

NOTES ON THE CARBONIFEROUS POLYZOA OF WEST YORKSHIRE
AND DERBYSHIRE—(*AN ATTEMPT TO IDENTIFY PHILLIPS' SPECIES*).
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FOR many years past I have made several unavailing attempts to identify, and re-describe, the Carboniferous Polyzoa of our older Palæontologists. I ascribe my failure rather to the scarcity of material than to any want of distinctness on the part of the original describers. There is, as a matter of course, the original specimens—especially of Phillips and McCoy—but these were not available for my work, and I preferred to depend upon later findings, comparing the new with the written details of authors. It is pretty well known, that after the publication of Goldfuss' *Petrifacta Germaniæ*, that this work was the source of much of our information respecting Fossil Zoophyta; and accordingly many of our British examples were furnished with the generic, if not the specific names of Goldfuss. In the *Petrifacta* there are but few species figured or described from Carboniferous rocks. To this cause we owe the original descriptions of Phillips, who, writing only a year or so after the issue of the German work, was able to furnish a rather goodly list of Carboniferous species. In his edition of the *Geology of Yorkshire*, p. 195 (1829 Ed.) Phillips says "Few of the Mountain Limestone districts of England are deficient in remains of Corals, Crinoidea, &c., whether as in Derbyshire and Mendip we contemplate the lower thick mass of Calcareous rock, or as in the North-West of Yorkshire, and in Northumberland examine the thinner portion which alternate with shales, gritstones, &c. Several of the same species are common in the whole range of the formation, and perhaps, if the local catalogues were more complete and more correct, it is probable that a very general conformity would be found to prevail in this respect."

Since the issue of the *Geology of Yorkshire*, a very steady progress has been made in either the discovery of new Carboniferous species of Polyzoa in Great Britain, or in showing the wider range of species identical with those described by Phillips. McCoy in his various works added much to our knowledge of Carboniferous Polyzoa,—and later still Prof. Young, and Mr. John Young, of

Glasgow have added to the number of species previously described, and have furnished many interesting details of heretofore unknown characters in some of the species described by Phillips in his "Palæozoic Fossils." Mr. Robert Etheridge, jun., has likewise done good work in his professional capacity on the Scotch Geological survey.

The present paper is the result of a careful study, for the purpose of identification, of the types of John Phillips, as described and figured in the Geology of Yorkshire, or referred to in the Palæozoic Fossils. I have previously examined some of the North Yorkshire Polyzoa,* and I have shown that many of these have a closer relationship with Scotch, than with Yorkshire types. The remarks which will follow are founded upon a very fine series of Carboniferous Polyzoa from Derbyshire and Yorkshire, collected by Mr. John Aitken, F.G.S., of Manchester. The Derbyshire species have a closer relationship with the Yorkshire, or Phillips' types, but hardly any with the Irish or Scotch examples bearing the same names.

Mr. Phillips in the work already cited (*Geol. of Yorks.*), and later still in the Palæozoic Foss. of Devon, &c., described and figured as Zoophyta, a goodly number of Polyzoa. Some of the species in the latter work are identical with those found in the Carboniferous rocks of Derbyshire, Yorkshire, Wales, and Scotland, in fact, many of the species are widely distributed in the Limestones and Shales generally. At the time when Phillips wrote, very little attention was given to either classification or growth, hence the multiplicity of species if the fragments found differed in the least particular from others that had been previously noted. There was no fixed rule given for the purpose of comparison, sometimes a cast, or the reverse would be described as a new species, and in all probability the obverse of one or other of those would be again given as likewise new. Several of the species figured in the Geology of Yorkshire are in this chaotic condition, and there is a great difficulty in the proper identification of species whenever or wherever new ground is broken. Because of this very plausible demurrer others have added to the confusion, and the fresh findings have been again

* Transactions of the Yorks. Geol. and Polytech. Soc., 1881.

christened, perplexing alike the Palæontologist as well as the ordinary Geological student. Phillips has described nine species of *Retepora* (*Fenestella*), only three of which can be retained as typical, *R. membranacea*, *nodulosa*, and *polyporata*; *R. laxa* must be referred to a different genus. As *Millepora*, Phillips described two species of *Ceripora* in the Geology of Yorkshire, *Millepora rhombifera* and *interporosa*, and in the Palæozoic Fossils two others, *M. gracilis* and *similis*, which are more or less abundant in the Carboniferous formation. Two other species, *M. spicularis* and *M. oculata*, have been referred by Morris (Cat. of Brit. Foss.), to the genus *Pustulopora* Blainville. The *Retepora phuma* of Phillips belongs to at least two types of Polyzoa.

As the whole of the Palæozoic *Fenestellidæ** have received from Mr. G. W. Shrubsole very marked attention, I am saved the necessity of furnishing any elaborate details, especially in respect to the Carboniferous species. Previous to the labours of Mr. Shrubsole there were about twenty-six described *Fenestella*,—these have been reduced to about five typical forms, and the elaborate details given by the author in his two papers, cause my labours on this group to be a comparatively easy one. I shall, therefore, accept without unnecessary discussion, Mr. Shrubsole's work, adopt the specific characters he has given, and also the types restricted or received by him. I do not accept the whole of the synonyms, for the simple reason that I desire to keep before me the labours of Phillips. I do not doubt the accuracy of the synonyms, because I believe, generally speaking, that Mr. Shrubsole is right. There is one advantage to be derived from purely local work over that of the more general labours in the study of our British Palæozoic Polyzoa. In the local work we are compelled to direct particular attention to the types before us, because we find that whenever we recede from any life region there are divergencies, if not in the cell characters, at least in the habits of species which are worthy of much closer study than has yet been given to the subject. In the following pages I have described the specimens before me, and because of this I have not

* A Review of Brit. Carb. *Fenestellidæ*, Quart. Journ. Geol. Soc., May, 1879, further Notes *ibid* May, 1881.

given the larger, and more general descriptions of Mr. Shrubsole which are founded upon a large suit of Carboniferous *Fenestella*, and from very wide localities.

Genus FENESTELLA, Lonsdale.

“*Zoarium*, a calcareous reticulate expansion, either flat, conical, or cup-shaped, formed of slender bifurcating branches (interstices), poriferous on one face, connected by non-poriferous bars (dissepiments), forming an open network. *Zoæcia* immersed in the branches and arranged in two longitudinal rows divided by a central ‘superficial’ keel, on which are often prominences. Orifice of *Zoæcia* small, circular, and prominent when preserved.” (Carb. Fenestellidæ, G. W. S., p. 179 *Quart. Jour. Geol. Soc.*, May, 1881.

1. FENESTELLA PLEBIA. McCoy, *Syn. Carb. Fos., Ireland*, p. 29, Fig. 3.
- = *R. flustriformis*, Phillips, *Geol. Yorkshire*, pl. i., Figs. 11-12.
- = *R. irregularis*, “ ” “ ” “ 21-22.
- = *R. undulata*, “ ” “ ” “ 16-18.

Phillips’ descriptions of these species are brief and unsatisfactory. Of the first, very few particulars are given: *R. irreuglaris* and *R. undulata* are different portions of the same species, and Mr. Shrubsole has done well in selecting the well-described *F. plebia*, McCoy, as the type of this group. In the Derbyshire specimen the Zoarium is a flat expansion, the dissepiments are thin, and the fenestrules are oval, with four or five zoæcia on each side, and only five fenestrules occupy the space of two lines measured transversely, four in the same space in a longitudinal direction. There is nothing in this that would interfere with typical *F. plebia*, other parts of the Zoarium would give different results. I have not the least doubt but that this is the typical *Retepora* and *Millepora flustriformis* of Phillips and Martin. Phillips’ figure is that of a cast, and the same specimens show that the mere casts of the fenestrules would give in a drawing, precisely the same result as in Figs. 11 and 12. On another part of the Zoarium there is a thin crust of *Hemitrypa*, similar to that referred to in my previous paper (*Hurst and Richmond Polyzoa*, p. 335, 1881). The specimens of *F. plebia* from Settle are more in accord with the Welsh and Scotch examples of the type: the “fenestrules are equal, rectangular, from two to three times as long as wide.”

Localities: Derbyshire, Castleton; Yorkshire, Settle. Widely distributed, and ranging from Lower Carboniferous to Permian.

2. FENESTELLA MEMBRANACEA, Phillips' *Geol. Yorks.*, Pl. I., Figs. 1 to 6.
 = *R. flabellata*, Phillips' *Geol. Yorks.*, Pl. I., Fig. 7-10.
 = *R. tenuifila* „ „ „ „ 23-24-25.

I have only poor specimens of the type *R. flabellata*, Phillips; it is a portion of the flat expansion of the upper portion of the Zoarium. The branches are rounded straight and in parallel lines; the dissepiments are fine, fenestrules oblong, slightly wider than the branches, and the average number to two lines, are about eight transversely, and five longitudinally. The Zoæcia are small and the orifice circular, from three to four occupy the length of the fenestrule.

Some very interesting particulars are given by Mr. Shrubsole respecting the development of this species, and in all probability the whole of his synonyms are correct, but I am not able, for want of material, to endorse the whole.

Localities: Derbyshire, Castleton; (Phillips: Bolland, Harrogate, Richmond, Hawes, Whitewell, Middleham).

3. FENESTELLA NODULOSA (?) Phillips. *Geol. Yorks.* pl. I., Figs. 31, 32, 33
 = *F. Frutex* (?) McCoy (*Syn. Carb. Foss. Ireland*, pl. XVIII., Fig. 10).

I have a fine specimen of *Fenestella* and it appears to me to be referable to *F. nodulosa*; and yet it might have very well served as the type of *F. hemispherica* McCoy. It is hemispherical and cup shaped, otherwise it is characteristically *F. nodulosa*. The Zoarium begins as a small base, enlarging and expanding by growth till at the distal part it is nearly two inches in breadth. The zoæcia open in the inside of the cup. In this respect it closely resembles the flabelliform growth of *F. frutex* McCoy, a name which Mr. Shrubsole gives as a Syn. of *F. nodulosa*. Although I have marked the species with a note of interrogation I have but little hesitancy in accepting the character as given in the paper on Carboniferous Fenestellida, p. 183. In comparing, however, this with a Scotch specimen of *F. nodulosa* I cannot help remarking on the difference in the habit of the two types. The Derbyshire specimen is a deep water, and the Scotch a comparatively shallow water form, and in the first, the root, branches, and cells are strong and robust, whereof

in the latter the whole framework is delicate or slender. Phillips' description appears to have been given from a flattened specimen. *Zoarium*, "Radiating dissepiments thin, fenestrules arcuato quadrate, pores usually one at the middle undulating the margin, and one at each dissepiment," the following refers to the remains of the spiny processes along the keel, "Smaller pores in the interstices."

Since this was written I have received from Mr. Aitken another fragment of *F. nodulosa* that might have served as the type of Fig. 31, pl. I., (*Geol. of Yorks.*) It is far more delicate and characteristic of the species than the above. With this specimen before me I am obliged to say that very few descriptions could be clearer than that given by Phillips, as already quoted, but I have no desire to remove the (?) from the above description.

Localities: (Phillips: Whitewell, Greenhow Hill, Harrogate).
Castleton, Derbyshire; Settle, Yorkshire.

4. *FENESTELLA POLYPORATA* Phillips, *Geol. Yorks.* pl. I., Fig. 19, 20. *F. multiporata*, McCoy, *Syn. Carb. Foss. Ireland*, pl. XXVIII, Flg. 9.

I have before me several specimens of this species, the largest of the British Fenestellidæ as regards the size of the fenestrules. Mr. Shrubsole who has had the advantage of comparing the type specimens of McCoy, or at least specimens from the same locality says—"It is subject to considerable variation." Prof. McCoy in his arrangement of the *Fenestella* assigned the smaller type to Phillips' *F. polyporata*, and the type with the larger development and greater number of pores he described as *F. multiporata*, but as both conform so well to the type in other respects, there is no reason for the division (Op. cit. p. 186.)

Zoarium foliaceous branches large and rounded, fenestrules large and elongated, four in the space of a line measured transversely, and two in the same space if measured longitudinally, keel rounded and well developed. *Zoecia* from five to nine in the length of the fenestrule, openings small, occasionally prominent. Dissepiments, thin and placed at irregular distances.

Localities: The only locality given by Phillips is Florence Court. Castleton, Derbyshire; Poolvash, Isle of Man; (Small fragments) Settle, Yorkshire. These are the only species of *Fenestella*

that I have any record of in West Yorkshire or Derbyshire.

With regard to *Fenestella fluviiformis* as described by Martin, I have thought that the following quotation from the *Petrefacta Derbiensca*, Vol. I., Pl. 43–45, Figs. 1 and 2, and Fig. 3, may be valuable. It is the only Polyzoa figured or described in the work.

“ERISMATHOLITHUS MILLEPORITES? (*fluviiformis*).

Plano-foliaceous, reticulatis, poris minutis, sub-obsolete sparsis.

Fossil coral, originally a *Millepora*? Plano-foliaceous or flat, and thinly expanded like a leaf; its form or outline is uncertain. (Note.—All the specimens I have yet collected appear to be only fragments or portions of the original). Its fabric open and reticulated, somewhat resembling the coralline distinguished by the title of *fluviæ*. The surface of the fibres forming the reticulation, roughened with minute, indistinct scattered pores; not, however, visible without the assistance of a magnifier. Common in Limestone, Middleton.”

I am unable to identify Martin's species in the Limestone of Middleton from either the description or figures. Fragments of *F. plebia*. and *F. nodulosa* are common, and I see no reason to prevent me referring Martin's type to *F. plebia* McCoy.

Genus PTYLOPORA, McCoy.

Zoarium, a feather-like arrangement, having a central stem, which gives off lateral branches, which are connected by dissepiments; the branches very rarely bifurcate.

5. PTYLOPORA PHILLIPSIA. sp. nov.

Zoarium multiform.—Central stem bearing two rows of cells like the *Glaucanome* species. Lateral branches striking off at acute angles from the main stem, are united by dissepiments, ultimately forming a cone-like zoarium. Zoæcia on the central stem, one between each of the branches, on the branches from two to three on each side of the fenestrule. Dissepiments strong, slightly dilated at the points of junction with the branches.

Locality: Castleton, Derbyshire. Rather abundant.

The peculiar habit of this species is so unique that I feel certain that it is not the *Ptylopora pluma* of McCoy. I have some doubts as to whether fragments of the cone-like zoarium have not been

previously referred to *P. membranacea* as some resemblance exists between the two species if the central stem is absent in the fragment: otherwise there are few features in common between *Fenestella* and *Ptylopora*. The fragment named *Retepora pluma* by Phillips, must not be confounded with *Ptylopora pluma* McCoy. I have a specimen of the latter species from Malahide, and the species is very well figured in *Nicholson's Manual of Palæontology*, Vol. I., p. 423. Sometimes the fossil here described is present in the Limestone as casts only, it is then seen that the place in the zoarium which the central stem occupied is a long and central furrow, and the surrounding cast has some resemblance to a minute auger, and when seen for the first time, is likely to be a complete puzzle to the palæontologist. As the genus is a rare one, these minute particulars may be the means of drawing the attention of the student to special features, such as the apex and the base, which are not so well known.

6. *PTYLOPORA PLUMA?* McCoy. (Compare with Figs. 263, p. 422, *Manual of Palæontology*, *Nich.* vol I., with Fig. 9, p. 14, *Page's Introductory Text Book of Geology*).

I am not certain that this is really the *P. pluma* of McCoy, as the only portions of the Zoarium that I have are the central stem with some of the lateral branches. Accepting Nicholson's fig. as above I will now describe the fragments. Central stem (Glauconome like), the origin of the stem appears as a root-like prolongation divided into narrow prongs altogether unlike the stem in its after development; higher up rootlets appear on the sides, and higher still the normal character with lateral oblique fenestrations as in ordinary *Ptylopora*. Normal stem with a broad central rounded keel bearing in the sides a row of cells, alternately placed on either side of the keel—keel spinulose along the centre. Branches united by dissepiments which are rather broad in the junction; apparently destitute of keel. Fenestrules rather broad, slightly oval bearing on either side three cells,—openings circular. General shape and size of Zoarium unknown.

Locality.—Castleton, Derbyshire.

There is a marked difference between this and *P. Phillipsia*.

1st.—The root-like base of the present species is, so far as I can see, unique. 2nd.—The strong rounded central keel with its spiniferous row is also different, in *P. Phillipsi* there is no prominent keel, the two rows of cells are in one plane, and whenever these are exposed, the bases of the cells are contiguous as in *Glaucanome* species. I have purposely kept the two distinct, but the possession of better material may cause me to alter my opinion in the future. Under present circumstances it is impossible to do so.

Genus POLYPORA, McCoy.

7. POLYPORA LAXA, Phill., *Geol. York.*, Vol. I., pl. I., figs. 26-30. (*Retepora laxa*, pars.)

= *Fenestella laxa*, Phill. *Palæoz.*, Foss. of Devon, Cornwall, &c.

= *Polypora laxa*, Morris, *Cat. Brit. Foss.*

“An irregular open network, interstices round, bearing on the reverse, oval spaces in quincunx, and interjacent lines of very minute pores. It resembles *Gorgonia ripisteria* Goldfuss.” Such is Phillips’ original description of *Retepora laxa* of Whitewell; but the description is far more applicable to the Derbyshire, than to the Yorkshire specimen. In the Palæozoic fossils of Devon, &c., Phillips referred a similar fossil to his Yorkshire species. In his *Geology of Yorkshire*, Phillips seems to have given figures of two different species, but I cannot make out distinctly what they are. I cannot believe that Phillips was entirely ignorant of the Derbyshire specimens, for his larger figures closely resembles that which is before me. I shall therefore describe the Derbyshire species as the nearest to the original of Phillips.

Zoarium, an open network with a very irregular habit. Root like base thick and prominent. *Branches*, round, rather more robust in its early, than in its later stages; bearing three rows of cells on the face, reverse striated. *Fenestrules*, large and irregular, from two to three, in two lines, measured transversely, dissepiments thin.

Localities: Survived from Devonian, Phillips; Carboniferous, Whitewell; Kildare, Ireland; Derbyshire, Castleton; Settle, Yorkshire; Richmond, Yorkshire.

8. POLYPORA TUBERCULATA?

In the general aspect, specimens of the *Zoarium* of this species, closely resemble the Scotch *Polypora tuberculata* Prout, and I am

not certain that the British species is not identical with it. For the present it may be as well to retain them separate, because there are still some features in the Scotch that I have not as yet detected in the Derbyshire species. The general habit of the two is similar; the arrangement and character of the cells is the same; it is only in the superficial tubercles that there is a difference.

Localities : Castleton, Derbyshire; Settle and Richmond, Yorkshire.

Genus THAMNISCUS, King.

Branches free, round, frequently and regularly bifurcating; more or less in one plane; Zoæcia on one side, cells immersed, round, arranged in oblique lines.

9. THAMNISCUS DUBIUS? King, *Permian Foss.*, p. 44, pl. V. *T. dubius*, (Shrubsole) Paper on *Thamniscus*, *Quart. Jour. Geol. Soc.* August, 1882.

Var. *Carbonarius*, new var.

Zoarium, a series of flattened branches generally in one plane. Branches free, frequently dividing, measuring about half a line in breadth, equal in size along their whole length. *Zoecia* on one side of the branch, apertures circular arranged in lines, or obliquely; about six cells in one line measured longitudinally, from four to six rows in the width of branch.

Localities : Castleton, Derbyshire; Settle, Yorkshire (small fragments).

There is a very great difference between the above species and that described by Mr. John Young, as occurring in the Carboniferous rocks of Scotland. *Thamniscus? Rankini*, Young (*Ann. Mag. Nat. Hist.*, May 1875), is of uncertain affinities; for as Mr. Young remarks "Meanwhile though strongly disposed to regard this fossil as a true *Hornera*, or a member of a closely allied genus, we think it safer to leave it in the Palæozoic genus *Thamniscus*." The Scotch type may be ultimately placed in the genus *Hornera*; but the present form has not the least affinity with that or any genus related to *Hornera*. I have named the species as a variety of *T. dubius* out of deference to Mr. G. W. Shrubsole, whose paper on *Thamniscus*, Silurian, Carboniferous and Permian (*Quart. Jour. Geol. Soc.*, Aug. 1882), merits this special approval. In that paper the whole history

of King's types is recorded, and a fresh description of *T. dubius* is given, after a careful comparison of the Permian specimens in the Newcastle Museum.

The Derbyshire species is comparatively rare, but I have been singularly fortunate in the fragments given to me by Mr. Aitken. I have both the reverse and the obverse, and besides this, there are several smaller fragments which afford good diagnostic characters. In founding the Genus *Thamniscus* Prof. King says "It embraces the two following genera, one of which (*Thamniscus*) is the type, and apparently Mr. McCoy's *Ichthyorachis*. (*Permian Foss.* p. 43.)

The following is McCoy's description of this genus :—

Genus *ICHTHYORACHIS*, McCoy.

A straight central stem, having on each side a row of simple branches or pinnæ, all in the same plane, obverse rounded, without keel, *each bearing* several rows of small prominent oval pores, arranged in quincunx, reverse smooth, or finely striated. (*Carb. Foss.*)

The only species *I. newenhami*, McCoy, County Clare, Ireland.

The type of this genus appears to correspond more closely as an ally of *Glaucanome* than *Thamniscus*, yet there are specimens amongst my Derbyshire collections that seem to reconcile the apparent conflict of opinions, but I do not think we shall be able to maintain McCoy's genus as a separate type. I will endeavour to describe fairly the two types and leave the reader to judge.

10. *ICHTHYORACHIS*, s.p.

Zoarium in its earlier stages, a strong central stem with lateral pinnæ. These do not strike off at right or acute angles like *Glaucanome* but the pinnæ bifurcate as free branches, rather diminutive at first, but towards the apex of the branches as bold and unfenestrated twigs. In the earlier stage the cells are arranged on the surface of the stem in three rows, on the pinnæ in two rows, and on the terminal free branches in from two to three rows.

In a small fragment of another, or the true *Thamniscus* type, casts of the main stem remain with a few lateral depressions. A small poriferous portion still remaining in one of the furrows, show that the arrangement of, and character of the cells are similar to the variety already described. In the absence of better material I must

leave the species as somewhat doubtful.

Locality: Castleton, Derbyshire.

Genus GLAUCONOME, Goldfuss.

(See paper by G. R. V. on Carb. Polyzoa, North Yorkshire, Trans. Geol. and Polytech. Soc., 1881).*

If we except *Retepora pluma*, which has yet to be worked out, no *Glaucanome* was described by Phillips in his *Geol. of Yorks.* In his *Paleozoic Foss.*, a species which is described as occurring in the Upper Devonian, is named *G. bipinnata*, and McCoy in describing a similar species from the Carboniferous Limestone, Dungannon, furnishes us with a few particulars respecting his type. It appears to me that Phillips' species was founded upon a peculiar habit, if so, this species is not unique in its *bipinnate* arrangements. Mr. John Young, of Glasgow, writing me about English and Irish *Glaucanome*, says (Oct. 1877) "We seem to have no *Glaucanome* in Scotland answering to the description of *G. grandis*, and *G. gracilis*, McCoy, although both have been noted in former lists from our beds. McCoy states that *G. grandis* has very small round prominent pores, one at the origin at each branch and three between. *G. gracilis* is said to have in each side a row of very large circular prominent pores which strongly indent the margin, one at the origin of each branch and one between, and about half the diameter apart. After very close examination of all our specimens, I have never found a fragment agreeing with either of the above species. I am inclined to think that we have only one species that agrees with any of McCoy's description, that is *G. bipinnata*, Phillips. In the shales from Capelrig we find a form with a straight crenated keel, or midrib, that has an oval pore at each branch and one between, reverse strongly granulated. McCoy does not mention anything about the keel in his description, he only says 'obverse with two rows of approximate oval pores, reverse with strong granulated striæ.' If it can be shown that *G. bipinnata* is not keeled in the typical form from

* In my fourth British Association Report on Fossil Polyzoa, 1883, I have altered—for reasons there given,—the generic name *Glaucanome*, for that of *Pinnatopora*. As this paper, however, was written and read before the change was made, I have allowed the references to stand. I reserve the Genus *Glaucanome* Goldfuss for Silurian specimens only.

England or Ireland, then the Scotch species is new, but rather than make it such, in the meantime I shall leave it as it is, and distinguish it as *G. bipinnata*? Phillips." After this letter was written Mr. Young sent me specimens of this species, and I shall use it in making my comparison with the Derbyshire fossil.

11. *GLAUCONOME BIPINNATA*? Phillips. Palæozoic Fossils of Devon, &c.

Zoarium, a long stem which branches rather acutely at distances about four lines apart; in the intervals of the larger branches, smaller pinnæ, four to a line, are placed alternately on each side of the main stem. *Zoecia* on the main stem, orifices oval, two in the intervals of the small pinnæ, or about eight to a line on each side of a not very prominent mid-rib; cells on the branches similar to the main stem; cells on the pinnæ rather smaller, and more closely set. Reverse striated, or slightly granulated.

Localities: Upper Devonian, Pilton, Croyd; Castleton, Derbyshire; Ireland, (McCoy), Blantyre? and Capelrig? Scotland. The *Glaucome* of Settle, Yorkshire, is not in a sufficiently good state of preservation to allow me to describe the species.

In the Carboniferous Limestone of Derbyshire there are several varieties of this peculiar type, one of which possesses a very strong main stem, pinnate and bi-pinnate as already described. I cannot, however, regard it as a distinct species, the only additional character is its robustness. The arrangement of the cells are similar. I can only suppose that this additional feature is the result of age.

A reference to my former paper will show directly, the difference between the character and abundance of *Glaucome* in North Yorkshire and in Derbyshire. For a long time I regarded the *Retepora pluma* of Phillips (*Geol. York.* pl. I., fig. 14-15) as a *Glaucome*, but the careful working of the type seems to dispel this idea. In all probability fig. 13, pl. I., *Geol. York.* is the reverse of *G. bipinnata*? Phillips, but it is hard to say.

Genus RHABDOMESON, Young.

Ann. Mag. Nat. Hist., January, 1874.

12. RHABDOMESON GRACILIS, Phillips sp. Palæozoic Fossils, Devon, &c. (See North Yorkshire Polyzoa by G. R. V., *Trans. op. cit.*).

I have only detected a few fragments of this species in the Derbyshire Limestone specimens. The species has a very wide range.

Localities: Devonian. Pilton (Phillips), Castleton; Hurst, Richmond, Yorkshire; Scotland, very generally distributed; Northumberland.

There are still remaining a few doubtful species, in my own, and in Mr. Aitken's collection. I cannot work these into the present paper for they are without a local habitation, and the fragments are not in such a state of preservation as to allow me to do them justice.

Now that attention has been directed to the Polyzoa of Derbyshire and North Yorkshire it is to be hoped that in the coming season for geological excursions some little attention will be given to the presence of these as well as to other, probably, more attractive groups of fossil remains.

ON THE GEOLOGY OF PALESTINE. BY W. H. HUDLESTON, M.A.,
F.G.S., &c.

IN the original choice of the subject, two principal considerations influenced me. In the first place, there is no foreign country whose history and geography attract more attention from all classes than does the Holy Land. It seemed therefore certain that a previous geographical acquaintance with the region might induce some curiosity as to its geological structure. And this brings me to the second consideration, which influenced my choice of a subject, viz., that Palestine—using the term in its widest geographical sense—contains within its borders some of the most remarkable features on the surface of the earth; and, notably, that astounding fissure, the Dead Sea Basin, which probably has exercised the imagination of most of us for a long period, and which geology, of all the sciences, is the most competent to investigate.

To facilitate reference, the subject has been divided into eight sections, as follows:—

- 1.—HISTORY OF THE INVESTIGATION OF THE REGION.
- 2.—PHYSICAL GEOGRAPHY.
- 3.—GEOLOGICAL OUTLINE AND EXPLANATION OF THE MAP.
- 4.—BEDS OLDER THAN THE CRETACEOUS LIMESTONE.
- 5.—THE CRETACEOUS AND NUMMULITIC LIMESTONES.
- 6.—POST-NUMMULITIC (MARINE) BEDS.
- 7.—VOLCANIC ROCKS.
- 8.—DEPOSITS OF THE DEAD SEA BASIN.