NOTES ON SOME NEW OR BUT LITTLE KNOWN EOCENE POLYZOA FROM
LOCALITIES. BY GEORGE ROBERT VINE.

Some time after my first paper "Notes on British Eocene Polyzoa,"* had been placed in the hands of the printer, I received from Mr. Alfred Bell another small packet of Eocene material for description. And quite recently (Feb., 1891), a few additions have been made by the same gentleman to the original stock, differing but little, however, from the first batch; so I think I shall now be able to describe, or incidentally refer to, all the Polyzoa known to me, from the several British Eocene horizons. The Polyzoan fauna that will be referred to further on, is altogether unlike the species already described, and so far as I am aware most of the forms are new to British rocks, some of the species at least being more closely allied to the Cretaceous Polyzoa of France, as described and illustrated by d'Orbigny, than to ordinary Tertiary forms, British or Continental. The locality whence most of the forms are derived, Fareham, Hants, is also new to me, consequently I asked Mr. Bell to draw up for the introductory part of this paper a brief synopsis of "Hants and its Fauna," which I give below in his own words:—

‘In widening the railway near this place (Fareham) a short time back, a deposit, containing a peculiar assemblage of mollusca, was opened up, including a large number of Brachiopods, *Terebratula bisinuata*, Lam., which at the time of publication of Dr. Davidson's Monograph of Fossil Brachiopoda, 1852, only two examples were known, collected from the Bracklesham beds and the Hampshire cliffs. I have since obtained other fragments from the Bracklesham sands.

The Fareham Brachiopods are very local, nearly all double, much crushed and distorted, and appear to have been destroyed by a sudden influx of mud or other matter. Polyzoa not being, so far as I can ascertain, associated with them as they are with some of the other shells.

* Proc. Yorksh. Geol. and Polyt. Soc., vol. xi., pp. 154-169.

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The general *facies* of the fauna is not that of the ordinary London Clay, and it was not till I had seen the fine blocks in the Woodwardian Museum, Cambridge, obtained by Mr. H. Keeping, that I could understand the relegation of this deposit to the horizon assigned to them. I believe, however, that we have here a passage bed between the London Clay and the Bracklesham series.

The Polyzoa occur chiefly on *Turritella sulcifera*, *Fusus* (*Strep-sidura*) *pyrus*, var. *bulbus* and *Voluta athleta*.

Usually the adherent Polyzoa in the Eocene beds generally are rather confined to the number of species to which they attach themselves; *Membranipora Lacroixii* seems to be an exception, as I have seen this species attached to *Cerithium*, *Cominella desertum*, *Fusus trilineata*, . . . *Murex minax*, and several *Voluta* species and other shells. *Biflustra eocena* is chiefly attached to stones."

The following species and varieties from the British Eocene rocks are all that are known up to date.

Sub-order, CYCLOSTOMATA, Busk.

1. *Crisia* sp. (*eburnea*?) London Clay.
2. *Idmonea coronopus* Def. London Clay and Bracklesham.
3. „ *gracillima*? Reuss. London Clay, Sheppy.
4. *Hornera* (*minuta*) Vine.
5. „ *flabelliformis*, Blainv.
6. „ *ramosa*, d'Orbigny. Fareham, Hants.
7. *Lichenopora mediterranea*? Blainv. „ „
8. *Ditaxia variabilis*, d'Orb. „ „

Sub-order, CHEILOSTOMATA, Busk.

9. *Dittosaria Wetherelli*, Busk. London Clay.
10. *Membranipora reticulum*, Linn. „ „ Fareham.
 „ = *M. Lacroixii*, Savg. (of authors.)
 „ ? *crassa*, Desm. Thanet sands.
 „ *holostoma*, Busk.
11. „ var. *perforata*, Vine. London Clay, Fareham
12. *Biflustra eocena*, Busk. Bracklesham.

MEMBRANIPORELLA NITIDA, Johnston.

13. „ var. *eocena*, Vine. London Clay, Sheppy.

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MICROPORELLA VIOLACEA, Johnston.

14. var. (*a*) fissa, Hincks (and Waters), London Clay and Fareham.

15. var (*b*).

PORELLA CONCINNA, Busk.

16. var. eocena, Vine, London Clay, Fareham.

17. Eschara? Brongniarte, M. Ed., Bracklesham.

18. Cellepora petiolus, Lonsd., Bracklesham and Barton beds.

19. „ sp. (pumicosa?) „ „

20. Lunulites urceolata, Lamk. „ „

- *21. [*Diachoris intermedia*, Waters] Bournemouth beds.

§ CYCLOSTOMATA, Busk.

This Sub-order is very poorly represented in British Eocene rocks, and in the Fareham Beds only three definable species have been brought to light, or at least to my knowledge, up to date:

1. *Hornera ramosa*, d'Orbigny.

2. *Lichenopora* sp. (Mediterranea? Blainv.)

3. *Ditaxia variabilis*, d'Orb.

1. *HORNERA RAMOSA*, d'Orb., sp.

1850-52. *Reteporidae ramosa*, d'Orb., Terr. Cret. v., p. 937, pl. 608, fig. 6-10, pl. 773, fig. 1-3.

1890. *Hornera ramosa*, d'Orb., (Pergens), Rev. des Bryoz. du Crétacé, Bull. de la Soc. Belge de Geol. Tome iii. p. 353.

Zoarium composed of free growing branches, circular or slightly flattened, but not, so far as I am aware, anastomosing. The diameter

*[NOTE.—In my former list of Eocene Polyzoa (Proc. Yorksh. Geol. Soc., vol. xi., p. 158), I recorded “*Diachoris intermedia*, Hincks.” In justice to Mr. A. W. Waters I append the following remarks, extracted from a letter to me, by way of explanation: “I notice that you give my *D. intermedia* as the same as Hincks, which is not the case. I first noticed the cast of *Diachoris* from the Bournemouth Beds, but from a cast in clay it is impossible to make a good species. I said something to the effect that if further specimens should be discovered, and better ones show that it is new, it might be called *D. intermedia*. You will find my remarks as a note to Starke Gardiner's paper on the Bournemouth Beds in the Quart. Jour. of the Geol. Soc.” With this explanation it will be far wiser to retain the name in the list, in the hope that something better may be brought to light.]

of the branches are variable, measuring from 1 to 2 mm. in the older parts of the zoarium. *Zoecia* disposed in transverse groups (*Idmonea* like) on the sides of the branches, generally from three to four in a row, the rows separated from each other by cancellated interspaces, about $\frac{1}{4}$ mm. apart. In the older parts of the branches, besides the lateral disposition of the zoecia there are from two to three rows of cells longitudinally arranged, which decrease in number in the smaller portions of the branches which ultimately fade away in the still younger parts. This feature is faintly shown in d'Orb., fig. (pl. 608, f. 7). The orifices of the zoecia are circular (0.08 m.m.) peristomes prominent. The rest of the surfaces of the branches, face, sides, and reverse, are occupied by intervening cavities (*cavités intersquelettiques*, Pergins, (op. cit., p. 311) similar to the cribriform features in ordinary *Hornera* species, fossil or recent.

Horizon : Senonian, France ; Middle Eocene, Hants.

Localities : France, d'Orb., "à Royan, à Bougniaux-Charente Inferieure ; à Meudon, pres de Paris ; à Sainte-Colombe-Manche." — England ; Fareham, Hants.

I do not think that there can be any doubt about the identity of this peculiar species, and its well established presence in British Eocene rocks. It is undoubtedly the most abundant polyzoon in the Fareham deposit. My first examples were embedded in masses of the dark Clay which I was allowed to soak, and pick out the fragments from the softened material, but I was unable to find other species of Polyzoa associated in the debris. In the debris, however, I was able to pick out several examples of Foraminifera, *Alveolina*, sp. (unique), and *Nummulites* similar to species found in the Isle of Wight ; *Miliolinæ*, and other species similar to, but finer than the Rotaline species found in the London Clay of Sheppy. My later examples were both free, and embedded in much harder debris commingling with water-worn blackish pebbles. From the peculiar appearance of these conglomerate masses we may conjecture that in all probability some sudden inrushing of muddy gravel, broken shells and other material enveloped, and consequently destroyed the habitat of this beautiful species which was, apparently, a remnant of the old Cretaceous Polyzoan fauna. I doubt, however, whether the full grown

Zoarium was "cupuliforme" (T. C., p. 937, pl. 608, fig. 6, d'Orb), or similar, in any other sense than that already described, to d'Orbigny's beautiful species. There is no evidence, judging from the preservation of the fragments in my possession, that this polyzoon had ever been subjected to the wearing action of water for any length of time. The destruction of the peculiar habitat seems to have been sudden and complete, although in other places (*vide* remarks by Mr. Bell, ante) the destruction of the then living Brachiopods, though brought about similarly, may have been more marked than the destruction of the Polyzoan fauna. Such catastrophies are quite common in our British rocks, both Palæozoic and Mesozoic.

2. *LICHENOPORA* SP. (MEDITERRANEA? Blainv.)

It is impossible, both on account of its peculiar habitat and poor preservation, to completely identify this species of *Lichenopora*. The zoarium is wholly adnate, irregular in outline, without marginal lamina, but hollowed in the centre. Its measurement is quite 3 mms. in one direction and $2\frac{1}{2}$ mm. in another. The zoecial rays are partly uni, and partly multiserial in their arrangement, but on the outer edges of the zoarium the orifices of the zoecia and the openings of the cancelli appear to be about equal in size, so that it is almost impossible to distinguish the one from the other. As this is the only true *Lichenopora* from British Eocene rocks that I have been able to examine, or in other words, the only species known to me, it would not do to pass it over, in spite of the difficulty of identifying it. On the fossil it is associated with a small colony of *Membranipora holostoma*, Busk (var. *perforata* n.v.), a few of the zoecia of which obliterates, to some extent, the face of the *Lichenopora*.

Horizon and Habitat: Upper Eocene, Barton Clay; On *Voluta athleta*.

The only species known to me with which I can compare this Eocene form is the *L.* (*Discoporella*) *mediterranea*, Busk (Cat. Polyzoa. Brit. Mus. III., p. 33, pl. 34, fig. 4), which the author identifies as follows:—

1844. *Lichenopora mediterranea*, Blainville Man. d'Actinol, p. 407.

1847. *Actinopora mediterranea* d'Orb., Prod. iii., p. 188.

1852. *Unicavea mediterranea*, *id. ib.*, p. 971.

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Hab. : Mediterranean on shell (H.M.S. 'Porcupine,' Blainville, Michelin, d'Orbigny) Fossil; Miocene : Astezan, Asti, Vaucluse.

In his Bruccoli paper* Mr. A. W. Waters says, respecting *Discoporella mediterranea* (p. 18), "In the material collected by Dr. Fuchs from Bruccoli, there are a few fragments adnate and one stipate, and it would seem that the mode of growth should not be used as a generic character. This view would lead to the addition of *Defrancia* to *Discoporella*, and as this is a very variable species it seems possible that *Defrancia lucernaria*, Sars (see Busk Op. cit. Brit. M. C., pt. iii, p. 36, pl. 33, fig. 3), is only a variety. The cells of the rays are in some much raised, in others the rays are less distinct." A similar opinion is expressed by Mr. Waters in his remarks on the same species as found at Naples (Ann. Mag. Nat. Hist. (5 iii.), 1879, p. 277). Besides these references Dr. Pergens, in his papers on the (Pliocene Bryozoen von Rhodos, p. 11., 1887, Bryozoa Nord-ouest Medt., p. 11, Bull. Soc. Roy. Malcol de Belg., 1889), partially describes this peculiar species, and Seguenza (Form. Terz. Reggio, pp. 330-372), refers to it twice.† Under present circumstances then, although I believe that the species may be placed here, it may be best to bracket the specific name, but I advise that a careful search should be made when comparing Barton Clay fossils for better examples than the one that has been so feebly described above.

British Horizon : Eocene, Barton Clay.

1851. GENUS DITAXIA, Hagenow.

The genus *Ditaxia* was founded by Hagenow for the reception of the following peculiar species previously described by Goldfuss.

Ceripora anomalopora, Goldf, "Petrifacta," p. 33, pl. 10, fig. 5.

„ compressa, „ „ p. 37, pl. 11, fig. 4.

Only the first of these is taken by Dr. Ed. Pergens‡ and accepted as the type of *Ditaxia*; the second is a *Mesenteripora*. The zoaria are in double layers simple and creeping, double and free, bearing on

* Bryozoa (Polyzoa) from the Pliocene of Bruccoli (Sicily). Proc. Manchester Geol. Soc., 1878-9.

† See Miss E. C. Jelly's "Synon. Cat. of Marine Bryoz.", p. 136, No. 884.

‡ Rev. des Bryoz. du Cret., p. 337.

the surface both the orifices of the true zoecia and the accessory cells ("cavities intersquelettiques"). Dr. Pergens in the grouping of the Cretaceous Polyzoa places this genus in the family *Diastoporidæ*, and he remarks (Op. cit., p. 328) that "Ditaxia comprises those species with 'cavities intersquelettiques' strongly developed. This difference between *Ditaxia* and *Diastopora* is however of little value, and perhaps some day anatomical researches will compel us to unite these genera into one." I cannot agree with this opinion in the present case, for after a careful study of the type species of Hagenow, *Ditaxia anomalopora*, there seems to me to be no relationship whatever between it and *Diastopora* as generally understood. I have no objection to the grouping of the following species however under the genus *Ditaxia*, as adopted by Dr. Pergens in his revision of d'Orbigny's labours (Op. cit., p. 337).

1. *Ditaxia anomalopora*, Goldf., d'Orb., Terr. Cret., p. 953.
2. ,, *variabilis*, d'Orb. (= *Semimulticlausa* id.) l.c., p. 900.
3. ,, *papularia*, Mich. (= *Reptomulticlausa* id., d'Orb.) l.c., p. 901.
4. ,, *nodosa*, d'Orb. (= *Seminodierescis* id.) l.c., p. 1067.
5. ,, *tubulosa*, d'Orb. (= *Semicrescis* id.) l.c., p. 1073.
6. ,, *ramosa*, d'Orb. (= *Semimulticrescis* id.) l.c., 1078.

3. *DITAXIA VARIABILIS*, d'Orb.

1850-52. *Semimulticlausa variabilis*, d'Orb., Terr. Cret., vol. v., p. 900, pl. 767, figs. 5-10.

1890. *Ditaxia variabilis*, Perg. Revis. des Bryoz. du Cret., p. 337.

This species is represented by several examples which closely resemble d'Orbigny's figure, but as such a variety of forms are associated under the generic term *Ditaxia* by Dr. Pergens, I forbear making any remarks on the genus *Ditaxia* at present. Certainly *Semimulticrescis ramosa*, d'Orb. (pl. 800, figs. 15-17) in some of its features resembles the above, but the Eocene forms, when magnified, are more akin to *D. variabilis* than to *D. ramosa*.

Horizons and Localities : London Clay, Fareham ; Cretaceous, 22nd stage, Villedien, Lavardin (Loir-et-Cher) ; Tours (Indre-et-Loire) d'Orb.

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§ CHEILOSTOMATA, Busk.

- Membranipora Lacroixii*, (Busk., Geol. Mag., v. iii., p. 866, p. 2).
 1826. *Flustra Lacroixii*, Savigny l'Egypt (Audouin), pl. 10, fig. 9.
 1850. *Membranipora Lacroixii*, Busk, Cat. Pol. Brit. Mar., p. 60, fig. 1.
 1880. „ „ Hincks, Brit. Mar. Pol., p. 129, pl. 17, 5-8.
 1886. „ „ *reticulum*, Pergens, Plioc. Bry., von Rhodos, p. 15.
 1889. „ „ E. C. Jelly, Synon. Cat. Recent Bryozoa, species 1047, pp. 162-164.

Miss E. C. Jelly's valuable "Synonymic Catalogue of Recent Marine Bryozoa" has been published since I wrote my paper on "British Eocene Polyzoa,"* which was recently printed in this Journal. On referring to the synonymy of *M. Lacroixii*, Aud., I find that this name will, in all probability, have to give way to that of *Membranipora* (*Millepora*) *reticulum*, Linn. In Miss Jelly's "Catalogue," no fewer than 60 references under the head of "*Membranipora reticulum*, Linn.; Pergens" are given by her, so that ample opportunity is offered to those students who wish to debate the question as to who was the author of the species which I have called *Membranipora Lacroixii*, Aud. As the present material, however, really merits a most careful examination I shall make no apology for the length or characteristic minuteness of my descriptive sketches.

1. MEMBRANIPORA RETICULUM, Linn. (Pergens), E. C. Jelly, species No. 1047.

Membranipora Lacroixii, Hincks, Brit. Mar. Polyz., pp. 129-131.

„ „ Vine, Proc. Yorksh. Geol. Soc., vol. xi., pt. ii., p. 159.

Zoecia, oval, or slightly elongated at the proximal extremity, area occupying the whole front of the cell; margin rounded "granulated," rising so as to form a prominent ridge; occasionally in the more sheltered portions of the colony a few cells are preserved with

* Vine, Notes on British Eocene Polyzoa, Proc. Yorksh. Geol. and Polyt. Soc. vol. xi., pt. ii., p. 159.

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the lamina, slightly calcified, intact, with a semicircular aperture at the top, triangular hollows immediately above the aperture. Communication pores : in rare cases three, especially in the Colwell Bay example ; in the Fareham examples, two, placed in the side walls at the distal and proximal extremities of the cell.

Horizon : Oyster Beds, Colwell Bay, on oyster shells, (Prof. Judd), Bracklesham Bay ; London Clay, Highgate (Busk) ; Walton-on-Thames (C. D. Sherborn) ; Fareham, on *Turritella*, *Voluta athleta*, Soland., and *Strepsidura pyrus*, var. *bulbus* ; Portsmouth, *Natica hautoniensis*.

In all probability the present forms, when in their natural state, were furnished with delicate spines on the walls of the cell, of which the remaining beaded, or granulated, surface may be indicative. The species, however, must not be confounded with *Bifustra Lacroixii*, Smith, which Hincks gives as a synonym of *M. Lacroixii*, and Busk (Challenger Rep., p. 63) as probably synonymous with *Membranipora crassimarginata*, Hincks, variety *B. incrustans*, Busk (Chal. Rep. p. 63, pl. 15, fig. 5.)

2. MEMBRANIPORA HOLOSTOMA, Busk (Crag. Pol., p. 36, pl. 3, fig. 3)

var. PERFORATA, var. new.

Zoarium encrusting ; irregular. *Zoecia* oval, and occasionally pyriform ; front of cell slightly arched ; margins much raised and forming a line of separation between the margins of contiguous cells ; surface of lamina coarsely perforated ; orifice semi-orbicular ; peristome not prominent ; a circular pore much larger than the perforations on each side just below the orifice. *Avicularia* (?)

Locality, &c. : on *Voluta athleta*, Sol. ; Barton Clay, adherent to *Lichenopora Mediterranea*, Blainville, which has already been described.

Membranipora holostoma is described by Busk from a fragment found on the inside of a small *Pectunculus glycimeris*, and the species seem to be somewhat rare in the Crag. Dr. Manzoni (Castrocaro, p. 14, pl. 1, fig. 12) describes and illustrates a fragment which he says is rare, but more like the Eocene form than that of the Crag. Reuss (Miocene d'Austria et Ungheria), also catalogues a species which he identifies with *M. holostoma*, Busk.

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The present variety, however, differs from the whole of the examples referred to in having the lamina perforated, but in the only fragment known to me I have not seen any avicularia.

3. MICROPORELLA VIOLACEA Johnston, var. (*a*) FISSA, Waters.
 ,, fissa, Hincks. Contrib. Gen. Hist. Marine Poly., Ann.
 Mag. Nat. Hist., ser. v., vol. iv., p. 381.
 ,, violacea, var. fissa, Waters. Quart. Journ. Geol. Soc.,
 vol. xxxvii., p. 329, pl. 15, fig. 26 ; pl. 17, fig. 73.
 ,, violacea, var. fissa, Vine. Proc. Yorksh. Geol. and
 Polyt. Soc., vol. xi., p. 162.

The examples of this species are similar to those already described in my first paper.

Horizon : Bracklesham Beds ; London Clay, Fareham, Hampshire.

4. PORELLA CONCINNA? Busk. Hincks Brit. Marine Poly., vol. i.,
 p. 323, pl. 46.
 var. EOCENA ; var. new.

Zoarium encrusting, in irregular patches, the whole of a *Turritella sulcifera*. *Zoæcia* ovate, convex and punctured round the margins, but this feature is often obscured by an incrustation of pyrites. *Oæcia* globose and prominent.

Horizon : London Clay, Fareham.

The range of variation in recent *P. concinna* is so great that one naturally hesitates to increase the difficulties of the Palæontologist by suggesting new varietal terms. The Eocene form differs from all the figures given by Hincks (Brit. Marine Polyzoa, vol. ii., pl. 46). In a modified sense it comes nearest to fig. 11 of the same plate, excepting that the general character of the cell is rather less elongate or more like the bottom cell in the left-hand corner of the figure, and the small avicularian cell is only seen in the better preserved cells. I should like to leave the Eocene form here provisionally, trusting that better examples, less pyritised, may turn up in the future.