

51. POLYZOA (BRYOZOA) found in the BORING at RICHMOND, SURREY referred to by PROF. JUDD, F.R.S. By GEORGE ROBERT VINE, Esq. Communicated by Prof. JUDD, F.R.S., Sec. G.S. (Read June 25, 1884.)

THE following notes are essentially the same as those originally supplied to Prof. Judd under the circumstances mentioned in his paper. With his permission I have extended my remarks, not for the purpose of correcting previous identifications, but because fresh materials have been placed at my disposal. These, I found, merited a closer comparative study than I had given to the series, and in preparing my observations for publication it was necessary to bring the results of my investigations up to the level, as far as was possible, of the palæontological work of the present day.

Many of the forms may be considered identical with those described by Jules Haime * and Prof. Brauns †; and I was inclined to place certain species under the names, and to accept the synonyms, of these authors. A reference, however, to the writings of Haime and Braun compelled me to reconsider my vaguely formed intention, after which I reworked the whole of the species and varieties found in the Richmond series—one of the most important local series that has ever been brought under my notice. Of course, in my mode of working I may appear to differ from Jules Haime in appreciation of certain forms. This is not the fact; for I feel convinced that this careful palæontologist must have had many mental forebodings before he arrived at some of his conclusions. This is especially apparent in his dealing with the *Spiropora* group, and also with the genus *Terebellaria*. In working up these groups—and here the value of the boring-washing is immediately apparent—I have endeavoured to settle, or at least simplify, many moot points. If any doubt about this should exist in the mind of the palæontologist after reading these notes, I refer him to the paper of F. D. Longe, F.G.S., “On the Relation of the Escharoid Forms of Oolitic Polyzoa to the Cheilostomata and Cyclostomata” ‡. In this special paper he will find, in spite of a splendid collection of Polyzoa from the Lower Oolite of Cheltenham, how difficult the specific study of forms has been to a really painstaking student. The reason is plain. In the whole of the Jurassic formation we have varieties of forms related, but not closely so, to forms now placed with the Chilostomatous Polyzoa. These, however, are not members of that group, though they may be considered in the light of relationship if external cell-structure is the only consideration on the part of the student. There are, however, strong reasons for believing that the “evolutionary beginnings” (if I may be allowed to express myself

* “Bryozoaires foss. de la formation Jurassique” in *Mém. Soc. Géol. France*, sér. 2, tome v. pp. 157–218 (1854).

† “Die Bryozoen des mittleren Jura der Gegend von Metz,” in *Zeitschr. d. deutsch. geol. Ges.* Bd. xxxi. pp. 308–338 (1879).

‡ *Geol. Magazine*, Jan. 1881.

thus) of the Chilostomata originated in early Jurassic times. The Richmond series of Prof. Judd, and the less remarkable series procured from the boring for water in connexion with Meux's Brewery, referred to by Mr. C. Moore, of Bath *, have enabled me to study and compare the Polyzoa from two horizons, both of which are Jurassic. Mr. Moore's collection of specific forms, however, is not so well preserved as the Richmond series, but still I have been able to arrive at a partial conclusion respecting their age; although I do not consider my evidence on this point so conclusive or satisfactory as on the Richmond forms. Mr. Moore believed that his material was derived from Neocomian rocks. I cannot accept this opinion, judging from the Polyzoa alone. The *Stomatopora dichotoma* (1/34) is the same as the form described in this paper; the *Diastopora diluviana* (1/36) is the same as the Great-Oolite form; so also is the *D. microstoma* (1/27); the *Idmonea triquetra* (slide 1/27) is more robust, but it is not related to any Neocomian *Idmonea* known to me; and the *Entalophora* (1/31) is closely related to some of the more delicate forms of *E. richmondiensis* of this paper, while *Terebellaria* ? *increscens* and *Lichenopora* (in bottle 1/36) are the same as species found in the Bradford Clay and Cornbrash. There is, however, one fragment (1/33) in Mr. Moore's collection that I have never, as yet, met with elsewhere. This appears to be a minute portion of one of the bundles of *Fasciculipora Waltoni*, Haime. The apical cell-openings are large, circular, and surrounded by peristomial ridges. These are separated from neighbouring cells by a very delicate interspace. This species Haime gives, on the authority of Mr. Walton, from the Great Oolite, Hampton Cliff. There are a few forms (*Heteropora*, sp.) which seem to be related to Neocomian species.

This closer study of *Lepralia*- and *Eschara*-like forms which Mr. Longe compares with the old *Eschara foliacea* of authors, has proved to me how insufficient mere growth and outline are in deciding the question as to the zoological position of a group. It may be that the *Terebellaria increscens* now described belongs rather to the Chilostomatous than to the Cyclostomatous group, but the peculiar shape of the oecia of this species seems to point in the opposite direction†. It is impossible to dogmatize on moot points of structure like this. It belongs to us to lay the foundation in good honest work; it remains for future systematists to say where or how groups shall be placed.

* I am indebted to Prof. Judd for obtaining for me an examination of this series. The specimens are the property of the Bath Museum.

† One of my principal reasons for refusing to believe that these *Eschara*- and *Lepralia*-like cells are "closely" related to the Chilostomata is this:—Whenever I make a section of a cell of any of the forms from the Jurassic rocks, I invariably find that the cell is tubular, in spite of its peculiar external shape. Whenever we are dealing with a true Chilostomatous type, whether from the Cretaceous or Cainozoic rocks, or recent, no indication of a tube is present, at least so far as I am acquainted with sections. There is, however, in the Jurassic *Terebellaria increscens* a large development of the distal part of the cell at the expense of the proximal, and the thinner the incrustation the broader will be the superficial area of the cell.

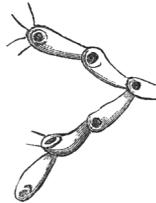
		Richmond slides.	Meux.	Known Horizon.
1.	STOMATOPORA, <i>Bronn.</i> <i>dichotoma</i> , <i>Lamx.</i>	1	1/34	Bradford Clay &c.
2.	Waltoni, <i>Haime</i>	2		Bradford Clay &c.
	DIASTOPORA, <i>Milne-Edw.</i>			
3.	<i>diluviana</i> , <i>Lamx.</i>	3	1/36 1/27	Great Oolite &c.
4.	<i>microstoma</i> , <i>Mich.</i>	4	1/27	Great Oolite &c.
5.	var. <i>connectens</i> , <i>Vine</i>	4*		
6.	<i>Lamourouxii</i> , <i>Haime</i> ...	5		Great Oolite &c.
	IDMONEA, <i>Lamx.</i>			
7.	<i>triquetra</i> , <i>Lamx.</i>	6	1/27	
	ENTALOPHORA, <i>Lamx.</i>			
8.	<i>straminea</i> , <i>Phill.</i>	*?		Great Oolite.
9.	<i>richmondensis</i> , <i>Vine</i> ...	8	1/31?	Allied to Forest
10.	—, var. <i>pustulopora</i> , <i>V.</i>	9		[Marble species.
	TEREBELLARIA (restricted)			
11.	<i>increscens</i> , <i>Vine</i>	10	*?	Allied to Cornbrash
	LICHENOPORA?			[sp.
12.	<i>Phillipsii</i> , <i>J. H.</i>	11		Great Oolite.
	HETEROPORA, <i>Blainv.</i>		?	
13.	<i>conifera</i> , <i>Lamx.</i>	12		Inferior and Great
	? <i>FASCICULIPORA</i> , <i>D'Orb.</i>			[Oolite.
14.	<i>Waltoni</i> , <i>Haime</i>		*	Great Oolite.

1. STOMATOPORA DICHOTOMA, Lamx. Fig. 1.

Alecto dichotoma, Lamx. Exp. méth. des Pol. 1821, tab. 81. figs. 12, 13, 14.

Aulopora dichotoma, Goldf. Petr. Germ. p. 218, pl. 65. fig. 2; Jules Haime and authors generally. See Haime's Jurassic Bryozoa, for synonyms &c.

Fig. 1.—Zoecia of *Stomatopora dichotoma*, Lamx., typical form. Enlarged.



This beautifully delicate species is present in the Richmond material, but very rare. It will be seen that the linear cells, as figured by Goldfuss, are characteristically simple. One specimen adherent to a piece of shell is well preserved, though fragmentary. In Mr. Charles Moore's specimens from Meux's Brewery boring (1/34) a fragment of three cells shows the delicately punctured surface.

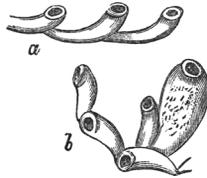
Richmond series, Prof. Judd, slide 1; C. Moore's series, No. 1/34, Bath Museum.

Horizon and locality. Great Oolite, Caen, on *Terebratula*; Bath (*William Walton*); also at Hampton Cliff; and Bradford Clay (*J. Haime*).

2. STOMATOPORA WALTONI, J. Haime. Fig. 2 *a*, *b*.

Stomatopora Waltoni, Haime, Bryoz. Foss. Form. Juras. 1854, pl. vi. f. 2; Vine, Brit. Assoc. Rep. Foss. Polyzoa, 1882, p. 251.

Fig. 2.—Cells of *Stomatopora Waltoni*, J. Haime. Enlarged.



a. Normal arrangement of cells. *b*. Basal colonial growth with oecium.

This is a very variable species, and I was tempted to give some of the forms, at least, the varietal name “*producta*,” on account of the cells being much produced at the distal extremities (fig. 2, *a*). In some of the specimens this feature is very prominent (slide 2 *a*); but as it is characteristic of the Bradford-Clay *Stomatopora* generally, I think that it would be unwise to increase the already too abundant difficulties of the palæontologist. It may be well, therefore, to give the following diagnosis, worked up from a fine series of specimens.

Zoarium irregular, branches free, and sometimes anastomosing. *Zoecia* elongate, produced at the distal extremity of the cell; orifice circular; peristome thick and slightly contracted, giving to the cell a bulgy appearance in some specimens just below the orifice; tubes finely punctured. *Oecia* a distended cell, very bulgy in the middle, sometimes single, occasionally in clusters.

Richmond series, Prof. Judd, slides 2 *a*, *b*, *c*. Not represented among Mr. Moore's specimens.

Horizon and locality. Great Oolite, Kidlington, *S. dichotomoides* type. Intermediate between the Inferior- and Great-Oolite species. *S. Waltoni* (typical), Bradford Clay and Cornbrash. Mr. Walford quotes Forest Marble (local work).

3. DIASTOPORA DILUVIANA, Lamx.

Berenicea diluviana, Jules Haime, Bryoz. Foss. Form. Juras. pl. vii. f. 2, 2 *a*.

? *Diastopora diluviana*, Vine, Brit. Assoc. Rep. Foss. Pol. 1882, p. 256.

I have not given in the above the several synonyms or references which Haime places under the name. In my own Report the form referred to, as peculiar to or characteristic of the Inferior-Oolite series, may be referred to again as *D. pellucida*. The present forms are characteristic of the Great-Oolite series, and are well

shown in figures in Haime's Monograph. The following diagnosis of the Bradford-Clay species is drawn up from some very fine specimens.

Zoarium incrusting, very irregular. *Zoecia* partially immersed, closely compacted, covering large spaces on shell and stone; orifice of cell circular, slightly raised; lip prominent, but not what may be called protruded; tubes finely punctured. *Oecia* consisting of a distended cell or of several cells, but not so characteristic as in *D. ventricosa*, Vine. Colony originating with a primary cell, assuming a flabellate, and ultimately an irregular, outline. Rarely discoid in its matured or nearly matured growth.

Richmond series, Prof. Judd, slides 3 *a*, *b*, *c*. C. Moore's (Meux Brewery), 1/36; slides M. 1/27 &c., 1/29 *a*, *b*.

Horizon and locality. Great Oolite, environs of Caen (*Ranville*); Bradford; Ardennes (*J. H.*); "Bath Oolite."

From the latter locality I had a large specimen, incrusting shell (Mr. Shrubsole's cabinet); but the cells of these are less robust than in the Richmond and Bradford-Clay forms. The only locality I had was "Bath Oolite—from the neighbourhood of Bath." Mr. Moore's specimens are more closely allied to this form than to those from Richmond.

In some of the specimens from the Richmond horizon there is a slight departure from the normal type, caused by peculiarities of habit; but as I cannot detect any departure from the characteristic cell-features, I have preferred not to give any new names to these. The slides are marked 3 *d* and 3 *e*.

4. DIASTOPORA MICROSTOMA, Michelin.

Berenicea microstoma, Haime, *op. cit.* pl. vii. figs. 3 *a-d*.

D. microstoma, Vine, Brit. As. Rep. 1882, p. 256; Haime gives as synonyms *D. undulata*, of both Michelin and D'Orbigny.

The five slides that I have mounted of this form show, I think, the characteristic features of this species. That marked 4 *a* may very well serve as a type of *D. undulata*, but this conception of character would be erroneous. As in *D. ventricosa*, Vine, and some specimens of *D. diluviana*, Lamx., there are several oecia in the colony, and the bulgy appearance of these causes the undulations noticed by the respective authors. Another point of interest is that the general habit of the species is a proliferous one, one colony overlapping another, or striking off from the marginal rim of some bulky specimen, and then helping to cover the parent colony. The separation of the cells, too, in this species is very distinct, appearing as mere extensions of the peristome, while the remaining parts of the tubes are undistinguishable or nearly so. It is this species—or an ally of this species, for it may be wise at some future time to separate them—that forms incrustations on the stems of *Entalophora*, producing that peculiar spiral character which is generally regarded by authors as *Terebellaria*. I have traced the form through a series of spirals, beginning as a mere point, and then increasing in size until very

bulky zoaria are produced; and I have noticed the same features in a species on *Entalophora* from the Greensand of Haldon Hill.

Richmond series, Prof. Judd, slides 4 *a*, *b*, *c*, *d*, *e*. C. Moore's (Meux Brewery), slide M. 1/27; poor specimen.

Locality and horizon. Ranville; Great Oolite, Hampton Cliff; my own cabinet, from Bradford Clay.

5. *DIASTOPORA MICROSTOMA*, Michelin, var. *connectens* (n. var.).

Zoarium irregular and occasionally proliferous. *Zoecia* varying in character, sometimes only the peristome visible above the surface, at other times slightly decumbent, separated by interspaces, roughened by lines which appear to connect the peristomes of cell and cell; mouth circular, lip (normal) thick; cell bulging immediately below the mouth; proximal part of the tube rarely visible.

Richmond series, Prof. Judd, slide 4**a*: type.

On account of the peculiar way in which the cells of *D. microstoma* are separated in the zoarium, I prefer to place this form as a variety of that species rather than any other.

6. *DIASTOPORA LAMOUROUXI*, J. Haime.

Diastopora Lamourouxi, Haime, *op. cit.* pl. viii. figs. 1 *a-b*.

D. foliacea (pars), Bronn; Blainville.

There are in the Richmond washings a great number of specimens of *Diastopora* having a very robust habit. I do not think that these can be placed under any of the species of *Berenicæ* given by Haime in his Monograph of the Jurassic Bryozoa. There are, however, in his Group of *DIASTOPORES SIMPLES* two species, one *D. Lamourouxi* and the other *D. Waltoni*, the latter from the Inferior Oolite of Cheltenham. The Richmond species is closely allied to *D. Lamourouxi*, if not identical with it.

If I am right in identifying this robust form, I can only say that I have not previously met with it as a British fossil. The specimen figured by Haime has the cells long and tubular, with a circular mouth, and the peristome slightly raised. These are the characteristic features of the specimens under consideration.

The synonymy of *Diastopora foliacea*, of Lamouroux, Bronn, and Blainville, has been well discussed by Prof. Brauns in his able paper on the Bryozoa of the Middle Jurassic of Metz, 1879, and he justifies the separation of *D. Lamourouxi* on the ground of its simple habit, and also on account of the circular peristome. *Elea foliacea* is a distinct operculate form, from the Inferior Oolite.

Richmond series, Prof. Judd, slides 5, 5 *a*. Not present in C. Moore's series.

Horizon and locality. Great Oolite, Ranville (*Eudes Deslongchamps*).

IDMONEA, Lamouroux.

Reptotubigera (pars), D'Orbigny.

When writing my Brit. Assoc. Report Foss. Polyzoa, Jurassic Q. J. G. S. No. 160.

species (1882), I was not acquainted with the Jurassic *Idmonea triquetra*, Lamx. In these Richmond washings, and also in Mr. Moore's collection, fragments are present, though not common. Before, however, I pass on to describe the Richmond form, it may be well to make a few remarks upon the genus.

I have not been able to refer to Lamouroux, *Exposition Méthodique*, 1821, in which this genus is described; I will therefore accept the description given by Mr. Busk, *Crag Polyzoa*, p. 104. In this diagnosis Mr. Busk says—"Mouths of cells disposed in parallel, transverse, or oblique, usually alternate, rows on each side of the front of the branches, which is angular or carinate in the middle." There can be no objection to this description of a well-marked type of structure. When, however, we compare the Jurassic *I. triquetra* with some of the more tubular *Idmoneæ* of the Cretaceous epoch, a very marked difference is observable; and it is because of these peculiarities that I wish, now that I have the opportunity, to direct special attention to Jurassic forms.

In Miss E. C. Jelly's collection from the Inferior Oolite (no locality given) there is an adherent specimen, having all the characters of *Idmonea* as given by Busk (and presumably by Lamouroux), except that it is "adherent" instead of "ramose." I believe that if students would direct their attention to specimens of this Inferior-Oolite form, it would be found that from the decumbent branches upright ramose branches are formed. However this may be, it seems to be a fair conjecture that from this Inferior-Oolite species the Richmond form is developed. The peculiar character of the cell is not unique on branches of this species, for in some of the *Entalophoræ*, from both the Inferior Oolite and the Great Oolite, a similar form of cell is found. I have no desire under present circumstances to speculate as to the origin of distinct groups, otherwise than to remark upon the apparently characteristic "facies" of species of Polyzoa from the various horizons of the Jurassic rocks. In this paper I have been careful in describing the Richmond series for this special purpose.

7. *IDMONEA TRIQUETRA*, Lamouroux.

Idmonea triquetra, Lamx. *Expos. Méth.* p. 80, 1821 (Busk).

Zoarium (decumbent?) or ramose; branches triangular, having an inferior side (back) rather broad and free from cells, and two other sides which rise from the inferior, forming an apparently, rather than really, carinated front. *Zoecia* forming obliquely linear or transverse rows; mouth circular; peristome thick and slightly protruded; tubes densely punctate. *Oecia* formed by the clustering of certain cells, over some of which there is a closure-like operculum.

Richmond series, Prof. Judd, slides 6 *a, b, c*. C. Moore's series (Meux Brewery), slide 1/27 &c. The specimens on this slide are much more bulky than those in the Richmond series.

In comparing *I. fenestrata*, Busk (*Crag Polyzoa*, p. 105), Mr. Busk makes certain remarks which seemed sufficient to guide him in the separation of his species from the Jurassic *I. triquetra*.

There is a difference between the two forms; and I am glad that they are kept distinct.

8. *ENTALOPHORA STRAMINEA*, Phillips.

Millepora straminea, Phill. Geol. of Yorksh. (ed. 1829), p. 149, pl. ix. fig. 1.

Spiropora straminea, Haime, *op. cit.* pl. ix. fig. 6.

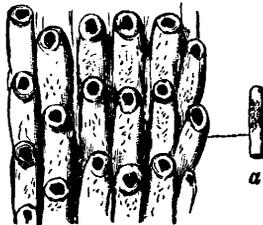
Entalophora straminea, Brauns, Bry. mittl. Jur. Metz.

Spiropora straminea, Vine, Brit. Assoc. Rep. 1882, p. 12 of Rep.

Phillips gives the horizon of his species as "Bath Oolite," and quotes several localities in which it is found.

As the individual specimens that I placed under the above name are the most abundant of the Jurassic forms from Richmond, and as there seems to be great confusion among authors respecting Phillips's type-species, I think it far wiser to separate and limit the various forms. And I do this for two reasons:—1. In my notes on the specimens sent to me by Prof. Judd, and under the circumstances mentioned, I gave, after a careful examination, three names—*E. straminea*, Phill., *E. bajocensis*, D'Orb., and *E. cæspitosa*, Lamx. Judging by cell-character, all three of these species are present in the material obtained from Richmond; but the three cell-characters are as often on a single specimen as on several; and for this reason alone a confusion must always follow careful work, if the old names be persistently retained. 2. Then, again, my friend Mr. Walford identifies a Forest-Marble species with *Spiropora cæspitosa*, Lamx. Now this Forest-Marble form is identical, or as nearly so as possible, with the Richmond forms, only much more bulky in zoarial growth. Then both *E. straminea*, Phill., and *E. cæspitosa*, Lamx., are assigned to two horizons—Inferior and Great Oolite.

Fig. 3.—Portion of the zoarium of *Entalophora richmondiensis*, showing the typical arrangement of the cells. Enlarged.



a. Natural size.

9. *ENTALOPHORA RICHMONDIENSIS* (n. sp.). Fig. 3.

Zoarium ramose, bifurcating, rarely, if ever, anastomosing;
3 G 2

branches varying in size from $\frac{1}{32}$ to $\frac{1}{24}$ inch in thickness, bulging at the nodes immediately beneath the bifurcation, where the measurement in breadth is about three quarters of a line. Zoecia disposed all round the branch in obliquely linear or transverse series, occasionally irregularly placed on the branch; about seven cells to the line in a longitudinal, and ten cells to the line in the direction of the zoecia, whether oblique or transverse; mouth circular; peristome distinct, slightly tufted or raised above the general surface of the branch; cells tubular, punctate, and bounded by their own walls, occasionally produced on the margins of the branch. Oecia a clustering of certain cells, some of which are covered by a solid opercular lid.

Richmond series, Prof. Judd, slides 8 a-d. Not represented in C. Moore's series, but 1/31 is closely allied.

I regard as allies of this species the British Great-Oolite form of *Spiropora straminea*, Phill. (Haime, op. cit. pl. ix. fig. 1; Phill. Geology of Yorkshire), the *S. caespitosa*, Lamx., from the Bradford Clay and Forest Marble, and the Hampton Cliff specimens of *S. bajocensis*. The *S. bajocensis* from the Inferior Oolite is related to this group; but it differs in certain peculiarities of structure from the forms indicated above.

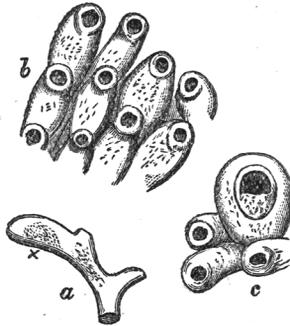
It may be well now to direct attention to some specimens or forms of incrustation called by authors *Terebellaria*, which cover with a thin layer of growth colonies of *Entalophora richmondiensis*, and mimic the various outlines of its surface. This form, which will be presently considered, has a very different cell from that of the *Entalophora* described above; and I cannot help expressing my opinion that the character of *Diastopora ramosissima* (Haime, pl. ix. figs. 3 a, b) has been drawn up from a specimen of *Entalophora* obscured by a colonial growth of *T. increscens*, Vine, and that the species itself has been much misunderstood by authors who have not entered so minutely into details as I have been compelled to do with these Richmond fossils. I have in my cabinet specimens of the species described by Haime from the Forest Marble and also from the Bradford Clay and Cornbrash series, and upon the study of these I found the opinion now expressed. It is quite possible, too, that some of the specimens included under *T. increscens* may be regarded by other authors as *Diastopora ramosissima*, D'Orb.

10. ENTALOPHORA RICHMONDIENSIS, Vine, var. *pustulopora*.

It may be well to note the peculiar characters of colonial growth in this series, and to distinguish the forms by a varietal name. I regard these as the early stages of *E. richmondiensis*; but the habit somewhat approaches that of *Pustulopora clavata*, Busk (Crag Pol. p. 107, pl. xvii. fig. 1).

Richmond series, Prof. Judd, slides 9 a, b, c. Early and advanced stages of growth.

Fig. 4.—*Terebellaria* (?) *increscens*, Vine.



- a. Branch of *Entalophora* incrustated with *Terebellaria*? *increscens* in two patches; Bradford-Clay specimen.
- b. Portion of colony at x enlarged.
- c. Portion of colony with oecium enlarged. From Cornbrash specimen.

11. TERESELLARIA (?) INCRESSENS, Vine. Fig. 4.

T. ramosissima, Vine, Brit. Assoc. Rep. on Foss. Polyzoa, 1882, p. 254.

? *Diastopora ramosissima*, Haime (pars), Juras. Bry. pl. ix. figs. 3a, b.

Zoarium a thin ribbon-like layer of cells growing upon foreign bodies, or coiling itself upon its own previously formed zoaria, ultimately assuming a spiral, ramose, dendroid, or massive form. *Zoecia* slightly elongated (or distended), sometimes disposed in spiral lines, but rather more distended at the distal than at the proximal part of the cell; orifice circular, occasionally semicircular; peristome thick; front of cell finely punctured. *Oecium* an enlarged globose cell, having beneath the orifice a semicircular cluster of punctures definitely arranged.

The above diagnosis, with but very slight alterations, was drawn up from a series of forms from different horizons: Bradford Clay, Forest Marble, and Cornbrash. There are some features, such as the oecia, that I have not found as yet in the Richmond forms, otherwise the rest of the diagnosis has been checked off as descriptive of specimens in the present series. It appears to me that it would be advantageous to science if the name *Terebellaria* were suppressed, but, seeing that the whole of the typical features have been found growing upon what passes for *Terebellaria* of authors, especially from the horizons given, I have thought that it would answer my purpose if I just placed a [?] between brackets after the generic name.

Richmond series, Prof. Judd, slides 10 a, b. C. Moore's series: one poor specimen.

Range of this peculiar cell-structure: Inferior Oolite, Mr. Longe's

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collection; Bradford Clay, Forest Marble, Cornbrash. My own cabinet.

This species is an incrusting one, and as such it has no special form otherwise than that given to it by the shape of branches &c. upon which it grows.

12. LICHENOPORA PHILLIPSII (?), Haime, op. cit. pl. x. fig. 10.

One fragment only, which I place doubtfully in this genus, and as but one form of it is known in the Great Oolite, as a representative of this species. It may, however, belong to the genus which Haime retains as *Apseudesia*, Lamx.

Richmond series, Prof. Judd, slide 11.

13. HETEROPORA CONIFERA, Lamouroux.

H. conifera, Lamx., Haime, op. cit. pl. xi. fig. 1 a-c.

It is useless to give the variety of synonyms of this species as given by Prof. Brauns. It will be necessary to have sections of the forms before any details of structure are supplied. The student of this peculiar species will find ample references to typical structures on reference to Prof. Nicholson's palæontological works; but no definite conclusion respecting its classificatory position has as yet been arrived at.

Richmond series, Prof. Judd, slide 12 a, b, c. C. Moore's collection.

Horizon and locality. Haime gives Inferior and Great Oolite.