DESCRIPTIONS OF NEW SPECIES OF INVERTEBRATE FOSSILS FROM THE CARBONIFEROUS AND UPPER SILURIAN ROCKS OF ILLINOIS AND INDIANA.

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The fossils herein described are a part of an important collection that has been sent to me for study by Mr. William Gurley, of Danville, Illinois, at which locality a large part of the collection was made. Others were obtained by him, and by Mr. William Gibson, from well-known localities, and some new ones, in both the States mentioned in the title. The frequent discovery of new forms and interesting types in districts, the fossils of which have been studied by so many able paleontologists, shows the extraordinary profusion and variety of invertebrate life during paleozoic time, in that great region of which the States of Illinois and Indiana now form a part. Collections of this kind also suggest many important questions to the philosophical paleontologist, which, however, it is not the purpose of the author to discuss in the present paper.

RADIATA.

ACTINOZOA.

Genus **BARYPHYLLUM**, Edwards and Haime.

Baryphyllum fungulus, White.

Corallum depressed, discoid; inferior surface plain, or slightly concave, the principal, as well as some of the secondary septa appearing through the obscurely developed epitheca; periphery moderately sharp, upper or calycular surface gently convex; septal fossett only slightly developed; septa numerous but distinct; the principal septum opposite the septal fossett much stronger than any of the others; the other primary and secondary septa both of about equal strength, sharp upon their edges and slightly sinuous and irregular in their course. The irregular disposition of the secondary septa, peculiar to the genus *Baryphyllum*, is well-marked in this species.

Diameter, 10 mm.; height, $2\frac{1}{2}$ mm.

Only a single example of this species has been discovered,

slight imperfections of which obscure the centre of the under surface and also, in part, the septal fossett.

This species differs conspicuously from *B. Verneuilianum*, Edwards and Haime, the species upon which the genus was founded, and which was obtained from the Devonian of Perry County, Tennessee (see Monog. Polypiers Fossiles des Terr. Paleozoiques), in the much greater number of secondary septa as well as in other details.

Position and locality. Shales of the age of the Niagara Group, township of Waldron, Shelby County, Indiana.

ECHINODERMATA.

Genus PLATYCRINUS, Miller.

Platycrinus Bonoensis, White.

Body of the ordinary cup-shape, moderately deep; base shallow basin-shaped, concave at the middle of the under side, or appearing to be so in consequence of the presence of a moderately broad and strong circular ridge surrounding the central portion, and not extending outward quite to the borders of the base. First radial pieces about as long as wide, having the shape and characteristics of outline usual in cup-shaped bodies of this genus, scarcely more convex than the general convexity of the body; facet for the articulation of the second radial pieces shallow; second radial pieces very small, and transversely subrhombic in outline. Upon the second radial pieces the rays divide into two secondary rays, the first piece of each articulating upon the second radial, but also abutting, in part, upon the upper border of the first radial. The secondary rays consist of two pieces each, upon the uppermost of which they again divide, the outer arms of each division from that point upward continuing simple to the end, while the two inner subdivisions of the ray again divide into two arms each, upon the second piece above first division, beyond which all the arms of the whole ray, six in number, are simple, making 30 arms for the whole body. The arms are moderately slender, comparatively short, and for the first two or three pieces above the last bifurcation they consist of single wedge-shaped pieces; but above that they are made up of the usual double interlocking series of pieces. The only examples yet discovered have their arms so closely folded together that the pinules are hidden from view.

With the arms thus folded the whole animal had an obovate form. The stem, near the body, is moderately strong, and slightly elliptical in outline of transverse section. Surface nearly smooth, or faintly corrugated. The part of the body above the calyx unknown.

Height of body to the top of the first radials, 8 mm.; greatest breadth, 10 mm.; height from the base of the body to the top of the arms, 26 mm.

This species resembles *P. æqualis*, Hall, as figured by Meek and Worthen in Volume V. of the Illinois Geological Reports; but it differs from that species in having the base concave instead of protuberant, in the proportions of the body, the comparative shortness of the arms, and in wanting the peculiar geniculation of the pieces of the double series composing the arms. It resembles *P. lævis*, Miller, as figured by de Koninck and le Hon on plate VI. Recherches sur les Crinoïdes du Terraine Carbonifère de la Belgique, but it differs in having only two, instead of three primary radial pieces to each ray, and also in other details of structure.

Position and locality. Subcarboniferous limestone, probably equivalent with the Keokuk limestone, Bono, Lawrence County, Indiana.

Genus **SCAPHIOCRINUS**, Hall.

Scaphiocrinus Gibsoni, White.

Body of medium size, or comparatively small; calyx roughly cup-shaped; plates moderately thick and protuberant, especially the radials and the first anal; base small, nearly or quite covered by the upper joint of the column; subradial plates comparatively large, tumid; first radials broader, but scarcely larger than the subradials; sutures between the plates of the calyx impressed, especially at the points where the angles meet, and where there is a pit-like depression which increases the tumid appearance of the plates, and gives the calyx a somewhat shrivelled aspect; anal space comparatively large. The postero-lateral rays consist of three pieces, including the first radials, and upon each of the third radials the first bifurcation takes place, and above this the posterior secondary branch only bifurcates, and this third bifurcation takes place on the eighth piece above the second bifurcation; giving five arms for each of the postero-lateral rays, beyond all

the bifurcations. All the pieces of the rays, including those of both the primary and subordinate divisions, have a tendency to become angular upon the back, especially at the upper side. This, together with the apparent corrugation of the calyx and the zigzag articulation of the joints of the arms near their upper ends, gives the whole specimen a good degree of asperity of aspect. Pinules strong and somewhat angular, one arising from each joint of the arms and subordinate divisions of the rays, upon alternate sides. The other rays are not fully known, but they apparently bifurcate in nearly the same manner as the postero-lateral ones. Column moderately large, composed of irregularly alternating larger and smaller pieces. The whole surface of body, arms, and column distinctly granular.

Breadth of body, 7 mm.; height from base to top of first radial pieces, 4 mm.; height from base of body to the top of the arms, 35 mm.

This species resembles *S. æqualis*, Hall, as figured in Vol. V. of the Illinois Geological Survey, more nearly than any other known to me, but it differs from that species in the much greater proportionate length of the arms, as well as their number, and the manner of their bifurcation, besides the difference in the character of the surface. A conspicuous difference is seen in the divisions of the rays; *S. æqualis* having eight arms by the ultimate division of each postero-lateral ray, while the species under discussion has only five. In the former species also, the joints of the upper part of the arms lack that zigzag arrangement that they have in the latter; and the general asperity of aspect of the latter is wanting in the former.

The specific name of this species is given in honor of Mr. William Gibson, from whom I have received many fine fossils for examination.

Position and locality. Subcarboniferous strata, probably equivalent with the Keokuk limestone, Crawfordsville, Indiana.

Mr. Gurley's collection also contains an example from Bono, Lawrence County, Indiana, that seems to belong to this species.

Scaphiocrinus Gurleyi, White.

Body of medium size or somewhat less; calyx roughly cup-shaped; subradial, first anal, and first radial plates prominent, the sutures being deeply impressed; base nearly covered by the

last joint of the column; subradial and first anal plates as large as, or a little larger than, the first radials; the anterior, and the two antero-lateral rays only are known. These rays consist of three pieces each, including the first radials, already mentioned as a part of the calyx, and upon the third one the first bifurcation takes place, each division being once more bifurcated at varying distances from the first. In the anterior ray the second bifurcation takes place upon the eleventh piece from the first. In the antero-lateral rays, the second bifurcation takes place upon the ninth piece of the anterior branch of each of those rays from the first bifurcation, and upon the seventh piece, of the posterior branch. Near the tips of some of the arms there is still another bifurcation, the divisions of which being small, may easily be overlooked, or confounded with the coarse pinules. The pinules are large, long, and angular, each piece of all the divisions of the arms above the first bifurcation of the rays bearing one, which are arranged upon alternate sides. The backs of all the divisions of the rays are rounded, and have little or no tendency to become angular, except perhaps toward the extremity of the arms.

Column composed of irregularly alternating larger and smaller pieces. Surface granular.

Height of body from base to the top of the first radials, 3 mm.; breadth at top of the first radials, 4 mm.; height from base to top of arms, 28 mm.

The calyx of this species closely resembles that of *S. Gibsoni*, especially in the tumidity of the subradial and first anal pieces, and in the character of the column; but it differs very materially from that species in the number of arms and the character of their bifurcations, as well as in the surface markings and other details.

The specific name is given in honor of Mr. William Gurley, its discoverer.

Position and locality. Subcarboniferous strata, probably equivalent with the Keokuk limestone, Crawfordsville, Illinois.

Genus **LEPIDESTHES**, Meek and Worthen.

Lepidesthes Colletti, White.

General form apparently ovate. Interambulacral areas very narrow, linear, slightly convex from side to side, composed of four or five rows of small plates, which rows apparently do not decrease in number, except, perhaps, at either extremity. Ambu-

lacral areas broad, partaking of the convexity of the body, lance-oval in outline, and five or six times as broad as the interambulacral areas are. Ambulacral areas made up of very numerous small rhombic plates, the transverse diameter of which is a little greater than the vertical; their lateral angles moderately acute, and interlocking so that they appear to be arranged in oblique rows; size of the plates nearly uniform throughout the field, except that they all become a little smaller near both the upper and lower extremities of the body. The number of vertical rows of these plates in each field is apparently 18 or 20. Each ambulacral plate has two distinct round pores near each other and near the upper angle of the plate. Surface granules small, more distinct upon the interambulacral than upon the ambulacral plates.

Only one specimen of this species has been discovered, and this is in a crushed condition. The original height was about 45 millimetres, and its transverse diameter probably considerably less.

The crushed condition of the specimen causes some doubt as to the true number of longitudinal rows of interambulacral plates, but they evidently do not exceed five. There seems to be only four rows to each area, one row of comparatively large plates, with two rows of smaller ones on the right-hand side of it and one row on the left. This want of bilateral symmetry suggests the possibility that one row on the left-hand side of the row of large plates has been forced beneath the others by pressure, but a careful examination fails to reveal any evidence of it.

This species is clearly distinguished from *L. Coreyi*, M. and W., the only other known species of the genus, by the very much narrower interambulacral areas, the different and varying proportions of the plates composing the former areas, as well as some other important but less conspicuous differences.

The specific name is given in honor of Hon. John Collett, of Newport, Indiana, whose effective labors in the geology of that State are well known and highly valued.

Position and locality. Subcarboniferous strata, probably equivalent with the Keokuk limestone, Salem, Washington County, Indiana.

MOLLUSCA.

POLYZOA.

Genus **PTILODYCTIA**, Lonsdale.

Ptilodyctia triangulata, White.

Corallum apparently ramose, transverse section triangular, the three sides being either flat or concave, usually the latter, and poriferous; the three edges sharp; the laminar axis consisting of three divisions which end respectively at the three edges, and meet at the centre of the corallum; pores well developed, but not arranged in the regular order that is common in this genus, nor are they bounded by any longitudinal or transverse lines or ridges.

Their mouths are moderately prominent, slightly oval, the direction of the longer diameter subject to no regularity. The breadth of the sides of the corallum varies from 3 to 5 millimetres; full length unknown.

This species differs from typical forms of *Ptilodyctia*, in having three flat or concave sides instead of two convex ones; in the axis being consequently tripartite, and in the irregular disposition of the pores upon the surface.

Position and locality. Coal-measure strata, Danville, Illinois.

CONCHIFERA.

Genus **ASTARTELLA**, Hall.

Astartella Gurleyi, White.

Shell small, not very gibbous, subtetrahedral in outline; anterior end truncated from the beaks obliquely downward and forward to about mid-height of the shell, where the front is sharply rounded to the somewhat broadly rounded base; posterior border broadly convex, and joining both the basal and dorsal margins by more abrupt curves; dorsal margin comparatively short, nearly straight; beaks small, umbones not elevated nor very prominent. An indistinctly defined umbonal ridge extends from each of the umbones to the postero-basal margin, behind which the shell is slightly compressed. Surface marked by concentric furrows, which are separated by sharp linear ridges.

Length of an example of average size among those of the collection, 7 millimetres; height from base to beaks 4½ millimetres.

This species differs from *A. vera*, Hall, with which it is sometimes associated, in its smaller size, in the slight prominence and want of elevation of the umbones, the greater proportional projection of the front beyond the beaks, and in being wider behind than in front, the reverse being the case with *A. vera*. The specific name is given in honor of Mr. William Gurley, in whose collection only I have seen the species.

Position and locality. Coal-measure strata, Danville, Illinois.

Genus **NAUTILUS**, Breynius.

Nautilus Danvillensis, White.

Shell moderately large, umbilicus deep, but not very broad, showing all the volutions; volutions apparently four, increasing rapidly in size, very slightly embracing, subtrihedral in cross section, the two sides of the volution forming two sides of that outline, while the inner side of the volution forms its third side; sides of the volution plain, nearly flat or slightly convex; dorsum very narrow, concave, and marked at either edge, where it joins the side, by a row of longitudinally compressed nodes. The sides are rounded abruptly into the umbilicus, which is unusually deepened by the diameter of the volutions being greater at the inner side than elsewhere. Septa plain, somewhat deeply concave dorso-ventrally, but less so transversely; siphuncle subcentral, a little nearer to the dorsal than the ventral side. Surface smooth, except the ordinary lines of growth and the two rows of dorsal nodes before referred to. Shell thin.

The specimens being imperfect, the exact form of the aperture is not accurately known, but the lines of growth show the lateral margins to have been sigmoid, and the dorsal margin concave. These lines also indicate that the aperture was oblique to the diameter of the plane of the shell, the dorsal portion retreating, and the ventral projecting.

Transverse diameter of a volution of less than full adult size, from edge to edge of the umbilicus, 4 centimetres; dorso-ventral width of its sides, 5 centimetres; breadth of dorsum, 16 millimetres; the full diameter of plane of the largest example discovered, about 13 centimetres.

The narrow concave dorsum, with its two rows of compressed nodes; the plain, flattened sides of the volutions and their great-

est diameter being adjacent to the umbilicus, are characters that distinguish this species from all others known to me.

Position and locality. Coal-measure strata, Danville, Illinois.

ARTICULATA.

VERMES.

Genus SERPULA, Linnæus.

Serpula Insita, White.

Permeating an earthy carbonaceous layer of the coal-measure strata at Newport, Vermilion County, Indiana, are abundant fragments of a very small serpula, which evidently burrowed in the mass when it was in the condition of mud. Also sessile upon the surface of some embedded shells are some nearly perfect examples of the same species. The species of this genus are usually so devoid of characteristics that clearly separate them from each other, that a distinctive diagnosis is difficult or impossible. This species is not likely to be mistaken for any other, in consequence of its very small size, and because no other is known in the rocks of that age in that region. It is named for the convenience of fully classifying all the collections of fossils which are yielded by the rich strata of the coal-measures of Illinois and Indiana, as well as the adjoining States. This species may be characterized as minute, sessile or free, tortuous, subcylindrical.