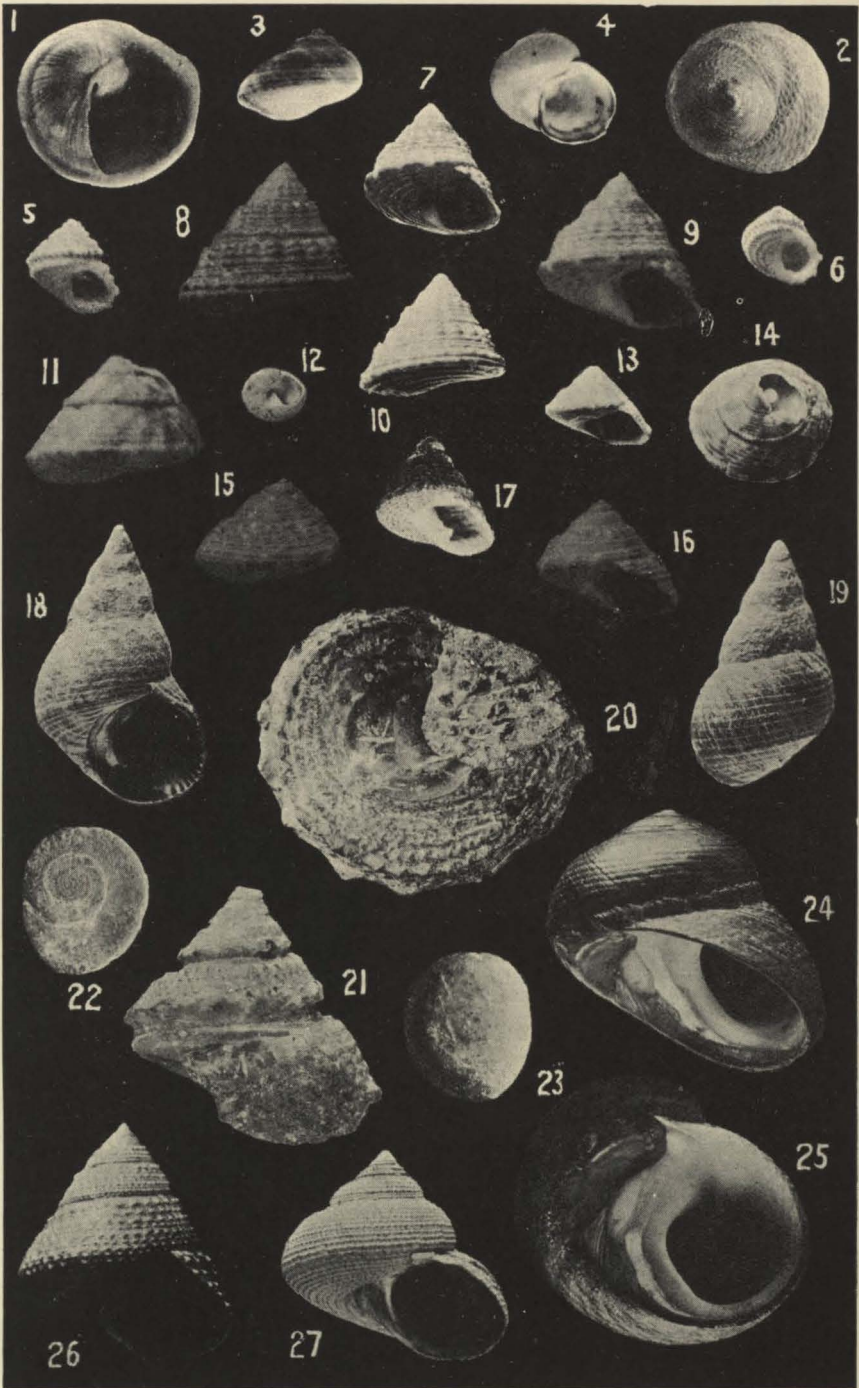
- Paxula murdochi* n. sp. for "*Columbella huttoni*" Murdoch.
Liratilia n. gen. for *Daphnella conquisita* Suter.
Zemitrella n. gen. for *Lachesis sulcata* Hutton.
Macrozafra n. gen. for *Clathurella subabnormis* Suter.
Antizafra n. gen. for *Columbella pisanopsis* Hutton.
Palomelon n. subgen. for *Cymbiola lutea* Watson.
Pinguispira n. subgen. for *Ancilla (Baryspira) opima* Marwick.
Rhizorus nesentus n. sp. for "*Volvulella reflexa*" Suter.
Cylichnina opima n. sp. for "*Cylichnella pygmaea*" Suter.
Dolicheolis n. gen. for *Eolidia longicauda* Q. & G.
Benhamina n. gen. for *Siphonaria obliquata* Sow.
Cadulus teliger n. sp. for "*Cadulus spretus*" Suter.
Cosa n. gen. for *Hochstetteria costata* Bernard.
Zelithophaga n. gen. for *Lithodomus truncatus* Gray.
Notovola n. gen. for *Pecten novae-zelandiae* Reeve.
Cycloclamys n. gen. for *Pecten transenna* Suter.
Cycloclamys secundus n. sp. for "*Pecten aff. transenna*" Mestayer.
Limatula maoria n. sp. for "*Lima bullata*" Suter.
Gaimardia auchlandica n. sp. for "*Modiolarca tasmanica*" Suter.
Gaimardia forsteriana n. sp.
Kidderia hamiltoni n. sp. for *Kidderia pusilla* Hedley, not *Mytilus pusillus* Gould, nor *Macgillivray*.
Costokidderia n. gen. for *Kidderia costata* Odhner.
Costokidderia pedica n. sp.
Costokidderia lyallensis n. sp.
Cuna laqueus n. sp. for "*Cuna delta*" Suter.
Cardita aoteana n. sp. for "*Cardita calyculata*" Suter.
Cardita brookesi n. sp.
Pteromyrtea n. subgen. for *Cyclina dispar* Hutton.
Parvithracia n. gen. for *Montacuta triquetra* Suter.
Zemysia n. gen. for *Lucina zelandica* Gray.
Zemysina n. subgen. for *Z. globus* n. sp.
Zemysia (Zemysina) globus n. sp. for "*Diplodonta globularis*" Suter.
Zemysia (Zemysina) striatula n. sp. for "*Diplodonta striata*" Suter.
Arthritica n. gen. for *Kellia bifurca* Webster.
Notolepton n. gen. for *Kellia antipoda* Filhol.
Zemylita n. gen. for *Pythina stowei* Hutton.
Myllitella n. gen. for *M. vivens* n. sp.
Rochefortula n. gen. for *Rochefortia reniformis* Suter.
Scintillona n. gen. for *Spaniorinus zelandicus* Odhner.
Maoritellina n. gen. for *Tellina charlottae* Smith.
Macomona n. gen. for *Tellina liliana* Iredale.
Zearcopagia n. gen. for *Tellina disculus* Desh.
Amphidesma forsteriana n. sp.
Dosimula n. gen. for *Dosina zelandica* Gray.
Austrovenus n. gen. for *Venus stutchburyi* Gray.
Irona n. gen. for *Venerupis reflexa* Gray.
Paphirus n. gen. for *Venus largillierti* Phil.
Panone ralphii n. sp. for *Panopea orbita* Tate, not Hutton.
Cleidothaerus maorianus n. sp. for "*Chamostrea albida*" Suter.

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(The following list of references is believed to include titles of practically all articles written on or referring to New Zealand Mollusca, Tertiary and Recent, since the publication of Suter's "Manual of the New Zealand Mollusca," in 1913, as well as a few important works prior to that date. All the works mentioned have been consulted in drawing up the present paper.)

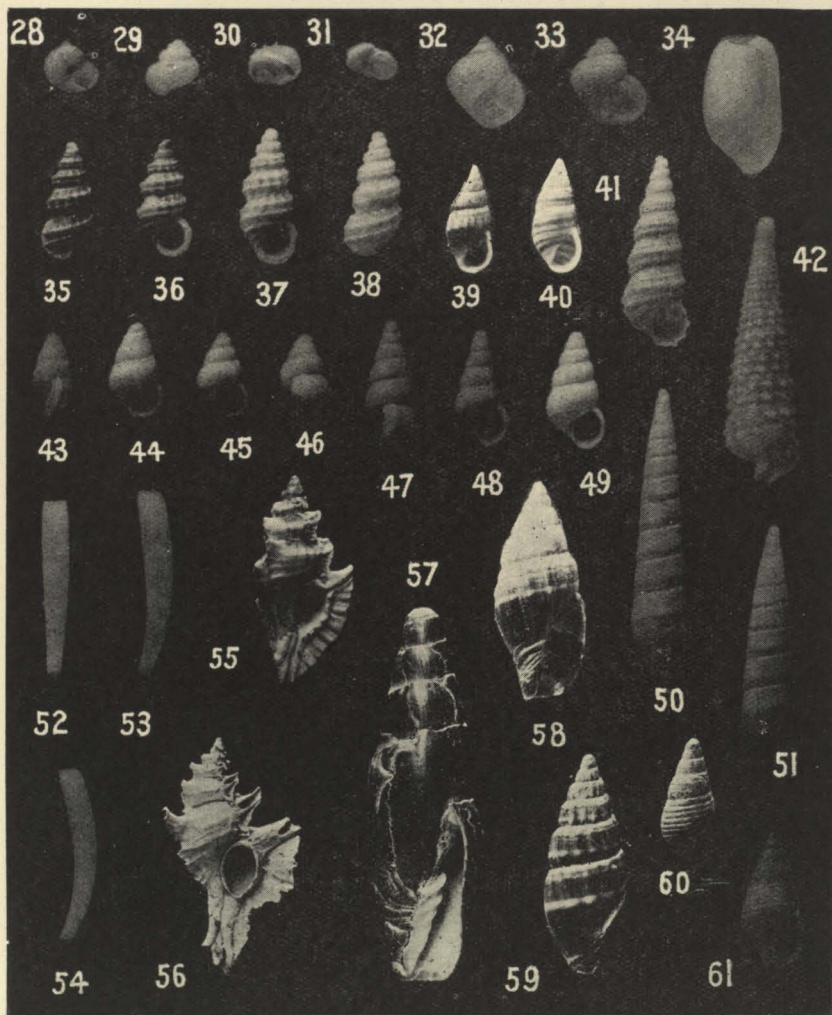
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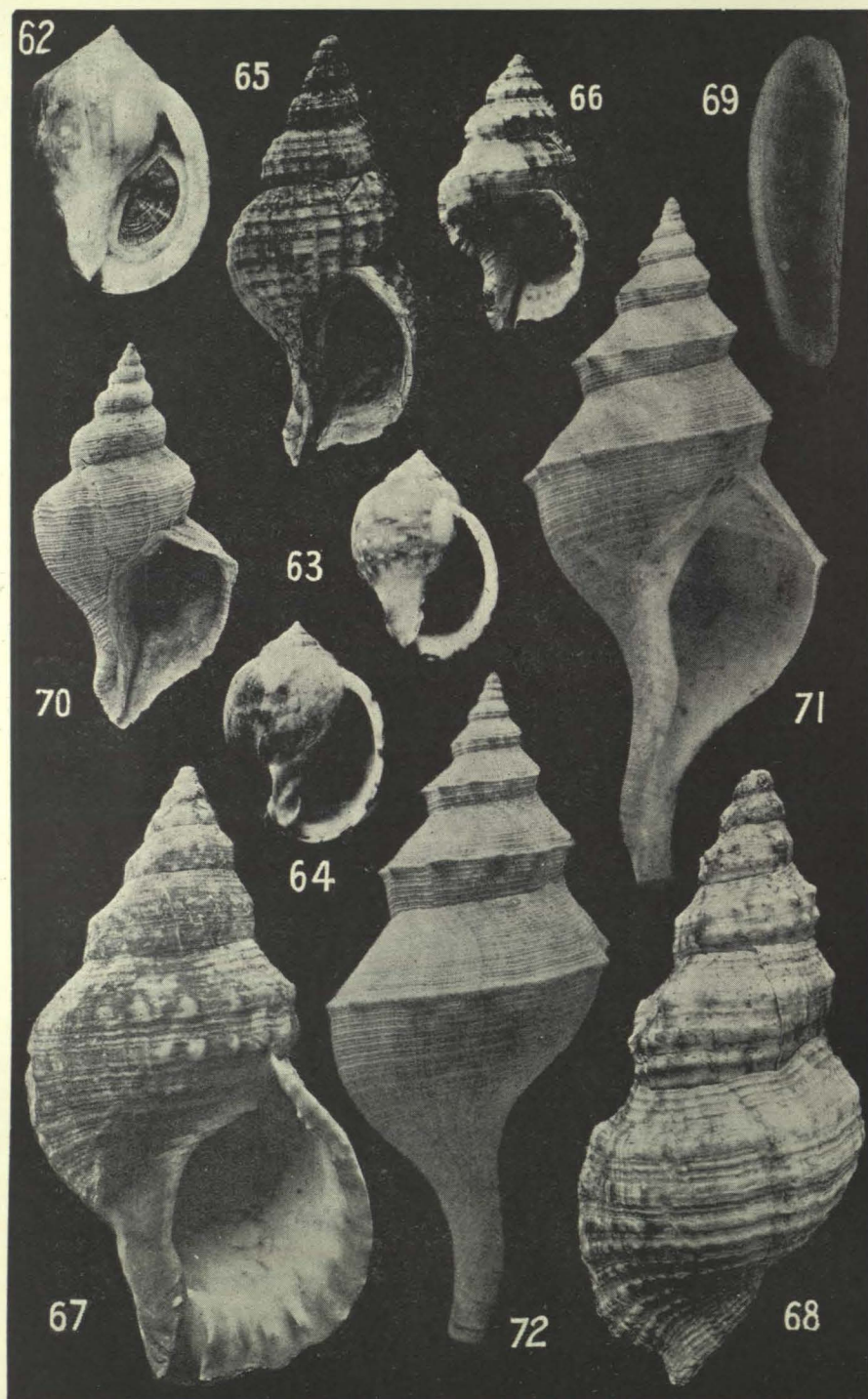


EXPLANATION OF PLATE 18.

- FIGS. 1, 2.—*Sigapatella terranova* Peile, off Cuvier Island, 40 f. $\times 4/3$.
 FIGS. 3, 4.—*Margarella decepta* (Iredale): neotype. $\times 1\frac{1}{2}$.
 FIGS. 5, 6.—*Herpetopoma larochei* Powell: topotype. $\times 3$.
 FIGS. 7-10.—*Thoristella benthicola* n.sp.: (holotype, 8). $\times 3$.
 FIGS. 11-14.—*Thoristella fossilis* n.sp.: (holotype, 13). $\times 3$.
 FIGS. 15-16.—*Thoristella dunedinensis* (Suter): topotypes. $\times 3$.
 FIG. 17.—*Paraclanculus peccatus* n.gen. et sp.: holotype. $\times 1\frac{1}{2}$.
 FIGS. 18, 19.—*Melarthaphe zelandiae* n.sp.: (holotype, 18). $\times 2$.
 FIGS. 20, 21.—*Incilaster marshalli* (Thomson): topotypes. $\times 2$.
 FIGS. 22, 23.—*Incilaster marshalli* (Thomson), operculum. $\times 2$.
 FIGS. 24, 25.—*Zediloma digna* n.gen. et sp.: holotype. $\times 5/3$.
 FIG. 26.—*Venustas* (*Mucrinops*) *spectabilis* (A. Ad.), off Otago Heads.
 $\times 1$.
 FIG. 27.—*Venustas* (*Mucrinops*) *urbanior* n.sp.: holotype. $\times 1$.

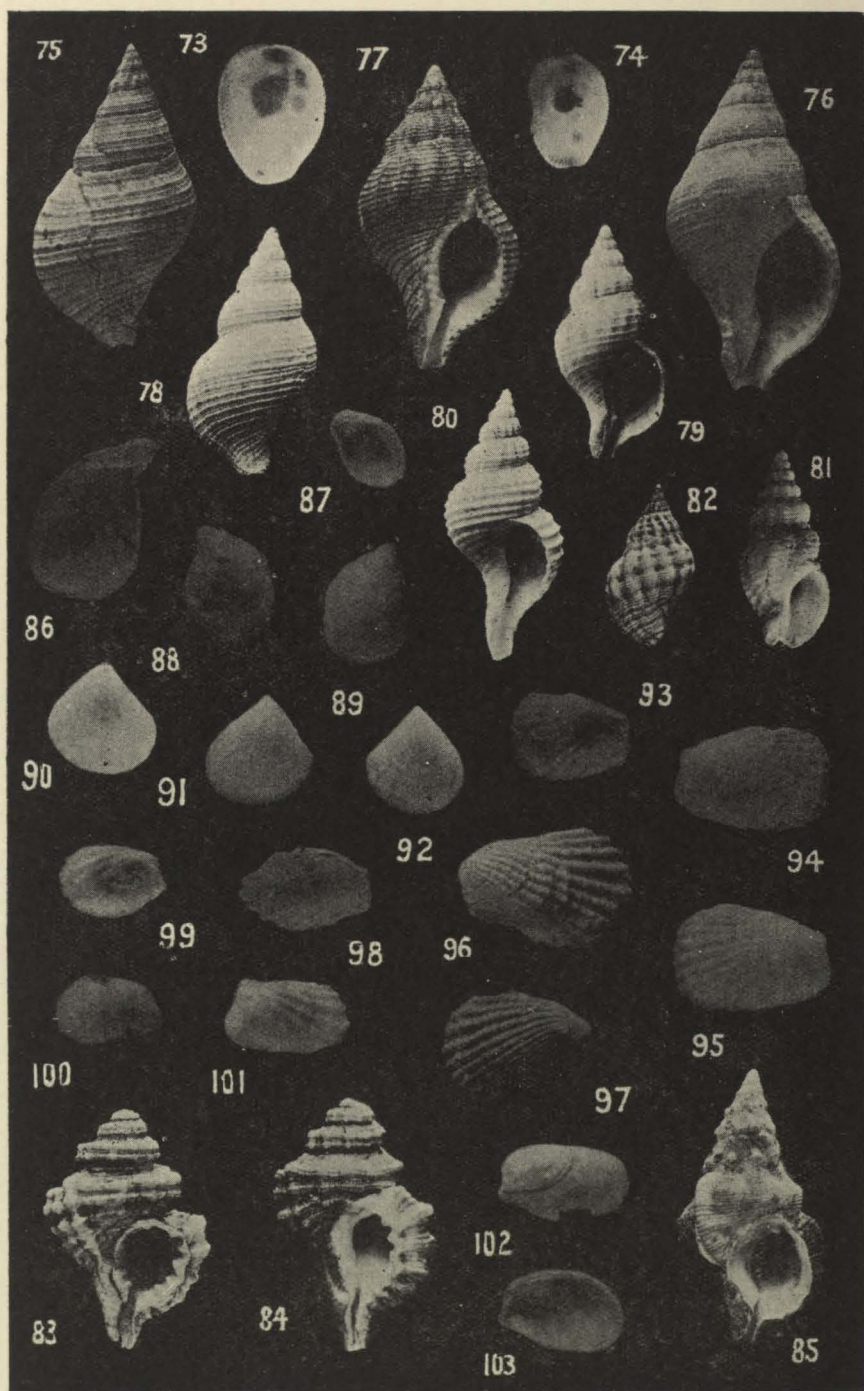


- FIGS. 28, 29.—*Lissotesta errata* n.sp.: (holotype, 29). $\times 6$.
 FIGS. 30, 31.—*Schismope laqueus* n.sp.: holotype. $\times 6$.
 FIG. 32.—*Dolicrossea vesca* n.sp.: holotype. $\times 6$.
 FIG. 33.—*Crosseola errata* n.sp.: holotype. $\times 6$.
 FIG. 34.—*Cylichnina opima* n.sp.: holotype. $\times 6$.
 FIGS. 35, 36.—*Meretina lyalliana* (Suter): topotypes. $\times 6$.
 FIGS. 37, 38.—*Meretina plaga* n.sp.: (holotype, 37). $\times 6$.
 FIGS. 39, 40.—*Rissoina anguina* n.sp.: (holotype, 39). $\times 3$.
 FIG. 41.—*Murdochella alacer* n.gen. and sp.: holotype. $\times 6$.
 FIG. 42.—*Alipta crenistria* (Suter), off Otago Heads, 60 f. $\times 3$.
 FIGS. 43, 44.—*Powellia paupereques* n.gen. and sp.: (holotype, 43). $\times 6$.
 FIGS. 45, 46.—*Powellia comes* n.sp.: (holotype, 45). $\times 6$.
 FIGS. 47, 48.—*Powellia lactea* n.sp.: (holotype, 47). $\times 6$.
 FIG. 49.—*Powellia semireticulata* (M. & S.): holotype. $\times 6$.
 FIGS. 50, 51.—*Syrnola menda* n.sp.: (holotype, 50). $\times 6$.
 FIGS. 52-54.—*Cadulus teliger* n.sp.: (holotype, 54). $\times 6$.
 FIG. 55.—*Pteronotus* (*Pterochelus*) *eos* (Hutton): topotype. $\times 1$.
 FIG. 56.—*Pteronotus* (*Poropteron*) *zelandicus* (Hutton): topotype. $\times 1$.
 FIG. 57.—*Mitra maoria* n.sp.: holotype. $\times 1$.
 FIGS. 58, 59.—*Austromitra antipodum* (Brookes): topotypes. $\times 3$.
 FIGS. 60, 61.—*Paxula murdochi* n.gen. et sp.: (holotype, 61). $\times 3$.



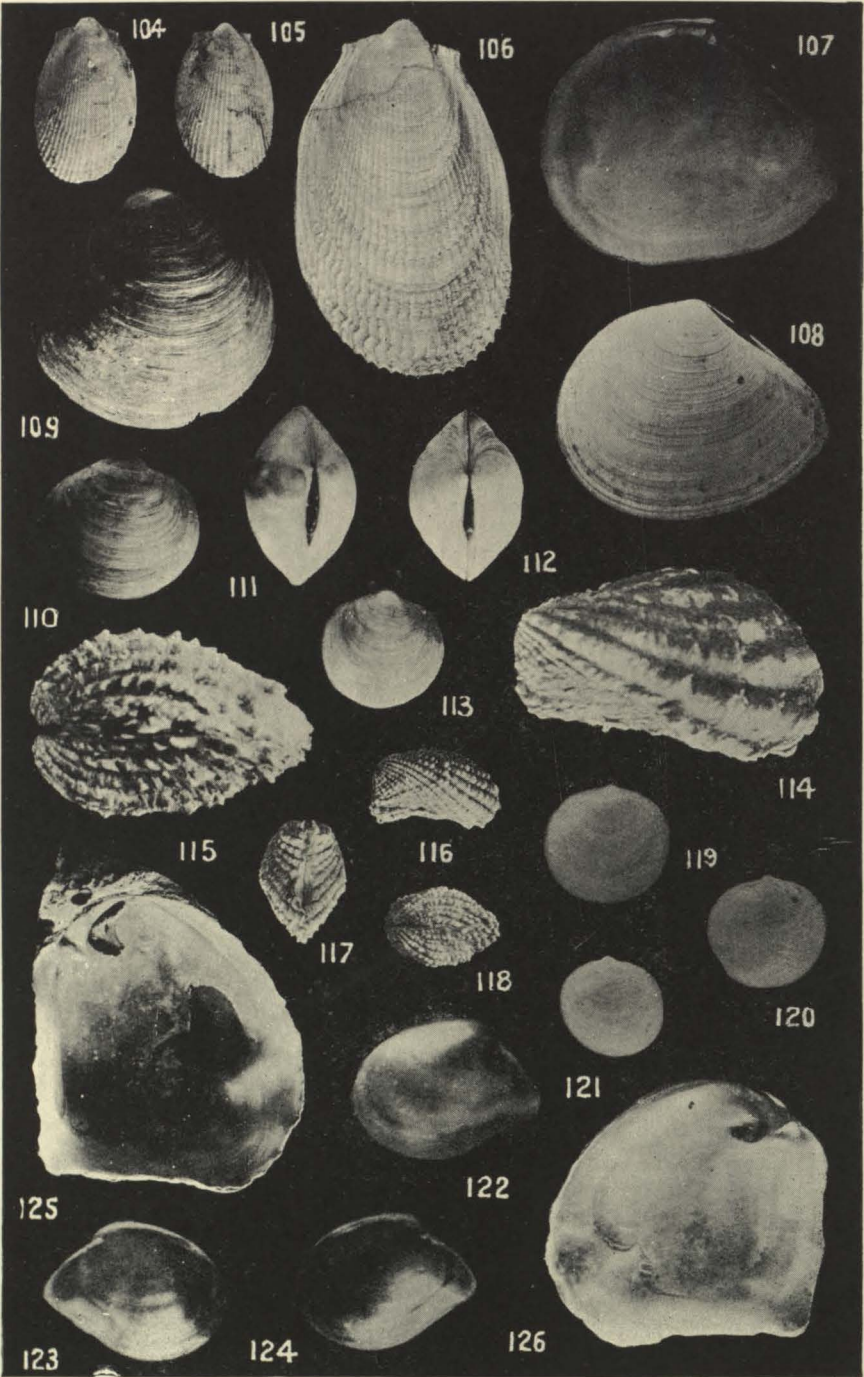
EXPLANATION OF PLATE 20.

- FIGS. 62, 63.—*Phalium* n.sp. (*labiatum* auct.), Opotiki. $\times \frac{3}{4}$ and $\frac{2}{5}$.
FIG. 64.—*Phalium* n.sp. (*pyrum* auct.), 40 fath., off Whakatane. $\times \frac{2}{5}$.
FIG. 65.—*Fusitriton laudandus* n.sp.: holotype. $\times \frac{3}{5}$.
FIG. 66.—*Mayena zelandica* n.sp.: holotype. $\frac{2}{5}$.
FIG. 67.—*Charonia capax* n.sp.: holotype. $\times \frac{1}{2}$.
FIG. 68.—*Charonia capax euclioides* n.subsp.: holotypé. $\times \frac{2}{5}$.
FIG. 69.—*Poroleda pertubata* Iredale, Dusky Sound. $\times 4$.
FIG. 70.—*Verconella dilatata* (Q. & G.), Castlecliff beds. $\times \frac{1}{2}$.
FIGS. 71, 72.—*Verconella rex* n.sp.: holotype. $\times \frac{3}{5}$.



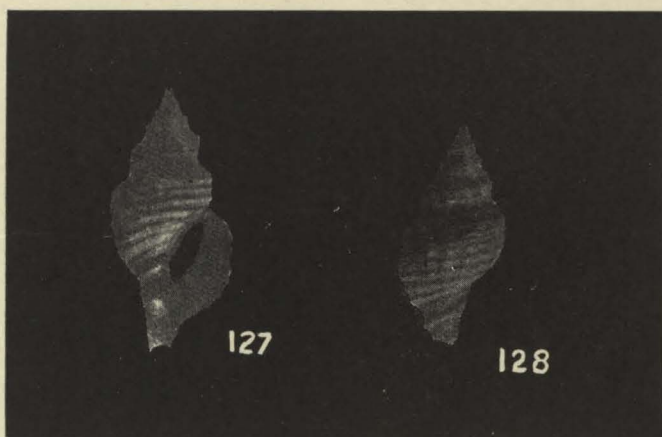
EXPLANATION OF PLATE 21.

- FIG. 73.—*Triviella memorata* n.sp.: holotype. $\times 4/3$.
 FIG. 74.—*Triviella merces* Iredale, Port Jackson. $\times 4/3$.
 FIGS. 75, 76.—*Buccinulum sufflatum* n.sp.: (holotype, 76). $\times 5/4$.
 FIG. 77.—*Buccinulum* (*Evarnula*) *fuscozonatum* (Suter), Whangaroa.
 $\times 1\frac{1}{2}$.
 FIGS. 78, 79.—*Buccinulum* (*Evarnula*) *striatum* (Hutton): topotypes.
 $\times 1$.
 FIG. 80.—*Glaphyrina vulpicolor* (Sow.), off Otago Heads, 60 f. $\times 1$.
 FIG. 81.—*Zephus otagoensis* n.sp.: holotype. $\times 1$.
 FIG. 82.—*Agnewia tritoniformis* (Blainville), Whangaroa. $\times 1$.
 FIGS. 83, 84.—*Cymatium exaratum* (Reeve), Tauranga. $\times 1$.
 FIG. 85.—*Austrotriton parkinsonianum* (Perry), Whangaroa. $\times 1$.
 FIGS. 86–89.—*Hochstetteria modiolus* (Suter): topotypes. $\times 6$.
 FIGS. 90–92.—*Cuna laqueus* n.sp.: (holotype, 92). $\times 5$.
 FIGS. 93–95.—*Costokidderia lyallensis* n.gen. et sp.: (holotype, 95).
 $\times 6$.
 FIG. 96–98.—*Costokidderia pedica* n.sp.: (holotype, 96). $\times 6$.
 FIGS. 99–01.—*Costokidderia costata* (Odner): topotypes. $\times 6$.
 FIGS. 102, 103.—*Kidderia acrobeles* (Suter): topotypes. $\times 6$.



EXPLANATION OF PLATE 22.

- FIGS. 104-106.—*Limatula maoria* n.sp.: (holotype, 106). $\times 4/3$.
 FIGS. 107-108.—*Macomona liliana* (Iredale), Stewart Island. $\times 1$.
 FIGS. 109-111.—*Zemysia* (*Zemysina*) *globus* n.gen. et sp.: (holotype, 109). $\times 1\frac{1}{4}$.
 FIGS. 112, 113.—*Zemysia* (*Zemysina*) *striatula* n.sp.: (holotype, 113). $\times 1\frac{1}{4}$.
 FIGS. 114, 115.—*Cardita aoteana* n.sp.: holotype. $\times 1\frac{1}{2}$.
 FIGS. 116-118.—*Cardita brookesi* n.sp.: (holotype, 116). $\times 1\frac{1}{2}$.
 FIGS. 119-121.—*Mytilella vivens* n.gen. et sp.: (holotype, 119). $\times 6$.
 FIGS. 122-124.—*Gaimardia aucklandica* n.sp.: (holotype, 124). $\times 6$.
 FIGS. 125-126.—*Cleidotherus maorianus* n.sp.: holotype. $\times 2/3$.



Aymene turbator n.gen. and sp.

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Additions to the Recent Molluscan Fauna of New Zealand.—No. 2.

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Plates 24, 25.

Venustus cunninghami regifica n. subsp. (Figs. 9, 10).

1924: *Calliostoma selectum* (Chemnitz): Finlay, *Trans. N.Z. Inst.*, vol. 55, p. 518.

The southern (Forsterian) representative of the North Island (Cookian) *V. cunninghami* (Griff. & Pidg.) (see elsewhere this vol.). Altogether a larger and more handsome shell, but differing especially in the characters of periphery and base. Periphery very roundly angled, not acute as in the species; base considerably inflated and convex, the vertical distance from periphery to anterior extremity of shell, gauged at the outer lip, being three-quarters of vertical distance from periphery to suture; in the species itself the base is very depressed and almost flat, the former vertical distance being only one-fourth to one-third of the latter. Umbilical callus area relatively larger, and less hollowed, columella much longer and less excavated.

Height, 54 mm.; diameter, 62 mm.; ht. of aperture, 26 mm. (type).

Height, 59 mm.; diameter, 59 mm.; ht. of aperture, 25 mm. (most elate paratype).

Habitat.—off Otago Heads, in 30 fathoms; ten living specimens. Type in Finlay collection.