

53. *Notes on some CRETACEOUS LICHENOPORIDÆ.* By G. R. VINE, Esq.
(Communicated by Prof. P. MARTIN DUNCAN, F.R.S., F.G.S.)
(Read June 25, 1884.)

IN his classification of British Marine Polyzoa (1880, vol i. p. 471) Mr. Hincks established the family Lichenoporidæ for the inclusion of a very peculiar group of recent Polyzoa. In this family two genera are admitted and defined, *Lichenopora*, DeFrance, and *Domopora*, d'Orbigny. In the synonymy appended to these genera no fewer than twenty-one obsolete names are given, and others could have been added to the catalogue. In his remarks on the genus *Lichenopora* (*op. cit.* p. 472) Mr. Hincks observes:—"D'Orbigny has constructed a large number of genera, which are merely arbitrary groups based on very trivial modifications of this well-marked type." One of the suppressed genera of the Lichenoporidæ is *Radiopora*, d'Orb.; and as species belonging to the genus are occasionally met with in our own Neocomian rocks, I have thought it better to direct attention to one species at least, before describing a form altogether new.

The genus *Radiopora* is accepted and described by Mr. Busk, in his British-Museum Catalogue of Marine Polyzoa (Pt. iii. Cyclostomata, p. 34), as follows:—

“Family DISCOPORELLIDÆ, Busk.

(3) RADIOPORA, d'Orb.

D'Orb., 1874, Pal. Franç. p. 992.

“Zoarium adnate, crustaceous, spreading irregularly, and composed of confluent disks like those of *Discoporella*: surface reticulate or cancellous; cells disposed in serial lines radiating from the centres of the constituent disks.” Brit. Mus. Cat. pt. iii. p. 34.

In the British Marine Polyzoa (p. 473), Mr. Hincks begins his description of the species of *Lichenopora* thus:—"1. Colony simple; or composed of many confluent disks. (*Radiopora*, d'Orbigny.)"

The type species of *Lichenopora* is *L. hispida*, Flem., and one of the varieties of this well-known form is given by Mr. Hincks (p. 473) as "Var. *a* (*meandrina*, Peach)." This is a composite variety with a well-marked character; and if we accept the type and the variety as *Lichenopora*, why then I can see no justifiable reason for keeping the two genera for recent and fossil species, when both may be included in one. As, however, there are peculiarities of structure in the Neocomian fossil, altogether unlike the structure of recent *Discoporella*, it will be best to redescribe the Cretaceous form. I cannot say whether we are right in assigning to d'Orbigny the following species; but as the fossil came into my possession as named below, and as I have used the name in my British-Association Report on Fossil Polyzoa, iv. 1883, I will let it stand for the present.

RADIOPORA PUSTULOSA, d'Orb.

= *R. pustulosa*, Vine, B. A. Rep. 1883, =? *R. bulbosa*, d'Orb. Pal.
Frang. Terr. Cret. Tome v. p. 996.

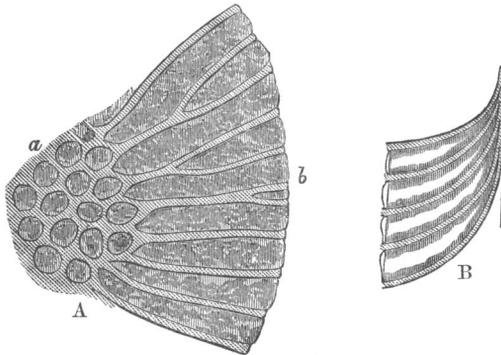
1. *Superficial Zoaria*.—If we examine any ordinary specimen of *R. pustulosa*, which I believe is rather common in the Lower Greensand of Faringdon, we shall find that the exposed surface is composed of a series of undulating or mamilliform prominences which are very characteristic. A mere superficial examination of these mamillæ will show that they are slightly rayed, and that the interspace between one mamilla and another is filled in by an apparently loose cancellous texture. If the apices of these prominences are slightly rubbed down and then examined under a low power of the microscope, the rayed character of the series of cells is distinctly visible. A better process, however, is to break from the fossil small fragments and then prepare and mount them as transparent objects. In these sections the structure of this species may be advantageously studied, and it is from specimens thus prepared that the following observations are made.

2. *Massive Colonial Growth*.—The massive growth of *R. pustulosa* is peculiar. The multiform zoaria are built up of a series of apparently laminated layers, of varying thickness; but on the average four of these layers measure about half a line. There is, however, a longitudinal as well as a superficial section which must be studied if the details of the building-up of massive forms of the fossil Polyzoa are to be mastered. In the longitudinal section of *R. pustulosa* before me there are about thirty of these layers. Towards the base of the fossil the disks, which will be described presently, are few in number, probably three or four; but of the primary disk I cannot speak. This simple layer, which may be conveniently spoken of as the originating layer, is composed of confluent disks, which appear to have had a limited range superficially.

The upward building of colonial growths began at the edges of the originating layer, whence fresh or newer zoaria gradually spread and consolidated over the first-formed as well as over successive layers; but the disks did not always anastomose at the edges, like the disks of var. *α* (*meandrina*, Peach), previously referred to. Many of them remained free, while others were connected, in part, by what appears to be cancellous tissue. This, however, I believe to be a deceptive feature; for in all probability what we suppose to be cancelli are only the broken edges of the tubular extensions of disk and disk. In some sections of the fossil a peculiar overlapping may be seen, and even the beginning of a new disk which will become proliferous on its near neighbour. This "overlapping," too, gives rise to a peculiar structure of the longitudinal section. In the general building up of the zoaria of this species it may be noted that the mamillæ in each succeeding layer are immediately above the mamillæ below, and not covering up interspaces or previously formed zoaria indiscriminately. I cannot tell the why or the wherefore of this;

but the fact being known, the study of a single colony or disk will be less puzzling to future students.

Fig. 1. —Sections of the zoarium of *Radiopora pustulosa*, d'Orb.
Enlarged.



A. Transverse section of the disk ; *a*. Celluliferous centre ; *b*. Tubular cells cut at different angles, sloping upwards towards the margin of the disk.
B. Longitudinal section of some of the marginal cells.

3. *Zoarial Disks*.—It is almost impossible to break off from the fossil a fragment too small to show a single disk at least. Generally speaking two or three may be secured. I have drawn, with the aid of the *camera lucida*, a transverse section of one of these disks (fig. 1, A). In the central part (*a*) there is a kind of cancellous structure, which appears to me to be nothing more than the cut ends of the tubular cells. These are contiguous, many-shaped, but more frequently circular or hexagonal, and the wall of each is distinct.

In the outer region of the disk (*b*) the circle is composed of long, tubular zoecia which radiate from the axis. The zoecia are also contiguous by their walls, but in some places these are separated by slight division ; but I have no evidence of cancellous interspaces, as in some of the *Discoporella*, or even as in *Radiopora simplex*, Busk (Brit. Mus. Cat. pl. xxxiv. fig. 2). Mr. A. W. Waters, however, has identified one of his Bay-of-Naples Polyzoa as *R. pustulosa*, d'Orb. (Ann. & Mag. Nat. Hist. April 1879, p. 277); and as he speaks of "cancelli-tubes which in the lower half are divided across the axis by septa* [tabulæ?], giving this part a somewhat cellular appearance," it seems to me to be pretty evident that our own Lower-Greensand species may be looked upon as distinct from the recent Bay-of-Naples

* Since the above was written, I find that Mr. S. O. Ridley (Ann. & Mag. Nat. Hist. June 1881, p. 452) has drawn special attention to the "septal structures in *Lichenopora*," in his paper on the Polyzoa of Franz-Josef-Land. Assuming that his view may possibly be a correct one (*op. cit.* p. 453), the "septæ," or "tabulæ" of Polyzoan species may ultimately merit special study.

R. pustulosa, d'Orb. ; but whether it is distinct from the Upper-Greensand form * described by d'Orbigny, I cannot say.

In longitudinal section of the layers of *R. pustulosa*, and only in certain places favourable for observation, some of the zoecia are seen to be small horn-like tubes (fig. 1, B), wide at the top and thinning towards the proximal end. The ends of these tubes are attached apparently to a laminar layer, but in no sense identical with that which is generally represented surrounding the zoarium of species of *Discoporella*. The use of the word "laminar" then must be regarded as a convenient term, rather than as a structurally correct one, whenever it may be applied in descriptions of Palæozoic or Mesozoic Polyzoa.

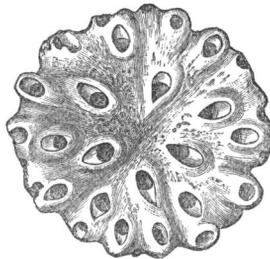
In describing *Lichenopora hispida*, Mr. Hincks says (*op. cit.* p. 474), "The composite form seems to owe its origin to successive buddings from the margin, the cluster of distinct disks thus produced gradually coalescing so as to constitute a massive zoarium with a mamillated surface."

It will be seen from the above remarks, and from the figures supplied, that the structure of the Lower Greensand *R. pustulosa* differs in many ways from that of *Lichenopora hispida*, Flem., *R. pustulosa*, Waters, and the variety of *L. hispida* (var. *a meandrina*, Peach); but the mode of zoarial aggregation seems to be the same in all the fossil and recent forms of the Lichenoporidæ. In the identification of species, however, it is necessary to state whether the forms described as *Lichenopora* are allied to the more ancient, or to the more recent forms.

The species which I am about to describe is unlike any recent *Lichenopora* known to me, and also unlike any described form found in either the Cainozoic or Mesozoic rocks; I am obliged, therefore, to describe it as new.

LICHENOPORA PAUCIPORA, n. sp.

Fig. 2.—*Lichenopora paucipora*, Vine, zoarium from above.
Enlarged 20 diameters.



Zoarium stipitate, with a disk-like capitulum slightly cupped; stipitate column coarsely ribbed, arising from a contracted cellular base, having a diameter of about one sixteenth of an inch, height of

* See Waters, *op. cit.* p. 278.

column about half a line; breadth of capitulum, so far as at present known, varying from three quarters of a line to a line. Basal attachment or early mode of growth unknown. *Zoecia* arranged in serial rays; but the cells rarely exceed two in each ray, depressed in the central portion of the zoarium, slightly exserted towards the margin, orifices oval or circular, peristome thick. *Oecia* unknown. No cancellous centre or interspaces.

Horizon: Neocomian.

Locality unknown.

The specimens of *L. paucipora* which I have here described have been handed over to me by Mr. George Busk, F.L.S. He informs me that they were discovered by Prof. P. Martin Duncan, F.R.S., amongst other fossils from the Greensand of some unknown locality.

It appears to me to be pretty evident, from the peculiarities of the marginal cells in the full-sized capitulum already figured, that the zoarium of this species may yet be found to grow much larger than in the specimens submitted to me for examination. The transverse section of the capitulum, and also the longitudinal section of the column, are unique in character, and in all probability we have here the colonial beginning of some unknown type of Mesozoic Polyzoa, rather than a matured species; nevertheless it will be better to allow the form to bear the name given to it.