MOLLUSCA.

By Tom Iredale.

(Plates xv.-xvii.)

Owing to the circumstances detailed above by Mr. Whitley, the collection of mollusca is not very large, but, as it includes the normal striking forms, it may be regarded as representative. It is very important, however, as it indicates definitely the relationship of the molluscs and therefore it is of great value. It can be stated, without question, that the two reefs, Elizabeth and Middleton, have been a part of the Lord Howe plateau since the time of the separation of the Phillipian Region from the Montrouzierian Region, i.e., New Caledonia. This time may be comparatively geologically recent as the land mollusca of the two Regions are closely related, but it has been long enough to allow generic development in the group. On the other hand, the marine mollusca of the two Regions show little distinction, but one peculiar form has evolved, the now well known *Turbo cepoides* Smith, of Lord Howe Island. There are, obviously, no land molluscs on Elizabeth and Middleton Reefs, so we must depend on the marine forms, and there we are agreeably surprised to find this distinctive shell.

Having this clue it becomes easy to reconcile all the reef forms with those of Lord Howe Island, and thus prove the concordance of the faunulae. This will be best shown by a short discussion of the elements of the collection secured by Mr. Whitley. In the systematic order in which they will appear they will be shortly referred to without separating the forms from the two reefs, but these will be listed at the conclusion of this essay.

Dealing with the bivalves, the most noticeable were the Giant Clams, but here while a small form agrees in detail with the Lord Howe Island species, a large one is puzzling. It differs considerably from those of the Queensland Great Barrier Reef, and it is possible that it may occur on Lord Howe Island below low water. This may appear a prejudiced statement, but quite recently a large shell, *Charonia tritonis*, was found alive on the edge of the reef at Lord Howe Island, whence not even a fragment had previously been seen. However, a Codakioid was commonly found as valves, which agrees with the Lord Howe form, while a very striking *"Tellina"*, known as *T. quoyi*, was also met with. This will be particularly discussed hereafter. The other bivalves are not distinctive, but all have been found at Lord Howe Island, so that there is no question here.

The Loricata have proved one of the best guides in the whole molluscan world, and in the time available it could not be expected that these would be studied. However, Mr. Whitley secured two small examples, and these are referable to endemic Lord Howe Island forms, one of which has no relation yet on New Caledonia. It could not have been anticipated that the Gastropoda would give much assistance, but *Turbo cepoides* indicated decisively the alliance, and this is conformed by the remainder of the larger shells collected, all of which (save one) have been collected at Lord Howe Island. The exception is the prize of the trip, a *Calcar* form, distinct from the New Caledonian or Queensland forms, and which has not otherwise been found. A *Nannoscutum*, hereafter defined, is so far only known from Lord Howe Island, Norfolk Island and the Great Barrier Reef, but not from New Caledonia, but as it is not on record at all, it may still be found at the last-named locality. A curious case is that of the shell known as *"Drupa"*

or *"Sistrum" chaidea,* which is common at the Islands, but is so far only known from the southern end of the Great Barrier Reef. There is a distinct connection between New Caledonia, Lord Howe Island and the Capricorn Group, judging from the molluscs collected at these localities.

Phylum Mollusca.

The molluscan inhabitants of a coral reef of the Great Barrier Reef of Australia have never yet been completely accounted, but probably fifteen hundred species would be a fair estimate. This figure is deduced from my own experiences, complementing those of my talented predecessor, Hedley. From his first investigation, that of Mast Head Reef, Capricorn Group, Hedley recorded 447 species with more than 100 left unstudied, the result of one week's collecting. A little later, from the Hope Islands in about the same time, Hedley reported that he had secured more than seven hundred species. With a longer period, a month or so, Whitley and I made a collection of nearer one thousand species at Michaelmas Cay, and this has since been confirmed at Low Isles and North West Reef, Capricorn Group. Mr. Melbourne Ward collected at Lindeman Island, an inshore island with a small reef, and the same figures are applicable. On the other hand, a good collection, made at Lord Howe Island by Mr. Roy Bell, shows that faunula to be definitely smaller, about five hundred species, suggesting a maximum of one thousand. Notwithstanding these figures the significant species will probably appear in the first hundred or so collected in any given locality, and hence comparisons are valuable even with little material. Thus the fifty odd species can be dealt with, the lcoal conditions being known, and their relationships adjudged with a fair meed of accuracy. It is necessary, however, in such cases, to criticise each species closely, and determine correctly as far as possible its exact alliance.

Class Pelecypoda.

Obviously there could be little found in the way of bivalves upon such reefs, as most of these are buried in the sand. Giant Clams were, of course, visible, but most of the collection was picked up on the sand spit, and thus these can be scarcely regarded as representative, but merely as an indication of the possibilities. Only some seventeen species were found, but each one was suggestive, and some distinctive forms were secured.

Family Arcidae.

Some specimens of a small Ark were found under coral blocks, and an odd valve of a larger Ark was picked up, and both are related to Lord Howe Island species of, however, wider range.

Genus Acar.

1857. *Acar* Gray, Ann. Mag. Nat. Hist., Ser. 2, Vol. xix., p. 369. Logotype, Stoliczka, Palaeont. Indica, p. xxi., August 1, 1871. *A. divaricata* Sowerby.

Previously overlooked, this type designation appears to be earliest, and, as it is legitimate, Gray's *Acar* is still acceptable in its traditional usage. The habit of living in crevices under coral blocks lends this shell to a little distortion, and series are necessary for accurate determination.

Acar dubia Baird.

1873. *Arca* (*Byssoarca*) *dubia* Baird, Jottings Cruise Curaçoa, p. 453, pl. xlii., figs. 5-6. New Caledonia.

The specimens from Elizabeth Reef have been contrasted with series from Lord Howe Island, Norfolk Island, New Caledonia and Queensland, and agree best with those from the first-named locality.

Genus Arca.

1758. *Arca* Linné, Syst. Nat., xth ed., p. 693, January 1. Logotype, Anton, Verz. Conch., p. 12, 1838. *Arca barbata* Linné.

There has been much difference of opinion as to the usage of the generic name *Arca,* and I have given details in a report on the mollusca of Low Isles, Queensland, with the conclusion that the above is the earliest legitimate type designation. The valuation of the forms commonly confused is also there fully investigated. The valve picked up at Middleton Reef belongs to the series confused in Queensland under the name *"Arca foliata* Forskal", and otherwise as *Arca decussata* Sowerby. I have distinguished it clearly in my report, and this valve agrees with Lord Howe Island specimens, and these were recorded by Brazier (Austr. Mus. Mem., No. 2 (Lord Howe Island), pp. 28, 30, 1889) under Sowerby's name.

Family Ostreidae.

One oyster was brought back from Middleton Reef, and this belongs to the species Hedley reported from Mast Head Reef, under the name *Ostrea cerata* Sowerby. I have investigated the Oysters of Eastern Australia very closely, and my results are now under consideration in my report on the Mollusca of Low Isles, Queensland, and it is not desirable to anticipate that report in this place.

Family Limidae.

Among some small shells, sorted out of debris from Elizabeth Reef, were a couple of valves of a small *"Limatula"*, with little distinctive features, so that it may be the juvenile of a larger species of the so-called *"bullata"* series. The same remarks apply in this case as in the preceding, and it may be noted that many species of "Limoid" mollusca live on coral reefs.

Family Mytilidae.

This group was also reported upon for the Low Isles report, and the *"Lithophaga"* series provided an excellent study, many species and their habits being recorded. It was found that many were apparently restricted to one sort of coral. One small specimen can be seen inside a small piece of *Acropora* from Elizabeth Reef, but this cannot be specifically named. Small specimens of *Septifer* were picked up at both Reefs, and a small *Musculus* was found in the debris from Elizabeth Reef, and this is here described.

Genus Lithophaga.

1798. *Lithophaga* Bolten, Mus. Bolten, pt. ii., p. 156, September. Haplotype, *L. mytuloides* = *Mytilus lithophagus* Linné.

The general name *Lithophaga* is here used, as many distinct groups have been fully described in the Low Isles Report, and until that appears in print it is unwise to attempt any other nomination here.

Genus Septifer.

1848. *Septifer* Recluz, Rev. Zool. (Cuv.), 1848, p. 275, September no. = October. Orthotype, *Mytilus bilocularis* Linné.

Septifer bilocularis Linné.

1758. *Mytilus bilocularis* Linné, Syst. Nat., 10th ed., p. 705, January 1. "O. Indico" = East Indies or Ceylon.

The small specimens found on both Reefs may be juvenile shells referable to the large species above-named, or they may belong to some small distinct species, but the material available has shown so much individual variation that this point has not yet been satisfactorily settled even in connection with Queensland shells.

Genus Musculus.

1798. *Musculus* Bolten, Mus. Bolten, pt. ii., p. 156, September. Logotype, Iredale, Journ. Conch., Vol. xiv., p. 342, 1915, July 1. *M. discors* Bolten = *Mytilus discors* Linné.

Musculus nubilis *sp. nov.*

This small species is easily distinguished from any of the described Australian forms by its fine sculpture and pronounced posterior angle. The hingeline, however, shows numerous strong denticles for such a small shell, and these allow its discrimination as a new subgenus *Propetilus*.

Shell small, transversely oval, swollen anteriorly, equivalve very inequilateral, umbones very anterior, coloration pale brown.

The umbones are placed well forward, much incurved, the anterior steep but a little rounded, the ventral margin curving away to meet the posterior side at a rather sharp angle. The hinge line is almost straight and the posterior side is produced at an obtuse angle to meet the ventral margin somewhat acutely. The anterior sculpture is a little indistinct, the flattened ribs being about twelve. The median smooth area is not very wide, while the posterior ribbing is very fine and the posterior angled area is more coarsely transversely ribbed, thus separating it widely from the local species (Rec. Austr. Mus., Vol. xix., pp. 270-271, pl. xxi., figs. 1 and 10, 1936). It is more like *Modiola difficilis* Deshayes, from Reunion.

Length, 8 mm. Height, 4.5 mm.

Elizabeth Reef, picked off *"Tridacna"*.

Family Chamidae.

Two forms were secured at Middleton Reef, both too worn for specific record without knowledge of the forms inhabiting the adjacent localities. I have been studying the Australian species recently, and find that there are many species distinguishable when series of good specimens are available.

Family Tridacnidae.

Whenever a Giant Clam is now met with there will be trouble in determining the species until a great deal of study has taken place. One hundred and fifty years ago many species were distinguished, and then through the mistaken energy of the nineteenth century workers the species were merged. At the present time we know that many different animal forms have been developed in this group, and that these are recognisable by means of shell characters. The groups, known as *"gigas"*, *"squamosa"*, *"crocea"*, and *"elongata"*, are of complex ancestry, and each must bear a differential name, while under *"gigas"* apparently two or more distinct groups are confused. A large Clam was brought back from Elizabeth Reef (it was also seen at Middleton Reef, according to Whitley), and this has necessitated a study of these Clams. This was in progress in

connection with the Low Isles shells, and in this case publication of some results can be here allowed. A small Clam occurred at both Reefs, and the specimens secured agree completely with those from Lord Howe Island, which Hedley regarded as *Tridacna maxima* var. *fossor*, his type being from North West Reef, Capricorn Group, Queensland.

The determination of the use of the generic name is again at issue as *Tridacna* is credited to Bruguière from the fact that it appeared at the head of two plates in the Tabl. Encyclopedie Meth., Vers., without specific nomination. No explanation accompanied these plates at the time (1797), but nearly thirty years afterward.

Bory de St. Vincent suggested the following identifications:—

"Plate 235, fig. 1. *Tridacna gigas* Lam., 1819, ex L. ?
„ „ „ 2. *Tridacna crocea* Lam., 1819.
„ „ „ 3. *Tridacna serrifera* Lam., 1819.
„ „ „ 4. *Tridacna squamosa* Lam., 1819.
Plate 236, fig. 1. *Tridacna squamosa* Lam., 1819.
„ „ „ 2. *Tridacna hippopus.*"

The earliest type designation is by Anton (Verz. Conch., p. 12, "1839" = October, 1838), who selected *C. gigas* Linné, but Bruguière's figures do not show that species as now understood. Figure 1, the only figure that has been so regarded, is of a small shell with a large byssal gape and scalloping towards the edges of the shell. If Bruguière's name be rejected as suggested by some authorities, the next name perhaps even anterior in date is *Tridachna* of the Museum Calonnianum. As the names in this work have been rejected, though absolutely incorrectly, by the International Commission on Nomenclature, they are not here used, without prejudice.

The next usage is by Bolten, who spelt the name *Tridachnes*, and perhaps this spelling * must be used. The type of *Tridachnes* Bolten, does not appear to have been selected, so is here named as *T. gigas* as of Linné. The following year Lamarck used *Tridacna*, with *Chama gigas* Linné as the sole species, and this has since been commonly used, but not without opposition. Gray introduced the usage of *Hippopus*, referring the generic name back to "Martini, 1773", a non-Linnean authority. Morch, however, went further back still, and proposed the recognition of *Chametrachea* of Klein, a pre-Linnean writer. Morch was followed by H. and A. Adams, but this usage did not gain universal acceptance. A complication ensues here also, as Morch did not include the traditional *gigas*, when he reintroduced Klein's name correctly, so that another type must be selected, and this action makes *Chametrachea* the valid name for the *crocea* group. The facts must be displayed in full, as otherwise they cannot be easily understood, and at this time this becomes very necessary, as important anatomical differences have already been recorded in connection with the species, and these have been misunderstood through ignorance of the many species and genera being confused.

* This appears to be the correct classical spelling.

Genus Tridacna.

1797. *Tridacna* Bruguière, Tabl. Ency. Meth., Vers., pls. 235/6. Logotype, Anton, Verz. Conch., p. 12, 1838, *C. gigas*.

[1797. *Tridachna* Humphrey, Mus. Calonn., p. 50, ante May 1. Logotype here selected, *Chama gigas* Linné.]

1798. *Tridachnes* Bolten, Mus. Bolten, pt. ii., p. 171, September. Logotype here selected, *Chama gigas* Linné.

1799. *Tridacna* Lamarck, Mem. Soc. d'Hist. Nat. Paris, p. 86, May. Haplotype, *Chama gigas* Linné.
1801. *Tridacna* Lamarck, Syst. Anim. s. Verteb., p. 117, January. Haplotype, *Chama gigas* Linné.
1847. *Hippopus* Gray, Proc. Zool. Soc. (Lond.), 1847, p. 198, November. ex Martini, 1773 (non-binomial). Orthotype, *Chama gigas* Linné. Not *Hippopus* Lamarck, 1801.
[1847. *Hippopodes* Gray, Proc. Zool. Soc. (Lond.), 1847, p. 198, November. ex "Gevers, 1787", in synonymy.]

This generic name must be utilised for the Giant Clams of the Indian Ocean, however it may be spelt, or whosoever authority may be allotted to it. Some exactitude may later be determined as to the type, but there is more than one species of Giant Clam, the Queensland form being dealt with in detail elsewhere. A large specimen brought from Middleton Reef proved to be very different from the East Australian one, and is here described and figured. It certainly does not belong to the same series, but rather to the *derasa* Bolten = *serrifera* Lamarck group, and is here made the type of a new genus, *Persikima*.

Genus Persikima *nov.*

Type, *P. whitleyi nov.*

(Plate xv.)

This species is named for Mr. G. P. Whitley, as a mark of my gratitude for his constant enthusiasm in securing molluscan specimens, especially as he would not have deserved blame had he neglected such an awkward object as this Giant Clam.

Shell of large size, not much swollen umbonally, compressed ventrally, ribs depressed without any scalloping, almost equilateral. Hinge very much intruded upon, teeth almost obliterated. Muscle scars central, the large rounded anterior adductor scar apparently enveloping the narrowly elongate pedal adductor, or otherwise that must be much reduced. The hinge is quite unlike that of the Giant Clams, as here the cardinals are almost suppressed, and the laterals are also nearly obliterated.

The pedal gape is closed but the remains of the combing can be still seen pushed underneath the umbo which is so forward that the anterior side is absolutely shorter than the posterior. When Sowerby described his *obesa* he drew attention to this fact, stating that it happened in no other Giant Clam. The external ribbing is also flattened out so that the external edge is scarcely wavy, the margin being sinuate only, not at all dentate.

The specimen figured measures about 12 inches in length by about 9½ inches in height, and is a very old shell. It would be equivalent for comparative purposes to the large specimen of *"Tridacna gigas"*, measuring 3 feet in length by 2 feet in depth. Such a shell is now before me and its huge size suggests a similar age, and its anterior adductor scar is comparatively smaller, the pedal almost indeterminate.

Hedley figured a small specimen from Murray Island as *Tridacna derasa* Bolten, and this would appear to be the immature of a species very closely allied, if not identical, to the Middleton Reef shell. It is obviously immature, though about 7½ inches long, and shows a narrow pedal gape, with strong teeth, as indicated in the Reef shell. In this the pedal adductor scar can be seen adjacent to the anterior adductor, while the cardinal teeth are well defined, as also the laterals, the ligament being normal.

Before leaving the subject of Giant Clams, attention must be drawn to the geographical distribution of the species as necessitating early research. Thus the bulk of the early material came from the Indian Ocean and the East Indies, and Lamarck only knew the same localities. When Reeve figured the specimens for his Monograph, he observed "With the exception of *T. gigas,* from Navigator's Islands, all the species of which I have the habitat, are assigned to the Moluccas or Philippine Islands". Reeve figured as *gigas* a scaly shell, writing:—"This colossal species which attains the enormous size of from six to seven hundred pounds weight may be distinguished in all its stages of growth by a tendency to radiate anteriorly in an oblique direction, and by the closely scaled character of the ribs". This was named *T. lamarcki* by Hidalgo (Mem. R. Acad. Madrid, Vol. xxi., p. 385, 1903), while Hedley probably following Lamy has regarded it as *Tridacna mutica* Lamarck (Hist. Anim. s. Vert., Vol. vi., p. 106, 1819), a determination disagreeable with Lamarck's description. Then Sowerby (Proc. Mal. Soc. (Lond.), Vol x., pp. 29-31, March 8, 1912) recorded all the species from the Philippine Islands, reducing the known species to six, adding two new ones; probably these eight each represent a generic group. Sowerby had monographed the genus in the Thes. Conch., and had given an excellent illustration of the Giant Clam of the Navigator's Islands, which is seen to have very deep grooves and rounded smooth, or rather scaleless, ribs. This is apparently the common Giant Clam of the Pacific Islands, as it also occurs at Fiji and Gilbert Islands. A small specimen from the latter locality in the Australian Museum was named *derasa* by Hedley, but it is very distinct from Bolten's *derasa,* which is much more like my *Persikima whitleyi.* From the Philippines, Sowerby described *T. obesa,* while he also recognised *serrifera,* i.e., *derasa,* and *obesa* appears superficially referable to *Persikima.* The Pacific Giant Clams, however, appear very distinct, and I propose the generic name *Dinodacna,* naming the species, *cookiana* and selecting the Gilbert Islands specimen as type, while referring to Sowerby's figure as an illustration. In this genus the cardinal hinge teeth are developed to a great extent with the suppression of the laterals, while the ligament is always kept in subjection. The immature characters are retained until a length of two feet is reached, and then the shell probably increases very slowly, as at three feet they are apparently aged, and with a senile look. It may be as well to summarise the conclusions here as to the Giant Clams for further reference. *Tridacna* Bruguière, 1797, is doubtfully valid; *Tridachna* (Humphrey) 1797 has been wrongly rejected; *Tridachnes* Bolten, 1798, is next available name, with type, *Chama gigas* Linné, whatever that is, but definitely a scaly Indian Ocean or Moluccan shell. The Pacific Ocean Giant Clam is deeply ribbed, but the ribs are scaleless, and this has developed from a different source from the preceding, and is here generically differentiated as *Dinodacna,* the species being named *cookiana.*

A third group of Giant Clams is that known for centuries which I call *Persikima,* and to which the Middleton Reef shell belongs. It is also scaleless, but is very shallowly ribbed and the immature is of the *derasa* or *serrifera* style. These appear to be the Giant Clams proper, but the *"squamosa"* shells also grow to a large size. These are easily recognised by their large distant scallopping, the large pedal gape with its edges notably ridged, its subglobose form, the umbones being almost central, the hinge teeth well displayed, the external ligament normal and the adductor muscle scars median, the anterior a little forward, the pedal small and central. This group is named *Flodacna,* the type being *squamosa* auct.

Genus VULGODACNA *nov.*

Type *Tridacna maxima* var. *fossor* Hedley.

Shells of small size for the family, maximum size about ten inches in length, elongate, anterior side much produced, byssal gape large, lengthened, exterior deeply ridged, ribs closely scallopped. The exterior ligament inclined to be intrusive and taking charge of the hinge teeth, which thus degenerate. The circular anterior adductor placed far forward and succeeded by an attingent small suboval pedal adductor scar.

VULGODACNA FOSSOR Hedley.
(Plate xvi., fig. 1.)

1921. *Tridacna maxima* var. *fossor* Hedley, Rec. Austr. Mus., Vol. xiii., p. 171, pl. xxx., fig. 7 (type), pl. xxix., fig. 6, pl. xxxiii., fig. 11, April 12 (Lord Howe Is.), Masthead Is., Capricorn Group, Queensland.

When Hedley differentiated this Queensland clam from *elongata* Lamarck, of West Australia, he gave as type a Queensland shell, but used Lord Howe Island specimens mainly in his discussion. There is very little difference superficially in the shells, so they are not separated here, but further study may yet necessitate this. The Middleton and Elizabeth Reef shells are very similar in every detail to those of Lord Howe Island, and will undoubtedly belong with those if separation take place.

The exact relationship of this species to the West Australian shell is not known, and perhaps the *"elongata"* series is not even homogeneous, but specimens from Rarotonga collected by Mr. G. P. Whitley appear to be referable to this series. I figured a very distinct shell as *Tridacna troughtoni* (Rec. Austr. Mus., Vol. xvi., p. 75, pl. v., figs. 9, 10, 1927) from Vanikoro, and similar shells also occur at Rarotonga, and Samoa, and these agree generally with the species described as *T. acuticostata* by Sowerby (Proc. Mal. Soc. (Lond.), Vol. x., p. 30, March 8, 1912), from the Philippines. The shells are elongate, but the ribs are more numerous, and with curious costal ornamentation, but differ entirely in the muscle scars. These appear to be reversed as compared with those of the preceding group, the most anterior being smaller and more irregularly shaped as if it were the pedal adductor, the succeeding larger almost oval scar being that of the anterior adductor. Otherwise if the scars be normally placed the pedal adductor is much larger than the anterior adductor, an anomalous state. This major discrepancy needs investigation, so in order to incite study a new generic name *Sepidacna* is here proposed.

Superficially the *crocea* group appears to be the most distinct, as its facies indicates its different habit. It is small for the family, irregularly formed, ribs scaly, but scales flattened; gape, which is called by Hedley, pedal, very large, open; the lateral teeth elongate, cardinals rather short, the adductor muscles of medium size, the pedal small, the anterior large and rounded. The anatomical features have already been shown to differ notably as would be expected from a knowledge of these molluscs in life. A generic name is already available as when Morch revived *Chametrachea*, this species was included, and as H. & A. Adams gave it as an example, it is here named as type. This course is taken as only a form of *elongata*, *squamosa* and *crocea* were included, so that one of these must be selected. Under the name *crocea* more than one species is confused, while geographical forms are easily separable of the restricted *crocea* style.

Family CARDITIDAE.

The species of this family are not well differentiated in literature. so

that it is difficult to name exactly the small specimens from Elizabeth Reef. These are identical with the species common at Lord Howe Island, and recorded by Brazier under the name *Mytilicardia variegata* Brug.

Genus CARDITA.

1792. *Cardita* Bruguière, Ency. Meth. Vers., Vol. i., p. 401. Logotype, Gray, Proc. Zool. Soc. (Lond), 1847, p. 193. November. *Chama calyculata* Linné.

The limits and synonymy of this genus will be published later, as both are somewhat complicated in literature.

CARDITA VARIEGATA Bruguière.

1792. *Cardita variegata* Bruguière, Ency. Meth. Vers., Vol. i., p. 407. L'Ocean des Grandes Indes.

The specimens from Elizabeth Reef belong to the species common at Lord Howe Island, but which also occurs in Queensland, and the geographical variation has not yet been worked out.

Family CODAKIIDAE.

The large Codakioid shell, so common on the Lagoon beach at Lord Howe Island, was found at both Elizabeth and Middleton Reefs, while a small valve referable to *Epicodakia* was also secured at the former reef.

Genus LENTILLARIA.

1817. *Lentillaria* Schumacher, Essai nouv. Syst. Test., pp. 49-147. Haplotype, *L. punctata,* pl. xv., fig. 4, for Chem., 7, 15, t. 37, figs. 397, 398.

Commonly, but wrongly, classed under *Lucina,* these large shells were transferred to *Codakia,* but the type of *Codakia* is a West African shell, not much like our Pacific forms, the hinge and muscle scars being notably different.

LENTILLARIA PAYTENORUM *sp. nov.*
(Plate xvi., figs. 2, 3.)

This name is given as the shell is a well known Lord Howe Island form, the type being from that locality, and the Payten family has been long established there. Two members, Messrs. T. and F. Payten, accompanied the *Wanderer* to the reefs and back, and were of great assistance to the expedition.

This species was named *Lucina interrupta* Lamarck in Brazier's report on Lord Howe Island shells, probably from Reeve's figures (Conch. Icon., Vol. vi., *Lucina,* pl. ii., figs. 5a, b, May, 1850) of specimens from Buoly Island, Torres Straits (Jukes) so determined. But Lamarck's description refers better to the species known as *simplex* Reeve, especially as he denies the coloration of the island shell, writing: "Le bord interne n'est ni rose, ni pourpré". The Middleton Reef valves agree with those from Lord Howe Island and vary a little from Queensland specimens. Shell suborbicular, of medium compression, equivalve, slightly inequilateral, coloration externally white, concentrically ridged, radially striate, ligament large, semi-internal, lunule very small, deeply impressed, heart-shaped.

The juvenile shell is a little oblique, radials predominating, but growth ridges develop and growth periods are notable. In the shell figured about fifteen periods may be seen at a glance, the intervening ridges being finely striate between. Radials are noticeable in the central area, a little distant however and delicately cut, so that they do not produce nodulation, but at each side these ridges become more numerous and deeper, and form a prickly area at each side. The general surface is superficially rough, but

not as rough as *"exasperata"*, nor as smooth as *"simplex"*. Internally the general coloration is yellow with a deep rose border all round, save at the hinge. This coloration varies a little in strength, but generally it is constant. Height, 51 mm. breadth, 54 mm. Depth of conjoined valves, 23 mm. Type from Lord Howe Island.

Along the Queensland coast; common at the Capricorn Group.

Genus Epicodakia.

1930. *Epicodakia* Iredale, Rec. Austr. Mus., Vol. xvii., p. 390, June 27. Orthotype, *Epicodakia gunnamatta* Iredale.

An odd valve was only picked out of debris from Elizabeth Reef belonging to the series known as *Codakia bella* Conrad recently, and *Lucina fibula* Reeve formerly, but the correct name is not yet known, though neither of the above are strictly available.

Family Veneridae.

A valve from Elizabeth Reef is the only representative of this family secured, but it is interesting as it proves to be a form of *Pardosinia alma* recently described from Queensland, and not yet known from Lord Howe Island.

Genus Pardosinia.

1929. *Pardosinia* Iredale, Mem. Queensland Mus., Vol. ix., p. 264, June 29. Orthotype, *P. colorata* Iredale.

Pardosinia alma Iredale.
(Plate xvi., fig. 7.)

1929. *Pardosinia alma* Iredale, Mem. Queensland Mus., Vol. ix., p. 265, pl. xxx., figs. 15, 16, June 29. Michaelmas Cay, North Queensland.

The single valve is narrower than those in the typical series, and the sculpture is finer, but generally it agrees. As we do not yet fully understand the variation seen, this may be called *P. alma extranea* subsp. nov. The ridges may number more than one hundred, while its height is 23 mm., breadth 22.5 mm., and the depth of the single valve 6 mm.

Family Tellinidae.

Valves of a large Tellen were picked up at Middleton Reef, but not at Elizabeth Reef where, however, it almost certainly lives. It has a somewhat complex history, which may be briefly related here. A small valve of an entirely different Tellen was secured at Elizabeth Reef.

Genus Laciolina *nov.*

Type, *Tellina quoyi* Sowerby.

Shell large, inequilateral, inequivalve, smooth, right valve a little swollen, left valve flattened, anterior side longer and rounded, posterior side shorter and beaked. External ligament small, teeth weak, cardinals close together, laterals a little distant. The pallial sinus very low, extending half way across the shell and similar in shape in each valve.

The shell is similar in shape to *tongana*, and the hinge is not unlike, but the pallial sinus in *tongana* is high and angulate. The hinge is much weaker than in *virgata*, and the pallial sinus is quite dissimilar.

Laciolina quoyi Sowerby.
(Plate xvi., fig. 6.)

1868. *Tellina quoyi* Sowerby, Conch. Icon. (Reeve), Vol. xvii., pl. liii., sp. 314, October. North Australia.

Hedley (Proc. Linn. Soc. N.S.W., Vol. xxxviii., p. 272, 1913) discussed this very beautiful shell referring to "Deshayes, Proc. Zool. Soc., 1856, 130", but the name does not occur there, although Sowerby at the place cited also quoted it. Quoy and Gaimard figured a similar shell from Tonga Tabu, and Deshayes (Hist. Anim. s. Vert. (Lam.), 2nd ed., Vol. vi., p. 208, March 7, 1835) latinised the vernacular name appearing thereon as *Tellina lata*. The text to Quoy and Gaimard's plates appeared after that date (Voy. de l'Astrol., Zool., Vol. iii., p. 497 (for pl. 81, figs. 8, 9, 10), after March 17, 1835), with the same name. Deshayes worked on this group at the British Museum, and, observing that this name had been previously used, apparently altered it dedicating it to Quoy. These names were used in the British Museum collection, but were never published by Deshayes. Sowerby thereupon used it for a North Australian shell without investigation, but credited it to Deshayes, adding a fictitious reference. It has sometimes been confused with *Tellina chloroleuca* Lamarck (Hist. Anim. s. Vert., Vol. v., p. 524, July, 1818. Hab.?), but that species was described as "tenui . . . valves très minces . . . tenuissime striata . . . pellucente", none of which are applicable to this shell, as noted by Quoy and Gaimard when they described *lata*. Dautzenberg and Fischer (Res. camp. sci. Monaco, fasc., xxxvii., p. 518, June 15, 1912), noting that Quoy and Gaimard's name was preoccupied, introduced *Tellina astrolabei* as a novel substitute.

Upon comparison it was noted that while the shells agreed in general coloration, the proportions were seen to differ. Thus a normal shell from Lord Howe Island measured 86 mm. in length, 53 mm. in height, with the umbo at 40 mm. from the posterior end. A Norfolk Island norm gave 100 mm. in length, 70 mm. in height, with the umbo at 42 mm. from the posterior end. A Queensland shell from Michaelmas Cay measured 92 mm. in length, 50 mm. in height and the umbo at 40 mm. from the posterior end. This indicates that the Lord Howe Island form is smaller but deeper than the Queensland one, while it is proportionately less deep than the Norfolk Island. At New Caledonia a similarly shaped shell is pure white, and shows fine radial striation, and has been called *chloroleuca*, but there are also specimens of the colored shell from New Caledonia which are at once separable, and prove the distinction of the so-called *quoyi* from the so-called *chloroleuca* from the same locality.

The Middleton Reef valves agree best with those from Lord Howe Island, a series showing measurements: length, height, and umbonal point reading, respectively, 75, 74, 80; 51, 49, 51; and 32, 33, 35 mm.

The Norfolk Island form differs at sight and may be called *Laciolina francesae* sp. nov., pl. xvi., figs. 4, 5, while the Lord Howe Island and Middleton Reef form may be regarded as a subspecies, *Laciolina quoyi attracta* subsp. nov. So far this is known as a rare shell.

The small Tellen from Elizabeth Reef cannot be named from the single valve, as the small Tellens as a whole have not yet been studied and apparently many generic forms are confused. This shell recalls the *tenuilirata* series, but the hinge is quite dissimilar, the teeth being very strong, especially the laterals, which are short and thick.

Class Loricata.

Without plenty of time it is impossible to secure a representative collection in this group at any locality, so that the acquisition of two small specimens is noteworthy. These were procured at Middleton Reef and are of great importance, as they are definitely referable to Lord Howe Island forms. In no other molluscan group are the relationships so easily and

definitely determined as in these, and consequently these specimens indicate unquestionably the correct alliance of the faunulae of these reefs.

Family Cryptoconchidae.

One small shell belongs to the *Macandrellus* section of *Notoplax*, conspecific with the Lord Howe Island species, and more distantly related to the New Caledonian *Notoplax tridacna* Rochebrune.

Genus Notoplax.

1861. *Notoplax* H. Adams, Proc. Zool. Soc. (Lond.), 1861, p. 385. Haplotype, *Cryptoplax* (*Notoplax*) *speciosa* H. Adams.

1878. *Macandrellus* Dall, Proc. U.S. Nat. Mus., Vol. i., p. 299. Orthotype, *Acanthochites costatus* H. Adams & Angas.

Complete synonymy and discussion will be found in the Austr. Zool., Vol. vii., p. 59, 1931, and Mon. Austr. Loricates, p. 79, 1927.

Notoplax leuconota Hedley and Hull.

1912. *Acanthocites leuconotus* Hedley and Hull, Proc. Linn. Soc. N.S.W., Vol. xxxvii., p. 275, pl. xii., figs. 4a, b. Lord Howe Island.

The small shell is immature, but it is undoubtedly closer to this species than to the New Caledonian *N. tridacna* Rochebrune, which has been well illustrated by Hull and Risbec (Austr. Zool., Vol. vi., p. 378, pl. xxxi., figs. 8-15 and many text figures, February 13, 1931).

Family Chitonidae.

The juvenile is characteristic of the strange genus *Tegulaplax*, with a distribution at present known of the Red Sea, Maldives, Ceylon, Moluccas, Torres Strait, at all these places rare, but common at Lord Howe Island, and not yet known from New Caledonia. This fact associates Middleton Reef with Lord Howe Island in preference to New Caledonia.

Genus Tegulaplax.

1926. *Tegulaplax* Iredale and Hull, Austr. Zool., Vol. iv., p. 171, February 22. Orthotype, *Chiton howensis* Hedley and Hull.

As much as is known is given at the above reference and reprinted in the Mon. Austr. Loricates, p. 106, 1927, where it was recorded from Australian waters for the first time.

Tegulaplax howensis Hedley and Hull.

1912. *Chiton howensis* Hedley and Hull, Proc. Linn. Soc. N.S.W., Vol. xxxvii., p. 278, pl. xiii., figs. 7, a. Lord Howe Island.

The small shell has been compared with Lord Howe Island specimens, and agrees in detail.

Class Gastropoda.

The few Gastropods collected are such as would be anticipated, but the inclusion of the *Turbo, cepoides,* and the acquisition of a distinct form of a *Calcar* shell make them noteworthy. A few small forms were picked off the outside of *Tridacna* shells, and from the debris shaken from the dead shells. These suggest a fairly varied faunula of large extent, and it may be here recorded that a collection made at the Bampton Shoals, many years ago, indicated a very different faunula, showing many strange species. A survey of the shoals and reefs of the Coral Sea, especially of the molluscan fauna, would be very enlightening as to geographical distribution of many groups.

Family Fissurellidae.

The only member of this family was a strange slug-like form, which, when alive, might be mistaken for some sort of Tectibranch, as no shell was visible. So far this quaint development has not appeared in literature, although it has been known to myself for over twenty years. The genus *Scutus* was monographed some fifty years ago by Smith from Museum material, and he allowed a few species with extensive range. This is absolutely incorrect when the species are found living, and a review has been long prepared, but not yet published. The Lord Howe Island animal is unlike that of any Scutus yet known, and the opportunity is now taken to describe this new form.

Genus Nannoscutum *nov.*

Type, *N. forsythi nov.*

The animal of *Scutus* was figured by Quoy and Gaimard, and refigured by Hedley (Proc. Linn. Soc. N.S.W., Vol. xli., p. 704, pl. xlvii., figs. 7-9, April 4, 1917). A juvenile is shown in fig. 9, and the much smaller animal from the islands is nothing like this, as will be seen by the figures now given.

Shell small, stout, Scutoid, strongly lined concentrically. This is immediately differentiated from the shell of the same size, of an immature *Scutus* by its solidity and strong ridging, associated with the position of the apex. The animal is very elongate and narrow, blackish above with a pale greyish white foot underneath. Muzzle short, tentacles elongate, awl shaped, eyes at base on outside. Mantle covering shell in life, and body length about equal to that of the tail.

Length of extended animal about 28 mm., the tail being about 14 mm. The shell placed anteriorly in the body area, measuring 6.5 mm. in length, 3.5 in breadth, and 1 mm. in depth. The width of the extended animal is only about one-fifth its length.

Type locality: Lord Howe Island, under stones.

Observations: Among the dredgings secured by Mr. Roy Bell at Norfolk Island many years ago were some dead shells of a minute *Scutus*-like shell. Although these were only a few millimetres in length they showed strong growth ridges and thickened edge, indicating they were adult, and they differed appreciably from juvenile shells of any known species of *Scutus*. These were regarded as representing a distinct genus, and later similar shells were received from Lord Howe Island. From Michaelmas Cay, Queensland, dredgings a few comparable specimens were sorted out, while others have been collected at the Capricorn Group, S. Queensland. Whitley collected a curious little slug under a coral block at Elizabeth Reef, and made drawings of it, which are here reproduced. His notes read: "General colour dark greyish, apparently somewhat rubbed off near centre of back. Tentacles pale yellowish. Ventral surface dirty white with some grey reflecting through. Mouth brown. The foot seldom protruding beyond edge of mantle posteriorly". When preserved the mantle edges receded, showing a Scutoid shell, which is very like that of the Lord Howe Island species, the animal, however, apparently differing. Thus, while about the same length, Whitley's sketches show an animal twice as broad without the lengthened tail. Until more is known about this quaint group, it would be unwise to differentiate the Elizabeth Reef form, though the animal does not exactly agree.

Family Stomatiidae.

A broken dead shell was found at Elizabeth Reef, and this involves the

question of nomination of the species commonly referred to *Stomatella*. The type of *Stomatella* is *imbricata* Lamarck, and when Pilsbry (Man. Conch. (Tryon), Vol. xii.), monographed the family, which he incorrectly called *Stomatellidae*, he separated four groups without giving group names. His third group was that of *S. mariei* Crosse, and he gave a description of the animal of *S. godeffroyi* Dkr., which he regarded as a variety of Crosse's species. This animal was imperfect through the loss of the tail, which is cast off under annoyance, even as *Gena* and *Harpa* do. The animal is very active and entirely unlike that of *Stomatella imbricata*, which is small, covered by the shell and immobile. *S. imbricata* is common around Sydney, living on rocks under stones, and so fixed that the animal is often torn while attempting to remove it. Thiele (Mitth. Zool. Mus. Berl., Bd. 11, heft. 1, pp. 59-71, 1924) proposed *Pseudostomatella*, with type *papyracea* Chemnitz, but that again differs in shell and animal characters. The Queensland *rufescens* Gray, is a little more coarsely sculptured on the last whorl than *mariei*, but in general these are very closely allied.

Genus Stomatolina *nov.*

Type, *Stomatella rufescens* Gray.

As above noted, the animal of this species is more like that of *Gena* in its actions than that of *Stomatella*. The shell is thin, subglobose, spire short, conical, last whorl swollen, sub-depressed, sculpture fine spirals. Operculum small, horny, multispiral, nucleus central.

Stomatolina rufescens Gray.

1847. *Stomatella rufescens* Gray, Voy. Fly (Jukes), Vol. ii., p. 360, pl. 2, fig. 2. Raine's Is., North Australia.

The Elizabeth Reef shell is in poor condition, but it seems nearer the Torres Straits species than *S. mariei* Crosse, a common New Caledonian shell. It is coarser in its sculpture, but it may be noted that Pilsbry figures a *S. godeffroyi* as a variety, at most, of *S. mariei*, with coarse sculpture. However, Pilsbry included *Stomatella orbiculata* A. Adams, with localities "Darnley Id., Torres Sts. (Brazier), Mozambique (Cuming), Japan (Dkr.)" as similar to *mariei*. The first-mentioned locality is very close to that of *rufescens*, and Brazier's specimens are inseparable from Gray's species, which he had merely overlooked.

Family Trochidae.

A couple of small Trochoids were picked out of debris from Elizabeth Reef, and they both belong to the Lord Howe Island fauna, although also of New Caledonian alliance.

Genus Calliotrochus.

1879. *Calliotrochus* Fischer, Spec. Gen. Coquilles Vivants, Trochus, p. 418. Haplotype, *Trochus phasianellus* Deshayes.

Deshayes described a Reunion shell as *Turbo phasianellus*, but C. B. Adams had preempted that name. Fischer, receiving a similar shell from New Caledonia, with a horny operculum, transferred it to *Trochus*, preserving the invalid specific name. Then noting the incongruity of this solid little shell with a horny operculum provided it with the above subgeneric name.

It is certainly a very distinct little group, being small, turbiniform, weakly perforate, smooth, but the specific values have not been allotted. While Fischer stated that the Reunion and New Caledonian shells were

identical, Hedley (Proc. Linn. Soc. N.S.W., Vol. xlviii., p. 308, October 3, 1923) went a step further, and recorded it from Australia under a Pacific name *striatulus* Garrett, from Hawaii. This Hawaiian shell was described (Proc. Calif. Acad. Nat. Sci., Vol. i., "p. 102, 1857", according to Pilsbry, but it is on p. 114 in the December, 1873, reprint, which is the only one available here) as "Length, one line; diameter, the same". Pilsbry (Man. Conch. (Tryon), Vol. xi., p. 249, pl. 61, figs. 19-20, March 7, 1890) transferred the name to a species of *Monilea* from the Viti Is., measuring "Alt. 6, diam. 8 mill.; alt. 11, diam. 14 mill.", obviously a different shell. The figure displays, instead of a *Calliotrochus,* a shell referable to the genus *Talopena,* the columellar characters being unmistakeable. It may be called *Talopena discerna* sp. nov. It is further doubtful whether Garrett's species can be referred to *Calliotrochus,* but the specific name is invalid, as there is a prior *Trochus striatulus* (Deshayes in Leymerie, Mem. Soc. Geol. France, v., 1842, p. 3, *fide* Sherborn), so that the Hawaiian species is here renamed *Trochinella perconfusa* gen. et sp. nov., the description given by Garrett indicating a *"Margarita"* shell . . . thin . . . pellucid . . . surface marked with regular revolving striae . . . base somewhat flattened and umbilicated" . . . whereas *Calliotrochus* might be termed "solid . . . smooth . . . narrowly umbilicate".

The good figure by Deshayes shows a shell 6 mm. by 5 mm., more conical than the local shells with a minute perforation which may be called *Calliotrochus normalis* nov. This leaves the island shells still unnamed, and series from New Caledonia, Lord Howe Island and Norfolk Island, as well as Queensland are available for comparison. At first sight these represent different species, all the Norfolk Island-New Caledonia shells being small, while the Lord Howe Island and Queensland shells are larger. Fischer has given a figure of the New Caledonian shell (Coquilles Vivants, Trochus, p. 363, pl. iii., fig. 4, 1879), and this species differs in form, and sculpture from the Reunion one, and is therefore named *Calliotrochus symbolicus* sp. nov. The Norfolk Island shell is more conical, smaller, yet with a wider umbilicus than the New Caledonian shell, and also lacks the basal lining. Otherwise it is very similar, and may be called *Calliotrochus symbolicus alter* subsp. nov. The coloration has been subordinated, as it is variable, but the Norfolk Island shells are darker as a whole. The Elizabeth Reef shell is most like that of Lord Howe Island, which is notably larger, and of different shape from the others, and is here described.

Calliotrochus excellens *sp. nov.*

Shell large for the genus, broader than high, subglobosely turbinate, spire short, spire whorls small, body whorl proportionately very large, smooth, narrowly umbilicate.

Whorls five, the apical one smooth and a little elevated; the succeeding ones spirally finely lirate, the lirae numbering about twenty on the antepenultimate whorl, becoming obsolete on the penultimate and missing on the last whorl. This whorl, instead, shows fine regular closely set growth waves, scarcely pronounced enough to be classed as sculpture.

The whorls are rounded and increase rather rapidly, so that the last whorl is the bulk of the shell. The coloration is difficult to describe as the ground colour appears to be pale green, closely blotched and mottled with darker green, and through this runs a series of dotted concentric lines, the whole shimmering with the light through the pearly shell. The mouth is large, subcircular, the outer lip thin, but not sharp. The columella is a little curved, reflected, and the inner lip continues across the body whorl,

in the senile shell forming an almost completely free aperture. The umbilicus is very small and not very deep. The operculum is large, horny, multispiral, nucleus depressed, whorls comparatively few, six large and some minute.

Height, 6 mm. Breadth, 7 mm.
Type from Lord Howe Island.

Note.—An immature shell of a Trochoid of *"Minolia"* facies was found at Elizabeth Reef, but it cannot be determined either generically or specifically at present.

Family Turbinidae.

The most valuable information accrues from the finding, as a common shell on both reefs, of *Turbo cepoides* Smith. This species is a well-defined smooth Turbinid, which hitherto was only known from Lord Howe Island. In its smoothness it recalls *Turbo petholatus,* and less so *Turbo militaris* Reeve, the former living on New Caledonia and the Queensland coast, mainly on the reefs, while the latter is found on the South Queensland coast and New South Wales as far south as Sydney. It was necessary to determine to which of these the Lord Howe Island shell was more nearly allied.

The type of *Turbo* is *Turbo petholatus,* the well known glossy brightly coloured shell which produces the even better known "Cats-Eye" of commerce, that ornament being the operculum thereof. The species-group, *petholatus,* is divisible, but hitherto no definite means of separation has been recognised. Mr. E. Dranga, calling in at this Museum on his way back to America from the Pacific Islands, showed me series from Samoa and the Fiji Islands, pointing out the slight but constant differences in the opercula. At the same time, Mr. H. S. Mort noted the distinction between the opercula of the East and West Australian shells which was accompanied by distinct coloration. Investigation on these lines removed *Turbo cepoides* further away from *petholatus* (sensu latissimo), and still further from *militaris,* thus giving it a higher differential value still. This suggests that *Turbo cepoides* has been isolated on the Lord Howe Island plateau since before the development of *Turbo petholatus.* On the other hand, the operculum of *Turbo militaris* appears to connect this form with the giant *Turbo jourdani* as a more isolated group still. Under the latter name there appear to be two forms confused, a rather heavily ridged shell and a smooth one. The former is typical, and is also well figured by Reeve and probably came from West Australia. The South Australian shell is of different coloration, and is smooth on the body whorl without any sign of ribbing, while the penultimate whorl is also smooth, as also the antepenultimate or with very indistinct ridges. The shell appears more globose than the Reevean and Kiener figures. The operculum is large, oval, inner side a little elevated, and almost smooth. The specimen from Kangaroo Island, South Australia, measures 7 inches in height by 6½ inches in breadth, and is here named *Dinassovica verconis,* gen. et sp. nov., the opercular characters being diagnostic of the genus. A similar operculum is seen in the mouth of *Turbo militaris* Reeve, and juvenile shells are available with the operculum scarcely varying from that of the adult, the form being oval with the inner side a little elevated and the surface weakly pustulose.

The operculum of *"Turbo petholatus"* is almost smooth, subcircular, with the inner side elevated, the outer edge flattened, semi-grooved. Its coloration is characteristic, but the West Australian shell shows a dif-

ferently coloured operculum, so that our idea gained from Pacific Ocean shells may prove to be faulty, as the Moluccan shell might be nearer the West Australian one.

The adult operculum of *Turbo cepoides* is more elevated still, the inner elevated edge being smooth, the outer depressed subgrooved edge, as in *petholatus*, wrinkled and creamy brown; the coloration extends half way, this portion being pustulose, the smooth portion being white. In juvenile shells the operculum is less elevated, all white, and rather strongly pustulose throughout, the inner edge only becoming smooth. This operculum is at this stage, similar to that of *argyrostomus*, and if the pustules became exaggerated, instead of being lessened, we should get the style seen in *pulcher* Reeve, i.e., *intercostalis* Menke, of West Australia, whose shell is very different.

TURBO CEPOIDES Smith.

(Plate xvi., fig. 10.)

1880. *Turbo cepoides* Smith, Ann. Mag. Nat. Hist., Ser. v., Vol. vi., p. 397. Locality unknown.

1913. *Turbo cepoides* Hedley, Proc. Linn. Soc. N.S.W., Vol. xxxviii., p. 282, November 5. Lord Howe Island.

An odd unlocalised shell was described by Smith, as it was weakly perforate, apparently referable to the *petholatus* group, but of distinct (onion-like) coloration. Sowerby (Thes. Conch., Vol. v., p. 193, pl. 499, fig. 65, 1886) gave quite a good figure, but it was not recognised until Hedley examined the type, and reported the result as above.

The form is fairly distinct, more conical than the majority of *petholatus* forms, but the perforation is a very unstable feature. It is present as a chink in the very small juvenile shells, and is retained in some cases until senility. Just as often, however, it becomes closed at an early age and remains so. The coloration is generally green, but some juveniles from Lord Howe Island are beautifully mottled with shades of green, while others are unicolor brownish yellow. Old shells have always the last whorl smooth, but the earlier whorls are concentrically ridged.

The most extraordinary result was the recognition of a figure, apparently of *cepoides*, in the Conch. Cab. (Mart. and Chemn.) cont. Kuster, Bd. ii., Abth. 2, pl. 2, fig. 8. The text was written by Philippi, and there is no explanation to this figure. Searching for the reason for this neglect, it was seen that this plate was a reproduction from the original edition issued in 1781, and was plate clxxxiii. in Vol. 5. The figure was there numbered 1833, and on p. 223 a good description is given without any locality. The figure shows the elevated form, the semi-shouldering of the last whorl and the onion-peel style of colouring from which Smith coined the specific name *cepoides*. According to our history, Lord Howe Island was not discovered by Europeans until 1788, so that apparently there must be a mimic of *cepoides* existing elsewhere. Yet anyone would easily determine from the illustration the identity of our species.

As above noted, this species has hitherto been known only from Lord Howe Island, and its occurrence commonly on both Elizabeth and Middleton Reefs definitely determines the relationship of these Reefs. As shown above, the opercular characters, as well as those of the juvenile shell, suggest this to be a relict of an ancestral stage of the *Turbo-Senectus* series.

Genus CALCAR.

1810. *Calcar* Montfort, Conch. Syst., pt. ii., p. 134-5, May. Orthotype, *Calcar sporio* = *Turbo calcar* Linné.

The conical Turbinids have been a source of trouble as to their nomination and discrimination. Pilsbry (Man. Conch. (Tryon), Vol. x., 1889) used *Astralium*, but pointed out "this genus is composed of a number of quite diverse subgenera of various degrees of affinity to each other". He, however, accepted a world-wide range for his genus, although he showed that similar shells covered distinct animals. Thiele (Handb. Syst. Weicht., pt. i., p. 68, 1929) utilised "*Astraea* (Bolten) Röding" as the generic name for a universal genus allowing the same sections as Pilsbry, with a couple of additions. For the Queensland forms I advocated *Calcar*, restricting *Astraea* to the Neozelanic shells with a distinct radula.

Among the Australian shells there are very distinct groups, and their nomination is somewhat complicated by the inaccurate synonymy available.

The type of *Calcar* is a somewhat depressed shell with a convex base, imperforate, and the periphery dentate. This seems to show variation in that the periphery may be developed into a wavy flange, and the whorls become disunited, so that the adult is pagodoid in form. This may be regarded as a subgenus, *Pagocalcar*, the type being the shell known as *pileolum* Reeve (Conch. Syst., pl. 217, fig. 5, June, 1842), which seems to be *limbiferus* Kiener (Coquilles Vivants, Trochus, pl. 32, fig. 1, 1850) from Australia.

A very different production is a shell of a similar form, but with the periphery showing puckered transverse bars, and this must also be differentiated subgenerically as *Rugastella, rotularia* Lamarck, being the type.

Apparently a distinct generic group must be allowed the "Stella" series, but the name for this genus is doubtful. *Stella* has been used as of Klein, but the earliest lawful introduction seems to be that of H. and A. Adams (Gen. Rec. Moll., Vol. i., p. 398, May, 1854). These authors, however, cite "*Stellaria* Schmidt" as a synonym, and that is perhaps the earliest available name for the *stellare* group. Schmidt's name is given in Sherborn as appearing in "Möller, Isis (Oken), 1832, 130", but no species is cited. Stewart (Spec. Publ., No. 3, Acad. Nat. Sci. Philad., August 9, 1930) has drawn attention to Schmidt's essay, as published in 1818—apparently unaware that he was handling, as far as conchological students were concerned, an unique and much sought for work—dealing with it only as regards type designations, and thus we are no further ahead in this case. Reference to Schmidt's original publication is necessary to determine the status of *Stellaria*, so that it cannot be used at present. It may be available for the *stellare* group, or may be a pure synonym of *Calcar*, so that in order to avoid confusion the generic name *Distellifer* is introduced, with species *D. wallisi* as type.

Before leaving this series it may be noted that with further consideration of the beautiful shell Hedley named *A. aureolum*, shows more similarity with the Neozelanic *Cookia* than it does with the present series with which I formerly associated it.

Another very distinct genus is *Guildfordia*, the second species, *monilifera* Hedley and Willey (Proc. Linn. Soc. N.S.W., 1896, p. 107, pl. xii.) standing out very discordantly in the drawer of Astraeoid molluscs.

Genus Distellifer *nov.*

Type, *D. wallisi sp. nov.*

Shell tall, conical, with double row of spinose tubercles along the periphery, imperforate, operculum normal. These elevated Astraeoid mol-

luscs appear to differ essentially from the depressed species of *Calcar* proper, and the radular features may also separate them.

Distellifer wallisi *sp. nov.*

(Plate xvi., fig. 9.)

Shell very elevated, trochoid in form, periphery keeled, solid, imperforate, whorls probably ten or more, flattened, tending a little to become pagodoid with age.

Coloration obscured by growth, columella area deep purple, outer edge of mouth pale bluish green. Six or seven adult whorls may be counted, but there may be three or four more juvenile ones. Sculpture, radials, more or less coarse, the periphery being surrounded by a double row of elevated nodules, sixteen or so in each row. Sometimes these are produced into blunt spines, while at others the lower row becomes reduced to small nodules, and the upper part of the whorl varies in roughness. The base is ringed with small squamae, closely set, and about a dozen rows. The columella is curved, ending in a tooth anteriorly, and is white with a deep purple expansion on to the base of the whorl which continues across to the outer lip. The mouth internally is bluish white, the edge of the aperture being sharp and of a pale bluish green. The operculum is oval, irregularly elevated, greenish white, the outer edge depressed and purplish in colour.

Height of type, 55 mm. Breadth, 43 mm. The tallest of a series of six measures 65 mm high, and 49 mm. broad, the others ranging 62, 56, 55, and 51 mm. in height, by breadth 45, 48, 40 and 41 mm. respectively.

This Middleton Reef species has been compared with numbers of shells, which had been determined as *petrosum* Martyn. As Martyn's names are now rejected, it will be necessary to fall back upon *rhodostomus* Lamarck, and the exact locality of that form was unknown. Judging from Delessert's figure, as also that of Kiener, the typical *rhodostomus* is quite unlike the present species in size and ornamentation. From New Caledonia shells are smaller than the present species and have a faint purplerose columella and agree fairly well with Martyn's *petrosum,* but as noted above that name is invalid. Many Queensland shells from Murray Island, Torres Straits to the Capricorn Group are similar, the Capricorn series being a little taller and with a purple tinge on the columella than the Murray Island ones, which are broader and more depressed and are greenish on the columella. These Queensland shells are definitely smaller and may be named *Distellifer queenslandicus* sp. nov., the rows of nodules being also fewer, and the height not exceeding 40 mm. The sculpture on the base is regular, but a little coarser than on the Middleton Reef species, but on *rhodostomus* it is displayed as coarser and irregular.

Family Neritidae.

Two Nerites were found on both reefs, *Theliostyla albicilea* Linné, and *Melanerita melanotragus* Smith, the latter being unexpected, save that it does occur at Lord Howe Island. The former is a common Indo-Pacific shell occurring throughout that area.

Genus Theliostyla.

1852. *Theliostyla* Mörch, Cat. Conch. Yoldi, pt. i., p. 167, August. Logotype, Kobelt Illustr. Conch., p. 147, 1878 (*Theliostoma* errore) *Nerita albicilla* Linné.

In form this is an easily distinguished genus, the opercular characters and the radular features confirming this status.

THELIOSTYLA ALBICILLA Linné.

1758. *Nerita albicilla* Linné, Syst. Nat., 10th ed., p. 778, January 1, based on "Rumph. mus. t. 22, fig. 8. Hitoe.

In this and the succeeding species I can find no local variation over an extensive range even with good series.

Genus MELANERITA.

1889. *Melanerita* Martens, Conch. Cab. (Mart. & Chemn.), ed Kuster, Bd. ii., heft 29, p. 125, ante May. Logotype, *N. nigra* = *melanotragus* Smith.

This black Nerite is very different in form from the preceding, and it was a surprise to meet with it from this place, though of course common on Lord Howe Island.

MELANERITA MELANOTRAGUS Smith.

1884. *Nerita melanotragus* Smith, Zool. Coll. Alert, p. 69.
1884. *Nerita saturata* Hutton, Proc. Linn. Soc. N.S.W., Vol. ix., p. 354.

These two names were given simultaneously, and Hedley accepted the former as having been published on August 1st, and the other as being issued on August 23. It has since been ascertained that the Alert appeared on July 12, and the Linnean Society's proceedings on August 19. Abstracts of the latter appeared earlier, but Hutton's name was not included. In the abstract, however, that was given in the N.Z. Journ. Sci. for July, 1884, Hutton's name was recorded, and that monthly was stated to come out on the second Saturday of the month, i.e., July 12. Smith's name is here used in continuance of custom.

Family HIPPONICIDAE.

The first rule in systematics is apparently ignored by many writers as they persist in the usage of the family name, Amaltheidae, and the generic name *Amalthea,* although it should be well known that these are invalid. Since the publication of Sherborn's Index Animalium, Part ii., there can be no excuse for such conduct.

Amalthea was introduced by Schumacher in 1817 with two sections; a, with only one species *Amalthea conica*; b, with *A. ungarica* alone.

Gray, in 1847, selected the latter as type of *Amalthea* b, and made this a synonym of *Capulus* Montfort, 1810, a correct procedure; he then allowed *Amalthea* as a valid name, with type *A. conica.* As a synonym he quoted "*Sabia* Gray, 1833. 1844, 63".

Unless some other name intervenes, or *Sabia* has some other application, it is available for the valueless *Amalthea.* Unfortunately the reference to Gray, 1833, appears to be a lapsus, and a later reference to Gray, 1839, with a citation to zoology of Beechey's voyage, has not been found by Sherborn. Sherborn gives as earliest reference to *Sabia* "Synops Contents Brit. Mus., ed. 43, 1841, p. 126" (after June 12), where it is a *nomen nudum.* Reeve (Conch. Syst., Vol. ii., p. 34, April, 1842) gave a note about *Sabia,* but here also it is a *genus coelebs.* It did not appear in the 42nd edition of the Synopsis, as it is not given in my Collation (Proc. Mal. Soc. (Lond.), Vol. x., p. 294, et seq, March, 1913), so that the 1833 and 1839 citations are doubtful. Thiele (Handb. Syst. Weicht., pt. i., 1929) uses the family name Amaltheidae (p. 241), and even a Stirps Amaltheacea (p. 238), while including in the family the genus *Cheilea* Modeer, 1793, which has an internal cup and would be better placed in the succeeding Stirps. Under *Amalthea,* Thiele cites *Hipponyx* Defrance, *Sabia* Gray, *Cochlolepas* H. & A. Adams, and *Malluvium* Melvill, as synonyms, and *Amathina* Gray, as a

subgenus. Peile has rejected *Malluvium* Melvill in favour of *Amalthea*, stating that the radula corresponded with that of *A. conica*, the type of *Amalthea*. His specimens were from Kii, Japan, and may have had nothing to do with the true *Capulus lissus* Smith, as there are similar smooth Capulid like shells found in deep water off the coast of New South Wales. Peile there (Proc. Mal. Soc. (Lond.), Vol. xxi., p. 251, March, 1935) suggests that *Saptadanta*, placed by its authors in Lepetellidae, should be transferred to the Amaltheidae. At this point the shells collected at Middleton and Elizabeth Reefs come into the matter as these are commonly known as *"Amalthea conica"*, and otherwise agree with Quoy and Gaimard's *Hipponix acuta*. These authors gave a figure of the animal (Voy. de l'Astrol., Zool. Atlas, pl. 72, figs. 35-38), and H. & A. Adams (Gen. Rec. Moll., pl. xli., figs. 4, 4a, b, c) gave figures of the shell and animal of *A. conica*. Troschel (Gebiss der Schnecken, Vol. i., p. 163 (361 at top of page), pl. xiii., fig. 15, 1861) gave an excellent figure of the radula of *Hipponyx (Amalthea) conica*. All these generally agree with the Reef shells, which belong to a form common throughout the Tropics on Trochoid, Turbinid and other Gastropod shells. All the details agree with Prashad and Rao's *Saptadanta nasika* (Rec. Ind. Mus., Vol. xxxvi., p. 2, text fig. 1, and pl. i., figs. 3 and 4, March, 1934), and both that generic name and the species may be regarded as synonymous. A group-synonymy, such as given by Thiele, would read *Sabia* = *Amalthea* (preoccupied) = *Amathina* = *Malluvium* = *Pilosabia* = *Saptadanta*, but I do not advocate such, and would allow *Amathina*, *Pilosabia* and *Malluvium*, but still *Saptadanta* would appear to fall under *Sabia*.

The specific name is not easily determined, as probably there may be geographical differences, and thus *conica* may displace *nasika*, but *acuta* may become valid. The elevated form of *conica* is a little strange, but these shells vary in shape, according to their environment.

The generic name *Hipponix* is based on a fossil, and therefore reference to animal characters cannot be made, but that generic name may be used as the basis of the family name.

Genus Sabia.

1847. *Sabia* Gray, Proc. Zool. Soc. (Lond.), 1847, p. 157, November (as of Gray, 1833, 1839, neither of which have been traced), ex Synops Cont. Brit. Mus., 43rd ed., p. 126, 1841, *nom. nud.*, and Reeve, Conch. Syst., Vol. ii., p. 34, April, 1842, *genus coelebs*). Orthotype, *Amalthea conica*.

1817. *Amalthea* Schumacher, Essai nouv. syst. Test., pp. 56-181. Logotype, Gray, supra, *Amalthea conica*.
Not *Amalthea* Rafinesque, Analyse Nat., p. 123, 1815.
Nor *Amaltheus* Montfort, Conch. Syst., pt. i., p. 90, 1808.

1934. *Saptadanta* Prashad & Rao, Rec. Ind. Mus., Vol. xxxvi., p. 2, March. Haplotype, *S. nasika* Prashad & Rao.

On the data given this result is inevitable.

Sabia acuta Quoy and Gaimard.

(Plate xvi., fig. 8.)

1835. *Hipponix acuta* Quoy and Gaimard, Voy. de l'Astrol., Vol. iii., p. 437, pl. 72, figs. 35-38, after March 17. New Ireland (Carteret Harbour).

The specimen figured may appear different from figures already given, but this is merely due to the great age of this shell, younger ones agreeing exactly with Quoy and Gaimard's figures.

Some small specimens of the shell known as *Hipponyx foliacea* Quoy and Gaimard, were also found on *"Tridacna"* from both Reefs. This species was admitted in the New South Wales Check-List, but that shell has long been regarded as distinct, though as yet unnamed. Quoy and Gaimard stated that in their species (Voy. de l'Astrol., Zool., Vol. iii., p. 439, pl. 72, figs. 41-45 (after March 17) 1835) from Guam, the young had the form of a Nerite with longitudinal striae. The Sydney shell has a minute rissoid smooth nucleus, and to complicate matters there appear to be two species from Lord Howe Island of similar appearance, but with different sculpture. In these the nucleus is neritoid, but it appears smooth. In order to avoid confusion the Reef shell may be regarded as Quoy and Gaimard's *foliacea*, until Guam specimens can be re-examined. This species lives under stones, and is obviously of different origin from the *"conica"* series. It is much more like the style of the fossil *Hipponix*, and should be separated from *Sabia*, even as all the old workers recognised. Fischer (Journ. de Conch., Vol. x., pp. 1-17, January, 1862) has given an account of the West Indian *"Hipponyx antiquata"*, showing an animal similar to that of *Sabia* = *Saptadanta*, but figures a spirally lirate nucleus. The local animal may later be investigated, but in order to lessen the confusion a name, *Antisabia*, is proposed for the *foliacea* series, and the different forms will later be segregated.

Thiele included *Cheilea* in his family, Amaltheidae, an extraordinary procedure at first sight, because in life it is so unlike, and would better be classed with the other shelf-bearing shells as *Calyptraea* and *Crepidula*. A small specimen with rather strong radiating sculpture was picked out of debris from Elizabeth Reef, but it cannot be, at present, specifically named. Tryon (Man. Conch., Vol. viii., p. 137, 1886) recognised a species, *Mitrularia equestris* Linné, giving it a circumtropical distribution, and recording some twenty-five names as synonyms, and then a var. *tortilis*, with another ten synonyms. Such action has prejudiced later workers, so that thirty years later Hedley included the Sydney form as *Cheilea equestris porosa*. A little later he emended the name to *Cheilea undulata* Bolten, giving its range as Sydney Harbour, N.S.W., northwards to Torres Straits. But in Queensland waters I have separated four very distinct species of *"Cheilea"*, indicating the absurdity of the grotesque lumping indulged in by Tryon. There is a very large species corresponding to the conventional *"equestris"*, with wrinkled sculpture and a large internal appendage. A smaller more regular shell has regular fine radials and a medium cup, and two smaller species have very small internal cups, but one is stout and heavily radially lirate, and the other is very thin and covered with elevated pustules.

Family Rissoinidae.

Two shells belonging to this family fell out of the debris from Middleton Reef, one of which was the commonest Lord Howe Island clathrate species, the other of the *"Rissolina"* style, also common at Lord Howe Island. Hedley (Mem. Austr. Mus., iii., p. 419, 1899) recorded the former as *Rissoina exasperata* Souverbie, a New Caledonian species, but noted that the Lord Howe specimens differed. The *Rissolina* was in too dead condition to determine exactly, but was of the *R. plicata* series.

Family Cerithiidae.

From the debris from Middleton Reef a small Cerithioid was sorted out, which may be referable to *Clypeomorus*, the species being known as *Ceri-*

thium nassoides Sowerby, in collections from New Caledonia, but it is obviously not the true *C. nassoide*, which was described by Sowerby (Thes. Conch., Vol. ii., p. 875, pl. 183, figs. 200-201, 1855) from the Sandwich Islands. The Middleton Reef shell is not uncommon at Lord Howe Island.

Family Vermetidae.

Some specimens were picked up, but on the *Turbo* and other shells, many living specimens of a small form which is well known, but does not appear to have been named were seen. On the small Clams another species was also seen, but is not here determined.

Genus Veristoa *nov.*

Type, *V. howensis nov.*

(Plate xvii., fig. 8.)

Spiroglyphus of Daudin was used by Tryon (Man. Conch., Vol. viii., 1886, p. 177) for similar small shells, but these are not easily differentiated. Mörch reviewed the Vermetidae (Proc. Zool. Soc. (Lond.), 1861, pp. 145-181, pl. xxv., September 16, and pp. 326, 365, April 7, 1862), and unfortunately his conclusions are not easy to follow; apparently they were not regarded as final, but rather preliminary. Thus in one place, *Stoa* de Serres, is mentioned as a synonym of *Siphonium* Gray, and then in another it is used subgenerically, and then later subordinated in part to *Spiroglyphus*. In some cases the operculum is regarded as calcareous, in others horny; while the nuclear characters, a very important feature, are not characterised. Consequently the present species is distinguished, both as a new genus and species.

The nuclear shell is minute, rissoid, brown, of two and a half whorls, longitudinally flexuously regularly striate: it settles mouth down, and then the adult shell of stronger texture encircles the nucleus, forming strong ridges above, and commonly boring into the surface of the shell upon which it has settled. The adult is purple brown in coloration, and, often, after circling, will lengthen out in a strong line. The nucleus is about 1 mm. in length, and .75 mm. in greatest breadth, the small completed shell before elongation being about 3 mm.

Common on both Reefs, on Lord Howe Island, and probably the same species on the Great Barrier Reef of Queensland.

"Genus Bivonia."

1862. *Bivonia* Mörch, Proc. Zool. Soc. (Lond.), 1862, p. 54, June 1.

It is questionable whether this is the same as Gray's *Bivonia*, but the matter is too complex for discussion here.

Bivonia constrictor Mörch.

1862. *Bivonia constrictor* Mörch, Proc. Zool. Soc. (Lond.), 1862, p. 63, June 1. Australia.

Hedley (Proc. Linn. Soc. N.S.W., Vol. xxxviii., p. 294, pl. xviii., fig. 71, November 5, 1913) has figured the type, and this agrees with Lord Howe Island specimens. A dead mass was picked up at Middleton Reef.

Family Naticidae.

A dead worn specimen from Middleton Reef belongs to the form regarded as *Uber pyriforme* by Hedley (Rec. Austr. Mus., Vol. xiv., p. 161, 1924), but the matter is more complicated than Hedley concluded. I am endeavouring to elucidate the species, but here it may be concluded that

the Middleton Reef shell agrees generally with the North Queensland shell. It has only once been sent from Lord Howe Island up to the present, so must be a very rare shell there.

Family Cypraeidae.

A dead worn shell of the common Cowry, *Mystaponda vitellus* Linné, and a fragment of the equally common *Ravitrona caputserpentris* Linné, were picked up on Middleton Reef. These are both very common at Lord Howe Island, as well as North Australia and New Caledonia, and so far no geographical variation has been determined.

Family Conidae.

Only a few odd shells were picked up, and these represent half a dozen species, all well known and common throughout the Indo-Pacific area, so that no good result would accrue from criticising them in any way. The accepted specific names are here utilised for ease in reference, as *Virroconus ebraeus* Linné, *V. musicus* Brug., *V. coronatus* Dillwyn, *Stephanoconus lividus* Brug., *Chelyconus rattus* Brug., and *Rhizoconus planorbis* Born. The first two were secured at Elizabeth Reef, the other four at Middleton Reef.

Family Turridae.

One small Turrid was found among debris from Middleton Reef, and this belongs to the group named *Iredalea* by Oliver, and the specimen is similar to the type of the genus, *subtropicalis,* described from the Kermadec Islands. Hedley (Rec. Austr. Mus., Vol. xiii., p. 258, pl. xlv., fig. 52, September 30, 1922) figured a shell from Torres Straits under this name, and the shell in hand will fall into the limits thus assigned. Shells of the same appearance are known from Lord Howe Island and New Caledonia.

Family Pyrenidae.

A living specimen of the Columbellid recorded from Lord Howe Island as *varians* Sby. was collected at Middleton Reef. It is fairly common at the former locality, and the series is not unlike the figures 49-50 of pl. xxxvii. in Sowerby's Thes. Conch., Vol. i., 1844. Some specimens also agree very closely with figs. 47-48, which suggests that the colour variation is similar. Sowerby's note (p. 118) is somewhat ambiguous: "Found in the Gallapagos Islands, H. Cuming. Numerous specimens were brought by the Endeavour, Capt. Cook". It would be interesting to know the locality whence the latter came.

At Lord Howe Island the more common species is *"versicolor* Sby." in a small form, about the same size as *varians.* This probably also occurs on the Reefs, and would have been of more value, as the Queensland form of *versicolor* is a large shell, easily distinguishable. The generic name to be used, at present, for these species is *Euplica.*

Family Thaididae.

It would be anticipated that members of this family would be met with as these shells are characteristic of coral reefs. Five species were collected at Middleton Reef, one of which had only been found at Elizabeth Reef. Two items are of interest in their connection, the occurrence of *"Drupa chaidea"* and *"D. marginalba".* I have pointed out the curious range of the former in my introduction, and the latter is one of a pair that is continually and easily confused. According to my experience in Queensland,

marginalba is the coastal shell, coming as far south as Sydney, New South Wales, where it is common, attacking oysters, and being known as the Oyster Drill. The other shell of the pair is known as *tuberculata*, but an older name is *granulata* Duclos, and this lives on the outer edges of the coral reefs, and this should have been the form found at Middleton Reef. It was the *marginalba* shell, which was, however, collected. The commonly used names of the five species are *Thais pica, Drupa horrida, D. morus, D. marginalba* and *D. chaidea.* Instead the names at present valid are *Menathais pica, Drupa morum, Morula uva, Morula marginalba* and *M. nodulifera.* The discussion in connection with these is too long for insertion here, so will be dealt with in detail elsewhere. The outlines are here only noted.

Genus MENATHAIS *nov.*

Type, *Purpura pica* Blainville.

The type of *Thais* Bolten (Mus. Bolten, pt. ii., p. 54, September) is here fixed as *T. lena* Bolten = *Murex fucus* Gmelin, the shell commonly known as *Purpura neritoides* Lam. The present species is unlike in form, having an elevated spire, a much smaller mouth, which is striated inside. This is apparently a rather large Pacific group of great complexity, four or five species living in North Australia, the figure in Reeve (Conch. Icon., Vol. iii.), pl. viii., fig. 36, showing the typical form with the widest range.

MENATHAIS PICA Blainville.

1832. *Purpura pica* Blainville, Nouv. Ann. Mus. Paris, Vol. i., p. 213, pl. 9, fig. 9, July (cites Martini, 956-8). Tonga.

Dead shells, inhabited by hermitcrabs, only from Middleton Reef; has been rarely found alive at Lord Howe Island.

Genus DRUPA.

1798. *Drupa* Bolten, Mus. Bolten, pt. ii., p. 55, September. Logotype, Rovereto, Atti. Soc. Ligustico (Genoa), Vol. x., p. 105, 1899, *Drupa morum* Bolten.

1807. *Canrena* Link, Verz. Rostock Samml., pt. iii., p. 126. Logotype, here selected, *C. neritoidea* pt. Martini, figs. 972, 973 = *D. morum* Bolten.

1810. *Sistrum* Montfort, Conch. Syst., Vol. ii., pp. 594-5, May. Orthotype, *S. album* = *Bucc. echinatum* Lam. ined. = *Murex ricinus* Linné.

1816. *Ricinula* Lamarck, Ency. Meth., Vers., Vol. iii., Liste, p. 2, December, for Ency. Meth., Vers., Vol. i., pl. 395. Logotype (Children), Quarterly Journal Science, Vol. xvi., p. 56, October, 1823. *Ricinula horrida* Lamarck.

1817. *Ricinella* Schumacher, Essai nouv. syst. Vers., pp. 72-240. Logotype, here selected, *Ricinella purpurata* Schum. = *Drupa rubusidaeus* Bolten.

1852. *Pentadactylus* Mörch, Cat. Conch. Yoldi, pt. i., p. 87, August, as of Klein pre-Linnean. Type here selected "*globosa* Mart." = *horrida* Lam. Not *Pentadactylus* Gray, 1845.

If the generic name *Drupa* be restricted to the forms about *morum*, the name *Ricinella* will be available for the open mouthed species, similar to *rubusidaeus*, as *aperta* Blainv., as shown by Cooke (Proc. Mal. Soc. (Lond.), Vol. xiii., p. 102, fig. 19, April, 1919).

DRUPA MORUM Bolten.

1798. *Drupa morum* Bolten, Mus. Bolten, pt. ii., p. 55, September, for Martini, 3, t. 101, figs. 972, 978 (sic). East Indies.

1816. *Ricinula horrida* Lamarck, Ency. Meth., Vers., Vol. iii., Liste, p. 2, December, for Ency. Meth., pl. 395, figs. 1a, b.
1817. *Ricinella violacea* Schumacher, Essai nouv. syst. Test., p. 240, for Mart., 3, p. 280, t. 101, figs. 972, 973.
1822. *Ricinula horrida* Lamarck, Hist. Anim. s. Vert., Vol. vii., p. 231, Aug., cites Martini, 3, t. 101, figs. 972-973, and Ency. Meth., pl. 395, fig. 1. L'Ocean Indien.
1852. *Ricinula globosa* Mörch, Cat. Conch. Yoldi, pt. i., p. 88, Aug., ex Martini, nonbinomial, for *horrida* Lam., and *morum* Bolt.

This common widely spread species has only once been found at Lord Howe Island, as it frequents the outer edges of the coral reefs. Two living specimens were collected at Middleton Reef. Although no geographical variation is yet known, apparently a distinct form lives at Samoa, according to shells so labelled in this Museum.

Genus Morula.

1817. *Morula* Schumacher, Essai nouv. syst. Test., pp. 68-227. Haplotype, *M. papillosa* = *Drupa uva* Bolten.

The name *Morula* should be restricted to the "mulberry" forms, as these small species have been shown to be of polyphyletic origin.

Morula uva Bolten.

1798. *Drupa uva* Bolten, Mus. Bolten, pt. ii., p. 56, September, for Martini, 3, t. 101, fig. 970. East Indies.
1816. *Ricinula nodus* Lamarck, Ency. Meth., Vers., Vol. iii., Lister, p. 2, December, for Ency. Meth., Vers., Vol. i., pl. 395, figs. 6, a, b.
1817. *Morula papillosa* Schumacher, Essai nouv. syst. Test., p. 227, for Martini, 3, p. 278, t. 101, fig. 970.
1822. *Ricinula morus* Lamarck, Hist. Anim. s. Vert., Vol. vii., p. 232, August, cites Martini, 3, t. 101, fig. 970, and Ency. Meth., pl. 395, fig. 6. Mers d'Ile de France.
[? 1832. *Purpura sphaeridia* Duclos, Ann. Sci. Nat. Paris, Vol. xxvi., p. 111, pl. 2, fig. 10, May. "Californie."]
1852. *Ricinula alba* Mörch, Cat. Conch. Yoldi, pt. i., p. 87, August, ex Martini, for Mart., 3, 970, = *uva* Bolten and *morus* Lam.

One live shell from Middleton Reef, also rarely met with at Lord Howe Island.

Morula marginalba Blainville.

1832. *Purpura marginalba* Blainville, Nouv. Ann. Mus. Paris, Ser. 3, Vol. i., p. 209, pl. 10, fig. 6, June-August. Mers Australes.

This is distinguished by its open mouth and dark teeth, the intervals of the outer lip being light coloured. The species following has been confused, but the mouth is cramped, two white teeth in the centre of the outer lip, the rest being dark. The latter has been commonly known as *tuberculata*. *M. marginalba* is common at Lord Howe Island.

[Morula granulata Duclos.

1832. *Purpura granulata* Duclos, Ann. Sci. Nat. Paris, Vol. xxvi., p. 111, pl. 2, fig. 9, May. New Holland.
[1832. *Purpura tuberculata* Blainville, Nouv. Ann. Mus. Paris, Ser. 3, Vol. i., p. 204, pl. 9, fig. 3, June-August. Madagascar.
The figure shows four evenly spaced teeth in mouth.]

1908. *Sistrum chrysalis* Sowerby, Proc. Mal. Soc. (Lond.), Vol. viii., p. 17, pl. i., fig. 5, March. New Caledonia.
(Seems to be based on a local aberration.)

The figure in the Ency. Meth., pl. 395, figs. 6, a, b, upon which *Ricinula nodus* Lamarck is based, is more like this species than it is similar to *uva*, with which *morus* Lam. has been commonly identified, the description belonging to that species.]

MORULA NODULIFERA Menke.

1829. *Purpura nodulifera* Menke, Conch. Samml. Malsb., p. 33 (pref. May 18). No locality.
1832. *Purpura chaidea* Duclos, Ann. Sci. Nat. Paris, Vol. xxvi., p. 106, pl. i., fig. 4, ex Vol. xxv., p. 94, January, 1832, *nom. nud.* Locality unknown.
1832. *Purpura nassoidea* Blainville, Nouv. Ann. Mus. Paris, Ser. 3, Vol. i., p. 205, June-August, for Quoy & Gaimard, pl. 38, figs. 7-9. Tonga.
1833. *Purpura nassoides* Quoy and Gaimard, Voy. de l'Astrol., Zool., Vol. ii., p. 564, pl. 38, figs. 7-9. Tongatabu; figs. 10-11, New Holland.
1868. *Sistrum rugulosum* Pease, Amer. Journ. Conch., Vol. iv., p. 93, pl. ii., fig. 7, November 3. Howland Island.

This shell is really dissimilar in sculpture and form, so that it should be separated as a subgenus, for the present, with the name *Oppomorus*; the mouth becomes cramped, but the teeth on the outer lip are insignificant, and the shell resembles *Cronia*, but is not closely related to that genus. It was the commonest of the series at both Reefs, and it is also common at Lord Howe Island.

Family QUIBULLIDAE.

A dead shell was all that was secured, but probably many Tectibranchs live on the Reefs.

Genus QUIBULLA.

1929. *Quibulla* Iredale, Austr. Zool., Vol. v., p. 349, March 24. Orthotype, *Bulla botanica* Hedley.

Study of the animals may enable us to determine the generic limits of the Bulloid molluscs, but there is very little to get hold of in the shells.

QUIBULLA SCOTTI *sp. nov.*

(Plate xvi., fig. 11.)

When I was reporting upon Strange Molluscs from Sydney Harbour (this Journal, Vol. v., pp. 349-50, 1929) I allowed Pilsbry's name *angasi*, but that was incorrect. Pilsbry had introduced *A.* (that is, *Bulla*) *angasi* for *Bulla solida* of Sowerby, not of Gmelin, and only reproduced Sowerby's description and figure from unknown locality. Therefore, Pilsbry's name must follow Sowerby's account, and, as Pilsbry himself admitted, that does not agree with Port Jackson shells, though he added that locality ex Angas. But Angas did not regard his Port Jackson shells as *solida* of Sowerby, but that shells similar were named *Bulla solida* Gmelin, not Bruguière in the British Museum. There appears to be one or two names available for the Sydney shell, as Angas called it *Bulla magdelus* ex Lister, and gave *Bulla ovulum* Gld. MS., as a synonym. Lister is pre-Linnean, and he had spelt the name *amygdalus*, and this had been used by Dillwyn for Lister's shell from the West Indies. If, therefore, *magdelus* Angas, be rejected as merely a mis-spelling, *ovulum* will become valid, and there appears to be no prior use of that name. It may be that Gould altered his

ovulum to *vernicosa,* as that Gouldian published species is quite similar. For Lord Howe Island specimens *Bulla adamsi* has been used, but *Bulla adamsi* Menke (Zeits. für Malak., 7th year, 1850, p. 162, April, 1851) must be restricted to the Mazatean shell he described. Menke also quoted *Bulla australis* A. Ad. in Sow., Thes. Conch., Vol. ii., p. 576, pl. 122, figs. 64-66, 1850, a figure of a Tahitian shell. This was not *Bulla australis* Quoy & Gaimard, a West Australian shell, and Brazier (Proc. Linn. Soc. N.S.W., Vol. x., p. 92, June 4, 1885) renamed the Tahitian shell *Bulla adamsi,* ignorant of Menke's usage prēvĭously.

The Elizabeth Reef shell is the same as one common at Lord Howe Island, and which is here described. It is more regularly elongately oval than *botanica,* as well as being stouter, but is definitely narrower than any of the *ampulla* series, as well as smaller. The apical umbilicus is very narrow, but deep, and there are about four spiral incisions internally; there is a strong deflection of the inner lip over the umbilicus, but little glaze posteriorly; the outer edge is slightly sinuate, but almost straight. Growth lines are well marked, almost forming a regular incised sculpture; there are no striae round the base.

Coloration: Mottled closely with brown on a whitish ground, with four indistinct transverse bluish bands.

Length of type, from Lord Howe Island, 40 mm.; breadth, 27 mm.

The common Sydney shell is smaller, narrowed a little posteriorly, and therefore a different shape, the apical umbilicus narrow, closely finely incised inside (I do not lay any stress upon this variable feature), but sometimes the incisions are strong, at others obsolete. Shell mottled and clouded with dark and light brown, but never banded. It must apparently be called *Quĭbulla ovulum* Angas.

Family Retusidae.

A small Retusid shell from the debris of Elizabeth Reef does not appear to fit in with any known group. The erect pupoid apex of the Tornatinid series is here flūng down, and almost immersed by the surrounding adult shell, which is crowned with a puckered frill.

Genus Decorifer *nov.*

Type, *D. elisa sp. nov.*

(Plate xvii., figs. 9, 10.)

A retusoid shell with slight columellar fold, two whorled pupoid nuclus laid transversely, the surrounding whorls becoming elevated, so that the crown becomes a shallow saucer, edges puckered and compressed, a shallow groove separating this from the smooth shell, on which faint growth lines only are distinguishable. Transparent, clouded with milky blotches.

Length, 3.25 mm. Breadth, 1.5 mm.

The figure of *Bulla planispira* A. Adams (Thes. Conch. (Sowb.), Vol. ii., p. 568, pl. 121, fig. 32, 1850), from the Is. of Luzon, recalls this, but our shell is nōt longitudinally grooved, while as there is no mark for size alongside the figure, which is four times the length of this shell, the comparative sizes are unknown.

Family Ringiculidae.

Some small shells sorted out of debris from Elizabeth Reef are smooth, and therefore referred to *Ringiculadda.*

Genus Ringiculadda.

1936. *Ringiculadda* Iredale, Rec. Aust. Mus., Vol. xix., p. 332, April 7. Orthotype, *Ringicula semisculpta* Hedley.

This genus was proposed as having less callus on the body whorl, with teeth less notable, and the outer lip less variced; the shells under review agree in those features.

RINGICULADDA ASSULARUM Watson.

1880. *Ringicula assularum* Watson, Journ. Linn. Soc. (Lond.), Zool., Vol. xvii., p. 291. Flinders Passage, Torres Straits, 7 F.

1886. *Ringicula assularum* Watson, Rep. Sci. Res. Chell., Vol. xv., p. 635, pl. xlvii., fig. 10.

The specimens are almost identical with Australian ones, and a Lord Howe Island shell is very similar. Four species of *Ringicula* have been recorded from New Caledonia, and all these are strongly sculptured, the present species being smooth.

The species referred to may be listed as follows:—

	Middleton Reef.	Elizabeth Reef.
Acar dubia Baird	—	E
Arca "decussata"	M	—
"Ostrea cerata"	M	—
"Limatula bullata"	—	E
Lithophaga sp. indet.	—	E
Septifer bilocularis Linné	M	E
Musculus nubilis Ired.	—	E
Chama 2 spp. indett.	M	—
Persikima whitleyi Ired.	(M)	E
Vulgodacna fossor Hedley	M	E
Cardita variegata Brug.	—	E
Lentillaria paytenorum Ired.	M	E
Epicodakia "bella"	—	E
Pardosinia alma extranea Ired.	—	E
Laciolina quoyi attracta Ired.	M	—
"Tellina" sp. indet.	—	E
Notoplax leuconota Hed. & Hull	M	—
Tegulaplax howensis Hed. & Hull	M	—
Nannoscutum forsythi Ired.	—	E
Stomatolina rufescens Gray	—	E
Calliotrochus excellens Ired.	M	E
Turbo cepoides Smith	M	E
Distellifer wallisi Ired.	M	—
Theliostyla albicilla Linné	M	E
Melanerita melanotragus Smith	M	E
Sabia acuta Quoy & Gaimard	M	E
Antisabia foliacea Quoy & Gaimard	M	E
Cheilea sp. indet.	—	E
"Rissoina exasperata"	M	—
Rissolina (plicata)	M	—
Clypeomorus (nassoides)	M	—
Veristoa howensis Ired.	M	E
Bivonia constrictor Mörch	M	—
"Uber pyriforme Hedley"	M	—
Mystaponda vitellus Linné	M	—
Ravitrona caputserpentis Linné	M	—

Virroconus ebraeus Linné	—	E
musicus Brug.	—	E
coronatus Dillwyn	M	—
Stephanoconus lividus Brug.	M	—
Chelyconus rattus Brug.	M	—
Rhizoconus planorbis Born.	M	—
Iredalea subtropicalis Oliver	M	—
Euplica varians Sowerby	M	—
Menathais pica Blainville	M	—
Drupa morum Bolten	M	—
Morula uva Bolten	M	—
marginalba Blainville	M	—
Morula nodulifera Menke	M	E
Quibulla scotti Ired.	—	E
Decorifer elisa Ired.	—	E
Ringiculadda assularum Watson	—	E

In addition to the new species described, the following novelties are introduced and here noted for the benefit of the Zoological Record compiler.

Propetilus subgen. nov., type, *Musculus nubilis* Ired.

Dinodacna gen. nov. (for Giant Clams of the Pacific Ocean), type, *D. cookiana* Ired.

Flodacna gen. nov. (for Squamose Clams), type, *Tridacna squamosa* auct.

Sepidacna gen. nov. (for small prickly Clams), type, *Tridacna troughtoni* Ired.

Laciolina francesae Ired., Norfolk Island.

Talopena discerna Ired.

Trochinella perconfusa Ired.

Calliotrochus normalis Ired.

symbolicus Ired.

alter Ired.

Dinassovica gen. nov. for *D. verconis* Ired. (*Turbo jourdani* pt.).

Pagocalcar subgen. nov., type, *Trochus limbiferus* Kiener.

Rugastella subgen. nov., type, *Trochus rotularius* Lam.

Distellifer queenslandicus Ired.

SEA SLUGS.

Subclass Opisthobranchia.

By Joyce Allan.

(The Australian Museum, Sydney.)

Amongst the Opisthobranchia were two small sea-hares and a Nudibranchiate sea-slug. One other seahare was sighted, and recognised as similar to the large, greenish brown species previously noticed at Lord Howe Island. It had a characteristic black mark on the tail, and is reasonably supposed to be *Tethys angasi* Sowerby, a species fairly common along the New South Wales coast.

Family Tethyidae.

Genus *Dolabrifera* Gray, 1847.

Dolabrifera Gray, Proc. Zool. Soc., 1847, p. 162. Type, *D. dolabrifera* Cuvier, 1818, from Mauritius.

Dolabrifera brazieri Sowerby.

Dolabrifera brazieri Sowerby, Proc. Zool. Soc., 1870, p. 250. Type locality, Botany Bay, N.S. Wales.