NO. XXIX.—NOTES ON URE'S "MILLEPORE," *TABULIPORA URII*,
J. YOUNG (*CELLEPORA URII*, FLEM.). BY JOHN YOUNG,
F.G.S.

[Read 3rd May, 1883.]*

The Rev. David Ure in his "History of Rutherglen and East Kilbride," 1793, figures and describes a Carboniferous organism, pp. 328-29, pl. xx., figs 1, 2, as a "Millepore," and says—"The Millepore is a very beautiful genus of the coralloides. It abounds in most of the lime quarries, not only in Kilbride, but in the West of Scotland. The specimens are in fragments, and commonly branched. They are from the thickness of a fine hair to that of a large quill. Some specimens continue to adhere to shells, &c., on which they were originally formed, as in fig. 1. The pores are round and of different diameters in the same specimen, fig. 2, which is greatly magnified. The extremities of the branches were originally round as at *a*. The Millepore is frequently spread on the surfaces of shells, entrochi, &c., like the *Seratulæ pumila*."

Those who, like myself, have collected Carboniferous fossils from the Kilbride district, and compared them with Ure's figures and the above description, now know that under the term "Millepore" he has confounded various smaller organisms found in the same strata, which bear a certain amount of external resemblance to one another, but are really distinct, both in form, size, and the character of the cells, and which are now grouped under different genera and species from those of the organism to which he specially refers. These are now known as *Ceriopora interporosa*, Phill., *C. similis*, Phill., *Rhabdomeson gracile*, Phill., *R. rhombiferum*, Phill., *Hyphasmopora Buskii*, Ether., jun., and *Archæopora nexilis*, De Kon. These are all at present provisionally placed among the Polyzoa, but the organism figured and described by Ure is now regarded, although somewhat doubtfully, as belonging to the tabulate corals.

In 1828, the Rev. Dr. Fleming in his "Natural History of British Animals," p. 533, names Ure's "Millepore" *Cellepora Urii*, and describes it in these few words, "branched, round, about a quarter of an inch in diameter, form round," (Ure, pl. xx., fig. 1). In Morris's "Catalogue of British Fossils," 1844, the organism appears under Fleming's name, in the list of Polyzoa, but, so far

* An abstract of this paper is printed in the *Annals and Magazine of Nat. History*, September, 1883.

as I am aware, it has not been further noticed or described by any palæontologist since Fleming's time.*

In 1836, the late Professor Phillips figured and described a somewhat similar organism from the Carboniferous limestone of Yorkshire, under the name of *Calamopora tumida*, which in its habit of growth, and external cell-characters, so closely resembles Ure's "Millepore"—but to which species Phillips makes no reference in his description—that Scottish collectors, ignorant alike of Ure's earlier description, and Fleming's specific name, have gone on identifying this organism with Phillips's species, wholly from external resemblances, the result being that, in recent lists of Scottish Carboniferous fossils, Phillips's specific name of *tumida* has supplanted Fleming's name of *Urii*.

In the short paper which I have to submit to the Society, I hope to point out a new character that I have recently discovered in Ure's "Millepore," which I believe will distinguish it from the organism described by Phillips, and which will, at the same time, enable us to restore to it Fleming's specific name, which I hold has priority over that of Phillips, even supposing the organism is found to be the same. I may here mention, that the organism described by Phillips as *Calamopora tumida*, has during recent years, been placed in no less than three other genera, viz., *Chaetetes*, *Stenopora*, and *Heterotrypa*, the last being a new sub-genus established by Professor H. Alleyne Nicholson in 1879 for certain tabulate corals belonging to the Monticulipora group. Ure's "Millepore" will likewise be found in Scottish catalogues under the names of *Chaetetes* and *Stenopora*, the latter name being that under which it appears in the Catalogue of Western Scottish Fossils, but with Phillips's specific name of *tumida* attached, but which name I believe should never have been given to the Scottish organism, as it is quite distinct from the form described by Phillips. This I now know from what I have discovered regarding its internal structure in specimens from Kilbride and various other localities in our limestone strata.

My attention was first drawn to Ure's "Millepore" by finding in a beautifully preserved incrusting specimen that the larger cell-tubes were closed by a thin, calcareous cover, which was pierced in

* I find that R. Etheridge, jun., F.G.S., in a paper entitled "Observations on *Chaetetes tumidus*, Phill.," *Annals and Magazine of Nat. Hist.*, 1874, vol. xiii. (4th series), refers to *Cellepora Urii*, Flem., as probably belonging to Phillips's species.

its centre by a small pore or opening of a roundly crescentic or reniform shape. This character in this organism is new to me, and it does not appear to have been noticed by either Ure or Fleming in their descriptions, which were chiefly confined to external characters. Having satisfied myself that it existed in other well-preserved incrusting specimens, it occurred to me this last autumn, that if these calcareous covers were of the nature of tabulæ, they ought to be found preserved within the internal structure of the organism, which in other specimens had grown up into a branching form from the first incrusting stage. I therefore made sections of several specimens both across the branches and lengthwise, and was pleased to find these perforated covers, or tabulæ, as I shall now term them, existing in nearly every specimen which had its internal structure at all well-preserved.

Before, however, describing this internal structure more minutely, I shall first refer to the habit of growth, and other external characters by which this organism is distinguished, and in a fuller manner than has been done by either Ure or Fleming. In its first, or youngest stage, as stated by Ure, it seems to have often formed a thin incrusting layer of cells, which are chiefly found in patches attached to stems of crinoids, corals, shells, and other organisms, and after thus attaining a fixed base of varying diameter it grew upwards in a branching manner until it reached a height of three or more inches. The branches are dichotomous, and terminate, as Ure states, in rounded extremities. In the larger and more robust specimens the branches seldom attain more than $\frac{1}{4}$ inch in diameter, the average being from 2 to 3 lines, and when found uncrushed their cross sections vary from round to oval. In the thin incrusting stage, where the organism sometimes covers a space of two or more inches in length, maculæ, and, more rarely, monticules, are present over its surface. These occur at intervals of from 2 to 3 lines apart. The maculæ consist of spots on which are often seen a few very small cells or pores, surrounded with a group of polygonal cells about one diameter larger than the intermediate polygonal cells which fill in the spaces between one macula and another. The maculæ are also seen on some of the branching specimens, but on these they are often less clearly defined. These maculæ, which are here noticed for the first time, so far as I am aware, in connection with this organism, if held to be of any zoological value, would seem to indicate that its place is amongst the group of tabulate

corals belonging to the Monticuliporidæ, but this group is now held by Dr. Gustav Lindström and others to be more closely related to the polyzoa than it is to the true tabulate corals. This point, however, I shall leave over for future discussion, and proceed to notice the form of the cells, and the surface ornamentation of the organism, as seen in its several stages.

In young and thin incrusting specimens, the openings of the cells are seen to be more or less polygonal in form, but as the bounding walls between the cells thicken in their growth the openings afterwards often become somewhat round or oval, this being the condition they present in older specimens. If these thickened walls between the cells are carefully examined in specimens which have their outer surface well-preserved they will be found to contain a number of small pores or tubes generally planted at each angle of the cell, while the rest of the wall bears numerous small spinose tubercles in one or more irregular rows, giving the surface of the organism a minutely granulated kind of ornamentation. When the surface of a branch is ground down lengthways a very little way at right angles to the cell openings these tubercles appear in the walls as minute pores, but both they and the larger pores at the angles of the cells gradually disappear in the sections as the specimens are ground nearer to the central axis of the organism from which the cells spring, and they there become polygonal in form, and thin walled, as in the earlier stage. I may here mention that I have found no evidence of tabulæ in the small wall-pores, like those said to exist in the wall-pores of others of the Monticuliporoid group. I shall now proceed to describe the tabulæ I have discovered in the larger cells, which, as formerly stated, I first found evidence of in the younger, or first incrusting stage of the organism, and afterwards in older specimens, by grinding sections of branches.

Before describing the appearance of these perforated tabulæ, I shall first briefly refer to the methods by which I have prepared sections for examination. These consists of cross sections, and longitudinal sections of branches either ground down to transparencies, or polished so as to be examined as opaque specimens. Cross sections for grinding are easily cut from the ends of branches with a thin-edged file, and both they and longitudinal sections are first ground to smoothness on a fine sandstone to the point of structure wanted, and afterwards polished on plate-glass with the

finest emery powder. If the sections are wanted as transparencies, the polished face is fixed to a glass slide with Canada balsam, which when dried to the proper hardness is then ground on the fine sand-stone, and polished on the plate-glass until it is of the proper thinness. In my recent investigation of this organism, I find that, as far back as the year 1871, I had ground to transparency several beautifully-preserved specimens, showing the perforated tabulæ, but from want of knowledge as to their nature at that time, I failed to understand the peculiar structure which these sections now reveal. I find that opaque sections of branches ground down lengthways so as to show the mouths of the tubes at right angles to the surface are best suited for showing the perforated tabulæ in the greatest numbers, in the various cells. Owing to the curvature of the branches these tabulæ do not all lie at the same external level within the tubes when ground in sections, hence, when a specimen of the organism comes to be reduced to a thin transparency, only those few which happen to be at the surface, and lying close to the glass of the slide, remain. In opaque sections, on the other hand, we not only see the tabulæ at the surface of the specimen, but we also see those lying deeper within the tubes shining up through the transparent calcite with which many of the tubes are filled. When sections are cut so as to show the whole length of the tubes from the central axis outwards, the tabulæ are seen to be comparatively numerous, being on the average less than the diameter of the tubes apart, and as many as from seven to ten may be seen in each tube in the space of $\frac{1}{16}$ inch in length or thereby. The perforations or openings in the centre of the tabulæ are, as before stated, of a roundly crescentic or reniform shape, the inner edges being in most instances slightly thickened so as to form a kind of raised rim. I find also, in branching specimens, that the concave edges of the aperture are, as a rule, invariably turned to the lower end of the branches, excepting at these points where bifurcation of the stem takes place. Where this is the case they are seen to be there slightly deflected to either side, and from this character alone one is always able to tell which are the lower or older cells in any fragment of a branch, yet this interesting fact could not easily be ascertained from an examination of any of the external characters seen on the specimen. In examples where the tubes are cut right through the centre of the perforations, in either vertical or cross-sections of branches, the tabulæ are seen as a series of small tooth-like processes, projecting,

one on each side, horizontally inwards from the walls of the tubes, and often showing a little rounded knob at their extremities, this latter character being due to the thickened rim, formerly mentioned, which exists round the perforation. When the section, however, happens, as is often the case, from the flexure of the tubes, to cut the tabulæ on either side of the openings, they are then seen to cross the tubes in a complete manner, and such a section might mislead as to the regular perforated character of the tabulæ existing in other specimens where they are well-preserved, and in which they happen to be cut in the proper line.

Having fully satisfied myself by the examination of numerous sections of Ure's "Millepore," from all the localities in which I could obtain examples, as to the constant presence of the perforated tabulæ by which it is characterized, I then endeavoured to find out in what other characters it either differed from or agreed with its nearest allied forms. In this investigation I have been very much assisted by the information I have obtained from Prof. Alleyne Nicholson's "Palæozoic Tabulate Corals," 1879. I have, therefore, in the first instance compared the organism with his subgenus *Heterotrypa*, in which he now places *Calamopora tumida*, Phill., and with which, as formerly stated, Ure's "Millepore" has all along been confounded owing to its great external resemblance. At p. 297 Prof. Nicholson states that *Heterotrypa* has two sets of tubes or corallites, both "traversed by complete horizontal tabulæ, which are greatly more numerous in the small tubes than in the larger ones." This is quite a different internal structure from that found in Ure's "Millepore," which, as before stated, has no tabulæ in its smaller tubes, but has numerous perforated or incomplete tabulæ in the larger ones. It, however, agrees in some of its external characters with *Heterotrypa*, in possessing on its surface maculæ in which, in many of the specimens, the cell-openings are distinctly larger in these spots, and also in having the outer cell-walls thickened, and in bearing numerous small spiniform tubercles. I next compared it with the description of *Stenopora*, as now defined by Prof. Nicholson in the same work, pp. 168-177, and which he places amongst the Favositidæ. Ure's "Millepore" agrees so far with *Stenopora* in having a branching habit of growth, cell-walls, externally ornamented with granulated or tuberculated bounding ridges, and in the arrangement of its tubes within the branches, they being, as seen in the

Stenopora (p. 168), "composed of tubular corallites, which are nearly vertical in the centre of the branches, and radiate outwards from an imaginary axis to open on all points of the surface," and also in having the "corallites in the centre of the branches polygonal, thin-walled, and more or less completely in contact." Here, however, its resemblance to *Stenopora* in a measure ceases, for there is no evidence of mural pores in the walls of the tubes, nor is there that evidence of the regular annular thickening of the walls in their outer portion, which is illustrated in "Tabulate Corals," pp. 173-4, figs. 25, 26, in *Stenopora*, as in pl. ix., fig. 1. The walls in Ure's "Millepore," in their outer portion, are very variable in form and thickness, being sometimes straight, sometimes flexuous, and sometimes slightly annulated, but never in that regular form seen in the above figures of Prof. Nicholson's species of *Stenopora*, and this variation in the form of the walls is often very observable in the same specimen. In transparent sections this is seen to be due to the irregular manner in which the sclerenchyma deposit, as Prof. Nicholson terms it, has been secreted on the walls of the tubes. The tabulæ in *Stenopora* have likewise been described as being remote, and complete, not perforated, nor numerous, as in Ure's organism.

I do not at present know of any other genera beyond the two here mentioned with which to compare Ure's "Millepore." I have, therefore, endeavoured, so far, to show that, while it has certain resemblances in some of its characters and points of structure to *Heterotrypa* and *Stenopora*, it differs in other points so widely from them, especially in the possession of perforated tabulæ, that neither of the above genera, as at present defined, can admit it without the introduction of an important character not at present known to exist in either. I have not yet, however, been able to obtain specimens of *Heterotrypa tumida*, Phill., so as to compare for myself its structure with that of Ure's "Millepore," and so far as my examination has gone, it does not appear to exist in any of the Carboniferous limestones of Western Scotland. I am, therefore, unable at present to say how far Phillips's description of his species, and that afterwards given by M'Coy, are to be relied upon, as they both seemingly describe characters not given in Professor Nicholson's *Heterotrypa*, which leads me to think that in their descriptions they have confounded together characters belonging to, or found in different organisms. Thus Professor Phillips in

his description, "Geology of Yorkshire," p. 200, states that its prismatic cells are "contracted to a smaller opening at the surface," and again that "transverse tubuli (mural pores) appear to stand at the angles" or in the walls of the cells (as shown in fig. 53). Phillips (figs. 56, 57) also shows the external contraction of the cells into a small pore or opening, and says—"It appears that this variety depends on the covering of the surface." Professor M'Coy, in re-describing Phillips's species as *Stenopora tumida*, "Palæozoic Fossils," pp. 82, 83, states that the outer portion of the tubes are "irregularly moniliform," and having each cell-mouth nearly closed by a concave diaphragm, perforated by a small, circular, central opening, about $\frac{1}{3}$ the diameter of the tube." As formerly stated, no reference to any of these characters is made by Professor Nicholson in defining his genus *Heterotrypa*, but some of them resemble what is stated to be found in *Stenopora*, and others those seen in Ure's "Millepore," which leads me to think that both Phillips and M'Coy may have drawn up their descriptions from distinct organisms, externally alike, but differing in internal structure. To show that this may have been the case, I have only to quote Professor Nicholson, who, in remarking upon some of the difficulties that at present attend upon a complete or satisfactory definition of the genus *Stenopora*, and of its separation from the Monticuliporidæ and Chætetidæ, to which groups it bears such an amount of external relationship, says, "Tabulate Corals," p. 176—"I am unable to say how far a mere examination of the surface with a lens would enable an observer to separate a specimen of the first from one belonging properly to either of the latter genera," meaning *Chætetes* and *Monticulipora*, in the latter of which Phillips's species is placed. Internally, however, the above organisms are found to differ when examined in sections.

Believing that Ure's Millepore is quite distinct from Phillips's *Stenopora tumida*, and that it possesses characters which, so far as I know, do not seem to have been noticed in that of the genus *Stenopora*, I propose to place the organism amongst the Monticuliporidæ under a provisional new sub-genus, which I name *Tabulipora*, as descriptive of its beautiful and interesting internal structure, which distinguishes this organism from all its near allies. At the same time I add to it the specific name of *Urii*, after the Rev. David Ure, whom I believe to be its original discoverer and describer, and the earliest pioneer of Scottish palæontology.

In placing it amongst the Monticuliporidae, I do so in the knowledge of the fact, that it possesses many of the external and internal characters given to this group; though, as to the zoological position of the group in the animal kingdom, there is at present much difference of opinion, one party placing it with the tabulate corals, the other amongst the polyzoa. It is, however, to be hoped that the true systematic position of the group will yet be discovered.

NO. XXX.—THREE MONTHS' TENT LIFE AMONGST THE SILURIAN
HILLS OF LOGAN WATER, LESMAHAGOW. BY JOHN R. S.
HUNTER, D.Sc., LL.D., F.R.PH.S.E., HONORARY MEMBER.

[Read 8th March, 1883.]

In a former paper which I read at a meeting of the Society in 1881,* “On the Silurian Rocks of Logan Water,” I sketched the geology of the district, and called special attention to the group of Silurian rocks which has yielded the crustacean remains that have made it famous amongst palæontologists all over the world. I stated then, after remarking upon the fossil forms which I had obtained, that at a later date I hoped to be able, through further research, not only to record other facts, but to present the results of my work in a more extended and better developed form. After carrying out this wish, I now propose to give you a short sketch of my tent life amongst the Logan Water rocks, with some of the results of my labours during the three months I spent there.

My object in taking to extended out-door life in such a high moorland locality was simply in pursuance of the old determination to work out the whole of this district exhaustively. The necessary permission to occupy the ground having been received, I purchased an emigrant's tent, with the needful cooking utensils, including a large Rippingale's patent paraffin cooking-stove, and I may say in passing that this last-mentioned item answered its purpose admirably, and never gave us any trouble during our lengthened sojourn in the land of the Peesweep and the Whaup. Before starting from home I took the precaution to erect the tent, and go through cooking drill, and I may say that we were able, almost at once, to turn out a very satisfactory dinner.

* *Transactions*, vol vii., part 1, page 56.