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On some TERTIARY FOSSILS from Muddy Creek, Western Victoria.  
 By the Rev. J. E. TENISON-WOODS, F.G.S., F.L.S., Hon.  
 Corr. Mem. Lin. Soc., N.S.W.

Plates 20. and 21.

The following fossils were obtained from the tertiary beds on the banks of the Muddy Creek, a tributary of the Wannon River, about five miles from Hamilton in Western Victoria. The most of them were gathered for me by Mr. Samuel Pratt Winter, whose beautiful station of Murndal, on the Wannon, is not far from the locality in question. Some have been in my possession for more than sixteen years, and I would have published a notice of them long ago, but that I understood that all the miocene fossils would have been fully described ten years since by the Victorian Geological Survey. This expectation has been frustrated by the reduction of the geological staff of the colony, and now the only person engaged on Victorian paleontology is Prof. M'Coy, who, in the "Decades," is most ably and satisfactorily dealing with some of the more remarkable species. As a very long time must elapse before all the larger fossils are dealt with, I have thought it better to publish my own limited investigations on the very small ones. I do this, because I am convinced that the material at my disposal gives me peculiar advantages, especially as I have for the last four years been engaged in describing the small existing species of the south coast, and I fear risking the loss of the material altogether if I delay its publication any longer. If what I offer is incomplete, I trust geologists will excuse this incompleteness, in view of the

great necessity of doing something where so much has to be done, and where there are so few inquirers.

The fossils now described are all new and peculiarly interesting. They are not generally like the present Australian fauna, and they are not identical with any fossils of other countries. The resemblance of some of them to the common forms of the Italian and Vienna miocene is very striking. This resemblance has already been referred to by Prof. M'Coy, and he has perpetuated it by giving specific names which will serve to recall the European types. So far as I have examined, the fossils would incline one to imagine the sea to have been a warmer one than at present; but it would not be, as yet, a very certain inference to draw from the evidence, which is so incomplete. For the rest, I have noted in the diagnosis of each species such resemblances or peculiarities as are the most apparent, and I will only add that the structure, sculpture, and elegance of form of the fossil fauna of the Australian miocene far exceed anything on our coasts at the present day. I do not enter into the question of the age of the beds. The evidence, so far, is entirely in favour of a miocene horizon. But the miocene of Australia is represented by wide deposits of such thickness that the percentage of existing species in the uppermost and lowest beds must be widely different. The true value of the term miocene, as applied to South Australian formations, can only be appreciated when the relative position of the beds in different localities is established. Prof. Tate is of opinion that the Muddy Creek beds are the equivalents of the uppermost of the River Murray series. I regard them as below the Mount Gambier limestones, which is the opinion of the geologists of the Victorian survey. So far, however, no accurate survey has been made to determine the question, which the following paleontological remarks may help to solve. All dimensions in French millimetres.

TRITON PRATTIL Pl. 21, fig. 15.

*T.t. parva, tumide-fusiformi, turrita, solida, nitente: anfr. 7 (embryonal. 2, inclusis), rotundatis, liris spirulibus inaequalibus cinctis, costis obsoletis rugulosis, et undique crebre striatis, striis*



*longitudinalibus concinnis, minutis; varicibus convexis, latis, elevatis; apice obtuso, nucleo laevi, rapide crescente, conspicuo; apertura elliptica, intus dentata, peristomate producto, acuto, labio conspicuo, canali praelongo, angusto, recurvo. Alt. 9, lat. 5, alt. spiræ: 5 millim.*

This is a small almost turreted species, very much of the character of all our Australian *Tritons*, and most like one which is peculiar to Australia, *T. Quoyi*, which however though one of the very small members of the genus, is much larger than this fossil. It has all the characters of the genus, the unequal spiral liræ all finely wrinkled, the obsolete ribs and the conspicuous varix round the mouth. It has two important marks of distinction, namely the smooth obtuse *Natica* like nucleus and the long narrow recurved canal. The mouth is also somewhat remarkable, as it is *Murex* like, dentate and almost entire, and there does not appear to be any posterior plait on the columella. For its size its markings are very perfect and neat. It is somewhat like *T. pavulum*, Michelotti, but is smaller than any living or fossil form known to me.

I have dedicated the species to Mr. Samuel Pratt Winter, whose station is not far from the Muddy Creek beds, and whose kindness and hospitality have enabled me to gain all the knowledge I have of them.

Prof. Tate regards this shell as a young *Ranella* belonging to the section in which the varices are not continuous. The species is allied to one from the Molluccas.

PISANIA TENUICOSTATA. Plate 20, fig. 6.

*P. t. parva, anguste ovata, tenui, nitente, anfr. 5, (nucleo? decoll.) convexis, parum declivibus, crebre liratis et tenuiter sed valide creberrime costatis, ita ut tota testa minutissime et eleganter reticulata appareat; costis tenuibus (in ult. anfr. 35), a liris quasi cooperitis et ideo crebre granulatis; liris latis, planatis, approximatis, interstitiis æquantibus, interdum liris parvioribus interpositis; varicibus numerosis ultimo excluso 2 vel 3 in omn. anfr., latis conspicue liratis; apertura ovata, labro varice incrassato, labio laevi, exacte definito, canali brevi viz recurvo. Long. 10, lat. 5.*

This fossil is smaller than *Triton reticulatum*, Blain., of the Vienna basin, which is also a *Pisania*, though we have a living *P. reticulatum*, Adams, in our seas. The Muddy Creek fossil is much smaller or more ovate; is shining and decollated in all the specimens I have seen. The ornamentation is very elegant, arising from very close fine ribs (there being thirty-five in the last whorl), over which numerous close flat lines pass so as to completely cover them with granules. There is only one varix on the last whorl, which is at the lip; there are two on the next and four on the next. On the fifth whorl of the spire, the ribs are scarcely granular, and the varices on one side of the spire follow one another nearly continuously. The aperture is rather long and the canal short and scarcely recurved. The columella lip is smooth, inconspicuous, and well defined.

FUSUS FUNICULATUS. Plate 20, fig. 1.

*Testa parva, elongato-fusiformi, solida, parum nitente, spira quam apertura longiori, anfr. (nucleo incluso) 6, parum convexis et declivibus, carinis spiralibus 5 vel 6, latis, rotundatis, solidis cinctis, lineis quoque longit. inconspicuis, supra carinas non transeuntibus, sutura lata, haud impressa; nucleo laevi, polito, 2 anfr., apertura ovata, labro varice incrassato, intus lirato, labio reflexo, tenui, canali brevi, recurvo. Long  $8\frac{1}{2}$ , lat.  $3\frac{1}{2}$ ; long. spire  $5\frac{1}{2}$ .*

The fossil is small, elongately fusiform, the spire much longer than the aperture, solid, slightly shining. The whorls, including the nucleus, are six in number, slightly convex and sloping, girdled with from five to six solid, broad, rather raised rounded keels, between which there are longitudinal raised lines which are something like rather prominent lines of growth which do not pass over the keels. The suture is very broadly grooved but not deep. The nucleus is somewhat swollen and smooth, white and highly polished. The aperture is ovate, attenuated at the ends. The labrum is thickened by a varix slightly removed from the edge. It has liræ inside. The lip is thin, reflexed, and the canal is rather short but very distinctly recurved.

This anomalous shell includes some of the characters of *Fusus*, *Nassa* and *Oolumbella*.



## PLEUROTOMA SAMUELI. Pl. 20, fig. 3.

*P. t. elongato-fusifomi, parva, tenui, polita; anfr. 6, declivibus, in medio angulatis, nodosis et undulose striatis; nodis elevatis subquadratis, ultimo anfr. spiraliter striata et longitud. flexuose corrugato; apertura, angusta, elongata; labro acuto tenui, sinu lato profundo, canali longo, parum recurvo, sutura profunda.* Long. 12, lat. 4, long. spiræ 7.

This very elegant species is very like *P. dimidiata* of the Paris basin and Vienna miocene, but it is smaller and the spiral liræ at the base are distant. It is a polished shell with whorls angular in the middle supporting a single somewhat distant series of coarse blunt somewhat square tubercles. These are exactly on the line of the sinus, and at each side the lines of growth curve away from it. The sinus itself is deep broad and somewhat quadrate. The aperture is long and round rather square posteriorly and the canal is long and only slightly curved.

I have named the shell after the christian name of Mr. S. P. Winter, from whom I have received so much assistance in getting fossils from these beds.

DAPHNELLA GRACILLIMA, mihi (Sec. Proc. Roy. Soc. Tas. 1876, p. 106).

Pl. 20, fig. 10 is a representation of a much worn specimen of this fossil, which is very common at Muddy Creek. The specimens found there are much more solid and thick than those of Table Cape, Tasmania, and the spiral groove less distinct.

## PLEUROTOMA MURNDALIANA. Pl. 20, fig. 5.

*P. t. fusiforme-turrita, tenui, nitente; anfr. 9, planatis, pyramidalis, carinis tribus, suciferis ornatis, prope apicem in medio granulosus; liris parvis inter carinas et sulcos insignitis; apertura elongata, angusta, canali prælongo, recto; basi concava, lirata; et cancellata, sinu profundo, postico, supra carinam sito, labro tenui, columella encausta, labio exacte definito.* Long. 17, lat 6; long spiræ 11, long aperturæ canali incluso 7.

This neat little species is distinguished by its long canal and pyramidal spire. The whorls are flattened, but have three

raised rather broad keels, which are grooved upon the summit. It is upon the median-keel the sinus is, and it becomes granular near the summit, with a rather faint but regular line of granules. Between the keels there are fine thread-like liræ, sometimes they are seen in the middle of the groove on the summit of the keel. The canal is slender and long, and even slightly recurved. The base is concave and cancellated. The apex is rather blunt, with a solid smooth nucleus of two whorls. The species has no very near ally, either recent or fossil. It slightly resembles *P. vermicularis* Grateloup from the Piedmont and Vienna miocene. It is also a little like the living *P. annulata* Reeve, whose habitat is unknown. Rare in the Muddy Creek beds.

## MANGELIA BIDENS. Plate 20, fig. 2.

*M. t. parva, ovato-fusififormi, turrita, spira, apert. superanti, solidiuscula, haud nitente; anfr. 6, purum declivibus, superne angulatis, crebre, flexuose, inconspicue costatis et distanter spiraliter liratis, supra angulum creberrime striatis et costis ibi curvatis, nucleo (1½ anfr.) lævi, apertura anguste ovata; labro varice valde incrassato, intus et ad marginem linea granulorum dentato; sinu profundo, lato, canali brevi, lato, vix recurvo, labio definito, inconspicuo.*

A small ovately fusiform shell, whose spire exceeds the aperture slightly, rather solid, not shining. Six whorls, slightly sloping, angular above, with many flexuous inconspicuous ribs and distinctly lirate. Above the angle it is closely grooved, and the ribs are curved. The mouth is very peculiar, on the outer lip so produced as to give the fossil the appearance of a *Strombus*; it has a thickened flexuous varix, and there are two rows of teeth, one on the edge and one within. The sinus is deep and thickened, and very conspicuous. The canal is broad, short, and only slightly recurved. Altogether the form is very different from any of our numerous species of this genus, though the general character of its ornamentation is the same. Its relations to any European fossil seem distant.

## DRILLIA TREVORI. Pl. 20, fig. 4.

*D. parva, elongato-fusififormi, solida, nitente, spira quam apertura longiori; anfr. 8, parum convexis, longitudinaliter costatis, spiraliter*



*crebre, sed regulariter et æquidistanter striatis, superne concinne marginatis; costis brevibus, latis, rotundatis, in medio elevatis, ultimo anfr. evanidis; apertura angusta, elongata, peristomate valde incrassato; sinu profundo, obliquo, margine tumido, labro solido, canali brevi, labio encausto, exacte definito. Striæ incrementi valde flexuosæ. Alt. 11, lat. 4, long. spiræ 7.*

This interesting little species which does not appear to be very common at Muddy Creek, bears considerable resemblance to our existing *D. Beraudii*, which is common on the S. E. coast of Tasmania. It is a fusiform shell with the spire much longer than the aperture, the whorls are studded with many short blunt tumid ribs, and regularly spirally grooved; they are very distinctly margined above with a rather broad flat space which is thickly covered with curved striæ. The ribs disappear on the last whorl, but there are very distinct undulose lines of growth instead. The aperture is long and narrow with a thickened raised margin almost all round it. The sinus is deep and oblique with a swollen edge. The outer lip is thickened and the inner one is enamelled and exactly defined. The canal is short, straight, and truncate. The nucleus is smooth and shining, of two whorls.

I have dedicated this fossil to Mr. Trevor Winter, who obtained the greater part of this collection for me when temporary illness prevented me from visiting the beds in person. I am not aware of any fossil species nearly resembling it.

CONUS RALPHII. Pl. 21, fig. 14.

*C. parva, anguste ovata, spira elata, solidiuscula, nitente; anfr. nucleo (2) incluso, superne concinne striatis, ad angulum anguste marginatis et coronatis, granulis quadratis; ultimo lineis incrementi insignito, basim versus spiraliter declivi striato, apertura angusta, nucleo lævi, tumido. Alt. 10, lat. 5.*

Shell small, rather narrowly ovate, with a somewhat produced spire rising in stages, which are very distinctly granular, the granules being square and large. The upper part of the whorls is grooved with a few lines, and this grooving extends over the angle of the last whorl, causing a kind of granular margin.

There is no other ornamentation on the body-whorl, except about ten spiral striæ near the base, but the lines of growth are very apparent. The species is like the Vienna miocene *C. extensus* Partsch in its young stage, but in that shell the spire is more acute and longer. In our fossil, the upper part of the whorl near the suture is faintly channelled. The granules are also different, and the anterior striæ are more numerous and finer. *Conus dujardinii* is like it in form, and *C. antediluvianus* has the corona more marked with a deep sinus near the suture. Both the latter belong to the Vienna miocene. There is nothing at all like it in the Paris basin; and we have nothing very similar existing in Australia but *Conus carmeli*, mihi, which has the two last whorls only coronate, but is distinctly grooved all over, and is broader in proportion to length. I have dedicated this interesting specimen to Prof. Ralph Tate.

NATICA WINTLEI, mihi, var. HAMILTONENSIS. Plate 21, fig. 8.

*Testa parva, late ovata, solida, polita, anguste umbilicata; anfr. 3; rotundatis, rapide accrescentibus, striis incrementi subregulariter tenuiter corrugatis; apertura semilunari, labro acuto, columella postice plus minusve callosa; umbilico uno sulco lato, corrugato, insignito, apice vix prominulo. Diam. et alt. 8.*

A common fossil at Muddy Creek, mainly distinguished by its small size. It is polished with very faint signs of the lines of growth. The callosity is not conspicuous and confined to the upper part of the columella. The umbilicus is narrow, with a broad corrugated groove. The aperture is semilunar. The outline of the shell is diagonal. It cannot be said to have any peculiar or marked features, but it does not resemble any in the Vienna or Paris basins and must mainly be distinguished by its size, the moderate callus and the very slightly exerted spire. In deference to the opinion of Prof. Tate, I have referred this species to my *Natica Wintlei* described by me in the Proceedings of the Royal Society of Tasmania, for 1875, p. 23. It is generally smaller and more globose than the type referred to.

ANCILLARIA SEMILEVIS. Pl. 20, fig. 7.

*A. parva, elongata, fusiformi, solida, nitente, spira apert. æquanti; anfr. 5½ angustis, encaustis, ita ut sutura et structura sint occultis;*



in ultim. balteo mediano, lato, duobus angustis balteis validis antice marginatis; apertura, elongata, lata; labro tenui, apice acuto. Long. 16, lat.  $5\frac{1}{2}$ .

Rather common. A small narrow somewhat acute species differing in this regard in a marked manner from our living *A. australis* which is short and stout and *A. mucronata* which is blunt and mucronate. The spire is covered with enamel so as almost to obliterate the suture. In the last whorl the median belt is rather broad. It is margined anteriorly with one narrow thick cord and one broader and less distinctly defined. Posteriorly there is one broad belt whose limits are not easily seen as the suture is so indistinct. The outer lip is thin and the aperture broad. Behind, the columella is twisted and the inner lip is very indistinct. Fossil *Ancillaria* are not uncommon in the Vienna and Paris basins, but this small species is more narrow and acute than any of them.

Prof. Tate remarks that the species is commonly about  $\frac{3}{4}$  of an inch long, and that some of the specimens show the body whorl to be coloured a violet brown.

NASSA TATEI. Plate 21, fig. 13.

*N. parva, ovata, spira quam apert. longiori, subturrita, solida; anfr. 7. (4 embryon. lævib.) convexis, conspicue costatis et liris sub latis, regularibus, distantibus, clathratis; interstitiis lineis incrementi conspicue corrugatis; costis (alt. anfr. 12) acutis, subelevatis, apertura ovata, intus lirata; labro varice incrassato, labio conspicuo, reflexo, expanso, plica postica munito; canali brevi lato profundo; recurvo. Alt. 7, lat.  $3\frac{1}{2}$ .*

In this small species there are seven whorls; the four apical ones being smooth, the rest cancellate, with numerous sharp raised ribs and transverse flat liræ. The interstices are rather corrugated with the lines of growth. The mouth is large, with a broad swollen varix on the labrum. The inner lip is expanded, with a conspicuous posterior plait. The siphonal notch is deep, broad, and abruptly recurved, and the throat is lirate. The shell is in form like our existing *Nassa compacta* in size and shape, but that shell is granular; this is cancellate. It is much nearer to

Muller's *Nassa incrassata* in form but smaller and coarser about the mouth, and with a columellar tooth. *N. incrassata* belongs to the Vienna miocene. It is also very near Deshayes *N. truncata* of the Paris basin.

CANCELLARIA VARICIFERA. Pl. 21, fig. 12.

*C. t. parva, ovata, spira elata, subacuta, varicifera, solida, concinne sculpta; anfr. 5 (embryon,  $1\frac{1}{2}$  lævib.), convexis, longitudinaliter costatis, et liris regularibus, distantibus cancellatis, undique præterea longit. tenue regulariter crebre striatis; costis validis (alt. anfr. 12), declivibus, undulosis, elevatis, conspicuis, acutis; liris æqualibus distantibus, planatis, supra costas transeuntibus, sed non nodosis, sutura profunde impressa; apertura ovata, intus lirata, antice canaliculata, labro tenui, columella regulariter triplicata; varicibus latis elevatis, rotundatis. Alt. 9, lat.  $4\frac{1}{2}$ , long spiræ 5.*

This shell does not appear to be uncommon at Muddy Creek. In its style of ornamentation it is much like many Australian forms, but we have no living species with varices. In this respect it is very near *C. Bellardi*, Michellotti, of the Italian miocene and Vienna basin (*Descrip. des Fossiles Miocene de l'Italie septent.*, p. 225); but in that species the plaits on the columella are irregular. Our shell is smaller, thinner, less acute, and the varix at the mouth is less pronounced. The longitudinal ribs are numerous, acute, and somewhat undulating. Where they are crossed by the liræ they are not nodose, and the liræ themselves are distinct, equal, flat, not nearly so conspicuous as the ribs, and regular, only that sometimes there is a smaller one in the interstices between the larger ones. Below the columella the mouth is channelled and the throat is lirate.

CERITHIUM CRIBARIOIDES. Pl. 20, fig. 14.

*C. t. eleganter turritissima, nitente, gracili, anfr. 14, sensim, accrescentibus, rotundatis, elegantissime clathratis, liris spiralibus 4, liris longit. paviorib. supra spiral. transeunt. et ibi nodosis; nucleo? (decoll.) sutura late impressa, basi planata, spiraliter striata, uno funiculo insignita, ad peripheriam angulata, apertura semilunari, labro tenui, canali contorto, recurvo. Alt. 19, lat.  $4\frac{1}{2}$ ,*



This fossil is a very interesting and new form, differing completely from every species of the Paris or Vienna basins. It is very beautifully latticed and gracefully slender, in a way to which I am sorry to say the figure does but scant justice. It is very like *C. cribarium*, S. Wood (See *Monograph of Crag Mollusca* in the Paleontographical Society's publications, 1848, p. 71). In the diagnosis Mr. Wood says that the shell is ornamented with four to five elevated transverse ridges and decussated with lines of growth. The base is smooth. In our fossil the base is also smooth, except for one elevated ridge near the angular edge, but the spiral ridges on the whorls are crossed by distinct fine raised riblets, giving rise to a very elegantly latticed pattern. The canal is also very much twisted and recurved. Altogether it is a very perfect representation of *C. cribarium* in our Australian tertiary beds.

CERITHIUM APHELES. Plate 20, fig. 15.

*C. t. elongato-turrita, subulata, tenui, sordida, parum nitente; anfr. 15—18, parum convexis, medio obsolete carinatis, et costatis, varicibus inconspicuis paucis insignitis, undique regulariter spiraliter striatis. Striis infra carinam distantibus, interstitiis planatis; supra carinam vero, crebris, interstitiis funiculatis. Anfrac. spiræ angulatis et costatis; nucleo, 3 anfr. lævi. Sutura lata, planata, marginata. Apertura orbiculata; labro tenui; columella gracili, contorta; canali longo, tenui, recurvo. Basi concava, striata, periphæria lamellosa. Long. 20—30, lat. 6—8.*

This peculiar form of *Cerithium* is very common at Muddy Creek and at Table Cape; but in the latter locality it reaches a much larger size. It may be said to be the commonest form of *Cerithium* and almost the commonest fossil. Its distinguishing features are that it has only obsolete ribs which are scarcely perceptible by more than a somewhat rugose surface, except on the upper half of the spire; it has occasional varices, which are not very conspicuous, and the whole surface is spirally grooved. There is a kind of obscure keel on the lower whorls which becomes more marked on the upper ones; below this the striæ are distant and rather broad, above they are close, fine, and the

interstices are like little threads, while below the keel they are flat. The mouth is round, the labrum thin, base striate, concave, periphery lamellose, produced, canal long, slender, recurved, suture broad, flat, margined, nucleus of three whorls, smooth.

We have no *Cerithium* at all like this in our Australian Seas, and I know of no fossil form near it.

TRIFORIS WILKINSONI. Pl. 20, fig. 9.

*T. elongata, pyramidata, turrita, tenui, parva, polita; anfr. 12, declivibus, convexis, 4 lineis granulorum cinctis; sutura canaliculata; embryon. 3 lævibus, rotundatis, apertura quadrata, basi planata, unisulcata, radiatim striata, canali brevi, recurvo. Alt. 7½, lat. 2.*

Shell elongate, pyramidal, turretted, thin, small, polished, with 12 sloping convex whorls, girdled with four lines of granules, suture slightly canaliculate. Embryonal whorls 3, smooth and rounded, aperture quadrate, base flattened, with one groove and radiately striate. Canal short, recurved.

This species is a good deal like Australian and Tasmanian forms, except that it is much more turretted and is more granular, and yet the granules not projecting. I have dedicated it to Mr. C. S. Wilkinson, F.G.S., Government geologist for N. S. Wales, who surveyed much of the miocene district near Cape Otway, and published valuable reports on the subject.

TRIFORIS SULCATA. Pl. 20, fig. 12.

*T. t. elongato-pyramidata, turritissima, tenui, nitente, anfr. 24, planatis, regulariter costatis, ad suturam uno funiculo spiraliter insignitis et duobus sulcis inæqualibus, spiralibus cinctis, costis latis, parum elevatis; apertura quadrata, labro tenui; basi planata, undulose striata; nucleo (2 anf.) lævi, inconspicuo. Long. 33½, lat. 5.*

This very beautiful species of *Triforis* is very distinct from any living or fossil. It is very elegantly pyramidal, with numerous whorls, which are rather flat and ornamented with numerous inconspicuous depressed broad ribs. At the suture there is a rounded spiral line, and, in addition, there are two spiral



sulci, one rather broad, shallow, and flat in the centre, and a narrower one above. The number of whorls, and the ornamentation, make it very beautiful and graceful. It has some faint resemblances in size and number of whorls to *Cerithium inversum*, Deshayes, of the Paris basin, but the differences are great. It has no living congener at all like it.

*TURRITELLA TRANSENNA.* Pl. 20, fig. 8.

*Testa parva, pyramidata, turrata, tenui, fragili, nitente; anfr. medio angulatis, 5 carinis cinctis (2 magnis, 3 parvis alternantibus) et costulis numerosis declivibus, supra carinas non transeuntibus clathratis; peripheria angulata, marginata, et bilirata, basi planata, spiraliter lirata, tenuissime transversim striata, margine, costata, granulata; apertura quadrata, antice conspicue producta et angulata.* Long.  $8\frac{1}{2}$ . lat. 3.

Shell small pyramidal, turreted, thin, fragile, shining, whorls angular in the middle girdled with five keels (two large and three small alternating), the interstices finely latticed with numerous small somewhat sloping ribs which do not pass over the keels. The periphery is angular, and margined with a double line of small keels. The base is flattened, has spiral liræ crossed with very fine striæ, having a granular keel at its edge. The aperture is quadrate, being very much produced and angular at its outer edge.

I am not acquainted with any fossil *Turritella* latticed in the peculiar manner seen in this species. *Turritella tasmanica*, Reeve, is, however, like it, but the suture is not so strongly marked or impressed, and the cancellation is not nearly so pronounced. The latter is a species very common both in Tasmania and South Australia.

*TURRITELLA PLATYSPIRA.* Pl. 20, fig. 13.

*Testa acute pyramidata, turrata, tenui, polita; anfr. 12—15, planatis, 3 carinis spiralibus inconspicuis, æquidistantibus, et uno sulco lato, haud profundo, antice, cinctis; lineis incrementi valde flexuosis, viz visibilibus, sutura angusta, parum impressa; nucleo 2 anfr. rotundatis; apertura subquadrata, columella marginata.* Long. 11, lat. 3.

This is a very common fossil at Muddy Creek, and is always found of small size. It differs from the two small *Turritella* of Table Cape, Tasmania, in the almost smooth whorls, garnished with three very inconspicuous keels and a broad, shallow groove at the lower part of each whorl. *T. Warburtonii*, mihi, has five keels, *T. Sturtii*, mihi, has the keels granular. The latter are both abundant at Table Cape, and about the same size. In the larger specimens of this fossil (which is also distinguished by not being decollated) one notices other small faint liræ in the last whorl, especially below the groove. I believe, also, that the outer lip had a deep sinus.

*THALOTIA EXIGUA.* Pl. 20, fig. 11.

*T. t. parva, tumide conica, spira elata, solida; anfr. nucleo incluso 7, planatis, lineis 5 granulorum cinctis; sutura vix impressa; apertura quadrata, columella recta, fauce antice lirata, incrassata; basi spiraliter granulosa; nucleo 1 anfr. levi, nitente.* Long.  $6\frac{1}{2}$ , lat.  $3\frac{1}{2}$ .

This fossil is very like the common *Thalotia conica*, Gray, of the south coast, except that it is very much smaller and has the aperture thicker in proportion. There are rows of granules in each whorl, and these are small, leaving spaces in which there is sometimes a fine raised line. There is another fossil *Thalotia* in the Tasmanian tertiary beds.

*MINOLIA STRIGATA.* Plate 21, fig. 7.

*M. turbinato-conoidea, parva, tenui, nitente, strigis rufis aliquando insignita, late, perspective umbilicata; anfr. 5, medio conspicue carinatis, superne angulatis, coronatis, undique distanter striatis; inter coronam et suturam late planatis; lineis incrementi declivibus, subtilissimis; granulis coronæ latis, acutis. Ultimo anfr. ad peripheriam angulato et carinato; basi levi, planata; umbilico granulis conspicuis marginato, intus corrugato. Apertura vix integra, orbiculata.* Alt.  $5\frac{1}{2}$ , diam  $6\frac{1}{2}$ .

This very pretty little species which often preserves its former coloring in faint reddish streaks is rather common in the Muddy Creek beds. It in some respects resembles our *M. vectiliginosa*, Menke and *M. angulata*, Adams. The main difference is the coronate



angle at the upper part of the whorls where they become flat to the suture. The umbilicus is margined with a conspicuous beading of rounded granules. It is sufficiently related to its Australian congeners to entitle it to the name of being Australian or allied to our living fauna, but I cannot find anything like it amongst the fossils of Europe or America.

*LIOTIA LAMELLOSA?* mihi. Plate 21, fig. 5.

*L. t. orbiculata, solida, ubique conspicue clathrata, costis longitudinalibus supra costas spiralibus transeuntibus, et ibi cucullatis, interstitiis crebre, eleganter, longitudinaliter liratis. Anfr. 4, sensim accrescentes; apertura varicibus duobus valde incrassata et bilabiata; umbilico parvo; apice planato, levi. Alt. 5, diam. 6½.*

This species is not uncommon at Muddy Creek. It is very close to *Liotia Australis*; and I question very much if it be distinct from the species described by me as *L. lamellosa*,\* from the Table Cape beds. The latter, however, was only half the size of this. Its general character is decidedly near to many Australian forms. One peculiarity in it is the two varices round the aperture. They are close, rather thin, and sculptured like the whorls.

I append Prof. Tate's note on this fossil. He says, "This may be your species of Table Cape, but it is not identical with the living one of the name. The differences observable between the now living examples and the fossils are the subquadrate outer whorl, more depressed form and more numerous transverse costæ of the living. More than twenty fossil examples agree in the rounded outer whorl and more open tessellated ornament. As the species was instituted for the fossil form the recent allied should be renamed." This suggestion I think I would provisionally, at least, adopt and name the recent species *Liotia subquadrate*. The species was inadvertently omitted from my "Census of Tasmanian shells."

*SOLARIUM ACUTUM.* Pl. 21, fig. 11.

*S. t. parva, depressa, discoidea, tenui, nitente; anfrac. 4, omnino planatis, liratis, ad margines duobus liris majoribus granulosis*

*insignitis; ad peripheriam acutis; basi in medio conspicue convexa, tenuiter lirata; umbilico costulis et liris granulosis in lineis 4 vel 5 marginata. Apertura transversim ovata. Alt 1½, diam. 6.*

This fossil is not very common. It is easily distinguished by its very small size and depressed form and very acute periphery, where the edge of the shell is produced into a sharp projecting keel. The upper surface is distinctly lirate, and the edges of each whorl margined with rather broad granular lines, two or three in number, the central one where there are three, being much smaller. The under side is abruptly convex in the middle, and faintly lirate. The umbilicus is broadly margined with three to five spiral lines of granules or riblets, varying in size and forming a very elegant pattern. In the figure of this shell on Plate 21, the side view and base with the umbilicus are represented. The species is not like any existing or fossil, its nearest representative is *S. millegranum*, Lamarck. Prof. Tate informs me that this species reaches nine-tenths of an inch in diameter, and that then the ornament is slightly different.

*SOLARIUM WANNONENSIS.* Pl. 21, fig. 10.

*S. t. parva, discoidea, superne planata, infra parum convexa, nitente; anfr. 3½, undique striatis et granulosis, sed utrimque moniliferis. Sutura canaliculata; basi oblique transversim striata, umbilico tribus lineis granulis majoribus circumornato. Apertura orbiculata, peristomate undulato, antice et postice alato. Diam. 3½, alt. 1.*

A small flat discoid shell with a canaliculate suture and the whorls bordered at each side with a line of granules besides being striate and granular throughout. The upper surface is flat and the lower slightly convex with smaller granulations and besides the spiral striæ a very close series of oblique radiating striæ. The lip is undulating from the raised liræ of the whorls being hollow underneath. The aperture is perfectly round, but the peristome is spread at the columella above and below into a kind of aliform expansion. The umbilicus is margined with three rows of large granules and is channelled inside each whorl. The species is very like *S. canaliculatum* of Lamarck only much smaller.

\* Proceedings Roy. Soc. Tas. 1876, p. 96.



Professor Tate informs me that he has several specimens from the Murray River, where it doubles the size of the figured specimen.

ADEORBIS ASTER. Pl. 21, fig. 6.

*A. t. minuta, discoidea, superne planata, subtus convexa, late, perspective umbilicata, nitente; anfr. 3, undulose striatis, ad peripheriam acute angulatis et lamellis latis dentiformibus armatis, subtus medio obtuse carinatis, lævibus; nucleo depresso, umbilico haud ornato.*

This is a minute discoid shell, which is flattened or even depressed above and very convex below. It has a very wide and solarium-like umbilicus, which has no granules or ornamentation, and the base is convex with an obtuse keel. The edge of the whorls is very acute, having broad serrated spinous lamellæ. It does not appear that there is any fossil or existing species like it.

ADEORBIS ACUTICARINATA. Pl. 21, fig. 9.

*A. t. parva, discoidea, tenui, nitente, depressa; anfr. 4, acute multicarinatis, magnis et parvis alternantibus, sed in ultimo tantum; spira 2 præcipuis insignitis, sutura late concava et tenui striata; apertura orbiculata; umbilico lato, perspective, profundo, corrugato.* Diam. 4, alt.  $1\frac{1}{2}$ .

There is a fossil in the Norwich crag which is something like this shell in its general form—*A. tricarinatus*, S. Wood (Paleontographical Society's Publication for 1848. *Monograph of Crag Mollusca*, by Searles Wood, p. 138). *Turbo sulciferus*. Lamarck, from the Paris basin, also resembles it. It is a small discoid shell, very smooth and shining, with between seven and eight sharp keels (four large, and three or four small) on the last whorl, and two on the spire. Between the keels the shell is deeply hollowed. The suture is in a broad groove, which is striated. The aperture is not entire, but almost united; the umbilicus is broad, perspective, and corrugate. I am not acquainted with any shell at all like it in the Australian seas.

TROCHITA TURBINATA. Pl. 21, fig. 1.

*Testa turbinata, tenui, haud nitente, opaca, anfr.  $1\frac{1}{2}$ , rotundatis rapide crescentibus, lineis incrementi parum corrugatis et tenuiter striatis; apice exserto; apertura suborbiculata, labro tenui, columella lamellosa, expansa, conspicue concava, radiatim sulcata, postice reflexa, umbilico parvo formanti.* Diam.  $9\frac{1}{2}$ , alt. 8, long. apert.  $6\frac{1}{2}$ , lat.  $5\frac{1}{2}$ .

*mella lamellosa, expansa, conspicue concava, radiatim sulcata, postice reflexa, umbilico parvo formanti.* Diam.  $9\frac{1}{2}$ , alt. 8, long. apert.  $6\frac{1}{2}$ , lat.  $5\frac{1}{2}$ .

A turbinate thin shell, opaque and not shining, with  $1\frac{1}{2}$  rapidly increasing whorls which are slightly corrugated here and there and finely striate with the lines of growth, apex exsert, aperture sub-orbiculate, labrum thin and extended, columella lamellose, expanded, conspicuously concave, radiately sulcate, reflexed posteriorly so as to give rise to a narrow umbilicus above.

This *Trochita* seems very distinct from every fossil form because of its few rounded turbinate whorls. It is quite different from our Australian species, which is depressed. It occurs at Table Cape as well as the Muddy Creek.

TORNATINA INVOLUTA. Pl. 21, fig. 4.

The specimen figured, which was the only one I have seen, has been crushed by accident since the drawing was made, so that I am unable to furnish any details, except that which the figure affords.

LEDA INCONSPICUA, Reeve. Plate 21, fig. 3.

This shell is described by Reeve as from Australia, but I am not acquainted with it from anything but his description and figure. It is not known to collectors in New South Wales, Tasmania, or New Zealand. The fossil form corresponds so exactly with Reeve's species that I cannot separate them. Prof. Tate thinks the species cannot be distinguished from *L. crebre-costata*, described by me in Proc. Roy. Soc. Tasmania, 1876, p. 112.

LEDA HUTTONII. Plate 21, fig. 2.

*L. t. parva, depressa, tenui, fragili, polita, transversim elongato pyriformi, concentricè rugose irregulariter striata et late sulcata, latere postico valde producta, et parum oblique truncato, angulato, angulo obtuso, area postangulari sulcata; latere antico brevi, rotundato, dentibus numerosis acute angulatis.*

The peculiar feature of this fossil is the length to which the posterior side is produced and its very slightly oblique obtuse end. The concentric striæ are irregular and appear to be



derived from the lines of growth only. The shape of the shell is depressed and flat, and the teeth are numerous and very minutely angular. It differs from all our living species.

The above thirty species is rather less than half those collected by me. I propose returning to the description of the rest in the course of a month or so. The most of the figures are already drawn on stone, and the diagnosis will receive my earliest leisure. It will be observed that I do not touch on the *Marginellidæ* which at present occupy the attention of Prof. Tate, who has written a most interesting memoir upon them.

#### EXPLANATION OF PLATES 20 AND 21.

##### Plate 20.

- Fig. 1.—*Fusus funiculatus*.  
 " 2.—*Mangelia bidens*.  
 " 3.—*Pleurotoma Samueli*.  
 " 4.—*Drillia Trevorii*.  
 " 5.—*Pleurotoma Murdaliana*.  
 " 6.—*Pisania tenuicostata*.  
 " 7.—*Ancillaria semilævis*.  
 " 8.—*Turritella transenna*.  
 " 9.—*Triforis Wilkinsonii*.  
 " 10.—*Daphnella gracillima*.  
 " 11.—*Thalotia exigua*.  
 " 12.—*Triforis sulcata*.  
 " 13.—*Turritella platyspira*.  
 " 14.—*Cerithium cribarioides*.  
 " 15.—*Cerithium apheles*.

##### Plate 21.

- Fig. 1.—*Trochita turbinata*.  
 " 2.—*Leda inconspicua*.  
 " 3.—*Leda Huttonii*.  
 " 4.—*Tornatina involuta*.  
 " 5.—*Liotia lamellosa*.  
 " 6.—*Adeorbis aster*.  
 " 7.—*Monilea strigata*.  
 " 8.—*Natica, Wintlei* var. *Hamiltonensis*.  
 " 9.—*Adeorbis acuticarinata*.  
 " 10.—*Solarium vannonensis*.  
 " 11.—*Solarium acutum*.  
 " 12.—*Cancellaria varicifera*.  
 " 13.—*Nassa Tatei*.  
 " 14.—*Conus Ralphii*.  
 " 15.—*Triton Prattii*.



