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XV.—Descriptions of species of Hippothoa and Alecto from the lower Silurian rocks of Ohio, with a description of Aulopora arachnoidea, Hall

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XV.—*Descriptions of Species of* Hippothoa *and* Alecto *from the Lower Silurian Rocks of Ohio, with a Description of* Aulopora arachnoidea, *Hall.* By H. ALLEYNE NICHOLSON, M.D., D.Sc., F.R.S.E., Professor of Biology in the College of Physical Science, Newcastle-on-Tyne *.

[Plate XI.]

THE fossils upon which the following communication is founded were in the first place kindly submitted to me for examination and description by Mr. U. P. James, of Cincinnati, an accomplished and experienced observer, and a studious worker in the richly fossiliferous Silurian strata of the State of Ohio. Subsequently I had the opportunity of visiting Ohio personally, and I obtained a large additional series of these forms at Cincinnati and at Waynesville. They constitute a small group of organisms which may be advantageously considered together, though differing considerably in their nature. The first of them is the *Alecto inflata* of Hall, which is an undoubted Polyzoon, though certainly referable to another genus. I have examined very carefully a number of beautifully preserved specimens, and am able to give a more complete description of its characters than has yet been published. Three species (viz. *A. frondosa*, *A. auloporoides*, and *A. confusa*) appear to me to be undoubted examples of *Alecto*, and they all would seem to be new. Lastly, I have appended a description of *Aulopora arachnoidea*, Hall, because this form, whilst seeming to be a genuine *Aulopora*, presents certain striking points of resemblance to *Alecto auloporoides*, with which it might readily be confounded.

1. *Hippothoa inflata*, Hall. Pl. XI. figs. 1, 1 *a*.

Alecto inflata, Hall, Pal. N. Y. vol. i. p. 77, pl. xxvi. figs. 7 *a*, 7 *b*.

Polyzoary creeping, adnate, branched, and forming a close but irregular network. Branches linear; cells uniserial, pyriform, each springing by a contracted base directly from the cell below; about four cells in the space of one line. Cell-mouths smaller in diameter than the expanded end of the cell, subterminal, and placed more or less distinctly on the front face of the cell.

Though in some respects resembling some of the species of *Alecto*, I think there can be no hesitation in referring this beautiful species to the genus *Hippothoa*, with which it agrees

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in the form and mode of growth of the cells, and in the position of the cell-mouths. It is very readily distinguished from the following forms by the fact that the cells are not at all immersed, by the fact that each cell springs directly from another, by the cells being strictly uniserial, and by the position of the cell-mouth on the front face of the swollen cell. The cells are distinctly pyriform in shape, attenuated below, with a smooth surface, the aperture being orbicular or oval and destitute of notches or spines. The network formed by the polyzoary is usually a very close one, the branches being given off from the sides of the cells, usually at intervals of from half a line to two thirds of a line.

All the examples of this species which I have seen are parasitic upon *Strophomena alternata*, Conrad. Hall's specimens are from the Trenton Limestone; but there can be no question as to their identity with ours.

Locality and Formation.—Abundant in the Cincinnati Group (Hudson-River Formation) near Cincinnati, Ohio.

2. *Alecto auloporoides*, Nicholson. Pl. XI. figs. 2–2 *b*.

Polyzoary creeping, adnate, of narrow branches, which divide at various angles and repeatedly inosculate, so as to give rise to a complicated network, the meshes of which are more or less elliptical, and have a long diameter of one line more or less. The branches vary in width from one fifth to one third of a line. Cells tubular, partially immersed, free towards their apertures, sometimes uniserial, more commonly arranged in two alternating rows, sometimes irregularly disposed at the points of anastomosis of the branches; from five to six cells in the space of one line in the narrower branches. Cell-apertures terminal, circular, of the same diameter as the tube, the last portion of the cell being more or less conspicuously developed above the general surface. Surface apparently smooth.

The Ohio palæontologists appear to regard this as being the *Aulopora arachnoidea* of Hall; and, indeed, it seems probable that Hall included this under his species. This, however, is an undoubted *Alecto*; and I think the name of *Aulopora arachnoidea* ought to be restricted to the form which I shall shortly describe under this name—a form which is very similar in general appearance to *Alecto auloporoides*, and occurs with it in the same beds, but which seems certainly to be an *Aulopora*, and is at any rate specifically distinct from the present fossil.

Alecto auloporoides is very nearly allied to *A. frondosa*,

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James, from which it is distinguished mainly by its more slender habit and graceful form, and by its generally having its cells arranged in a double or single series. Also, I have not hitherto been able to make out in the texture of *A. auloporoides* the minute pores which seem to be present in all perfect examples of *A. frondosa*.

Locality and Formation.—Cincinnati Group, Cincinnati, Ohio. The species is a common one, and is found upon *Strophomena alternata*, Conrad, and *Streptelasma corniculum*, Hall.

3. *Alecto frondosa*, James. Pl. XI. figs. 3–3 *d*.

Aulopora frondosa, James. Named, but not figured or described, in the 'Catalogue of the Lower Silurian Fossils of the Cincinnati Group,' 1871.

Polyzoary creeping, adnate, of reticulating and anastomosing branches, which usually become more or less completely confluent so as to give rise to a thin expanded crust, or which are partially reticulated and partially confluent. When the branches form a network, the size of the meshes, as well as their disposition, is exceedingly variable; but they are usually more or less oval, with a long diameter of half a line to a line or more, the interspaces between them varying from half a line to two lines. The cells are uniserial on the narrowest branches, but biserial, triserial, or multiserial on other parts of the cœncœcium; elongated and tubular, immersed below, but free towards their apertures, the terminal portion of the tube being more or less elevated above the general surface. Cells from six to eight in the space of one line. Cell-mouths terminal, circular, of the same diameter as the tube. Entire surface, in well preserved specimens, minutely porous.

There does not appear to be any reason for doubting that this is a true *Alecto*. It is nearly allied to *A. auloporoides*, especially as regards the form of the cells; but the greater width of the branches and their common coalescence into expanded crusts, together with the greater number of the rows of cells over most portions of the cœncœcium, communicate to the fossil quite a peculiar appearance, and appear to be characters of specific value. Since my original description of this species, founded on type specimens furnished me by Mr. James, was written (in the Report on the Fossil Corals, Polyzoa, and Sponges of the State of Ohio, now in course of publication), I have examined a large suite of specimens which I collected myself at Cincinnati. These enable me to assert that, in all well-preserved examples, the entire surface of the polyzoary is covered with the apertures of exceedingly

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small circular tubes, rendering it minutely porous (Pl. XI. fig. 3 *d*).

The examples of *A. frondosa* which have come under my observation are most commonly attached to the valves of *Strophomena alternata*, *S. planumbona*, and *Orthis occidentalis*; but I have also seen the crusts growing on *Chætetes frondosus* and *C. mammulatus*.

Locality and Formation.—Hudson-River Group (Lower Silurian), Cincinnati and Waynesville, Ohio. The specimens figured are reticulated examples, and are not so characteristic as the expanded and confluent forms.

4. *Alecto confusa*, Nicholson. Pl. XI. fig. 4.

Polyzoary adnate, forming thin crusts which envelop foreign bodies. Cells tubular, multiserial, arranged in irregular transverse rows, immersed towards their bases, free and elevated above the surface towards their apertures. Cell-mouths circular, terminal, as large as the diameter of the tube, about five in the space of one line.

All the examples of this species that I have seen are parasitic upon the columns of Crinoids, which they closely embrace and incrust; and they might readily be referred to *Aulopora*, unless care were exercised. The species is nearly allied in essentials to the two preceding, but is distinguished by its constantly forming thin crusts, and by its larger, more closely and irregularly arranged, and more prominent cells.

Locality and Formation.—Cincinnati Group, Cincinnati, Ohio. Collected by Mr. U. P. James.

5. *Aulopora arachnoidea*, Hall. Pl. XI. figs. 5, 5 *a*.

Aulopora arachnoidea, Hall, Pal. N. Y. vol. i. p. 76, pl. xxvi. figs. 6 *a*–6 *c*.

Corallum very slender and delicate, attached to the surface of foreign bodies, repeatedly branching, and in many examples anastomosing to form a network. The branches are usually given off at intervals of from one third to two thirds of a line, and are very narrow and linear, not exceeding one fifth of a line in width. The corallites have much the form and character of the cells of the uniserial forms of *Alecto*, being invariably arranged in single lines and opening in the axis of the branches. The terminal portion of the corallite is elevated above the surface; and the calices are circular and not expanded. About four or five calices occupy the space of one line.

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Some examples of this species are branched with tolerable regularity, as in the specimen figured; but others form compressed and closely interlaced reticulations. No positive or absolutely definite characters can be stated which would lead to the reference of this fossil to *Aulopora* rather than to *Alecto*. Nevertheless the general aspect of the fossil is such that it can almost positively be placed under the former genus. The forms to which it presents the nearest alliance are *A. filiformis*, Billings, and *A.* (?) *canadensis*, Nich., both of which are Devonian; but it is readily distinguished from these, and by no character more conspicuously than by the fact that the corallites open in the axis of the branches, instead of making an angle with the main stems. With a little care, also, there is no great difficulty in separating it from *Alecto auloporoides*, to which it presents a very considerable superficial resemblance.

The examples of *Aulopora arachnoidea* described by Hall are from the Trenton Limestone; but ours are from a higher horizon. The specimens which I have seen are all attached parasitically to the surface of different species of *Chætetes* (*Monticulipora*).

Locality and Formation.—Cincinnati Group, Cincinnati and Waynesville, Ohio.

EXPLANATION OF PLATE XI.

Fig. 1. *Hippothoa inflata*, Hall, sp., a small fragment, greatly enlarged. 1 *a*. Two of the cells of the same, still further enlarged.

Fig. 2. *Alecto auloporoides*, Nich., a portion of the polyzoary growing on *Strophomena alternata*, greatly enlarged. 2 *a*. Portion of a branch of the same, still further enlarged, showing the biserial cells. 2 *b*. Portion of another branch, in which the cells are uniserial below and biserial above.

Fig. 3. *Alecto frondosa*, James, a reticulated example, of the natural size, growing on *Strophomena alternata*. 3 *a*. Portion of the same, enlarged. 3 *b*. Portion of the same, still further enlarged. 3 *c*. Portion of the polyzoary of another specimen, enlarged. 3 *d*. Portion of another specimen, enlarged, showing the minutely porous nature of the surface.

Fig. 4. *Alecto confusa*, Nich., forming a crust on a crinoidal column, enlarged.

Fig. 5. *Aulopora arachnoidea*, Hall, a specimen in which the branching is regular and no close reticulation is formed, growing on *Chætetes gracilis*, of the natural size and enlarged. 5 *a*. Portion of a branch of the same, greatly enlarged.

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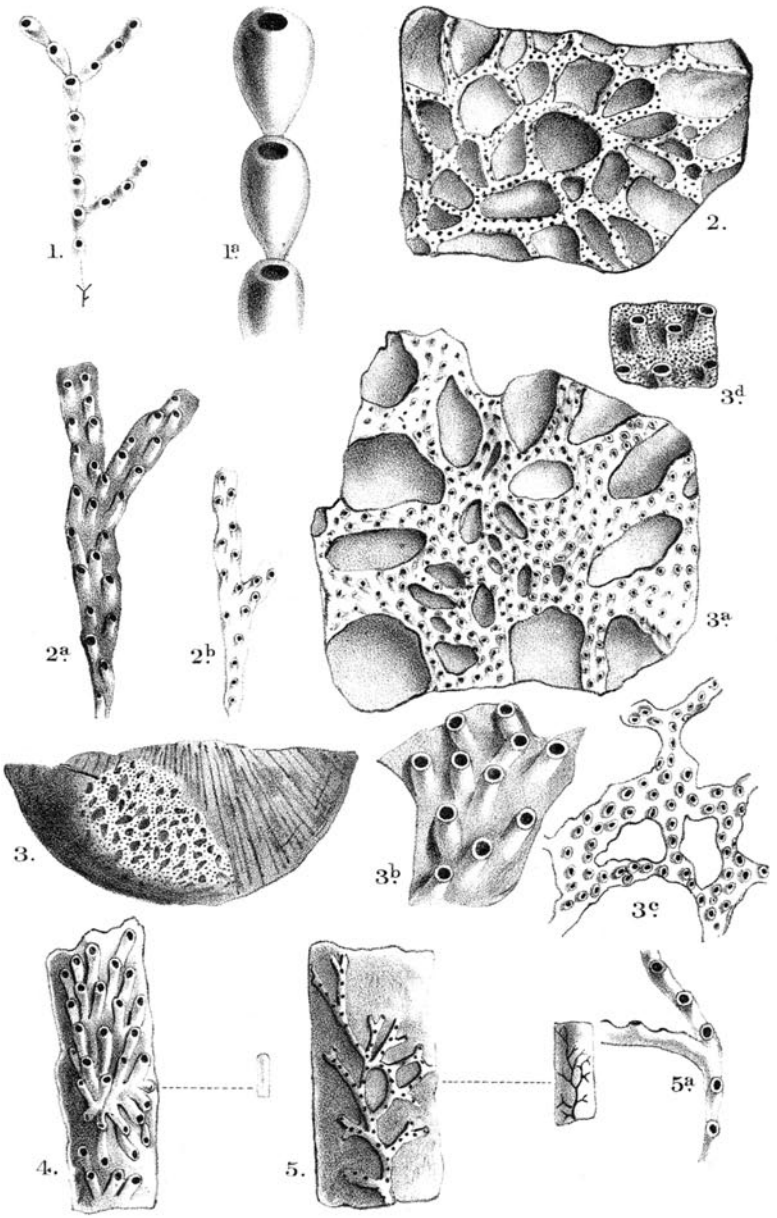

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