in the *Hornblend* rocks of Chester County, the texture of the *Feldspar* and the reflecting plates being peculiar. I propose for it the provisional name of *Cassinite*, Mr. John Cassin having first called my attention to this glassy, bluish-green *Feldspar*. The possession of the reflecting plates had not been observed until I had discovered it by an examination with the microscope, but which when pointed out may be seen by the naked eye.

A gray satin-like specimen of *Delawareite* exhibited no red reflections, but there were some small, black, microscopic crystals chiefly of very elongate hexagons; some were irregular and not long.

A green and red mottled *Feldspar* from Mineral Hill, near Media, presented reddish groups of reflections here and there throughout the mass. Under a high power these plates were observed to be of the usual modified forms of the hexagon, that of the rhomboid prevailing while the hexagonal form itself was found only in rarer instances. The color of these plates varied from a blood red to a pale wine red, and are very small and numerous. This is a remarkably beautiful mineral and is I believe very rarely now found. I have found a single specimen and the only other specimens I have seen, were found some thirty years since.

In the beautiful *Sunstone* of Chester County, near Kennett Square, I found many reflecting plates of various shades of red. These plates are very numerous and usually elongate rhomboids, but the hexagonal form and all its modifications are found of various sizes when examined with a high power. There were observed also many black irregular spots, and some of these had irregular hexagonal margins. Interspersed throughout could be seen very numerous short, black, attenuate, prismatic forms, much more numerous and approximate to each other than was the case with the reflecting plates.

The fine *Sunstone* of Arendal, Norway, presents very remarkable reflections of not very minute plates. The *Feldspar* is clear and pure, and these reflections numerous and very brilliant. The hexagonal form and its modifications are very perfect, and the color pure and translucent, varying from dark red to light wine color. Many of the rhomboids are very elongate. Occasionally opake black plates were observed, and the same may be said of other *Sunstones* generally.

Chesterlite, from Chester County Poor House, quite to my surprise, presented here and there hexagonal plates. In one specimen I detected a remarkably fine hexagon of a deep red color.

Perthite, from Perth, Canada West, is a very dark salmon-colored variety of *Sunstone*, and I found in it the same hexagonal form and its modifications, but the plates were darker in color. There were mixed with these some opake black ones, similar in density and form to those which are found in the *Sunstone* of Chester County.

In *Peristerite*, from the same locality, I found very numerous minute black crystals, generally elongate rhomboids, very like, if not the same with, common *Labradorite*, to which it seems to be very nearly allied.

Observations on CHAETETES and some related Genera, in regard to their Systematic Position; with an appended description of some New Species.

BY DR. CARL ROMINGER.

Chaetetes has, by its tubular structure and the transverse diaphragms, dividing the tubes, a strong resemblance to Favosites, and was for this reason generally considered to be a member of the Favositoid family.

In the following pages I shall try to prove this to be an error, and to demonstrate its immediate connection with forms which are considered to be Bryozoa.

It has been asserted that transverse diaphragms have never been observed

in the tubules of any Bryozoon, (Milne Edwards et. H. Arch. du Museum, tom. v. p. 278,) but some jurassic specimens of Heteropora in my possession exhibit with the utmost distinctness their tubules divided by horizontal diaphragms. It would be difficult to distinguish a vertical section of them, from a similar section of a Chaetetes, if the tube-walls of the first were not perforated by densely crowded, very minute pores, while the walls of a Chaetetes are imperforate.

Fisher, the author of the genus, informs us that the tubes of Chaetetes multiply by division, while other observers, in specimens believed to be Chaetetes, could only see a multiplication of tubes by lateral gemmation, and therefore, to avoid the difficulty, created the genera Stenopora and Monticulipora, for these specimens. Milne Edwards is, to my knowledge, the only one to affirm Fisher's observation to be true, (British Fossil Corals, p. 264,) but he does not specially designate the species on which he made his observations, and subsequently places all the species he formerly named Chaetetes, under the genus Monticulipora.

I know of only one fossil resembling Chaetetes, in which the tubes are multiplied by division; this is the genus *Tetradium*, whose tubes regularly divide into four parts, but there is no reason to suppose this to have been the type for Fisher's genus Chaetetes, nor seems it probable that Milne Edwards had it under consideration. The structure of Chaetetes is considered to be exclusively tubular.

If we observe the different forms of Chaetetes, we will find some with contiguous polygonal orifices, and thin intervening walls. Others we will see with the tube mouths rounded, only partially contiguous, and with a number of smaller angular openings dispersed between them. In still others, the orifices are circular, not in contiguity, and surrounded on all sides by smaller angular openings. A vertical section through these different kinds will, at first sight, not exhibit a corresponding variety of appearance; we find the whole corallum to be an aggregation of tubules, which are divided by transverse diaphragms; a closer examination, however, will reveal to us, in the last mentioned forms, two sorts of tubules: larger ones, more or less circular in the cross-section, with straight diaphragms at variable, sometimes quite remote distances; and smaller ones, which are angular, with more closely approximated diaphragms; but the different tube segments, cut off by the diaphragms, are not always so regular as the nature of a tube would require it; some are projecting over the others, and joining with the adjacent segments in zigzag lines, which is a sure evidence that we have no real tubules before us, but merely vertical rows of independent cells, which being crowded in between tubes, assumed themselves the shape of tubules.

An interesting family-mark, common to Chaetetes, and to a number of other genera related to it, are the peculiar maculæ noticeable on their surface. In specimens of prevalently tubular structure, these maculæ are constituted by aggregations of larger tubes than the others; at the same time we see the surface at these places frequently elevated into small monticules. In other specimens, where the intertubular cell-mass is well developed, these maculæ are contrasting with the other surface by their entirely cellulose structure, and it is not uncommon to see these spots depressed, instead of being elevated.

The orifices of Chaetetes are generally open, or exhibit some distance below the surface their diaphragms, which appear to be perfect. It is, however, not rare to find specimens in which the tubules are closed by opercula with a central opening. In specimens of *Chaetetes rugosus* and *ramosus*, from the blue limestone of Cincinnati, a part of the surface frequently has closed tubules; their appearance assumes hereby an entirely different character, which reminds one greatly of the ramulets of Melicertites from the Oolite formation. Also of *Chaetetes frondosus*, I have some specimens exhibiting opercula.

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In the first two species the opercula are slightly convex, in the latter, concave, and with an excentric opening.

Several species are decorated with spinules, rising from the margins of the tube orifices, and from the interstitial spaces. One of these, which attracted the attention of Milne Edwards, induced him to create for it the genus Dekayia. This spinulosity is not a confluent character, and has, in my estimation, no more importance than the hairs of a plant have, in regard to its generic position.

The so called *Dekayia aspera* occurs in the blue limestone of Ohio and Indiana, in which several other spinulose forms are found. One of them grows in small ramulets, with somewhat oblique, very minute orifices; some of its specimens are entirely smooth, without showing any signs of detrition; in others the surface is raised in scarcely perceptible, obtuse nodules; and finally, some are found with a perfectly hirsute surface. Also some specimens corresponding with McCoys *Nebulipora lens*, are decorated with quite prominent spinules; likewise some larger hemispherical masses, considered to be *Ch. petropolitanus*, and a species similar to *Chaetetes frondosus*.

From the shales of the Hamilton group of New York and Michigan, I know also several species of spinulose Chaetetes forms.

The stellate form of orifices, which is least expected to be seen in Chaetetes or in a Bryozoon, nevertheless is represented in some species of the Chaetetes family.

A few specimens found at Cincinnati, which in all particulars agree with *Chaetetes frondosus* have from three to five longitudinal ridges projecting into their tube cavities, by which the orifices acquire a floriform shape. In other specimens of the same species the orifices are round, without any traces of stellate character; even in the mentioned specimens, not all orifices are stellate. The stellate orifices of *Callopora florida* are made known by Hall; several other species of it are of the same character, and also in the genus *Fistulipora* we will meet with floriform orifices.

The question now is, have we to consider this stellate character as a serious objection to the bryozoic nature of Chaetetes and the allied genera?

I think not, for two reasons: 1. This radiate structure cannot be the exponent of a character which is essential to these organic beings, or it would be invariably developed. 2. These projecting lamellæ are not the equivalent of the radial organs in corals. Their number is not constant enough for that, and their distribution indicates frequently an unsymmetric bilateral, and not a radial plan. In some species there are only two such projections on one side of the tubes, while the other side is smooth; in others, with a larger number of lamellar projections, they generally form two opposite groups, and are rarely found disposed at equal distances around the circumference.

The relations between Chaetetes and some acknowledged bryozoic forms of the paleozoic era are so great, that if radial structure should be considered incompatible with the polyparium of a Bryozoon, I would rather remove the whole assemblage from the bryozoa, than to separate Chaetetes and some others from them.

In the blue limestone of Madison and Richmond, Ind., a well marked form of Chaetetes is found in abundance, which I do not see described. I propose for it the name *Chaetetes quadratus*.

It grows in coarse ramifications, with an even or slightly monticulose surface. Tube orifices vary in size in different specimens from one-fourth to one-third of a millimeter; those on the maculæ are somewhat larger; they are contiguous, polygonal or quadrate, separated by thin walls. Intertubular cells entirely wanting.

The quadrate tube form is particularly obvious on the terminal surface of branches, or on transverse sections. On the sides of the branches the quadrate tube form gives the surface a fanciful appearance, which I cannot bet-

ter explain than by comparing it with certain decorations of watch cases, consisting of concentric circle lines crossing each other. *Chaetetes pavonia*, with the synonyme *Ptylodictya pavonia* D'Orbigny, is described by Milne Edwards amongst the Chaetetes forms of the Cincinnati limestone.

This species has indeed a great resemblance to the group to which Ptylodictya belongs. It grows in double, thin laminæ, separable in two folia, which have on the inner side a dermatic concentrically wrinkled and striated crust, exactly similar to the separated leaves of Ptylodictya. The tubes begin with prostrate, thin walled ends, and become rectangular to the surface, by abruptly bending upwards; the erect part of them exhibits very thick walls. The orifices are contiguous, slightly dilated, and arranged in undulating rows, which, crossing each other under oblique angles, make their outlines more or less regularly rhomboidal. The outlines of the single tubes, however, are polygonal, and may be plainly distinguished in the centre of the massive interstitial spaces. Diameter of tubes one-sixth of a millimeter, somewhat larger on the monticules, which are little elevated and are disseminated over the surface at a distance of three or four millimeters. No diaphragms observed. Intertubular cells wanting.

This species would be entirely in correspondence with the genus Phænopora of Hall, but the entire absence of intertubular cell-mass, which is always, to some extent, developed in the species of Phænopora, is a difference of some importance, which, however, will be diminished, after we have seen in Chaetetes species with abundant intertubular cell-mass, and other species composed of tubules alone, with all intermediate forms placed between them. It is also to be noticed, that all the specimens of *Chaetetes pavonia* which I have seen, appear to be the terminal explanate ends of the fronds, while at the basal ends the cellulose tissue may be developed to some degree. This is decidedly the case in a small ensiform bryozoon of very similar structure, and occurring in the same association. The pointed basal ends of these specimens have a large proportion of cell-mass entering into their structure, while the upper portions are almost exclusively tubulose.

Chaetetes decipiens, nov. spec.

Occurs in association with *Ch. pavonia*, to which it is so surprisingly similar that, even for an experienced eye, it becomes almost impossible to distinguish the two species without the help of a lens.

It grows in entirely similar thin double leaves; the surface is covered with the same sort of monticules, composed of larger tubules; the orifices are similar in size and distribution, but a closer examination will reveal sufficient constant differences between the two.

The latter species has an abundant cell-mass interposed between the tubules; its tube-walls are thin, with not dilated and not contiguous orifices; the two leaves composing the laminæ are not so clearly defined, and not separable, and on vertical sections the vesiculous cell-rows interposed between the tubules, which themselves are also sometimes septate, will distinguish it at once.

The thick tube-walls in the one, and the intertubular cell-mass in the other, will produce on the naked eye a similar impression, which disappears under the magnifier.

This species has likewise much similarity with *Ch. frondosus*, but it is more delicate in all respects, and in *Ch. frondosus* the intertubular tissue is considerably less developed, its tubules being usually in immediate contiguity.

The genus *Callopora* of Hall, comes so near to Chaetetes that it may be well characterized at once, by saying it is a Chaetetes with abundantly developed intertubular cells. *Chaetetes Fletcheri*, (Milne Edw.) for instance, is in all particulars a Callopora.

The opercula, described by Hall in *Callopora elegantula*, are of the same general form as in Chaetetes, but a peculiarity of them is, some five or six

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elevated ridges, radiating on the surface of the opercula, from the margin of the central opening to the outer circumference. In a species of Fistulipora, subsequently to be described, I found opercules of exactly the same structure. Also some species of Callopora, with a spinulose surface, are made known by Hall, which exhibit no esseutial difference from the spinulose species of Chactetes.

The floriform orifices of *Callopora florida*, Hall, and *laminata*, Hall, have been occasionally mentioned before. The same stellate character of the orifices is developed in a species from the carbonifcrous limestone of La Grange, Missouri, (Keokuk Limestone.)

Callopora missouriensis nov. spec.

From an incrusting basal expansion branching nodose stems grow up. Diameter of stems four or five millim., orifices one-eighth of a millim. wide, distant from two to four of their own diameters. Form of the orifices sometimes only slightly sinuose, but in some finely preserved specimens, having the form of a five-rayed star, with a spinula on each of the inward projecting angles.

The intermediate spaces are filled with open angular cells, much smaller than the tubules. In vertical sections the tubes do not exhibit any diaphragms; the intertubular cell mass forms very regular vertical rows, having the appearance of septate tubules.

The genus *Trematopora* Hall, naturally succeeds Callopora. The principal differences from the latter genus are the elevated rims of its tube orifices, and the generally closed interstitial cells, which are less similar to tubules than in Chaetetes, and show decidedly their vesiculous nature. The tube diaphragms are not often developed, but there is no difficulty to find specimens in which their existence can be demonstrated.

Not all species united by Hall in the genus Trematopora properly belong there; for instance, *Trematopora sparsa*, *striata*, and others. On the other side, I think several species ought to be united with it, which are placed in other genera; as *Ceramopora foliacea*, *Diamesopora dichotoma*, etc.

McCoy's species of Fistulipora seems to have exactly the same structure with Trematopora, but McCoy had much less correct ideas of the affinities of his genus than Hall had; the latter expressly states the similarity of Callopora and Trematopora with the Bryozoa, and was only prevented from giving them their proper place by the existing prejudice, that the tubules of Bryozoa never have any diaphragms.

I take Trematopora and Fistulipora as being identical, and will use the name Fistulipora in a more extended sense, applying it to all the species which agree with it in anatomical structure and general surface characters, without to inquire specially at this place, how far a division into some subgenera, would be practicable.

Fistulipora is represented by a considerable number of species, during the whole paleozoic era. A striking feature of nearly all its species are superficial maculæ, analogous to those of Chaetetes; they are of exclusively cellulose structure, and have frequently a subregular stellate form.

A fair representation of these maculæ is given (Arch. du Mus. Tom. v. Tab. 20, f. 5,) in the figure of *Chaetetes Torubiæ*, which itself is, to all appearances, a Fistulipora.

The projecting tube margins of Fistulipora are in most of its species oblique to the surface, although the tubes themselves have generally a rectangular position to it, excepting the smaller ramose forms, and the earlier stadia of growth in laminar expansions, where the tubules are prostrate in the beginning, but soon elevate themselves under an abrupt angle and become rectangular.

The tube orifices are generally circular, or oval, but sometimes sinuate, or even stellate, like those described in Chaetetes and Callopora. Also opercu-

la, of similar structure to those of the former genera, are sometimes noticed in specimens of Fistulipora. The central opening appears to have been closed in some of the opercula by a subsequent solid depositiou; we find, at least in all the perfect opercula, the central portion forming an offset from the surrounding marginal part.

Fistulipora is quite polymorphous; we find its species inerusting, and in free expansions, with orifices on one side only, or in double leaves, with orifices on both sides; they grow in hollow stems, or in strumose cystical form, or in solid ramifications, or in undefined large masses.

One, or several, of these forms are generally significant for a certain species, but I think, in the systematic arrangement of the Bryozoa, too much weight has been given to their external form and to the manner in which they grow.

For further elucidation of my general remarks, I will append the description of a number of species of Fistulipora which are new, or whose anatomy was not *fully recognized before.*

Hellipora (Constellaria) antheloidea,

Is the oldest and at the same time the most marked form of Fistulipora.

Its eireular tubules with projeeting rims, the vesiculous interstitial cell-mass, the monticulose maculæ with a star-like depressed cellulose centre, represent, in ideal perfeetion, the prineipal characters of the genus.

In this place I take occasion to mention a lower silurian fossil, whose nature is only imperfectly known, and which resembles in its structure Fistulipora.

Stromatocerium rugosum Hall.

By its external appearance, it has been generally confused with Stromatopora, but this latter has a widely different structure and belongs to the Petrospongiæ.

Stromatocerium rugosum grows in large subglobose masses with an undulated monticulose surface. Vertical sections show a series of superimposed laminæ, on which the naked eye ean scarcely recognise organized structure; under the magnifier we find it eomposed of small, subparallel, simple tubules, and of a eomparatively coarse vesiculous cell-mass surrounding the tubules. These cell-vesicules are convex above, concave below, spread out in horizontal layers, and not in vertieal rows; the size of the vesicules is very unequal and varies from a half to one millimeter in the horizontal direction, about half as much in the vertical sense.

Diameter of tubules one-sixth of a millimeter; distance between each other about half a millimeter.

The more delicate surface charaeters cannot be recognized, on aceount of the unfavorable state of preservation of the specimens.

According to Hall, it is found in the Black River limestone. My specimens are from Madison, Ind., where it occurs in association with *Favistella stellata*, in the upper strata of the Hudson River group formation. Some of the best specimens, however, I found in the drift deposits of Michigan.

The Clinton group, and, in particular, the Niagara group, contain a good many species of Fistulipora structure—the *Trematoporas* of Hall.

In regard to a few of them, I have to make some remarks.

Trematopora tubulosa of the Clinton group, and *Diamesopora dichotoma* of the Niagara group, combine exactly the same internal strueture with their external similarity of form.

The inner face of their hollow stems is covered by a delicately-wrinkled dermatic crust. Their tubules are arranged in oblique rows, becoming somewhat irregular by the slightly-developed maculæ. The basal portions of the tubules are prostrate, and in immediate contiguity; but, by abruptly bending up to the surface, leave a more or less considerable space between the erected tube ends, which is filled out by cellulose tissue. This cell-mass is generally found homogeneous, and allows no discrimiuation of cells. A

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few specimens, however, may always be found which exhibit with sufficient distinctness the outlines of the tissue vesicules.

Trematopora tubulosa could, for this reason, with propriety, be placed under the genus Diamesopora; but Diamesopora itself, again, so much resembles *Trematopora ossiolata*, that I would rather see the genus Diamesopora given up, by amalgamating its only representative with Trematopora.

The species named by Hall, *Ceramopora foliacea*, is, in all respects, correspondent with the other Trematoporas. It grows in double leaves, which may be separated in two folia, with a dermatic crust on the interior face of the two leaves. Its tubules are, as in the former species, prostrate, and make an abrupt bend to the surface; the inter-tubular cell-mass exhibits its structure with the greatest distinctness.

Diameter of tubules one-sixth of a millimeter. From *Ceramopora imbricata*, the type of the genus, it differs essentially. More natural would have been its combination with *Rhinopora verrucosa*, which has the structure of Fistulipora, and the exterior form in common with it.

In *Rhinopora verrucosa*, the maculæ are represented by elevated, branching and anastomosing ridges, which are lined with tube orifices of somewhat larger size.

Fistulipora neglecta nov. spec.

Convex, undulating, laminar expansions of a few millimeters thickness, with a wrinkled epitheca below. Tubules one-fourth to one-third of a millimeter wide, with quite projecting, oblique, oval orifices, forming a sharp lip on the outer side, and gradually lost in the general surface on the inner side. They are arranged in closely-set subregular rows, which are interrupted by small, little conspicuous maculæ.

Locality. Waldron, Ind, and Rochester, N. Y., in the shales of the Niagara group.

Fistulipora Halli nov. spec.

Undulated, free or incrusting expansions, with a wrinkled epitheca below.

Tubules one-sixth of a millimeter wide, orifices oval, with an abruptly-projecting lip on the outer side, and arranged in subregular rows, which keep a distance of about one tube diameter. Maculæ quite conspicuous, sometimes slightly elevated, of irregular substellate form.

This species has much resemblance to *Ceramopora foliacea*, but it does not grow in double leaves as the latter.

Locality. Waldron, Ind., Rochester and Lockport, in the shales of the Niagara group.

In the upper strata of the Helderberg group, and in the Hamilton group, Fistulipora is represented by numerous species. The smaller ramose forms, which are so frequently met with in the Niagara group, are rarely seen in this horizon; larger laminar expansions, or massive tuberoso-globose forms, prevail here.

Fistulipora lunata nov. spec.

It grows in tortuous thick laminæ, with a wrinkled epithecal crust below, or more frequently in distorted, very irregular masses, consisting of several laminæ, which are grown together with their epithecal sides. The tubules are not angular to the surface, with prostrate basal ends as usual. Size of tubules one-fourth of a millimeter. Orifices with moderately-elevated margins, rotundato-semilunar, with two dent-like projections into the tube cavity at the concave or flattened side, which continue as longitudinal ridges down the cavity of the tubes. Distribution of orifices without any apparent order; distance a little over their own diameter. Tube diaphragms sometimes developed, frequently wanting.

Intertubular tissue coarse-celled; cells arranged in subregular vertical rows.

Surface raised in small rounded monticules, with cellulose maculæ on the vertex; distance from the centre of one monticule to the other about four or five millimeters.

Locality. It is quite common in the limestones of Sandusky, Columbus, and other places, (upper Helderberg group.)

FISTULIPORA HELIOS nov. spec.

A thin laminar expansion encrusting the stem of *Eridophyllum colligatum.* (Heliophyllum, *Dillings.*)

Orifices pustulose, one-sixth of a millimeter wide, distant from each other about two or three tube diameters. Maculæ large, depressed in the centre, from which irradiate depressed cellulose spaces, giving the surface an ornamental appearance, very similar to *Hellipora antheloidea.*

Drift specimen belonging to the corniferous limestone.

FISTULIPORA STELLIFERA nov. spec.

Double leaves separable in two folia; surface raised in low monticules, distant about four millimeters from one centre to another.

Orifices linguiform or irregularly oval, one fourth of a millimeter wide in the larger diameter, surrounded by an elevated rim. A few larger and more projecting orifices are generally noticed on the monticules, from the summits of which narrow, cellulose, bifurcating spaces irradiate. In places to which these cellulose radii do not extend, the orifices are closely approximated.

Locality. Thunder Bay, Lake Huron, in the shales of the Hamilton group.

FISTULIPORA SULCATA nov. sp.

Thin simple lamiuæ, with an epitheca below. Orifices one-fourth of a millimeter wide, irregularly linguiform, surrounded by an elevated margin, closely approximated and disposed without any apparent order. Maculæ having the form of elongate narrow foveæ, which send out some radiating furrows.

Locality. Partridge Point, Thunder Bay, Michigan, in the shales of the Hamilton group.

FISTULIPORA MINUTA nov. sp.

Undulated laminæ, only half a millimeter thick, with an epitheca on the lower side, and raised in low rounded monticules on the upper face.

Tubules one-eighth of a millimeter wide, irregularly oval, distant from each other somewhat more than one tube diameter. Maculæ little conspicuous, on account of the minuteness of the fronds.

Occurs with the former at Partridge Point.

FISTULIPORA ACERVULOSA nov. spec.

Large undulated expansions, from a few millimeters to one centimetre thick, and with an epithecal crust on the lower side.

Surface elevated in monticules of about five millimeters distance. Tubules one-fourth to one-third of a millimeter; of somewhat larger size on the monticules.

Cellulose maculæ only feebly developed.

Orifices rotundate, forming a prominent lip on the exterior side, equally distributed over the surface, holding a distance of a little more than their own diameter. Tube diaphragms distant, frequently wanting. Opercula with a central opening, sometimes developed. Intertubular tissue formed as usual by vertical rows of vesicules.

Locality. Partridge Point, with the former species

FISTULIPORA SPINULIFERA nov. spec.

Grows in branches of two or three centimetres thickness, or also in thick undulated expansions.

Surface monticulose, distance from one monticule to the other three or four millimeters, summits of monticules cellulose. Tubules one-fifth of a

millimeter wide. Surface finely spinulose or granulose, exhibiting seemingly dilated polygonal orifices, but actually it is the luxuriant spinulose intertubular cell mass which forms the polygones, and obscures the tube mouths within its meshes. Occurs with the former species.

FISTULIPORA ERIENSIS nov. sp.

Undulated and distorted laminar expansions one or several millimeters thick, with a wrinkled epitheca below.

Surface spinuloso-granulose, raised in irregular low monticules, with a cellulose macula on the summit.

Intertubular spaces more or less elevated above the small projecting lips of the tube orifices, making the surface appear as if covered by expanded polygonal openings, as in the former species. Tubules one-fifth to one-fourth of a millimeter wide.

This species has much resemblance to *Fistulipora spinulifera*, but it does not grow in massive ramifications; its laminar expansions are more delicate, while, on the contrary, its surface has a coarser texture.

Locality. Shore of Lake Erie, near Hamburg. Shales of the Hamilton group.

FISTULIPORA UTRICULUS nov. spec.

Strumose branching utricules, or irregular cysts, with a dermatic crust covering the inner cavity. Large cellulose maculæ dispersed over the surface. Tubules one-sixth of a millimeter wide. Intertubular spaces and maculæ spinuloso-granulose. Orifices generally surrounded by a shallow depression, from which the tube margin projects under the form of a sharp lip. Distance of orifices about one tube diameter, excepting the cellulose maculæ. The three last-mentioned species are very similar to each other, but, aside of the different manner of growth, each one has some constant smaller peculiarities, which convince me of their specific difference.

Locality. Widder, C. W., in the upper strata of the Hamilton group.

FISTULIPORA CRASSA nov. sp.

Digitato-ramose, or undulated explanate masses, attached to other bodies or partially free, with a concentrically-wrinkled epitheca on the lower side. Surface raised in obtuse monticules, with more or less extended cellulose maculæ on the summits.

Tubules one-third to nearly one-half a millimeter wide, distant from each other one or a little more than one tube diameter, excepting the before-mentioned maculæ.

Orifices rotundate, slightly sinuate, surrounded by an unequally-elevated margin, which exhibits sometimes two dent-like projections into the tube cavity.

Tube diaphragms distant, or not developed. Intertubular tissue coarse. Opercula of usual form, sometimes noticeable.

Locality. Widder, C. W., in the lower strata of the Hamilton group, and in the drift deposits of Michigan.

FISTULIPORA ELEGANS nov. spec.

Thin laminæ, with a concentrically-wrinkled epitheca below.

Tubules one-third of a millimeter wide, prostrate at the base, rectangular to the surface at the upper end. Orifices perfectly circular, with an equally-projecting, crenulated rim distributed over the surface at a distance of about one tube diameter, excepting the cellulose maculæ, which, however, are not very conspicuous. Opercules very frequently preserved, flat, with a central opening, which in some is closed by a subsequently deposited globular solid stopper. In a few specimens, I see six elevated ridges radiate from the inner opening to the outer circumference, exactly as in the opercules of *Callopora elegans*. Intertubular cell-mass coarse, with angular cells as large as the

tubules. In some specimens, which are splendidly preserved, I see the roof of every interstitial cell perforated by a minute opening.

Locality. Shore of Lake Erie, Hamburg. Widder, C. W., in the Hamilton group.

The carboniferous limestone encloses, likewise, a number of interesting representatives of the genus.

Fistulipora Spergenensis nov. sp.

Undulated convexo-concave laminæ, or strumose utricules and cyst, with an epitheca on the inner or inferior side Tubules one-third of a millimeter wide, distant less than their own diameter. Orifices circular, surrounded by an elevated rim, which projects more on the outer side. Many specimens have no elevated tube margius, and exhibit interstitial spaces with open cells; but this is only owing to an imperfect state of preservation, or the effect of detrition. Surface raised in obtuse unequal monticules, with cellulose maculæ in the centre.

Locality. Spergen Hill, Ind. Warsaw Limestoue.

Fistulipora flabellum.

It is fixed to the ground by a prevalently-cellulose, thick basal expansion, consisting of concentrically superimposed layers. From this base, elevates itself a compressed, more or less elongated stem, which finally expands in a thiu fan-like double leaf, fissible in two folia, with a dermatic crust on the inner face of each. This division in two laminæ goes through the whole stem, to the bottom of the basal attachment.

Tubules prostrate at first, and then bending rectangular to the surface. Width one-fifth to one-fourth of a millimeter. Distance of tubules more than one tube diameter, arranged in subregular rows, which are much interrupted by large, not elevated cellulose maculæ. No diaphragms observed. Orifices rounded or obtusely triangular, with a projecting lip, but more frequently not elevated above the surface, and without a lip. Intertubular spaces, if in good preservation, decorated with fine flexuose anastomosing striæ. Cell tissue usually appearing solid homogeneous, but in some better preserved specimens, of distinctly vesiculous structure, as in other Fistuliporas. Iu some specimens, the orifices are closed by slightly depressed opercula with a small opening.

Locality. Spergen Hill. Warsaw Limestone.

This species shows, by its mode of growth, a strong affinity to the group, which includes Ptylodictya, Stictopora, Phænopora, Clathropora, etc., which all do, in elementary structure, correspond with Fistulipora, being composed of tubules of the same configuration, and of an intertubular cellulose tissue. I fiud it strange, that no one describing these different-mentioned genera has stated the cellulose nature of this intertubular substance, although it forms an important and essential part of all these bryozoa.

Fistulipora trifolia nov. spec.

From au incrustiug basal expansion of prevalently-cellulose nature, triangular stems about one centimeter wide, with sharp edges and concave sides, grow up. From the surface of these, uew three-edged folds elevate themselves, aud prolongate into stems, whereby a very peculiar sort of ramification is produced. Each triangular stem is composed of three leaves, grown together with their inner sides, forming a three-edged central suture liue, from which the tubules begin in a prostrate positiou, but soon become rectangular to the surface of their respective leaves.

Surface generally appeariug worn, with not projecting round orifices one-fifth of a millimeter wide. In perfect specimens they are surrounded by an elevated rim. Distance of orifices about two tube diameters. Intertubular spaces where not worn, exhibiting the elevated angular outlines of the cells.

Quite conspicuous, not elevated maculæ are distributed over the surface.
Locality. La Grange, Missouri. (Keokuk Limestone.)

FISTULIPORA COMPRESSA nov. spec.

Occurs associated with the former.

It grows in compressed ramose stems about one centimeter wide in the larger diameter, which are fixed to the ground or to foreign bodies by an irregular basal expansion. Surface raised in obtuse, unequal monticules, with a cellulose macula in the centre of each. Tubes one-sixth of a millimeter wide, of irregular form, distant about a tube diameter or less, and, if the surface is not worn, surrounded by an elevated margin. Structure in conformity with all the other Fistuliporas.

FISTULIPORA PECULIARIS nov. spec.

Is a very interesting representative of stellate or floriform tube orifices in Fistulipora, with whose occurrence in the genera Chaetetes and Collopora we have already become acquainted. It grows in thin leaf-like expansions, with orifices on both sides, or in simple leaves with an epitheca below. Orifices circular, surrounded by an equally-projecting margin, distant more than their own diameter, and exhibiting from six to ten tooth like projections from their inner circumference. By grinding away the superficial portions, the tubules appear still provided with these radial dents, an evidence that they are not spinulose projections confined to the tube margins, but the ends of vertical ridges, running through the whole length of the tubules.

The surface is dotted with scarcely-elevated cellulose maculæ, which, like the narrower intertubular spaces, are finely granulose. Intertubular tissue vesiculose. Tubules rarely septate.

Locality. La Grange, Mo. (Keokuk Limestone.)

Fourth Contribution to the HERPETOLOGY of Tropical America.

BY PROF. E. D. COPE.

1. *The collection made by direction of the Governor of Yucatan, Jose Salazar Starregui, by Arthur Schott, Naturalist of the Commission, and sent to the Smithsonian Institution.*

Cinosternum s h a v i a n u m. *C. mexicanum* Le Conte, Proc. Aead. Nat. Sei. Philada., 1854, p. 180.

Chelopus a r e o l a t u s? Cope, Proc. l. c. 1865, 186. *Emys areolatus* Duméril, Arch. d. Mus., vi. 223.

A large female specimen from Belize, from Dr. Parsons, confirms the characters of that from the expedition, and appears to be distinct from the C. p u n c t u l a r i u s.

Crocodilus m o r e l e t i i A. Duméril, Arch. d. Mus, vi. 255.

Anolis n e b u l o s u s Wiegmann.

One sp. No. 714. Very near the true A. s a l l a e i Gthr.

Anolis l a e v i v e n t r i s Wiegm.

This species is allied to S e h i e d i i Wiegm. (*sericeus* Hallow.) and t r o p i d o g a s t e r Hallow. Several speeimens Nos. 503, 505, 452.

Basiliscus v i t t a t u s. *Corythaeolus* Kaup.

Abundant. A seeond specimen of the allied B. n u e h a l i s Cope, Proc. A. N. S. Philada., 1862, 181, has been sent to the Museum Smithsonian by Robt. Kennicott, from Panama. The B. g a l e r i t u s A. Dum. is the species sinee deseribed by Gray as *B.* (*Ptenosaura*) *seemanni.*