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BY

THOMAS E. RAWLINSON, C.E., Hon. Sec.

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THE AUTHORS OF THE SEVERAL PAPERS ARE SOLELY RESPONSIBLE FOR THE SOUNDNESS OF THE OPINIONS GIVEN AND OF THE ACCURACY OF THE STATEMENTS MADE THEREIN.

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other on the increased spike or flower stalk, and in this condition it is commonly given as food to small cage birds, as the canary, &c. The flowers are very small, but easily distinguished by means of a common lens. The calyx consists of four sepals. The corolla is one with four divisions, and of a scaly texture, four long stamens and a single style. The germ or ovary is, in the early stage, two-celled, and contains a few ovules. The capsule, or ripened fruit, is usually one-celled, and two or three seeds or more may ripen, and the capsule top splits off like a lid.

Now the specimen in question, I observed, had run to seed, but several of the spikes, in place of fruiting as usual, had metamorphosed the carpel as follows: it had become longer than usual, and in most instances enlarged at its upper extremity, and also unequally so, and when fully developed, the styles having fallen off, it dehisced or split in two at the top. On opening the capsules, each was found to contain a small cluster of leaves in place of the ovules. On some I counted as many as ten or twelve leaves. Now, in some botanical works, and I can quote Lindley's *Vegetable Kingdom*, it is stated that the ovary is composed of a single carpel, and seldom four-celled. (Page 642). From an examination of the carpel in this specimen, it will be seen that the ovary is really composed of two carpellary leaves; first, because the carpel is in some instances more developed on one side, *i.e.*, posteriorly, and next, that a sutural line may be seen separating the anterior from the posterior portions; and again, that the fully grown capsule in this state dehisces at the top into two. I have taken one of such carpellary portions, and having decolorized it, I find that the carpel presents all the character of a leaf, it has a central vein with lateral anastomosing ones.

The other point of interest in this specimen is, that the ovular buds, in place of remaining as such had in some instances, become further developed into florets, each being a miniature of the parent flower—four sepals, four stamens.



ART. II.—*On some Tertiary Fossils in South Australia.* By the Rev. JULIAN E. WOODS, F.G.S., &c., &c. Penola, S. A.

[Read 27th May, 1861.]

I have frequently had occasion to describe to the Society certain rocks which appear at Mount Gambier, and the South Eastern district generally. I now wish to draw attention to the fossils contained in them. The stone, as I before mentioned, is a mass of organic remains, but these are either so finely comminuted, or of so small a size, that it looks like a compact freestone. The fossils are principally Bryozoa, and Foraminifera, enclosed in a calcareous cement.

The resemblance of the formation to the Lower Crag deposit is very striking, and an examination of the imbedded fragments shows a positive identity. It is to the consideration of the fossils which form the basis of resemblance between the two formations, that I have principally addressed myself in my investigations, part of which form the subject of the present paper.

On seeing the mass of minute beings matted together in the stone, and representing almost every variety of shape and form; and on noticing how in the thousands of specimens composing a cubic inch of rock, not two of the little branchlets are alike, all being more or less broken, it would seem almost impossible to draw order out of this confusion, and give a family and specific name to every individual.

It is, indeed, a matter of no small difficulty. Fortunately the classification of the Polyzoa has made great progress lately; not a single twig of the little stony shrubs with which the formation teems, but can be named, and its affinities described.

Though the Polyzoa at all times possess no ordinary interest, yet those of these strata have an especial attraction of their own. It is the last link in Australian geological history immediately preceding the present state of things. But this is not all. The included fossils differ not only from existing species on the coast, but also almost entirely from every species, and sometimes even genera, previously described. Out of forty-two specimens sent home to Dr. Busk, thirty-six proved to be previously unknown to science. In their general character, and in the genus *Cellepora*, the beds

possess features peculiarly their own. I proceed at once to describe the specimens to which the accompanying drawings refer.

No. 1. *Salicornaria Sinuosa* (Hassal). This fossil is the prevailing one of the beds. It is found everywhere, and is so common that I have never yet found a square inch of stone belonging to the deposit which did not at least contain a dozen of its fragments. Busk identifies with this species the *S. farciminoides*. The variations in the form of the cells which I have witnessed, after examining hundreds of specimens, make me believe this to be very proper.

*S. gracilis* and *S. tenuirostris*, have both been found fossil, but are not drawn, as they are both figured in Busk's catalogue.

No. 2. *Canda angulata*, the connection of the branches by transverse tubular fibres is not, according to Busk, a character of either generic or specific importance. It was only known to occur in one species till the discovery of that here described.

No. 3. *Cellepora Gambierensis* (Busk). This is the characteristic fossil of the formation. It grew to immense size. In appearance it very much resembled a true branching coral; was hollow in the stem, and was very much and irregularly branched.

No doubt it existed in the form of a reef, and probably gave rise to the coralline formation. I have seen it, where sections of the bed have been exposed, branching up like a strong tree ten or twelve feet high. Probably such an immense operation as a coral reef by Bryozoa is a solitary instance, but we have long since learned that in nature the magnitude of the work bears no proportion to the workman. No drawing can give a character by which it can be known, for it varies so much in form. It may, however, be described as irregular branches studded with cells, which are perforated with one minute opening. The branch is hollow inside, and the interior of the cavity is smooth and finely ribbed. The thickness of the tube varying with age; cells apparently growing from without, and irregularly disposed.

No. 4. *Cellepora Hemisphærina* (Busk). This is a lenticular polyzoary, more or less flattened, but generally in shape like a double convex lens. It varies in size from that of a sixpence to that of a lentil. The cells are very small and equal in dimensions.

No. 5. *Cellepora Nummularia* (Busk). Polyzoary obliniar



above, slightly concave beneath. The upper surface studded with small irregularly disposed cells, and the under surface with a calcareous crust, on which are radiating raised ribs and concentric rings. This is a very common fossil, and extends through the whole formation. It is of various sizes, the largest about that of a shilling. The under surface is not unlike a nummulite.

No. 6. *Cellepora tubulosa* (Busk). Spherical polyzoaries with one side perforated two-thirds through with a cone-shaped cavity, cells irregular, very large and minute, the latter grouped around the former, and giving an ornamental appearance.

No. 7. *Cellepora spongiosa* (Busk). A hard compact irregular polyzoary, with cells raised and rounded. Aperture simple. A very common fossil, and never found encrusting others.

No. 8. *Melicerita Angustiloba* (Busk). Another species of the genus peculiar to the Crag deposits, described by Milne Edwards. It is a common fossil, and is small and brittle.

Figures 9 and 10 are two species of *Hornera*, very common in the beds. They are probably *H. Rugulosa*, and *H. Gambierensis*.

Figure 11 is a fragment of *Caberea lata*. It still exists on the coast, and is described in Busk's Catalogue. It is not very common, but occurs from time to time.

Figure 12. *Crisia eburnea*. I have very little doubt that this is the species described by Johnson (*Bri. Zooph.*, vol. i., p. 284.) It is a British species, and yet appears to have been very abundant in our seas when these strata were deposited. The species is not described by Busk, who has distributed Lamouroux's order of *Crisidæ* into other genera.

I have only described in the foregoing a very few of the most common fossils in the Mount Gambier rocks. It will be seen, even from these few, that most of the species are new. I have omitted mention of three new genera, namely, *Psilcschara*, *Cœleschara* and *Scutularia*, of which the leading characteristics are not well made out. But at any rate it will be perceived that these deposits offer a wide field, replete with novelty and interest, and their fauna will probably number thousands of species peculiar to them alone. It must not, however, be supposed that they ever will, even when fully explored, give a true picture of the former state of our seas. More than half the genera and species must have perished. The Polyzoa of our present seas would tell

us this. Very few are calcareous (and no others can be preserved), and of those which are, the majority are so fine and small, and lightly jointed, as to render their preservation almost an impossibility. Thus, for instance, our *Catenicellidæ* being united by short corneous joints, their decomposition and destruction is certain. The same may be said of the different species of *Carbasea Flustra, Bicellaria,* &c., &c. None of these are found in the Mount Gambier limestone, and yet I believe we are not without some record of their former existence. Under the microscope the finest dust of the stone is seen to have some trace of organization, and there are apparently a great many foramenifera, such as *Globigerina, Orbulina, Rotalia,* &c., &c. Doubtless some of the latter might prove to be scattered cells of *Catenicella,* &c.

I must state, in conclusion, that shells are never found unless as casts, with the exception of the *Pecten coarctatus,* and the *Terebratula compta,* but in other respects the formation is so precisely similar to the Upper Crag, Suffolk, that a specimen of the latter, which I have, cannot be known from Mount Gambier limestone, except by a narrow examination of the fossils. Even the very concretions and texture of the stone are repeated in both strata. I shall return to the subject again shortly. In conclusion, I append a list of the fossils here figured and described :—

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EXPLANATION OF FIGURES.

No. 1.—*Salicornaria Sinuosa,* a natural size.
No 2.—*Canda Angulata,* a front and back view.
No. 4.—*Cellepora Hemisphærina,* six transverse sections.
No. 5.—*Cellepora,* six upper and an under surface.
No. 6.—*Cellepora tubulosa.*
No. 7.—*Cellepora spongiosa,* two specimens.
No. 8.—*Melicerita,* an upper surface, six sections natural size.
No. 9.—*Hornera,* much magnified ; a front and six back view.
No. 10. *Hornera Gambierensis,* a front, six back, and natural size.
No. 11.—*Caberea lata,* a front, six back, and natural size.
No. 12.—*Crisia eburnea,* a magnified to natural size.
No. 13,—Part of an axis of a coral resembling *Iris Hippuris,* N.B.
These are universally disseminated through the stone.

*To accompany the Rev. Julian E. Woods' paper on Tertiary Fossils in South Australia.*