JAMES (J.F.)

Manual of the paleontology of the Cincinnati group pt. II.

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MANUAL OF THE PALEONTOLOGY OF THE CINCINNATI GROUP.

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Part II.

(Continued from Vol. xiv, p. 72).

CŒLENTERATA.

An extensive sub-kingdom, comprising a great variety of forms in both a living and a fossil state; widely scattered over the world and found in all geological formations from the most ancient to the most recent.

It is divided by Nicholson* into two classes, Hydrozoa and Anthozoa, and these again are divided into sub-classes. Both classes are represented by fossils in the Cincinnati group.

The Cœlenterata show a considerable advance over the Protozoa, there being present a simple or divided cavity, which acts as an alimentary tract, and which is sometimes divided into two parts. The body wall consists of two layers, an "ectoderm" or outer skin, and an "endoderm" or inner skin. Between these, an intermediate layer, "mesoderm," is usually developed.

Thread cells, possessed of peculiar stinging powers, are present. They are provided with long lasso-like filaments, that lie coiled up in the cells when at rest, but are shot out rapidly when a necessity arises for their use. The tip of the lasso is furnished with a number of barbs or hooks, by means of which the "sting" is inflicted. A nervous system is generally developed. Reproductive organs are present, but asexual reproduction, (budding or gemmation) also takes place. (See Nicholson, as above, and T. Rymer Jones, "Animal Kingdom," 4th edition, pp. 57–59, for fuller details.)

*Manual of Palentology, vol. 1, 1889, pp. 190–191. I am also indebted to this same author for most of the account of the sub-divisions of this sub-kingdom, which follows.

Class.—Hydrozoa.

This class comprises those Cœlenterates in which the walls of the body enclose a simple undivided cavity. No æsophageal tube is present, but the upper end of the alimentary tract may be prolonged into radiating canals united by a peripheral ring. The reproductive organs are external buds, often developed into specially modified zooids. (Nicholson, Ibid, p. 192.)

The simplest living type is the fresh-water *Hydra*. In this, as in all the other members of the class, the ovum gives rise to a "polypite," often capable of throwing out buds. These generally remain attached to the parent "zooid," and a compound organism is produced. Frequently the zooids are differentiated into two sets; the members of one of these supply the food, while the others act as the reproductive bodies of the colony. These last are termed "gonophores," and may remain attached to or become free from the parent. The colonies are either free or attached by a modified end. The ectoderm frequently secrets a chitinous or calcareous outer layer, that may cover only the fleshy stem or "cœnosarc," or be extended into little cups or "hydrothecæ." When these last are present the body of the polypite is contained within the cup, while the tentacles are protruded from the open end.

But few genera of this class are preserved in a fossil state, though great numbers are now found in the oceans. The bodies are generally soft and illy-adapted for preservation; and although certain of these soft bodied animals (*i. e. Medusæ* or jellyfish) are supposed to have left impressions on the rocks, generally only those secreting a horny, chitinous or calcareous skeleton have been preserved.

Three sub-classes are represented in the Cincinnati Group in Ohio. These are Hydroida, Graptolitoidea and Stromatoporoidea. The features of these sub-classes are given under their respective heads.

Sub-class Hydroida.

A single order, Thecaphora, is represented. The general features are: organism attached or at least capable of attachment; branching and plant-like, consisting of numerous

polypites united by a common stem or "cœnosarc;" outer covering chitinous or corneous, investing the cœnosarc, and prolonged into hydrothecæ.

To this order two genera, generally classed under Graptolites, are referred by Nicholson. They are *Dendrograptus* and *Dictyonema*, and are readily distinguished from each other. In the first the stem is branching and plant-like; in the second it forms a reticulated net-work. The two genera differ mainly from the true Graptolites by having a base for attachment, the typical GRAPTOLITOIDEA lacking this.*

Genus 1.—DENDROGRAPTUS, Hall, 1862.

Fronds simple or aggregate, consisting of a strong footstalk, sometimes furnished below with a distinct root, or root-like bulb, and above variously ramified and divided into numerous branches and branchlets, slightly divergent; the whole thus appears shrub-like; fronds some times flabellate (?); branches celluliferous on one side; cellules appearing sometimes as simple indentations on the surface, sometimes distinctly angular, with conspicuous denticles; substance of stipe and branches corneous; solid or tubular; surface striated; the denticles are sometimes absent from some branches. (Hall, Geol. of Wisconsin, vol. 1, 1862, name only, p. 21. Grap. of Quebec Group. Can. Organic Remains, Decade II, 1865, p. 126; Nicholson, Mon. of Brit. Graptolitidæ, pt. 1, 1872, p. 127. *Buthotrephis* in part. *Psilophyton* in part.)

Remarks.—This genus was first proposed in the Geology of Wisconsin, as noted above, but it does not seem to have been described until 1865, when the "Graptolites of the Quebec Group" was published. It is probable that the species described by Hall as *Buthotrephis gracilis* is really a graptolite, and there is no doubt in the mind of the writer that *Psilophyton gracillimum*, Lesqx., is really one.

1. D. GRACILLIMUM, Lesqx. (sp.) 1877.

"Stem very slender, dichotomously branched, smooth or naked half round, slightly channeled in the length, branches numerous, of various length, filiform." (Am. Phil. Soc.,

*For numerous references and notes in the portion which follows I am indebted to Dr. R. R. Gurley, of the U. S. Fish Commission. He has been engaged for several years past in the study of the group of Graptolites.

Proc., vol. 17, 1877, p. 164, as *Psilophytum gracillimum*, Lesqx.)

Locality.—Cincinnati, in bed of Crawfish creek; Kentucky, in bed of Licking river.

Remarks.—The above species was originally described as a land plant belonging to the genus *Psilophyton* of Dawson. It is, however, associated with marine organisms, and can scarcely be considered as of any other than animal origin. Walcott notes this fact in his paper on "Fossils of the Utica Slate" (advance paper of Albany Institute Trans., vol. 10, 1879, p. 21), where he says: "Their occurrence with algæ, graptolites, trilobites and brachiopods in the same layers of shale, in a position indicating their growth *in situ*, taken with their graptolitic structure, precludes the idea of their being of other than marine origin." The specimens as found at Cincinnati are generally greatly broken up, and occur in a soft, blue clay, with stems of crinoids, brachiopoda, etc. The species greatly resembles *D. tenuiramosus* and *D. simplex*, Walc., from the Utica slate, and *D. gracilis* Hall, from the "Quebec" group. A form of *Buthotrephis* (*B. gracilis* Hall) is also very similar to this, and appears to be distinct from other forms referred to the same species. (See Paleontology of N. York, vols. 1 and 2, 1847, 1852).

2. D. TENUIRAMOSUS, Walcott, 1879.

Stipe slender, compressed; branches bifurcating irregularly, frequently subdividing, terminating in filiform extremities; surface apparently smooth; celluliferous side with smooth, simple, round pits or depressions along the center of the branches; substance corneous, and probably tubular. (Separate from Trans. Albany Insti., vol. 10, 1879, p. 10).

Locality.—Cincinnati, Ohio.

Remarks.—This species was originally described from the Utica slate of New York, but it also occurs in the Cincinnati group. Ulrich gives its horizon as between low water in the Ohio at Cincinnati and 200 feet above. A specimen in the collection of the late Mr. U. P. James shows all the characters of the species. It is closely related to *D. gracillimum* and occurs at about the same horizon at Cincinnati.

Genus 2.—Dictyonema, Hall, 1852.

Fronds circular, flabelliform, funnel-shaped or conical, sometimes arranged in groups composed of radiating branches, which frequently divide, but run nearly parallel with one another; all the branches united by delicate transverse bars or dissepiments; cellules forming distinctly angular denticles, arranged on the sides of the branches in an alternate manner; frond rooted (?); substance corneous. (Palentol. of New York, vol. 2, 1852, p. 174. *Emend.*, Nicholson, Mon. Brit. Graptolitidæ, 1872, p. 129.)

Remarks.—The genus was originally described by Prof. Hall as a coral, the type species occurring in the Niagara Group. Prof. Hall noticed its resemblance to the Graptolites, however, and in 1857 referred the genus to that family.* Only a single species has been recorded from the vicinity of Cincinnati. This has been generally referred to as *D. irregulare*, but Dr. Gurley says it is not that species as it occurs in New York. He places it in the species as given below with the accompanying comments.

1.—D. arbusculum, Ulrich (sp.) 1879.

"Frond small, originating in a single stipe at the base, branching and spreading above; branches varying in size, but narrow, not exceeding two-one-hundredths of an inch in width, with strong, prong-like projections rising from the sides at variable intervals; bifurcations numerous; surface with faint longitudinal or diverging corrugations irregularly distributed; free extremities of branches usually pointed. (Jour. Cin. Soc. Nat. Hist., vol. 2, 1879, p. 28; as *Inocaulis arbuscula.*)

"To this description I add the following from an examination of specimens in the cabinet of the late Mr. U. P. James:

"Specimens consisting of a portion of the network, showing it to be formed principally by the curving toward each other of adjacent branches, dissepiments, however, being present. In consequence of the curvilinear direction of the branches the meshes have a rounded-oblong, or rounded-diamond shape. Branches varying in thickness, but about two-

*In the Rept. Prog. Can. Surv., 1857, p. 142, where *Graptopora*, Salter was noted as a synonym. Hall also records the discovery of hydrothecæ ("cellules") and modifies the original description to include these. (R. R. G.)

one-hundredths of an inch or more. Length several times the breadth, so that the spaces are frequently long and narrow.

"*Locality.*—Covington, Ky., 150 feet above low water in the Ohio River; run emptying into the Little Miami River, near Symmes Station, on the Cincinnati, Washington and Baltimore R. R.

"*Remarks.*—Mr. Ulrich informs me that a study of better material than that upon which his original description was based has convinced him of the identity of three species enumerated in his 'Catalogue of Fossils occurring in the Cincinnati Group,' 1880, p. 6. These are *D. irregulare*, Hall (U. P. James), *Dictyograptus reticulatus*, Ulrich, (named, but not described) and *Inocaulis arbuscula*, Ulrich.

"In the cabinet of the late Mr. U. P. James are two specimens identified by him as *D. irregulare*, Hall. A comparison of these with Mr. Ulrich's figure of *Inocaulis arbuscula* seems to rather favor his views of the identity of the two forms. I may also add that the species is undoubtedly a *Dictyonema*, and it is distinct from the Calciferous form. Specimens of the latter from the type locality show the branches more angularly bent, so the meshes are more nearly rectangular; whereas in the present form the branches are more slender and more roundly curving, thus making the interspaces rounded diamond shape."

In the original description Mr. Ulrich compares his species to *Inocaulis bellus*, H. & W., from the Niagara. J. W. Spencer says (Bull. Mus. Univ., Missouri, No. 1, 1884, p. 13) that it "resembles and is probably a species of *Calyptograptus*," a new genus proposed by himself (Can. Nat., new ser., vol. 8, 1878).

The original description of *D. irregulare*, Hall, is as follows: "Frond spreading, diffuse, branches lax, frequently bifurcating; bifurcations unequal; branches equal to one-half the usual width of the interspaces, or a little less; connecting filaments generally slender, expanding with their junction with the branches. Fenestrules extremely irregular in form and proportions, varying from a width greater than the length, to a length three or four times as great as the width; those with a length and breadth nearly equal, often appear hexagonal. Near the base of the frond the fenestrules are sometimes elongate and triangular. Cellules undetermined.

Surface without distinct organic markings. Branches arranged in the proportion of from 25 to 28 in the space of an inch." (Canadian Organic Remains, Decade II, 1865, p. 136).

Sub-class GRAPTOLITOIDEA.

Hydrozoa, in which the hydrosoma is compound and free, consisting of numerous polypites united by a cœnosarc, the latter being enclosed in a strong tubular polypary, while the former are protected by hydrothecæ. The polypites not separated from the cœnosarc by any partition, and the polypary generally supported by a chitinous rod or solid axis. (Nicholson, Monograph Brit. Grapto., 1872, p. 99. See also for a full explanation of the features of various members of the suborder, Manual of Paleontology, Nicholson, vol. 1, 1889, pp. 210–222).

Remarks.—In this sub-class are included the majority of the Graptolites. The limited number of species known from Cincinnati scarcely justifies an elaborate classification, but the key presented below is perhaps as natural a one as can be given with our present knowledge of the more obscure forms.

Key to Genera.

a. MONOPRIONIDÆ—*i. e.*, polypary with cells on one side only.

1. Graptolithus—Polypary simple and unbranched.

b. DIPRIONIDÆ—*i. e.*, polypary with cells on both sides.

2. Diplograptus—Cell mouths at the end of projecting denticles.

3. Climacograptus—Cell mouths apparently sunk beneath the substance of the stipe.

4. Dicranograptus—Cell mouths as in No. 3; the main stem with cells on both sides; the branches with cells on one side only.

c. MULTIPRIONIDÆ—*i. e.*, with many cells, without definite arrangement.

5. Megalograptus—Cell scattered over polypary, but not on margin.

d. INSERTÆ SEDIS—*i. e.*, of uncertain position.

6. Inocaulis—Cells unknown; branched and rough, generally in groups.

7. Dawsonia—Polypary unknown; ovoid bodies supposed to be ovarian capsules.

Genus 1.—GRAPTOLITHUS, Linn, 1768.

Polypary simple, linear, commencing with a more or less attenuated, generally curved base, and possessing only a single row of cellules on one side; the cellules generally overlap to a greater or less extent, and are never separated by non-polypiferous portions of common canal. (Emend, Nicholson, Mon. Brit. Grap., 1872, p. 101, as *Graptolites*).

Remarks.—Nicholson notes that the above definition does not correspond to the original one of Linnæus, nor to the later definition of Hall. It is made to include, however, those forms that in an adult condition have only a single row of cellules on one side. The two species commonly referred to this genus from the Cincinnati group are *G. gracilis* and *G. subtenuis*. As regards the genus itself Dr. Gurley says:

"*Graptolithus* has practically been abandoned; because, first, it was established for, and as at first defined included, only *inorganic* objects (*Dendrites*, etc.), and second, it has been used for everything until it now means nothing. When used at all by the latest writers, it is in the sense of the *exclusively* Upper Silurian *Monograptus*."

In regard to the form identified as *G. gracilis*, from Cincinnati, Dr. Gurley says: "So far as can be determined from the material I have seen, the specimens identified as *Graptolithus gracilis*, Hall, and *Dendrograptus gracillimum*, Lesqx., seem much alike. I judge, however, from single specimens of each, and these leave much to be desired. The only criteria are the thickness and general aspect of the branches, which seem much the same. This *gracilis* bears no relation to *Stephanograptus gracilis*, from Norman's Kill, New York, which is the only '*Graptolithus gracilis*' Hall described. Better specimens might show different features, but probably that called *G. gracilis* is *Dendrograptus gracillimum*, Lesqx. *Dendrograptus gracilis*, Hall, is, I think, Calciferous, which is strong presumptive evidence against the reference of the Cincinnati form to that species."

In regard to *G. subtenuis*, Hall, and *G. tenuis*, Portlock, Dr. Gurley writes: "Portlock's species is *Monograptus tenuis* of the Upper Silurian. To it has been referred almost every species which was slender and had the thecæ confined to one side. The American species that has been referred to it is

Leptograptus (*Graptolithus*) *sub-tenuis*, Hall (sp). This is a Norman's Kill, New York, form, and I should doubt very strongly its presence in the Cincinnati group. There can be no question whatever as to the distinctness of Portlock's and Hall's species, and I strongly suspect the Cincinnati form is referable to neither."

Upon this authority, therefore, what has been called at Cincinnati *G. gracilis* is referred to *Dendrograptus gracillimum*, (which see *ante*); and *G. sub-tenuis* is dropped altogether.

Genus 2.—Diplograptus, McCoy, 1854.

Polypary composed of two simple, monoprionidian stipes, united back to back, their dorsal walls uniting to form a median septum, along the center of which runs the solid axis; cellules alternating with one another on the two sides of the frond, the cell mouths being situated at the end of projecting denticles; base usually furnished with a radicle, and the solid axis probably always prolonged beyond the distal end of the polypary. (Nicholson, Mon. Brit. Grap., 1872, p. 115).

Remarks.—McCoy's original description of this genus consists of the statement that he restricts *Graptolithus* to those species having cells only on one side. For those with cells on both sides he proposed *Diplograpsus* [now *Diplograptus*]. (Brit. Pal. Foss., 1854, p. 3).

Of the two species commonly referred here, one (*spinulosus*) has been placed in the genus *Glossograptus*. The other (*Whitfieldi*) remains with the genus. Both are, however, here retained in *Diplograptus*, as I can not see the justice of separating the two species. *Glossograptus* was defined as follows: "Column free; thin membranaceous, ligulate, extremities rounded, axis distinct." (Emmons, Amer. Geology, pt. 2, 1856, p. 108).

1.—D. spinulosus, Hall, 1859.

Stipe simple, flat; sides sub-parallel, gradually expanding from the base, which is furnished with several minute setiform radicles; serratures not distinct, the margins sinuous; the principal parts extended into slender, spiniform processes. These spinules are about one-sixteenth of an inch apart. (Paleont. of New York, vol. 3, 1859, p. 517.)

Locality.—Cincinnati, O.

Remarks.—Dr. Gurley remarks that this species is doubtfully distinct from *Glossograptus ciliatus*, Emmons. The description of the latter species is as follows: "Straight linear crenulations faintly developed and prolonged into ciliæ, equal in length to the width of the ligulate body; ciliæ surrounding the whole body or membrane. The axis is prolonged beyond the membrane, forming the column or stem. Length one inch." (Emmons, *loc. cit.*, p. 108).

2.—D. WHITFIELDI, Hall, 1859.

Stipe simple, flat, gradually expanding from the base to near the middle of its length, the upper part gradually narrowing in the direction of the apex, rarely continuing of the same width above the middle; serratures shallow, angular; the upper margin of the denticle short and nearly rectangular to the axis, the lower side twice as long as the upper, the tips furnished with mucronate or short setiform extensions which project in a line with the upper margin of the denticle. Serratures from 22 to 28 in one inch. Length one to one and a half inches. (Paleont. of New York, vol. 3, 1859, p. 516).

Locality.—Cincinnati.

Remarks.—Dr. Gurley says the occurrence of this species at Cincinnati is doubtful, as it, like the previous one, is a "sub-Utica" form in New York. It is also possible, he thinks, that both may be errors for *quadrimucronatus*, Hall, a "Utica" species.

Genus 3.—CLIMACOGRAPTUS, Hall, 1865.

Polypary composed of two simple, monoprionidian stipes united back to back, their dorsal walls coalescing to form a median septum, in the center of which runs a solid axis, the cellules so welded together that their mouths appear as if sunk below the general surface of the polypary; solid axis prolonged beyond the distal extremity of the frond, and usually beyond its proximal extremity as well. (Hall, Grap. Quebec Group. Can. Organic Remains, Decade II, 1867, p. 111. Nicholson, *loc. cit.*, 1872, p. 117).

Remarks.—Though originally described by Hall, the above description is that given by Nicholson. It differs somewhat in terminology from Hall's description, but the characters are the same. Two species of the genus have generally been

credited to the Cincinnati rocks. *C. bicornis* and *C. typicalis.* Dr. Gurley informs me that in New York the former very rarely ranges above the lower Trenton, and that probably the Cincinnati forms heretofore referred to this species should be called *C. typicalis.* The two descriptions are, however, inserted here for comparison.

1.—C. BICORNIS, Hall, 1847.

Stipe linear, elongated, compressed, narrow, gradually widening from the base upwards; one line or less wide; serrated on both sides; serratures slightly oblique; teeth about one-half the width of the stipe, obtuse; axis capillary; base bifurcate, slit extending about one-half way to the axis; about one-half as thick as wide, round on one side, flat on the other, often covered with carbonaceous material. (Pal. of New York, vol. 1, 1847, p. 268, as *Graptolithus bicornis*).

Locality.—Cincinnati (?).

Remarks.—For remarks on this species see under the generic description above.

2.—C. TYPICALIS, Hall, 1865.

Stipe linear, serrated on both sides; orifices sunk beneath the surface of the polypary, transversly oval, or, when flattened, rectangular or slightly oblique and semi-oval; axis filiform, central or sub-central and apparently solid; cellules joined to the axis at the base, the cell partitions consisting of triangular plates, with an unequal arching or convex upper surface, and a concave lower surface; at the base of the cellules and along the entire length of the stipe is a longitudinal depressed line.

Locality.—Cincinnati.

Remarks.—This species, while named by Hall in 1865 in Canadian Organic Remains, (Grap., of Quebec Group,) 1865, p. 57, and explanation of plate A, is not expressly defined by him. Consequently the description above given has been compiled from remarks made in the course of the discussion of *C. bicornis* on pages 29–30. On plate A nine figures of the species are given. Nicholson rather questions the absence of a vertical septum in this species, saying it is certainly present in the type species of the genus, and in all others examined

by him. "If it should be proved," he says, "that such a vertical septum is truly wanting in *C. typicalis*, Hall, a new genus must, I think, be established for its reception." (See Mon. Brit. Grap., 1872, p. 118).

Genus 4.—DICRANOGRAPTUS, Hall, 1865.

Polypary having its proximal portion diprionidian, but dividing distally into two monoprionidian branches, which have cellules on their outer aspect only; cellules so welded together that their mouths appear as if sunk below the general surface of the polypary; solid axis prolonged proximally as a minute radicle, flanked by two minute lateral spines. (Nicholson, Brit. Grap. *loc. cit.*, p. 119).

Remarks.—In this case, as with *Climacograptus typicalis*, no definite description is given by Hall on the original proposal as the name. (Canadian Organic Remains; Grap. of Quebec Group, 1865, p. 112). The description given above is, therefore, taken from Nicholson's Monograph. But one species has been recorded from the Cincinnati group, given below.

1.—D. RAMOSUS, Hall, 1847.

Stipe linear, narrow, about one line wide, compressed, serrated on both sides, except branches; teeth obtuse, distant, somewhat narrowed toward the base, more than one-half the width of the stipe; stipe bifurcating or ramose; branches linear, serrated only on outer margin. (Pal. of New York, vol. 1, 1847, p. 270, as *Graptolithus ramosus*).

Locality.—Cincinnati.

Remarks.—This species, under the name of *Graptolithus ramosus*, is frequently mentioned in Hall's "Graptolites of the Quebec Group." Nicholson also refers to it (Mon. Brit. Grap., 1872), and gives an excellent figure.

Genus 5.—MEGALOGRAPTUS, S. A. Miller, 1874.

Stipe large, cylindrical or sub-cylindrical; surface covered with cells; fronds with spinous processes on the margins; carbonaceous film covering one side. (Cin. Quart. Jour. Science, vol. 1, 1874, p. 343).

Remarks.—This is quite an anomalous genus, being entirely distinct from any other known graptolite. Its position in any system of classification is as yet undetermined. Only one species is known.

1.—M. WELCHI, Miller, 1874.

Surface of polypary smooth, mostly covered with cells immersed in the body of the frond; openings circular, about one thirty-second of an inch in diameter and one-sixteenth of an inch apart; cellules not extending to the edge of the polypary, but ceasing about one-quarter of an inch from the edge; numerous spines borne on the edges of the frond, varying from one-quarter to one-half an inch in length, sharp and sometimes branched; frond divided into sections by transverse constrictions, each section bearing from two to four spines; spines probably originally round, but flattened by compression; whole surface, when well preserved, covered by a black, carbonaceous film, the cell openings only lacking this. (Ibid, pp. 343–346).

Locality.—Clarksville, Clinton County, Ohio.

Remarks.—As noted above, there is only one species in this genus. No one has written upon it except Mr. Miller. In his "North American Geology and Palæontology" (1889), his original figures are reproduced, but no new information is given.

Genus 6.—INOCAULIS, Hall, 1852.

Frond composed of numerous flattened, corneous or scabrous bifurcating stems, having a fibrous or plumose structure. (Pal. of N. Y., vol. 2, 1852, p. 176).

Remarks.—This is also an anomalous genus, and its position in the order is very uncertain. No cellules are known in any species referred to it. In a previous paper (Fucoids of the Cincinnati Group, this JOURNAL, vol. 7, p. 164), by the writer, it is suggested that a form described by Miller and Dyer as *Licrophycus flabellum* should be referred to the present genus. It is evident, however, that this was an error. The species in question is more likely the burrow of an annelid. Only one species has been referred to this genus from the Cincinnati group. It is here referred to the genus *Dictyonema* as *D. arbusculum*, which see (ante).

Genus 7.—DAWSONIA, Nicholson, 1873.

Horny or chitinous capsules of a rounded, oval, conical, or campanulate shape, furnished in most cases with a little spine or mucro, and having a marginal filament exactly resembling the solid axis of a graptolite. The marginal fiber sometimes complete, sometimes ruptured opposite to the mucro. The mucro sometimes apparently wanting, sometimes marginal, sub-marginal, sub-central or central. The surface smooth or concentrically striated. (Annals and Mag. Nat. Hist., 4th ser., vol. 11, 1873, p. 139). *Lockeia*, U. P. James. The Paleontologist, 1879.

Remarks.—The above name was proposed by Dr. Nicholson for certain bodies found associated with graptolites in Scotland and in Canada, which he considered the ovarian capsules of graptolites of different species. The generic name, *Lockeia*, was proposed for similarly shaped bodies found at Cincinnati, and supposed to be the remains of marine plants. There can be no question that the bodies under consideration are not plant remains. Their resemblance to figures and descriptions of *Dawsonia* cause them to be considered as synonymous with that genus. I find, however, that in 1868, Dr. Dawson refers as follows to a species of trilobite. After describing *Microdiscus dawsoni*, Hartt, he says: "Mr. Hartt had originally described this species under the new generic name of *Dawsonia*, but Mr. Billings regards it as a species of *Microdiscus* of Salter." (Acadian Geology, 1868, p. 655). Whether under these circumstances the name *Dawsonia* was pre-occupied by Hartt is a question to be decided by others. In case it be decided in the affirmative, it is evident that *Lockeia* must be used. For the present we shall use *Dawsonia*, Nicholson. The description of *Lockeia* is as follows: Elongated, convex, obtuse or sharp-pointed bodies, seed-like in appearance, slightly attached to the surface of the rock, with or without a longitudinal depression. (The Paleontologist, 1879, p. 17). Only one species is known from these rocks, as given below.

D. SILIQUARIA, U. P. James (sp.) 1879.

Convex, elongated elevations from one-eighth to one-half an inch long, one-half to one and one-half lines broad at base, and one-half to one line high in center; sloping and tapering

to sharp or more or less obtuse ends; rounded or sharply ridged longitudinally; scattered over the surface of the rock

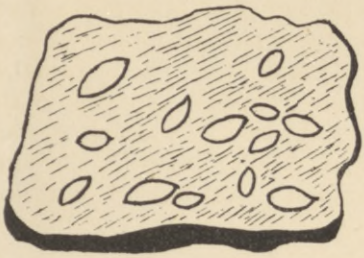

FIG. 7.—*Dawsonia* (*Lockeia*) *siliquaria*. Nat. size. (Original.)

irregularly, sometimes in the form of a star, one in the center and five others placed quite regularly around it with their longer axis pointing inward; again they lie in groups or overlie one another: The specimens have been likened to grains of wheat.

Locality.—Ohio River bank, near Ludlow, Ky., between low and high-water mark.

Remarks.—Placing these bodies with graptolites is, of course, purely conjectural. They do not present any carbonaceous appearance, but from their resemblance to some forms of *Dawsonia*, it seems evident that they belong to that genus, whatever place it may be considered to occupy.

[TO BE CONTINUED.]