NOTES ON THE FOSSILS REFERRED TO IN THE FOREGOING PAPER.

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[*Read* 11*th July*, 1876.

Since I last described some of the Table Cape fossils existing in the Museum of the Royal Society the collection has been very much enlarged, owing to the indefatigable exertions of the author of the preceding paper, Mr. R. M. Johnston. From this collection I have been enabled to determine upwards of eighty new species, the greater part of which are new to science. About ten per cent. of these are still existing, some few in the same seas, some in the Northern Hemisphere, in subtropical regions or in European seas. Knowing as we do now, from deep sea dredging the wide diffusion of species until recently regarded as local, we must not be surprised at the result, nor should we be surprised if a still larger number of our living shells are found common to European seas and our own. Ten per cent. can hardly be finally regarded as the proportion of surviving forms, because our knowledge of the existing fauna is so imperfect. Some of the fossil shells I never saw living until very lately, and should have described them as extinct had not living specimens been recently discovered. Such instances are, however, like the species themselves—extremely rare. *Natica polita* and *Fissurella concatenata* are cases in point. They had been described there as extinct and only very recently discovered living specimens. *Trivia europea* and *Eulimella subulata* are European forms, which I believe occur at Table Cape as fossils.

I have already described the nature of the formation. I may add that it is evidently a deposit belonging to the Laminarian zone. This I gather from the entire absence of truly littoral shells, and the presence in abundance of Rissoidæ, etc., which feed on sea weed at depths, of from eighty to one hundred fathoms. Foraminifera are numerous and indicative of the same depths as well as corals among which are true reef builders, *Heliastræa tasmaniensis*, Duncan; *Thamnastræa tasmaniensis*, Dunc.; and *T. sera*. Dunc., which are rather abundant. They are the only ones hitherto found in the Australian tertiaries. I have been able to determine a new Placo-

trochus, and a very peculiarly branched Dendrophylla. The Brachiopoda are abundant, and tend to confirm the evidence of the depth at which these beds were deposited. Several new species are under the consideration of Mr. Thomas Davidson—our greatest living authority—and, doubtless, will soon be described.

The Echinodermata are numerous and present some new forms. They are all considerably distorted by pressure. Nothing, however, of very great novelty has hitherto been found, and all the species bear the strongest resemblance to those of the Malta Miocene.

Polyzoa are scarce, and in this respect the Table Cape beds present a remarkable contrast to those of a similar horizon in Australia. This is accounted for by the nature of the beds which are composed of a levigated mud, mingled with coarse pebbles of quartz and feldspar, and all highly ferruginous. They were either derived from the detritus of submarine craters, or the wearing down of volcanic rocks in a sea, not tranquil, but containing strong oceanic currents These conditions are very unfavourable to the growth of polyzoa.

Though some of the shells, as far as yet known, are peculiar to the Table Cape beds, and many of the corals; yet the majority of the fossils are identical with those of the Australian so-called Miocene and undoubtedly belonging to the same sea. To show what differences have arisen since the period, I may mention that there is a much closer resemblance between the fossils of Table Cape and those of Southern Australia, than there is between the shells found upon the same coasts now, that is to say, that the two places had more species in common formerly than than they have now, and, though of course the differences even now are not very great, yet they are more evident than they were. It should be remarked, however, that *now* the existing shells for comparison are littoral, but *then* they were a continuous deep sea, and whereas we know the littoral species, we do not know the deeper sea ones.

It is certain that as we go back in geological periods we find a greater similarity extending over wide spread areas, until in the early formations, where absolute identity is the rule in the most remote parts of the earth's surface. Thus the Devonian fossils of Tasmania are, with few exceptions, specifically identical with those of Europe. Professor

McCoy has pointed out another curious fact in our Australian palæontology, which is, that though in our early tertiary formations we have little specific identity with European fossils, yet we have shells in some instances so closely resembling them as to be mimetic, and no more than just specifically distinct. As far as my examinations go this I find to be rather the exception than the rule, and in most cases I looked in vain for even a general resemblance between our fossils and those which may be presumed to be of the same horizon in Europe.

The following are the new species brought to light by Mr. Johnston. Note.—All dimensions in French millimetres.

Murex eyrei. n. s. Shell fusiformly ovate with a rather depressed spire, lamellose and spiny, last whorl three-fourths the whole length of shell, sharply angulate rather above the middle and furnished with eight thick lamellose frilled varices which at the angle become projected into blunt hollow short somewhat recurved spines. About the fourth from the aperture the varices lose their lamellose character, and become lirate ribs, still preserving the spines at the angle, above which the shell slopes upwards to the suture at a slight inclination on which the varices are represented by smooth lamellar raised lines; the spiral whorls, four in number, have the angle spinous, and but little raised above the suture; apex obtuse; aperture ovate; outer lip produced at the angle and terminating anteriorly in a long straight canal; inner lip reflected with a conspicuously raised foliaceous rib, spirally sloping to the siphonal aperture. Long. 48, lat. 32. Last whorl from posterior margin of mouth, 34; length of canal, 17.

Cassis sufflatus. n.s. Shell thin, shining, globosely inflated with simple or subplicate whorls, spire short almost acute; whorls 6, $2\frac{1}{2}$ apical, naticiform, three next distinctly cancellate with a fine subnodosé carina above; last angulate below the suture, between which and the angle there is a shallow broad finely bimargined groove; below this the shell is somewhat finely and indistinctly tuberculate and ribbed, the ribs showing a faint lower band of tubercles near the middle of the whorl, below this the shell is smooth or very finely striate; aperture auriform, outer lip reflexed, rounded, thickened and much produced anteriorly; inner, a mere enamelling above and passing as a thin septum over the round abruptly twisted, short siphonal canal, causing a broad spiral groove like an umbilicus to pass behind the labio. Long. 37, lat. 23. Long. apert., 26, lat 12, mil.

Though very distinct there is an approach to the Australian

types *C. paucirugis and C. semigranosa,* which are now found on our coasts.

Fusus tateana. n. s. Shell ovately fusiform with the apex curved, and a rather long, narrow, straight canal; whorls 8, roundly convex, smooth, the upper and obliquely curved ones obscurely tubercled, and all more or less marked with flexuous, slightly raised lines of growth; suture well defined but not deep, rather sloping; aperture regularly elliptic, smooth, outer lip thin and roundly curved into the anterior canal, which is narrow and straight; base slightly concave. Length, 81; lat., 35; aperture, 30, anterior canal, 20, but often broken and evidently continued at least 5 mil. further where its width would be scarcely 5 mil. Common.

The constantly curved apex, the slightly tubercled spire while the rest of the shell is so conspicuously smooth renders this form peculiar and distinct. Among living Australian forms there is nothing at all like it, while with the fossil tertiary species of Europe its analogies are remote. I have great pleasure in dedicating the species to Professor Tate, of the Adelaide University, who has done such service to molluscan science by his numerous conchological works, but especially in the revised edition of "Woodward's Manual."

Fusus transenna. n. s. I name this shell provisionally as the only specimen sent to me has the apex and lip broken. It is ovately fusiform with sharp spire, and scarcely rounded whorls, which are completely, equally, rather distinctly latticed, with transverse and spiral liræ, which are subnodose at the intersection, there are about 24 longitudinal ones in the body whorls, but this number is uncertain, as they become confused to some extent with the striæ of growth, and there are 10 spiral ones on the body whorl reckoned at the back of the columella. The body whorl is also subangulate above, and there concave to the suture, which is rendered almost marginate by small granulations at the end of the liræ. The outer lip appears to be thin, the columella slightly twisted, the aperture oval, with a long sub-oblique posterior subrecurved canal. Long. 22, lat. 11, aperture with canal, 12, lat. 4.

Fusus johnstonii. n. s. Shell very small, narrowly fusiform, apex smooth, elongate, of two whorls, the upper being the most swollen; whorls 7, very convex in the middle with 8-9 very prominent broad rounded ribs; conspicuously marked, with very numerous spiral liræ which alternate, large and small, and pass over the ribs; longitudinally finely striated but not so conspicuously as lirate, so that the whorls could scarcely be called cancellate, suture deeply impressed, aperture narrowly ovate, canal prolonged, outer lip thin, columella

simple, with the lip slightly enamelled, and the liræ descending obliquely from behind it. Long. 8, lat. scarcely 3 mill.

A form slightly aproaching *F. Swartzii*, Hörnes, of the Vienna basin, but in that species the canal is recurved, and the liræ sub-squamate.

Voluta M'coyi. n. s. Shell narrowly ovate, thin, smooth, shining, with a small obtuse naticiform apex; whorls slightly convex and oblique with no other marks than the lines of growth, aperture 1-3rd larger than the spire, acute posteriorly and gradually widening to the anterior notch, which is broad and scarcely recurved, columella with four high oblique plaits. Long. 30, lat. 11, aperture long. 18, lat. 5.

Terebra additoides. n. s. Shell very acute—lanceolately turretted, somewhat solid, closely longitudinally ribbed and finely transversely striate, ribs rounded, ivory like and smooth, interrupted above by a rather broad shallow groove in which they are slightly deflected, but not entirely obliterated, above becoming almost nodular; interstices broad, slightly concave, shining, equally and closely striate, which disappears on the ribs, suture sharply and deeply impressed; whorls 13, ribs nodular in 7th to 11th, two spiral whorls, rugose only; apex decollate; mouth ovate, almost channelled near suture; inner lip reflected over columella, which is twisted into four to six rugose folds, sloping down to the siphonal notch. Long. 24, lat. 5.

In this fossil the groove on the ribs and general form brings it near to the Tasmanian *T. addita* and *T. kieneri*, but the whorls are closer and more numerous. It has a general resemblance to the Australian members of the genus. It is very close to certain European miocene forms, notably *T. pertusa* Bast., and *T. basteroti* Nyst (formerly called *T. duplicata* by Brocchi, by mistake identified with Linné's shell of that name), but from these it differs in being a smaller narrower shell, and in the ribs being more numerous and finer.

Astralium (Calcar) flindersii. n. s. Shell solid, trochiform, not umbilicated, spire somewhat elevated, granular and spiny; whorls six, furnished at the base with lamellar imbricated folds in the form of short spines, above which are five spiral unequal lines of round granulations, the uppermost of which are the largest; last whorl angular; suture a broad and deep groove with a line of granulations within; aperture subcircular; columella flattened and concave; outer lip angled and channelled at the base; base flat with many spiral granular or imbricated liræ. Alt. 17, diameter 13 mil. The short spines and the coarsely granular liræ easly distinguish this species.

Astralium (calcar) ornatissimum. Shell very solid, rounded obliquely, and globosely conical, whorls five, rounded and ornamented below with a marginal rib of close granulations; above this a very fine line of granules, above this a projecting conspicuous spiral line of lamellar imbricating spinous folds, and crowned above by a spiral line of coarse round nodules; aperture circular, outer lip with an exterior angle and canal; columella curved, scarcely flattened; base concave above with four spiral granular ribs. Alt. 17, diam. 13.

Delphinula tetragonostoma. n.s. Shell small, obliquely turbinate, latticed, whorls four, swollen, with three keels and 8-9 spiral liræ, which are united to each other by small close diagonal riblets, making complete lattice-work all over the test; apex obtuse, depressed; aperture round, outer lip quadrangulate, with a distinct channel at each angle; inner lip reflected over the umbilicus, on the outside of which is a salient conspicuous marginal rib which joins the aperture at the anterior angle; base convex and latticed. Long. 2; lat. $3\frac{1}{2}$ mil.

This very small Delphinula has some relation with our latticed Tasmanian *Liotias*, but is very distinct in every other way.

Zizyphinus blaxlandii. n.s. Shell small, conical, stained purplish in colour, spirally ribbed and transversely diagonally finely striate; whorls 7, flattened above and surmounted by a broad canaliculate spiral groove, which is diagonally finely striate; spiral ribs, four on each whorl, and separated from each other by equal grooves, which have 3-4 spiral liræ and diagonal striæ; penultimate whorls very finely coronate above with almost imperceptible elevation of the margin, these become more distinct on the next whorl above, and then are regular granulations on the two next; the two apical whorls are smooth; on the penultimate whorl and base the transverse striæ are raised, but faint, with a tendency to be in pairs; on the antipenultimate they are wrinkled and distinct; mouth sub-quadrate; outer lip thin; columella with a faint umbilicus behind, margined by a thick spiral rib. Long. 5, lat. 4, mil. Named after one of the first explorers who crossed the blue mountains. This fossil is not allied to any existing species in these seas, though slightly resembling a Philippine form.

Liotia lamellosa. n. s. Shell small, orbicular, subdiscoid, apex flattened, and depressed, four to five longitudinal keels, which are not very prominent, and equally, distinctly lamellosely costate with overlapping undulating ribs, between which the whole shell is closely and finely striate,

umbilicus broad, deep, and finely crenulated by the endings of the lamellæ, aperture round, with a thin varix. Diam., 3 mill.

This form which, though decidedly similar to many Australian forms, is distinct from any yet described. Quite recently I have seen in the collection of Mr. W. F. Petterd, a specimen dredged from the Tasmanian coast, so that the species is still living.

Margarita kekwickii. n.s. Shell small, thin, broadly globosely conical, deeply umbilicate; spirally lirate and shining; whorls seven, rapidly decreasing in size, rounded and equally spirally lirate with alternating large and small fine liræ, the larger ones sharp, and the lowest projecting a little, forming a groove over the suture, the smaller microscopic, and not visible above the basal and penultimate whorl; aperture round, peristome almost meeting on base, outer lip thin; columella curved and thin, umbilicus acutely margined and with curved ribs at right angles to spiral liræ. Long. and lat. 5. Named after my late friend the overseer of Stuart, the great explorer, who accompanied him on all his expeditions, and was one of the most courageous and indefatigable of his followers. The fossil has no known living congener in Tasmania.

Trochus josephi. n. s. Shell very small, broadly pyramidal with a small, smooth, white, rounded apex of $1\frac{1}{2}$ whorls; spire conspicuously latticed; whorls 6-7, with three conspicuously keels, the lowest projecting much over the suture; keels closely latticed regularly by somewhat broader sub-distant sloping ribs which seem to pass under the keels, and to cause them to become nodular as the point of intersection, in addition the whole shell is very finely striate; base flat, with numerous spiral alternating liræ; aperture subquadrate, simple, entire. Long. 3, width of base, 2.

Thalotia alternata. n. s. Shell turbinately conical, spire elevated, acute; whorls six, very slightly convex, granulosely ribbed; on the last whorl the spiral ribs are twelve in number, three conspicuous and largely granulose, and the rest with small sometimes sharp edged grains or reduced to fine lines; they are disposed thus—each granulose rib has fine liræ at each side of it, and the large and small ribs alternate; suture inconspicuous, base convex, rounded at the periphery, with spiral granulose ribs and fine liræ regularly alternating; aperture obliquely quadrate, nacreous, outer lip thin, smooth inside; columella slightly twisted with an obsolete tubercle at the base. Lon. 12, lat. 10.

Not like any of our existing Thalotias.

Solarium (Torinia) gibbuloides. n. s. Shell thick, sub-

turbinate, rugose, spire somewhat elevated; whorls 4-5 angulated tuberculately coronate above and conspicuously keeled, keel thin, finely granular with irregular lines of rather larger granules above it; apex smooth, and turbinate for $1\frac{1}{2}$ whorls, base very much produced by the spiral, sharp, smooth, edge of the umbilicus, and handsomely ornamented with spiral granular lines, and undulating subsquamose striæ, which are also found above the carina and between the granules on the body whorl; aperture orbicular, outer lip produced and everted posteriorly, and narrowed into a fine short canal anteriorly, inner lip acute, curved, umbilicus, keeled. in the centre, very concave, and distinctly undulately striate. Diam. 8, alt. 7.

This form which departs in many respects from the typical Solarium has some affinity to *S. turbinoides*, Nyst, and *S. trochiforme*, Desh. of the French and English Eocene deposits.

Gibbula crassigranosa. n. s. Shell solid, thick, rugose, turbinately conical, apex obtuse, depressed, smooth, whorls 5-6, coronate with slightly oblique rounded ribs, extending to a sharp granulose carina, in the middle, below they have a conspicuous spiral groove to the suture on which is a line of very fine granules; base sharply angular, slightly convex with spiral lines of fine and coarse granules; aperture, orbicular, nacreous, columella produced into an anterior angle. Long. 14, Lat 11. Young specimens have numerous oblique longitudinal lines of growth, and are umbilicated. At the dimensions given there are about 16 costæ on the last whorl.

Gibbula æquisulcata. n. s. Shell orbiculately turbinate, sub-depressed, thick, apex acute; whorls 5-6, rapidly but regularly increasing, rounded, spirally finely regularly grooved, and very closely lirate and regularly cancellate with extremely fine diagonal striæ; aperture orbicular, smooth, outer lip finely crenulate, inner lip arcuate with slight anterior angle; deeply narrowly perspectively umbilicate; periphery rounded, base convex, marked like the whorls. Diam. 12, alt. 9, Lat. of apert. 6. Rare. The carinæ between the grooves are sharp and very distinct from the much finer liræ with which the whole shell is marked, on the last whorl where they are crossed by the diagonal striæ they become granular.

Except that this is a more depressed and smaller shell, it has considerable affinity with *Trochus patulus*, Bron. of the Vienna Miocene. The description, however, as given by Nyst. Coq. Foss. p. 383, makes this a more angular shell in Belgian formations.

Turbo etheridgei. n.s. Shell turbinately conical, solid, granular, grooved, spire rather elevated and acute, whorls 6-7, convex, conspicuously carinated with 5-7 elevated sub-

distant, largely granular spiral ridges, interstices closely, finely, but very distinctly, obliquely striated with striæ which pass over the ridges and sometimes even over the raised rounded often polished granulations; aperture orbicular, nacreous and smooth; columella simple, not tuberculate, base convex and spirally granular. Sometimes the interstices between the ribs have a fine sharp raised keel in the midst. Long. 17, Lat. 12½. Common, but nearly always broken.

I have dedicated this shell to Mr. Robert Etheridge, jun., F.G.S., a distinguished palæontologist and geologist, formerly connected with the Victorian Geological Survey.

Syrnola bifasciata. Tenison Woods. This species which is described by me in last year's Transactions of the Society has been forwarded by Mr. Johnston as found fossil at Table Cape.

Turritella warburtonii. n. s. Shell small, shining, *narrowly* pyramidal, spirally ribbed and (microscopically) transversely closely undulately striate, *two smooth* conspicuous ribs at the lower part of each whorl, with others very fine and of varying size above; *whorls* 8-10, *flattened*, slightly swollen above; suture narrow and deeply depressed, apex always decollated, base flattened, almost concave, with 8-10 fine spiral ribs which alternate large and small, outer lip thin, inner lip *not reflected*, mouth quadrate, columella simple. Long. 6, Lat. 2.

I have marked the difference between this and the preceding species in *italics*. In addition it is a much smaller shell. Table Cape. Common.

Turritella sturtii. n.s. Shell small, acutely pyramidal, spirally granulosely ribbed; ribs 7-8 in each whorl, three conspicuous and prominent, the others intermediate, small non-granulose, and of varying size. Whorls ten, constricted at the suture which is deeply impressed. Base flattened with 7-8 spiral equal sized ribs, covered with numerous very fine transverse striæ; mouth subquadrate, outer lip thin, inner lip much reflected over the base, columella simple, and slightly reflected at the base. The three prominent ribs on the whorls are all granular, the larger two at the base of the whorl, and the third above and separated by a wide interval in which the smaller ribs occur. Granules on lowest prominent rib separated from each other by oblique grooving, and below this rib a deep channel above the suture; apex always decollated. Long. 12, lat. 4 mil.

This fossil is of a type common enough in the genus, which may be said to vary in individuals by the disposition of the three prominent ribs. It has remote resemblance to some living Australian species. Its small size and remarkable granula-

tions distinguish it. Very common at Table Cape, and in the Australian Lower Cainozoic, Muddy Creek, Corio Bay, etc. In the Museum there is a large block of yellow calcareous sandstone from Table Cape, principally composed of this fossil, with an almost complete skeleton of a small marsupial herbivore imbedded. (Macropus or Helmaturus ?)

Tenagodus occlusus. n.s. Shell loosely twisted, the three apical whorls in contact, the fourth slightly detached, and sloping, the last largely unfolding, making a loose turn two and a half times the length of the remainder; whorls solid, wrinkled or detaching upper shelly coat in flakes, underneath which it is still thick, cracked, smooth, and somewhat polished, rounded below but narrowing and almost angular at the cleft, which is a smooth slit without punctures closed for its whole length, and evidently almost filled up by lamellar calcareous matter down to the aperture where it is little more than a shallow notch, pyriform and projecting below, apex disciform, apical whorl vermiform and fine pointed. Length, 56 lat., aperture 8 mil.

The absence of foramina and the almost closed slit distinguish this from all known Australian forms. The cleft is much more narrow and inconspicuous than the size of the shell would lead one to suspect, and its being reduced to a notch in the aperture. It is supposed that the slit is left open for the purpose of bathing the gill which lines the left side of the mantle, which, in this animal, is divided. It cannot, however, be so necessary where the aperture slopes forward from the notch. The slit is not, in this case, entirely closed, for the tube, when broken below it, separates at once at the fissure, and shows a fine delicate edge at the point of junction.

Vermetus conohelix. n. s. Tube adhering, corrugated, coiled, lower whorls, laterally depressed into a ridge and coiled upon each other with a truncated flattened hollow cone of two whorls, at the apex the tube becomes free, obliquely erect, flexuous and cylindrical, aperture somewhat thick and orbicular. Height of cone, 3; breadth, 6; length of free end, 5; aperture, 1, mill. wide.

I am unacquainted with any form like this either in Australian seas or elsewhere, as far as I can gather from O. Mörch's extensive lists.

Rissoa stevensiana. n.s. Shell minute, narrowly pyramidal, nucleus somewhat suddenly contracted of two smooth turbinate whorls, spire slightly tumid in the middle; whorls ten, angular or sub-carinate in the middle, coarsely costate, from 12-16 ribs on each whorl, and finely but indistinctly lirate, ribs rounded, not much elevated and continuous from suture

to suture, the latter very deeply impressed so as to give the whorls a rounded swollen aspect; base almost flat, aperture pyriform entire, 1/5th length of shell; columella simple. Long. 3, Lat. 1 mil.

Rissoina varicifera. n.s. Shell minute, smooth shining, tumid, apex somewhat contracted, of two whorls, smooth, and was previously whiter than the spire; whorls 6-7, flattened, but rounded above, suture deeply impressed, aperture rounded, much smaller than penultimate whorl, outer lip slightly produced, inner lip reflected over the base, generally a continuous line of swollen conspicuous varices on the columella side of the whole shell. Long. 3, Lat. scarcely one mill., but this is the largest size.

A form approaching somewhat the *R. costulata*, Grat. of the European tertiaries, but smaller and with a rounded contracted aperture. The varices are not always visible. I believe this form still exists in Tasmanian seas.

Rissoina johnstoni. n.s. Shell minute, rather broadly pyramidal turretted, apex smooth, white, shining, of two smooth turbinated whorls; spire $2\frac{1}{2}$ length of aperture; whorls 9-10, sloping, rather convex, obtusely carinated in the middle, more or less longitudinally plicate, with 6-12 ribs (which are in some specimens very faint, and others almost varicose) and spirally lirate with 6-8 valid liræ, which often alternate in size; suture well impressed; aperture suborbicular outer lip somewhat produced, thin; column slightly twisted, and everted below; base concave and spirally lirate. Long. $3\frac{1}{2}$, Lat. $1\frac{1}{3}$.

Very common. In this species the ribs do not follow each other in a regular series, but seem rather to alternate, those of each succeeding whorl rising from the interstices between the ribs of the ones below. It has no living representative in Australia. Its Bittium-like form distinguishes it from any other species known to me.

Turbonilla pagoda. n.s Shell minute, narrowly pyramidal, apex a swollen elongated kind of pullus of two smooth whorls, spire flattened turriculate, whorls 9, rising in stages or slightly overlapping; ribs 12-16 rounded, raised, in a continuous sloping series, broader than the interstices; no visible transverse markings, base smooth, slightly convex, aperture oblong, squared above, rounded below, columella twisted. Long. $4\frac{1}{2}$. Lat. 1 mil.

In this genus determinate characters are not easily specified. The above fossil may, perhaps, be best distinguished by its size, sloping ribs, smooth base, twisted columella, and the whorls rising in stages.

Turbonilla liræcostata. n.s. Shell elongate, narrowly

pyramidal, nucleus of two smooth turns, apex blunt, whorls (without nucleus) 8, flattened, with 20-24 straight round ribs which continue unaltered (though sometimes slightly flexuous) from suture to suture; interstices not so wide as the ribs, and very closely spirally grooved, which sometimes pass over the ribs; base roundly convex and spirally lirate, suture submarginate, aperture broadly ovate, outer lip thin, columella slightly arched, canal short, very slightly recurved. Long. $5\frac{1}{2}$, Lat. $1\frac{1}{2}$.

Eulimella subulata. Donovan. *(Nat. Hist. Brit. Shells, vol. 5, t. 173—1799 as Turbo.)* This shell, which is very fully described and figured by Hörnes, Nyst, Wood, and others, as Eulima, would come under Prof. Forbes genus of Eulimella. It has received a host of names during the last 77 years of its scientific life. I can see no difference whatever between the specimens found at Table Cape and those found existing in the British seas. It is extensively known as European Miocene and Pliocene fossil. Not common. Two specimens forwarded by R. M. Johnston, one by — Stephens, many found by myself at Muddy Creek, Victoria, Mordialloc, etc. It has not yet been found living in Australia, unless some only closely allied forms of Eulima should be identified with it.

Actæon scrobiculatus. n.s. Shell oblong, ovate, solid, apex acute, smooth only at the extreme summit, whorls 7, cancellate with very distinct spiral liræ, much finer longitudinal striæ; interstices rounded or punctate, liræ on the last whorl broad and subdivided by a fine groove, longitudinal striæ subdistant (so that the interstices are transversely oblong) and passing occasionally over the liræ, so as to make them subgranular, especially at the anterior margin; aperture subauriform, posteriorly acutely attenuate, peristome anteriorly everted and recurved, plait conspicuous, solid, obtuse. Long. 12, Lat. 6, apert. 6.

A form very closely allied to the *A. pinguis*, D'Orb., of the European Miocene, from which it differs in the narrower form, the character of the plait, the anteriorly produced mouth and everted lips. It has no Tasmanian nor Southern Australian congener.

Cylichna arachis. Quoy. Still living in Tasmania and Australia, and not uncommon in the Table Cape beds.

Liotia discoidea. Reeve Zool. Prov., 1844. Living in Tasmania and extending to Philippines; somewhat small in the fossil state and rare.

Fissurella concatenata. Crosse. Shell thin, oval, laterally and anteriorly depressed, tumid posteriorly, irregularly concentrically ridged with lines of growth, and covered all over with fine hexagonal depressions which grow broader

from apex to margin; foramen oval, with a conspicuous tubercle on each side, and widely margined beneath, interior margin enamelled, and above which the shell is undulately striate or subcorrugated to the foraminal margin. Long. 14, Lat. 10, alt. $2\frac{1}{2}$ mil. Easily distinguished by its hexagonal markings, in which it differs from any described. This shell was described by H. Crosse, in the Jour. de Conchy, in 1864 but the fossil forms are generally thinner and fragile, and more like the variety found near Sydney.

Emarginula transenna. n.s. Shell thick, small, oblong, subquadrate posteriorly, end slightly produced, conical, high, apex submarginal, smooth, acute, recurved, parallel with the margin, anterior surface ventricose, posterior concave, latticed; radiating ribs 23, high, between them smaller ones which often in descending give rise to still smaller; transverse ribs raised, but always more sunk than the radiate, and at all the points of intersection, very projecting granules, interstices very deep and square, fissure slightly longer than width, margin denticulate, straight. Long. 11, Lat. 6, alt. 6. Fissure, Long. $1\frac{1}{4}$ mill., Lat. $\frac{1}{2}$ mill.

There are many fossil Emarginulas, some descending as low as the Inf. Oolite, though most of them are tertiary. The above description, detailed though it may seem, would apply to many species unless particular attention is paid to the relative dimensions. It is very near the existing Arctic (?) *E. fissura*, Lamk., but narrower, and less high in proportion to length. It is not unlike the *E. clathratæformis*, Eichw. (Vienna Miocene) but that has a sinuous margin, and the apex is incurved and marginal. I doubt very much if our fossil is distinct from what Mr. Angas names *E. dilecta* of South Australia and N. S. Wales, but which is very distinct from *E. dilecta* of A. Adams (Proc. Zool. Soc. 1851, p. 85), which comes from King George's Sound. The latter is very *depressed* with deep fissure.

Pleurotoma. This genus, which is very largely represented in the tertiary deposits of Europe, and in the existing fauna is not numerically a large genus in Australian or New Zealand tertiaries, and in this it accords with the existing state of things. Out of over 400 living species (divided into many genera and subgenera) Australia has scarcely 30, and out of nearly 400 fossil species the tertiary beds of Australia and New Zealand have not so far yielded a dozen well defined. The genus is mainly characterised by the deep cut or sinus in the outer lip. In this and in the form of the shell there is every variety. I draw attention to two important characters which distinguish the *sinus*, which seems of value in the identification of species. Sometimes it is close to the

suture, either as a mere notch or narrow slit, or it is at some distance from it. 1st. On a keel which becomes nodose, granular or imbricately squamose. Or, 2nd. By the side of the keel, next the suture, or outside. On this particular the striation and ornamentation I have found depend very much. For convenience also we may divide the genus into :—1. Plicate, or ribbed. 2. Spirally keeled. 3. Plicate and keeled. Each division may also be subdivided thus :—A. Spire longer than the body whorl. B. Body whorl longer than the spire. In New Zealand the plicate division is represented best. Eleven fossil species are known, two of which are living, and there are four living forms in the same seas, and one which Captain Hutton refers to *Daphnella*, the *Drillia* (*Mangelia*) *letourneuxiana* of Crosse. It does not correspond with the Daphnella genus referred to here. We find in the Australian tertiaries none of those mitræ like forms of Europe such as *P. ramosa*, Bast., neither is the style of ornamentation that of *P. granulocincta*, Münst, *P. Schreibersii*, Hörn. The shells are simply granular, and not often ribbed as far as they have been examined.

Pleurotoma pullulascens. n.s. Shell small, slender, rather solid, fusiformly turretted, spire nearly twice exceeding body whorl, apex naticiform shining, smooth of $1\frac{1}{2}$ turns; whorls (exclusive of apex) 5, angular, equally, distantly, spirally lirate; upper ones subplicate with rounded undulating ribs; all finely long, undulately striate; suture with a distinct margin much broader than the liræ; sinus a rather deep broad crescentic bend, occupying all the space between the angle of the whorls and the suture, which is slightly sloping, lirate and very distinctly striate with the lines of growth; aperture sub ovate, outer lip simple; inner lip thickened distinct, enamelled; canal short, not recurved. Long. 8, Lat. $2\frac{1}{2}$.

This is a form which closely allied to *P. crispata*, San. (cited by Hörnes as agreeing with *Murex turricula*, Brocchi, and *P. turrella*, *Reineri*, *Basteroti*, *Tarentini*, of other authors) the differences being that is smaller, the canal is not contorted, and the granular apex. There is no known form like it existing on our coasts.

Pleurotoma sandleroides. n.s. Shell small, somewhat solid acutely fusiform, turretted, spire twice longer than body whorl, apex naticiform, smooth shining; whorls 7, rounded, accurately, closely, diagonally plicate; liræ solid, smooth, shining, 8-12 in a whorl; sinus deep and conspicous, aperture narrow much contracted anteriorly, canal short, outer lip thin, and curved so as to appear thickened and conspicuous, columella slightly twisted, base spirally striate. Long. $7\frac{1}{2}$, Lat. 2.

A form approaching *P. Sandleri*, Partsch. (Vienna basin Miocene and in habit also resembling *P. costellaria*, Nyst (*Rech. coq. foss. Hosselt et Kl., p.* 31) but smaller and more slender than either. Much approaching in character many of an existing Australian Mangelias, with which it would probably be associated by many naturalists. I prefer to keep it with the Pleurotomas because of the very conspicuous sinus which is also margined, the margin extending remarkably on the body whorl. The number and size of the half ribs varies in different specimens.

Pleurotoma paracantha. n.s. Shell fusiformly turretted, spire pyramidal acute, and nearly twice as long as the aperture; spirally equidistantly lirate, with an angle and a spiral row of tubercles about the upper third of the body whorls, and the lower part of those of the spire; finely longitudinally undulately striate with the lines of growth in which the profound broad rounded sinus of the outer lip is very conspicuous upon the keel; interstices between the liræ with 3-4 fine lirulæ, tubercles on the carina sometimes broad and sharp-edged, sometimes white, round, enamelled and projecting almost like spines, mouth pyriform, outer lip acute, thin, inner lip defined, slightly enamelled; canal short, almost truncate, base strongly and finely in the interstices, spirally lirate, and almost cancellate behind the columella. Long. 33, Lat. 13. Not common at Table Cape. A very distinct form having some relations with *P. cataphracta (Murex c.* Brocchi Conch. foss. subap. Tom. 11, p. 427) and *P. turbida*, Lamarck, Hist. an. s. vert. Vol. 7, p. 97, which is the *P. colon* of Hörn, and *P. crassata* of Nyst, Coq. foss. de Belg. p. 511. That shell has the spire short in proportion to the whole length of the shell.

Daphnella columbelloides. n.s. Shell small, fusiform sub-turretted, rather solid, and much the aspect of a columbella, whorls seven apical ones margined at the suture, and ribbed with rounded smooth oblique ribs, 8-12 in each whorl; penultimate, and last whorl smooth, margined at the suture; aperture long and narrowly fusiform, rounded posteriorly; outer lip and columella simple and truncate. The lines of the sinus only visible with a lens, rather recurved than deep. Long. 12, Lat. 5. Not common.

Pleurotoma johnstonii. n.s. Shell fusiformly turretted, solid, apex acute, transversely striate, and finely, undulately, longitudinally, striate (whorls 11, with 3 spiral ribs below (the middle one most prominent), forming a tumidity above the suture, which is distinct but not impressed, above which the former fissure marks form almost nodular crescentic markings above these the lines of growth curve forward to the summit, and are crossed by regular equidistant

fine liræ; apex very acute; aperture elongately fusiform, and prolonged below into a rather long straight canal; outer lip thin, with a broad, deep incision ($2\frac{1}{2}$ mil. broad, and 2 deep); columella broadly enamelled. Long. 38, Lat. 12.

Daphnella gracillima. n.s. Shell fusiform, thin, fragile, shining, whorls 6, gracefully sloping, last longer than the spire, finely striate lengthwise with irregular ridges of growth which become fine, close, and rounded at the lip; regularly and somewhat distantly grooved with rather broad, flat, shallow, conspicuously striate grooves, one of which is much broader just below the suture, which is distinctly canaliculate; apex obtuse, and natica like; mouth narrow, finely rounded at the suture; outer lip thin; canal short; base of the pillar finely and obliquely decussate behind. Long. 21, Lat. $7\frac{1}{2}$. Aperture, Long. 13, Lat. 3 mil.

This shell is very closely allied to *D. ornata*, Hinds, of the Philippines. It is very common in Table Cape. Fourteen specimens were collected by Mr. Johnston.

Daphnella tenuisculpta. n.s. Shell fusiformly ovate, rather solid, aperture a little longer than the spire, apex naticiform, depressed, smooth, shining, whorls 6, rounded, slightly concave and narrow, grooved near the suture, everywhere very finely and closely cancellated, acutely undulately ribbed; ribs broader than the liræ (which pass over them), regular oblique, close on the whorls of the spire, only slightly interrupted by the groove, and becoming an obliquely subgranular on a margin round the suture. On the body whorl irregular, fine and undulating, 24 in number; aperture pyriform, attenuate at each end; outer lip thin, columella smooth, canal somewhat short and truncate. On the basal whorl the spiral liræ alternate, large and small, while the longitudinal ones are much finer throughout. Long. 17, Lat. 8. Common.

Mangelia gracililirata. n.s. Elegantly fusiform turretted; aperture about $\frac{1}{3}$ length of spire, apex obtuse, smooth, almost turbinate for $3\frac{1}{2}$ whorls; the latter (apex included) 9, convex, everywhere very finely lirate, liræ alternating regularly large and small and obliquely plicate; plaits 18, in penultimate whorl, 23 in last becoming obsolete anteriorly Mouth elliptical, outer lip varicose, produced in the middle, sinus inconspicuous; columella grooved slightly; canal short, truncate. In larger and older specimens the former mouth leaves a distinct varix on the body whorl, half a turn form the lip. Long. 13, Lat. 5. Specimens much smaller than this are found, but without the varix.

This most remarkable fossil with its peculiar apex and varix is distinct from any living or fossil known to me, though if I mistake not there are Mesozoic forms not unlike it. I call

attention to the fact of the smooth almost turbinate apex which most of the Pleurotoma family had in the Australian cainozoic period. In this respect they seem to be distinguished at once from living forms and European tertiary fossils.

Buccinum fragile. n.s. Shell ovately fusiform, turretted, extremely thin and fragile, spire acute, apex naticiform of two whorls; the whole shell lirate with raised liræ which are alternately large and small, and about three on each whorl become nodose keels. These are cancellated by much finer longitudinal lines; whorls 6-7, rather globosely convex, and angulate above, the upper ones with solid ribs, which disappear on the body whorl which is multicarinate, suture deeply impressed, but not canaliculate; aperture broadly ovate, outer lip very thin, with a smooth inner margin, within which there rises a number of small, raised, polished liræ which have a tendency to run in pairs; columella short, and spirally much twisted, but not enamelled; canal short, and scarcely reflected. Long. 17, Lat. 10. Long. of aperture, 8, Lat. 5.

This is a very common fossil and widely distributed as I have seen it taken from most of the Lower Tertiary beds of Australia. It has many representatives of its peculiar type among European tertiary fossils, but none living or fossil of such a fragile character which gives it a marked specific distinction. *B. tenerum*, Sow., is a very fragile form of *B. undatum* found in the Eocene beds of England and Belgium, but in that well-known and much larger species the shape is different, and the whorls obliquely ribbed.

Triton minimum. n.s. Shell small, somewhat solid, ovate, with a naticiform obtuse, smooth, white shining apex of nearly four whorls; whorls 7-8, with numerous raised rather broad liræ, sometimes alternating large and small; interstices about twice as wide, and closely, elegantly, striate at right angles with very fine lines, which do not appear to pass over the spiral liræ; spire regularly costate near the apex, the plait disappearing for the two last whorls, though some of the liræ are slightly nodular; varices much raised and lirate; mouth broadly oval, outer lip projecting beyond the varix and undulate, prominently dentate; inner lip only slightly inflexed, and oblique, about half the length of the aperture; second varix on a line with the columella. Long 11, Lat. 5.

There is a small fossil of this genus in the Vienna Miocene, *T. parvulum*, Michl., but it is larger than the foregoing, and is distinctly ribbed throughout. Our existing *T. quoyi* is also small, but the size of the present fossil at once distinguishes it from all known species, fossil or recent.

Cominella cancellata. n.s. Shell solid, imperforate ovally pyramidal, costate and lirate: apex subacute, smooth;

whorls 7-8, convex, subangular and somewhat concave at the suture very distinctly and slenderly cancellate throughout (the spiral liræ being a little smaller than the longitudinal with a tendency especially at the base to become alternately large or small) at the angle coronate with rounded ribs which are obsolete below (about 14 on last whorl) aperture oval; outer lip acute, simple, columella excavated anteriorly and slightly twisted; canal short. Long. 24, lat. 13. Long apert. 13.

In form a good deal like one existing *C. costata*, Quoy, but the ribs are smaller and neater while the cancellation entirely removes it. from any Australian species. In the European Miocene *Buccinum philippi*, Micht., appears the nearest form, but that is very different—more turriculate, not ribbed on the lower whorl, lip thickened, etc. Some of the Belgian Eocene forms come perhaps a little nearer.

Cominella lyræcostata. n.s. Shell rather small, fusiform turretted, lirate and costate; apex smooth white, turbinate of $2\frac{1}{2}$ whorls, whorls 8, rounded, closely, ribbed with round prominent ribs (16 on last whorl), and very conspicuously spirally lirate, with liræ which pass over the ribs; in addition to which the whole shell except the apex is finely cancellate, suture deep and margined; aperture oval, outer lip acute, finely crenulate, columella twisted, canal much recurved with a distinct enamelled plait passing from the centre of the notch to the back of the columella. Long. 19, lat. 7. Long. of apert. 7.

In older larger specimens the ribs become obsolete in the body whorl, but as the dimensions grow they are very conspicuous, and extend from suture to suture without alteration. Approaching in character the Miocene *Buccinum prismaticum*, Broc., of Vienna, but all the fossils of Europe differ much in the aperture, and have the inner lip reflected over the columella. This species differs from the last in the whorls not being angular nor coronate; in the larger liræ, the more prominent ribs, the contorted canal, and the general form.

Thala marginata. n.s. Shell small slenderly fusiform; apex obtuse smooth, shining, of three whorls; whorls 7, rounded oblique, plicate, sub-angular, coronate and conspicuously grooved above, finely spirally lirate, and undulately striate with lines of growth which show the semilunar sinus very plainly upon the groove; plaits anteriorly absolete on the body whorl; suture conspicuously marginate; canal straight, narrowly ovate, canal prolonged, equalling the aperture in height, outer lip thin, inner lip reflected on the columella, and with 3-4 very distinct plaits. Long. 8, Lat. $3\frac{1}{2}$, length of aperture to the end of canal 5.

The genus Thala was erected by Messrs. H. and A. Adams in 1853, for shells which combine the characters of Mitra, Pleurotoma, and Fasciolaria. The type specimen. *T. nucifera* was found in the Philippines, and perhaps this makes only the second or third specimen of a very rare genus.

Marginella octoplicata. n.s. Shell solid, smooth, shining, pyriform, spire scarcely visible, of three very small depressed whorls, body whorl distinctly striate with lines of growth, mouth narrow, sub-sigmoid, columella with *eight* plaits, the anterior valid, scarcely oblique, the posterior four faintly traceable, outer lip much thickened, and very regularly dentate with 12 raised linear teeth, at the base of the columella there is a distinct varix, which proceeding round the posterior end of the shell unites with reflected lip making that broadly marginal.

This shell has considerable resemblances to certain forms from the Indian Archipelago, but is unique in its multiplicate columella, and peculiarly dentate outer lip. In this respect it bridges over the gap between Marginella, and Erato, and Cyprea. *M. 5-plicata,* Lam., *M. elegans,* Gmel., and *M. turbinata,* Sow., show an approach to this form, but they are larger shells. If the lower part of the columella were not so distinctly plicate, and the upper teeth so rudimentary I should have no hesitation in placing this as a species of *Erato.*

Marginella strombiformis, n.s. Shell small, solid smooth shining, ovate, narrowed anteriorly, spire short obtuse, whorls four, rounded, body whorl obscurely longitudinally plicate below the suture, columella anteriorly obliquely somewhat coarsely quadri-plicate, aperture narrow, curved posteriorly emarginate, outer lip conspicuously thickened and produced posteriorly, finely, tuberculately dentate within. Long. 3, lat. 7.

Very different from Australian forms, all of which, as far as I know, have the lip smooth. It is nearest in form to the Indian *M. Marguerita,* Kiener, but that is a somewhat larger and more angular shell. Not unlike a minute strombus viewed from above owing to the produced lip. The genus is very poorly represented in European tertiaries, few being known and none living in the northern seas.

Marginella wentworthii. n.s. Shell small, ovately oblong, tumid, smooth, shining; spire exsert, obtuse, whorls five, roundly angulate, aperture narrow,oblong, outer lip much thickened, deeply channelled above, enamelled on the edge, with numerous small tubercular teeth within the margin; columella with four plaits; the three anterior oblique, fourth at right angles to the axis, anterior aperture widely channelled. Long. 6, lat. 3½ mil.

Trivia europea. Montf. Testac. Brit. (as *Cyprea*) *C.*

coccinella. Lamarck (1810, *Ann. Mus., vol.* 16, *p.* 104. *T. coccinelloides, Sow. Min. Conch, vol.* 4, *p.* 107, *pl.* 378, *fig* 1. *Nyst. Coq. Foss. de Belg., p.* 609.) The shell which I thus identify I distinguish by its size, the absence of dorsal division between the striæ and the arcuate aperture. It is found throughout the Miocene of Italy, France, Austria, Sicily, and exists in the Mediterranean. I can find no ground whatever for separating our fossil from the one described as above. An unusual number of works (31) are cited by Hörnes and Partsch, whose Foss. Moll. and the above-named authors I have been able to consult, besides Wood on the Crag Mollusca, Deshayes, Lamarck, while specimens of the Italian fossil are in my possession, and except that they are a little longer I can see no difference. Long. 7, lat. 6. The knowledge obtained recently of this wide-spread diffusion of some species will prevent that difficulty hitherto experienced in the identification to European species, and will prevent their needless multiplication on geographical grounds alone. The shell is, however, very distinct from our *Trivia australis*, Lamk.

Columbella cainozoica. Shell minute smooth, somewhat solid, narrowly pyramidal, spire longer than the aperture, apex elongately naticiform of two smooth shining whorls; whorls in all six, very slightly rounded, almost flat, smooth, but not shining with faint striæ of growth, suture distinct; aperture broadly sigmoid; outer lip thickened and finely dentate; columella smooth with five corrugated plaits behind, passing obliquely to round the notch which is broad and scarcely recurved. The outer lip is thickened into almost a varix, and the last whorl has the striæ of growth raised so as to become almost like costæ. Long. 4, Lat. scarcely 2.

In shells which differ so little in form as to cause the majority of specific distinctions in existing forms to depend upon colour alone, it is difficult to give such a description as will not apply to many other species. This species therefore must be distinguished first by its small size. 2. By its thickened almost varicose lip. 3. By its very prominent striæ of growth. 4. By its naticiform apex (which it shares with many living Australian species, especially *C. minuta*, mihi, which is much the same in size); and, lastly, the peculiar corrugations from the back of the columella and round the notch. No living or fossil form known to me unites all these details, though in general form our fossil is not unlike *C. scripta*, Bell., a much larger form of the Vienna Miocene. The genus is almost unknown as fossil, but very numerous as living species, probably over 200. All subtropical, two being in New Zealand, but none fossil, in any of the extensive tertiary deposits of those islands.

Columbella oxleyi. n.s. Shell small, fusiformly turretted, smooth, shining; whorls 8, somewhat rounded, overlapping slightly at the suture, apex with a distinct natica like pullus extending for $2\frac{1}{2}$ whorls, smooth, pyriform, much narrower posteriorly, and produced, with a narrow sloping channel anteriorly, outer lip thin; inner lip slightly inflected over the columella, behind which are numerous sloping fine regular liræ. Body whorl slightly angulated at the suture. Long. 9, Lat. 3 mil. Named after the early explorer of N. S. Wales.

This singular fossil varies from Columbella in particulars of almost generic importance, not only in the apex but in the turriculated habit. It has no known living form in Australia.

Natica vixumbilicata, n.s. Shell globose, smooth, shining, very finely cancellate, which is visible only with a lens; spire acute, slightly exsert as a more finely rounded coil; whorls 6. The apical 4, small, round, and distinct, only slightly increasing in size, the last two becoming suddenly globose, aperture semilunar; outer lip thin, inner lip everted anteriorily into an acute projecting angle, umbilicus small narrow, deep, slightly callous above, with a conspicuous groove leading to it from the anterior angle of the lip. Long. 20, lat. $13\frac{1}{2}$, long apert. 12, lat. 7, diam. of umbilicus $1\frac{1}{2}$.

Cucullæa cainozoica. n.s. Shell roundly trigonal, oblique, globose, smooth, faintly and closely marked with radiating ribs and concentric striæ, the latter well defined and somewhat rugose at the margin and sides, umbones very acute and recurved; ligamental area, arched, broad, with six straight grooves on each, which are well defined and overlap each other alternately under the umbo, hinge teeth, 6-7, bent under the hinge and then bicuspidate, muscular impressions lanceolate, well defined, the anterior adductor with a slightly lamellar edge, margin finely pectinated with very distinct crenulations which continue in young shells all round as far as the hinge. Young shells are also more quadrate and have the angular ears slightly developed. Altogether the shell is intermediate between Cucullœa and Pectunculus and partakes somewhat of the character of both genera.

Nucula tumida. n.s. Shell small, solid, obliquely trigonal, tumid truncated anteriorly, slightly produced and rounded posteriorly, finely wrinkled with consecutive irregular rounded ribs, increasing in thickness from umbones to margin, and irregularly grooved with deep consecutive lines of growth, margin thickened and bilabiate, hinge teeth small diverging progressively in an increasing series, interrupted by a narrow deep ligamental pit, largest teeth slightly bent, anterior row short, eight in number, the distal ones smaller, but all high and lamellar, umbones fine and sharply incurved;

lunule shallow but well defined, wrinkled and broadly lanceolate. Transverse long. 13, lat. 11 ; thickness of both valves united, 8 mill. Not unlike the Tasmanian *N. grayi*, Sow., but more tumid and conspicuously sulcate.

Leda crebrecostata, n.s. Shell minute, depressed, transverse, trigonal narrowly oblong, roundly obtuse in front, much punctured, almost angular, and slightly gaping behind, sinus conspicuous—2—sub-depressed and conspicuously cut by an angle from which the shell slopes to the margin, whole surface of the valve regularly concentrically marked with equal rounded ribs ; hinge line inconspicuous, and short anterior sub-ligamental area distinct. Transverse long. 5, lat. 8, thickness of both valves joined 3.

The sinus and angle project from the margin of this fossil like a tubercle. Smaller and less rostrate than *L. caudata*, Don but like it, distinguished by the abrupt angulation of the sinus. There is no European fossil like it in this respect.

Cardita gracilicostata. n.s. Shell roundly oblong, transverse, inequilateral, oblique, globose, solid, furnished with 30 to 34 fine, curved, radiating, finely nodular ribs, which are narrower than the interstices, nodules obsolete to near the centre, whence they become less rounded and more lamellose to the margin, where they are almost spinous, and united to one another by transverse raised liræ, umbones, finely ribbed, acute, oblique, and much incurved, lunule, short cordate, well defined and deep, hinge area much overlapping the hollow of the umbones, hinge with one central tubercular, rounded tooth, round which the laterals make a complete arch, much thickened posteriorly. Margins coarsely crenulate. Long. from umbo 27. Transverse lat. 31. Alt. of both valves 14 mil.

Lima bassii. n.s. Shell oblong, subquadrate, rather solid, somewhat tumid, radiately and squamosely ribbed, margin full, and equally rounded with a prolonged curve ; anterior side short, and very slightly concave, almost margined through its whole extent by a small, narrow, obtusely angled auricle, which has three small rough ribs, and is deeply striate near the umbo, posterior side without auricle, truncated with a straight, sloping line deeply impressed with fossa towards the interior ; ribs 22 in number, radiating regularly, divided at equal intervals by long arched, raised squamæ, etc., umbo acute and only slightly curved. Length from umbo to margin 27. Lat. 22 mil.

Very distinct from any Australian congener by the absence of the auricle and the straight posterior side, though the form closely approximates to the sp. *L. squamsa*, now living in the Red Sea and Mediterranean.

Lima (Limatula) subauriculata. Montf. This shell which is also found in the British seas still existing, and has been collected by Cumming in the Philippines, is a common fossil at Table Cape, at least I can discover no difference in size, shape, makings, etc. We thus have a world-wide distribution as well as an extensive range in time.

Tellina cainozoica. n.s. I give this name to a shell which has characters slightly different from any existing Australian form, but the number of species is already so great and the differences so slight that I venture to add to them only with considerable reluctance. The form of this fossil approaches to our *T. albinella*, of which there is a white and pink variety. It is, however, smaller, smoother, and less arcuate with scarcely a perceptible sinus. The dimensions of this specimen is transversely 24. Long. 15. Thickness 5.

Chione propinqua. n.s. Shell small, oval, transverse, equivalve, sub-equilateral, posterior and slightly longer and sub-attenuate, anterior end broadly, rounded, transversely ribbed with many solid, raised, rounded ribs grooved behind and lamellar at each end, ribs striate transversely and between which the striæ become larger towards the umbones and finally indistinguishable from the ribs of which there are 18-20 in all; interior finely crenulate right round to the hinge posteriorly, to the umbone anteriorly; central tooth bifid, lateral,—anterior lamellar and moved outwards; posterior bifid, muscular impressions scarcely perceptible. Transverse length 26. Lat. 4.21. A shell certainly very nearly approaching our existing *Chione conularis*, but less oblique in its shape, size, and almost entirely crenulated margin.

Venus (chione) cainozoica, n.s. suborbicular, inequilateral, globosely convex, very finely and closely striate with concentric lines, which here and there become lamellose, lamellæ close and more numerous at the anterior and posterior margin, scarcely raised, extremely thin and nearly always broken and incomplete, where there are no lamellæ, striæ regular and equi-distant, marking lines of growth which seem to overlap each other in regular succession; anterior side rounded, contracted; posterior side broadly rounded and very slightly produced; umbones convex, much incurved and smooth, lunule clearly defined, but not deep, broadly cordate lamellosely striate and radiating from the umbones, and finely crenulated on the edge within; hinge teeth, right valve with one long lateral ridge extending to the ventral margin with a groove between it and the edge, three smaller teeth, the two posterior bifid, the anterior one small, lamellar and oblique; left valve with a lateral ridge, one thin short curved hinge below the corselet, one broad central tooth; and

two anterior, one oblique and lamellar and one more tubercle, the whole anterior, ventral margin finely crenulated. Transverse. Long. 22, Lat. 18. Thickness of both valves 17.

This fossil is very completely removed from any known existing Australian form, being more globose, more finely striate; and the peculiar crenulation of the margin which extends under the lunule. I am not acquainted with any fossil form near it as far as my acquaintance with the European Miocene and Eocene extends. It must be admitted, however, that the points of distinction in shells where there is so much general resemblance, as in this genus, can scarcely be made out without the closest attention to details and comparison of specimens. The descriptions by most ordinary writers on palæontology are quite insufficient.

Chama lamellifera. n s. Shell somewhat small, thickish, globose, angularly orbicular, very inequivalve, and adherent. The whole surface of both valves covered with close thin irregular lamellæ, which, though sometimes projecting slightly, never become much produced or spiny, in the grooves between fine and smaller ridges can be seen; left valve very convex, attached anteriorally where it is sharply angled and flattened; umbones small and very much incurved, making almost a spiral whorl; hinge linear and curved with a broad flat concave linear fossette under the dorsal curve, right valve solid, very convex (but less so than the left valve) with an incurved sloping prominent umbo. Largest specimens about lat. 24 by 22 and 18 mill. thick.

In the absence of radiating striæ the non-spinous or produced lamellæ, and the size, all this species differs from the known fossil Chamæ. It is very abundant in the beds.

Besides the foregoing fossils I have provisionally named the following not being able to publish a more extended diagnosis because of the imperfect state of the specimens.

A small smooth Pyramidella, *Pyramidella roberti*, mihi, with perfectly flattened smooth whorls, 12 in number; the apex of 3 round smooth turns; the aperture subquadrate; base of columella everted. Long. $6\frac{1}{2}$, Lat. 2 mill.

Rissoina tateana. Almost turbinate, numerous oblique solid ribs on upper whorls; lower whorl almost smooth; outer lip varicose. 1 mil. Lat.; Long. (?), (decollated.)

Gibula clarkei. n.s. A turbinated multicarinate shell, obliquely, regularly, and finely lirate, where they cross the carinæ, making the latter almost granular; whorls 6; flattened and broadly canaliculate at the suture; base flat or convex, grooved, deeply umbilicate, obliquely striate within,

shell a brilliant green nacre underneath the outer shelly coat. Diam. and Lat. about 3 mil., dedicated to the eminent geologist, the Rev. W. B. Clarke. A fossil which varied so much in the few specimens I examined that I hardly liked to include it in my list.

Dendrophyllia duncani. n.s. This is a compound corallite, with a very imperfect epitheca. It gives off four branches from a kind of internode, but in the specimens examined by me (among the corals collected by R. M. Johnston, Esq., Dr. Milligan, and Mr. Stephens), the branches and stem were broken off short. It differs from the hitherto only Australian tertiary species in the internodal character of the branches and the imperfect epitheca. A complete diagnosis will no doubt be published by Professor Duncan, to whom the specimens will be forwarded, but I have taken very gladly the opportunity of dedicating it to the learned Professor, to whom the science of geology owes so much.

Flabellum duncani.* n.s. The coral is cuneiform and very much compressed at the base, which is pedicillate. The calice is elliptical and shallow. The septa are in six systems of three cycles, delicate and well apart, the principal exsert and rounded, having few large rounded lateral granules. The fossa is deep and rather broad. There is no columella. There is a stout epithera, and the costæ are strongly marked, linear tapering with faint transverse curved folds, 22-24 in number. Height, 6, transverse diam. of calice, $4\frac{1}{2}$. Lat. 3, millim. This is the fifth flabellum described from the Australian tertiaries. It is smaller than any of them, and mainly distinguished by the distinct external costæ.

Buskia. nov. gen. This genus is proposed for Escharas, which are disposed on a cylindrical hollow axis, which is branched and irregular. It differs from Eschara in not having the cells back to back, but on one side only of the cylindrical branches, and from Hemeschara, in being erect and branched, and not encrusting.

Buskia typica. n.s. Cells disposed sometimes quincuncially and sometimes irregular, surface of the branches crumpled and flexuous, elliptical branches irregular and widely separated; if bifurcating a very wide cellular interval between the opposite divisions; cells convex and projecting from a very clearly defined margin, within which there is a row of pores continuing all round from 18-26 in number. From each pore there is a deep grove to the mesial line, which is also sometimes grooved, and then the surface has a rugose corrugated appearance; mouth orbicular, with a somewhat larger often pyriform pore on each side. Width of some of the branches, 10 diam. 7 mill.

ECHINODERMATA.

The following notes on the Echinodermata have been made by Mr. Johnston, some of which I have examined and compared the species, and added the specific names, with a few verbal alterations.

Micraster brevistella. *Laube*. Rather more rounded than Laube's figure. It is slightly compressed dorsally; central surface concave. The anal orifice is triangular in appearance, with the apex towards the "plastron," and is situated on the posterior of the ventral surface.

The plastron is round, and is situated near the middle of the concave ventral surface. The five ambulacra radiate from the apical disc in a graceful though slightly irregular manner. The pores 27 to 37 double pairs on each ambulacrum, extend about half way over the dorsal surface; and from the extremities of each double pair, the two grooves are continued round to the ventral surface, and thence to the plastron. The groves may be described as irregularly parallel to each other. The whole surface is densely covered with rather small tubercles, uniform in size, and surrounded by scrobicula.

Micraster etheridgei. n.s. Test small, oval, depressed, and surface very much flattened; ventral slightly concave; ambulacral groves 5, well marked and continued from apical disc on the dorsal surface to the plastron on the ventral surface; anal orifice, small, round, situated at the posterior ventral margin; plastron, central, round. The whole test covered densely with tubercles, small, but irregular in size and distribution. The dorsal surface is too imperfectly preserved to make out the apical disc or ambulacral pores clearly.

Hemipatagus woodsii (var. a) Cordiform. Differs from *H. woodsii* in the following particulars:—Apical disc contains 5 ocular plates, and is situated nearer to *anterior* end of test madreporiform body angular: odd ambulacral groove, much shallower than in *H. Woodsii*.

Primary tubercles greater in number; occasionly *one* primary tubercle is found situated on the posterior inter-ambulacra. Great breadth nearer to anterior and than upon *H. woodsii*. Dorsal surface much more flattened and depressed.

Note.—Prof. Duncan has lately shown that *Hemipatagus* is a genus identical with the living *Lovenia*, Gray.