

DESCRIPTIONS OF NEW WESTERN PALEOZOIC FOSSILS, MAINLY FROM
THE CINCINNATI GROUP OF THE LOWER SILURIAN SERIES OF
OHIO.

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FULL illustrations and descriptions of the fossils described in this paper are in course of preparation for the report of the Ohio Geological Survey, now being prosecuted under the direction of Prof. J. S. Newberry, the State geologist.

RADIATA.

ECHINODERMATA.

HETEROCRINUS EXIGUUS, Meek.

Body small, obconoidal, or tapering from above to the column, near which it becomes pentagonal in consequence of the flattened surface of each of the basal pieces. Sub-basal pieces obsolete, or very minute. Basal pieces (subradials of some) of moderate size, about as wide as long, pentagonal, and almost perfectly flat. Left posterior ray bifurcating first on the fifth piece, the first piece being comparatively large and irregularly hexagonal, in consequence of having a short sloping side on its upper right edge for the reception of one side of the first anal piece; the four succeeding pieces much narrower, about as long as wide, and rounded, and more or less constricted in the middle, with expanded upper and lower ends. Right posterior ray bifurcating first on the eighth piece, the first piece being decidedly smaller than that of the left posterior ray, pentagonal in form, and slightly longer than wide; while the second is of the same breadth but shorter, rounded on the dorsal side, and irregularly pentagonal in form, the fifth angle being formed by a short side on the left above, for the reception of the first anal piece; succeeding pieces about as long as wide or slightly longer, rounded and constricted in the middle, and expanded at the ends. Right anterior lateral ray bifurcating first on the sixth piece, the first piece being distinctly larger than the others, apparently a little longer than wide, and subpentagonal in form; while those above are smaller, and of the

[February 13,

same form as the corresponding pieces of the other rays described. (Other rays unknown.) Arms very long, slender, and bifurcating at least four times at irregular distances above the first divisions of the rays; pieces of the lower divisions generally longer than wide, rounded and constricted in the middle, and expanded at the ends; while those of the smaller terminal divisions are usually from three to four or five times as long as wide, and scarcely expanded at the ends. Surface smooth. Pinnulæ not seen.

First anal piece small, about as long as wide, and, as usual, resting between the superior sloping sides of the first radial on the left, and the second on the right, and bearing three or more others, in direct succession above, that doubtless form a part of the walls of the ventral extension.

Column small, distinctly pentagonal near the base, where it is composed of alternately thin and slightly thicker pieces.

Length of body, to top of the larger radial pieces forming a part of its walls, 0.14 inch; breadth, about 0.12 inch; length of rays and arms above the body, 1 inch; thickness of column near base, about 0.07 inch.

At the same time that I propose to name and describe this delicate little Crinoid as a new species, I suspect that it *may* not be distinct from *H. exilis* of Hall, which has not yet been illustrated, and has, unfortunately, been only briefly described. If Prof. Hall's description is *strictly accurate*, however, in several important characters, the form under consideration must be clearly distinct, as he states that the posterior lateral rays of *H. exilis* bifurcate on the *second* pieces, and the anterior lateral on the *fourth*; while, in the form here described, one of the posterior lateral rays bifurcates first on the *fifth* piece, and the other on the *eighth*; and, in the only one of its anterior lateral rays seen, the first division takes place on the sixth or seventh piece. He also says that the arms of *H. exilis* bifurcate *once* or *twice*, while in our type they bifurcate at least four times above the primary division of each ray. Again, he describes the body plates of *H. exilis* as having the general curve of the body; but in our type the subradial plates are so flattened as to impart a pentagonal form to the lower part of the body.

This species will be at once distinguished from *H. simplex*, by its frequently bifurcating arms and other well-marked characters. From *H. heterodactylus*, which also has its arms several times

divided, it will be readily distinguished by its very differently formed body, its more slender and more frequently divided as well as longer arms, and its more slender column.

Locality and position.—Cincinnati group, 100 feet below tops of hills, at Cincinnati, Ohio. Mr. Dyer's collection.

HETEROCRINUS SUBCRASSUS, M. & W.

Heterocrinus subcrassus, Meek & Worthen, 1865. *Proceed. Acad. Nat. Sci. Philad.*, p. 145; *Illinois Report*, vol. III., p. 325, pl. 4, fig. 5, *a, b, c, d.*

Heterocrinus (Iocrinus) polyxo, Hall, 1866?. Descriptions of some new species of Crinoidea and other fossils, from the Silurian Strata, etc., p. 5; *dated*, Nov. 1866.

A careful comparison shows the proposed species *H. polyxo*, Hall, 1866?, to be in all respects identical with *H. subcrassus*, M. & W., 1865. Prof. Hall places it under a subgenus *Iocrinus*, and, if there be sufficient grounds for so doing, the name of the species, when written in full, would be *Heterocrinus (Iocrinus) subcrassus*.

POTERIOCRINITES (DENDROCRINUS) DYERI, Meek.

Body small, obconic, or tapering regularly to the column from above. Basal pieces longer than wide, the greatest breadth being across between the superior lateral angles; all pentagonal. Subradial pieces a little longer than the basals, longer than wide, and, excepting the one on the anal side (which is largest and heptagonal), all hexagonal. First radials of about the size of the subradials, but proportionally broader, being a little wider than long, with a general pentagonal outline, though all, excepting the one on the right of the anal series, have the superior lateral angles a little truncated; while the second piece in that ray, which, as is usual in the group, corresponds to the first in the other rays, also has these angles truncated. Succeeding radials in all the rays much narrower, about as long as wide, or slightly longer, and numbering from five to six or seven pieces below the first bifurcation. Arms remarkably long and slender, laterally compressed, more or less angular on the dorsal side, and giving off, alternately on opposite sides, at distant intervals above the first bifurcation of each ray, from three to four or more scarcely diverging divisions that are slightly more slender than the arms, from which

[February 13,

they spring, and sometimes themselves bifurcate once or twice; divisions composed of pieces about as long as wide.

First anal piece nearly as large as one of the smaller subradials, resting on the superior truncated edge of the largest heptagonal subradial, between the first radial on the left and the first and second on the right, while it supports others above that form the base of the ventral extension. Interradial pieces with the lowest piece of the ventral part resting between the truncated superior-lateral angles of the first primary radials so as to appear as minute interradians. Surface without costæ or sculpturing of any kind.

Ventral extension very long, or nearly or quite equalling the length of the arms, and as wide as the body below; composed of the usual small hexagonal plates apparently without costæ, and separated by punctured sutures. Column slender, slightly tapering downward just below the base, near which it is more or less pentagonal, and composed of short alternately thicker and exceedingly thin segments. Farther down, it becomes nearly or quite cylindrical, and composed of more uniform very short pieces, with a very small nearly or quite round perforation.

Length of body, from the lower end of base to the top of first primary radials, 0.24 inch; breadth of do., at top, 0.16 inch; length of rays, from top of body to first bifurcation, 0.20 inch; length of arms, above this bifurcation, 2.30 inches; diameter of column, 0.04 to 0.05 inch.

This delicate little species seems to agree exactly, in structure as well as in physiognomy, with *Dendrocrinus*, excepting that it *appears* to have the small pieces forming the lower part of its ventral extension above the first anal piece, and those seen in the interradian spaces above the large first radials that form a part of the walls of the body, connecting laterally with the succeeding smaller radials, nearly or quite up to the first bifurcation. This arrangement, if it really exists, would make these smaller primary radials, above the body proper, as it were, a part of the walls of the body or ventral extension; so that the rays would only become free at the first bifurcation. The specimens seen are not in such condition as to remove all doubts on this point; but, in some conditions, these little pieces between the rays give that part of the fossil somewhat the appearance of a *Glyptocrinus*. The presence of well-developed subradials and a long ventral extension of the 1872.]

body (to say nothing of other differences), remove it, however, at once from that genus, as well as from *Mariacrinus*, from which latter it also differs materially in the structure of its arms and in other important characters. I suspect that it may be found to present sufficiently marked differences in this apparent fusing of the rays, as it were, into the walls of the body, up to the first bifurcation, to entitle it to rank as the type of a new group; but, without better specimens for study and examination, I prefer to refer it provisionally to *Dendrocrinus*, which can scarcely be regarded as more than subgenerically distinct from *Poteriocrinites*.

In general appearance, it seems to resemble most nearly *Dendrocrinus acutidactylus* and *D. gregarius* of Billings. It differs from the first, however, in having a more slender body, with proportionally longer arms, much less diverging at the bifurcations, as well as in having the two branches at each division unequal. From the latter species it also differs in the nature of its arms, as well as in having its column composed of very short pieces not presenting a bead-like appearance.

Locality and position.—Cincinnati group of the Lower Silurian, in the lowest beds seen at Cincinnati, Ohio. The survey is under obligations to Mr. C. B. Dyer, of Cincinnati, for the use of the only known specimens of this species.

POTERIOCRINITES (DENDROCRINUS) CINCINNATIENSIS, Meek.

Body of about median size, obconic, or tapering to the column from above, nearly or quite as wide at the top of the first radials as the height to the same. Base forming a rather rapidly expanding cup, nearly twice as wide as high. Basal pieces of moderate size, wider than high, pentagonal in form, and each provided with a minute notch at the middle of the under side, corresponding to a furrow extending up each side of the column. Subradial pieces about twice as large as the basals, as wide as long or slightly wider, all hexagonal excepting the one on the anal side, which is heptagonal and a little larger than the others. First radial piece in the ray on the right of the anal series a little smaller than the subradials, and pentagonal in form, supporting on its upper truncated edge a rather shorter piece, corresponding to the slightly larger first radials in the other rays, and, like the latter, rounded on the outer side, with a pentagonal outline, and a somewhat narrowed facet above for the reception of the first free

[February 13,

radials. Succeeding or free radials distinctly narrower than those forming a part of the walls of the body, rounded on the dorsal side, and, in the two posterior lateral rays, all shorter than wide, while the fifth one in each of these rays (other rays unknown) is an axillary piece supporting two arms.

First anal piece nearly as large as the subradial upon the upper side of which it rests; connecting on the left with the first radial piece, and on the right with the first and second radials; while it supports others above, forming the base of the ventral extension, which is composed of small pieces strengthened by radiating ribs.

Arms of the two posterior rays rounded, composed of pieces slightly wider than long, and each bifurcating at least twice (and perhaps oftener) at unequal distances above their origin on the last primary radial.

Column of only moderate size for an inch or so below the base, where it is very distinctly pentagonal, the angles being a little rounded, with a rather deep furrow between on each side, composed of short pieces, which near the base seem to alternate with much thinner ones.

Length of body, 0.28 inch; breadth of same, 0.26 inch; thickness of column at its junction with the body, 0.09 inch; breadth of free rays below the first bifurcation, 0.07 inch.

So far as the specimens afford the means of making a comparison, this species would seem to be nearly related to *Poteriocrinus gracilis* of Hall, described in the first vol. of Palæontology of N. Y., p. 84. His diagram and figure, however, do not show whether that species has two of the primary radials of the right posterior ray included as a part of the walls of the body, as in *Dendrocrinus*, or whether it has more properly the structure of *Homocrinus*. He represents the first anal piece, however, proportionally much smaller than it is in our crinoid, while, to the right, and partly beneath the anal piece, he shows in his diagram a small piece that *seems* to occupy the position and relations to other parts of the subanal in true typical *Poteriocrinites*.¹ His speci-

¹ Prof. Hall also ranges it under *Poteriocrinus* in his corrected list of the New York Fossils, published in 1859, after he had proposed the genera *Homocrinus* and *Dendrocrinus*, and included this form in the former group in 1852; from which we may infer that his type has more recently been found to possess the structure of *Poteriocrinites*. In that case, it would of course

men had only a segment or two of the column attached; but an end view of it, in his diagram, represents it as being *round*, while in the form under consideration it is very distinctly pentagonal. As he does not *say* that it differs in the form of the column from his *P. alternatus* (which has a decidedly round column), in pointing out the distinctions between the two, I also infer that it is round in both. In addition to this, *Poteriocrinites gracilis* of Hall is stated by him to be found only at the base of the Trenton limestone, while our crinoid is only known to occur in the middle part of the Cincinnati group. From these facts, and from the usual very restricted vertical range of the species of *Crinoidea*, I infer that our Cincinnati form is specifically distinct from the New York species.

Locality and position.—One hundred feet below tops of hills at Cincinnati, Ohio. Cincinnati group of the Lower Silurian. Mr. C. B. Dyer's collection.

POTERIOCRINUS (DENDROCRINUS) POLYDACTYLUS, Shumard (sp.).

Homoerinus polydactylus, Shumard, 1867. Trans. Acad. St. Louis, vol. I. p. 78, pl. I. fig. 6.

An examination of good specimens of this species shows that it has the structure of the body seen in *Dendrocrinus*, and that it is related to *D. Jewettii* of Billings more nearly than to any other of the species known to the writer.

This is a rather common species in the upper part of the Cincinnati group at Richmond, Indiana.

GLYPTOCRINUS DYERI, Meek.

Body globular-subturbinate, being wider than high, with sides rounding under to the base. Sub-basal pieces obsolete, or, if present, not exposed externally. Basal pieces (subradials of some) very small, and projecting as a thin rim below, much wider than

differ *specifically* from our crinoid; but if either a *Poteriocrinites* proper, or a *Dendrocrinus* (if we view the latter as only a subgenus of *Poteriocrinites*, as Prof. Hall has since done in describing other species), then the name *P. gracilis* could not stand for the New York fossil, because Prof. McCoy had used that specific name for a species of this genus from the Carboniferous rocks in 1844. For this reason, D'Orbigny proposed the name *P. subgracilis* for the New York species, which will have to be retained if it belongs to any mere section of that genus.

[February 13,

high, and presenting a trigonal general outline, though the lateral angles are doubtless minutely truncated. First radial pieces of moderate size, heptagonal in form, and wider than long; second and third a little smaller, the second being hexagonal, and the third pentagonal, and supporting on its superior sloping sides the first divisions of the rays. Secondary radial or supraradial series each composed of from eight to eleven pieces, rapidly diminishing in length upward to the second bifurcation or commencement of the arms, just below which a few of the smaller pieces seem to be free and bear pinnulæ on their inner sides; farther down, the second and fourth secondary radials of each ray give off, alternately on each side, small divisions that do not become free, but are soldered into the interrarial walls, though they can be traced to the summit of the body, where they merely give origin to pinnules.

Anal area a little wider than the interrarial areas. First anal plate of about the same size as the first radials, hexagonal in form, and supporting in the next range three pieces, arranged with the middle one higher than the others; while, above these, three smaller pieces can be seen arranged in the same way in the third range, and three to four or five in the fourth, which is as far up as they can be traced. The middle plates of this series form a direct vertical row, that have a rather prominent mesial, rounded ridge extending all the way up from the middle of the lowest piece, of about the same size as those passing up the primary and secondary radial series, while the other plates on each side and other parts of the lowest pieces are ornamented with radiating costæ of smaller size, like those on the interrarial pieces.

Interrarial areas not excavated below, but becoming moderately concave above; first interrarial pieces of about the size of the second primary radials, hexagonal in form, and supporting two other somewhat smaller pieces in the next range, that bear between their superior sloping sides a fourth smaller piece, while above these there are two pieces in the next range that connect with the pieces of the little lateral divisions of the secondary radials, and perhaps some other small intercalated pieces filling the upper part of the interrarial areas.

Axillary areas flat, and each occupied below by a hexagonal or heptagonal piece of about the size of the second piece of each

secondary radial, while the space above is occupied by several much smaller pieces.

Arms four to each ray, rounded on the dorsal sides, slender, of moderate length, very gradually tapering, simple, and composed of very short, slightly wedge-formed pieces, each of which bears a pinnule at its larger inner lateral end; pinnules slender, rather closely arranged, deeply furrowed on the inner side, and apparently composed of rather long joints.

Surface of body plates all ornamented with distinct radiating costæ, starting from the centre of each piece, and passing one to each of its sides so as to connect with others on each contiguous piece: of these costæ, those passing up the middle of each of the radial series are a little larger and more prominent than those of the interradiial plates, while they bifurcate with the rays so as to send a division up each of the secondary radial series, toward the upper part of which they become more prominent and rounded, being there of about the size of the free arms. Column unknown.

Height of body, 0.60 inch; breadth, about 0.68 inch; length of arms, 1.05 inch; thickness of same, 0.05 inch; number of joints, in a space of 0.10 inch near the base, eight.

This very beautiful species reminds one, by its sculpturing, of the common typical species *G. decadactylus*, from which, however, it may be at once distinguished by its proportionally broader and shorter body, with sides rounding regularly under to the column instead of being obconical. It also has proportionally more slender arms, and differs materially in having, in each secondary radial series, from nine to eleven pieces between the first bifurcation of each ray and the arm bases, instead of only two. In the form of its body, it agrees more nearly with *G. ornatus* of Billings; but it differs materially from that species in having twenty arms instead of only ten, as well as in less important details.

The specific name is given in honor of Mr. C. B. Dyer, of Cincinnati, Ohio, to whom I am indebted for the use of the very fine specimens from which the description was made out.

Locality and position.—Cincinnati group of the Lower Silurian, 100 feet below tops of hills at Cincinnati, Ohio.

GLYPTOCRINUS DYERI, var. **SUBGLOBOSUS**, Meek.

There is, in Mr. Dyer's collection, a specimen showing the whole of the anal side of the body, all the way up, and more or less of

[February 13,

six of the arms, that seems to agree exactly, in structure, ornamentation, and form, with the last, excepting that its body is not quite so rounded below; and it has a more robust appearance, in consequence of having the ridges up the radial and secondary radial series (particularly the latter), as well as that up the middle row of the anal plates, rather decidedly stouter and more prominent. Its arms are also proportionally stouter, and composed of shorter pieces.

This may be specifically distinct from the last; but, with the present means of comparison, I prefer to range it provisionally as a variety of the same, under the name *Glyptocrinus Dyeri*, var. *subglobosus*.

Locality and position.—Same as last.

MOLLUSCA.

POLYZOA.

PTILODICTYA (STICTOPORA) SHAFFERI, Meek.

Polyzoum small and delicate, consisting of slender, compressed divisions, that give off on each side rather closely arranged, regularly alternating, lateral branches of the same breadth as the main stems, from which they diverge at an angle of about forty degrees; lateral branches in the same way giving off on each side very short lobe-like, alternating projections; lateral margins of all parts very narrow, sharp, and minutely striated longitudinally, in well-preserved specimens; pores apparently without raised margins, more or less oval longitudinally, alternately disposed in longitudinal and oblique rows, so as to present a quincuncial arrangement; the number of longitudinal rows varying from five to about seven in the breadth of a stem or branch; spaces between the pores, measuring transversely to the stems and their divisions, about equal to the breadth of the pores, but greater, measuring in the direction of the oblique and longitudinal rows; all the interspaces ornamented, in perfectly preserved specimens, by very minute, more or less waved or flexuous striæ.

Size of entire polyzoum unknown; breadth of stems and branches, 0.05 inch; number of pores in 0.05 inch, measuring in the direction of the oblique rows, about 4 to 6, and, in the same space, measuring longitudinally, from 3 to 4.

1872.]

This very delicate little form will be readily distinguished from the other known Silurian species by its small size and peculiar plumose mode of growth, and particularly by its very minute striæ between the pores. *Stictopora raripora*, Hall, from the Clinton group of New York, is as delicate a form, but differs materially in its mode of growth, and particularly in its very much less numerous pores.

The specific name is given in honor of Mr. D. H. Shaffer, of Cincinnati, Ohio, to whom I am indebted for the use of a very fine specimen of it; I also have good specimens from Mr. Dyer's collection.

Locality and position.—Toward the lower part of the Cincinnati group of the Lower Silurian at Cincinnati, Ohio.

BRACHIOPODA.

RETZIA (TREMATOSPIRA) GRANULIFERA, Meek.

Shell transversely oval, the length being about four-fifths the breadth, moderately convex, the convexity of the two valves being very nearly equal; lateral margins rather narrowly rounded in outline; front and anterior lateral margins broadly rounded, or perhaps the former sometimes straight or slightly sinuous in outline in the middle; cardinal margin nearly straight on each side, and sloping at an angle of about 140° from the beaks toward the lateral extremities. Dorsal valve nearly evenly convex, its greatest prominence being perhaps slightly behind the middle; provided with about thirteen simple, angular, radiating plications or costæ, five of which on the middle are smaller than the others (the middle one being smallest and not continued to the beak), and form together a very low, flattened mesial elevation, scarcely rising above the general convexity; beak rather strongly incurved. Ventral valve of much the same form as the other, excepting that its beak is somewhat more prominent, perforated,¹ and incurved upon that of the other valve; while two of the middle costæ are much smaller than the others, and the first one on each side of these is intermediate in size between the smallest central ones and the largest on the lateral slopes; these four

¹ The immediate point of the beak of the ventral valve seems to be slightly broken in the specimen, though it has the appearance of having been naturally perforated before receiving the slightest injury.

smaller ones being a little depressed so as to form a shallow mesial sinus that is not continued to the beak. Crossing all of these plications of both valves, are numerous fine lines of growth; while the entire surface, as seen under a magnifier, is occupied by minute projecting points, like grains of sand; and, between these, a higher magnifying power shows the whole surface to be very minutely and regularly punctate.

Length, 0.37 inch; breadth, 0.50 inch; convexity, 0.27 inch.

Until the distinctions between the genus *Retzia*, and the proposed genus *Trematospira* (if any exist) are better defined, and the interior of the species here described can be determined, it is not possible to say to which of these groups it most properly belongs.

Specifically, however, it seems to be closely allied to *Trematospira gibbosa* of Hall, from the Hamilton group. Yet it differs, not only in having two to three more plications on each side, but also in having five instead of three a little raised to form the mesial fold of the dorsal valve (the middle one being also much smaller), and four depressed to form the mesial sinus (the middle two being much smaller than the others). It so nearly resembles the New York form, however, that I should almost be inclined to suspect that it might be only a variety of the same species, if it were not found at a so much lower horizon. It must be very rare, as I have only heard of the single typical specimen being found.

Locality and position.—Cincinnati group of the Lower Silurian; from the basal beds at Cincinnati, Ohio. Mr. Dyer's collection.

LAMELLIBRANCHIATA.

AMBONYCHIA (MEGAPTERA¹) ALATA, Meek.

Megapteraa Casei?, James, 1871. Cat. Fossils of Cincinnati Group (not Meek and Worthen).

Shell attaining a moderately large size, subtrigonal in general outline, compressed postero-dorsally, and more convex in the un-

¹ In first proposing the name *Megaptera*, for these great winged species, in 1866, Mr. Worthen and the writer were not aware that this name had been previously used by Dr. Gray for a genus of Whales. Naturalists do not agree in regard to the propriety of retaining the same name for different genera or subgenera in such cases. Where the groups belong to the same 1872.]

bonal and antero-central regions; umbonal slopes ranging at an angle of about fifty degrees below the hinge line, and broadly rounded; hinge line straight, very nearly or quite equalling the greatest antero-posterior diameter of the valves, and ranging nearly at right angles to the anterior side of the same; posterior alation very large, not separated from the swell of the umbonal and central regions by any defined sulcus, slightly rounded at its immediate extremity above; posterior margin faintly sinuous for a little below its intersection with the hinge margin above, thence sloping forward and downward, and finally rounding into the regularly rounded base; anterior side more or less concave, and nearly vertical above, but rounding regularly into the base below; beaks terminal, rather pointed, rising little above the hinge line, and directed a little obliquely upward and forward, with more or less inward curvature.

Surface ornamented by about twenty-four to twenty-eight simple, strong, radiating costæ to each valve, that are nearly equal in breadth to the furrows between; those on the central portions of the valves passing nearly straight from the beaks obliquely to the posterior basal margins, those on the anterior side curving more or less forward below, and those near the cardinal margin curving a little upward behind. Crossing all of these costæ, and the furrows between, are numerous fine crowded lines, and, at regular distant intervals, a few strongly defined imbricating marks of growth that curve parallel to the basal and posterior margins.

Height, 2.30 inches; breadth, 2.20 inches; convexity, about 0.80 inch.

This species was referred by Mr. James, with a mark of doubt, to *Megaptera Casci* of Meek and Worthen; but, after a comparison of these shells, I can find no reason for doubting that they

class, nearly all agree that only the name first given can stand; but, where they belong to different classes or subkingdoms, some would retain both names, while others would change the later name, even where one of the genera belongs to a different class, subkingdom, or kingdom of nature. If it should be thought desirable to substitute another name for this group, as typified by *M. Casci* and the species here described, I would propose to call it *Opisthoptera*. As yet very little is known in regard to the hinge of these shells; and consequently we have not the means of determining whether they should be ranged as a subgenus under *Ambonychia*, or as a distinct genus, though I at present incline to the former opinion.

[February 13,

are really distinct specifically, the *M. Casei* being marked by very numerous alternating larger and smaller radiating striæ, while *M. alata* is ornamented with large, strong radiating ribs. *M. Casei* also differs in having its umbonal slopes distinctly angular, instead of broadly and evenly rounded, as in the species under consideration; while its ventral margin is angular in outline, at the termination of the umbonal ridge, instead of being rounded. Its marks of growth also show that the extremity of its wing was rather acutely pointed, instead of being a little rounded.

Locality and position.—Clinton County, Ohio, in upper part of the Cincinnati group of the Lower Silurian. Mr. James's collection.

MEGAMBONIA JAMESI, Meek.

Megambonia? Spinneri? James, 1871. Cat. Fossils Cincinnati Group, p. 12.
(Not *M. Spinneri*, Hall.)

Shell attaining a rather large size, a little obliquely subovate in general form, rather convex, the most gibbous part being somewhat above and in front of the middle, more or less abruptly cuneate posteriorly and below; basal outline regularly rounded; posterior margin rounding into the base, and ascending with a convex curve and forward inclination to the posterior extremity of the hinge, which is not in the slightest degree alate; anterior margin rounding into the base below, and slightly sinuous under the lobe-like protuberance, or rudimentary wing above, which is convex, slightly more prominent than the margin below, and defined from the swell of the umbonal regions on each side, by an oblique sulcus extending to the hinge margin in front of each beak; hinge equalling about two-thirds the antero-posterior diameter of the valves; beaks rather prominent, or rising distinctly above the hinge line, but slightly oblique, and distinctly incurved; umbonal slopes broadly rounded; longer axis of the valves moderately oblique to the hinge line. Surface ornamented by very regular, rounded, simple, and depressed radiating costæ, a little wider than the furrows between, and numbering about five in a space of 0.30 inch, near the middle of the lower margin.

Height, about 2.05 inches; antero-posterior diameter, 2.16 inches; convexity, 1.50 inch.

The only specimen of this species I have seen is a cast of the exterior, with portions of the ventral and anterior ventral margin. 1872.]

gins broken away. The beak of its right valve projects rather decidedly above that of the left; but I think this is due to accidental displacement of the valves, rather than to any inequality in their size. It shows distinct indications of a well-defined, moderately wide cardinal area, widest under the beaks, and narrowing to the extremities of the hinge.

Mr. James referred this species, in his list of the Cincinnati fossils, with a mark of doubt, to the Lower Helderberg species, *M. Spinneri* of Hall. But, in addition to the rather widely different geological horizons from which these two shells were obtained, they seem to me to differ so materially in form as to be clearly distinct species, even if similarly marked, while the typical specimen of *M. Spinneri* shows no traces of the regular radiating costæ seen on the species here described. It is true that the specimen of that species figured is an internal cast, and ours a cast of the exterior, which might account for the difference of surface characters, but this would not produce the degree of difference in form, obliquity, and general physiognomy. To me, it appears to be much more nearly like the typical species *M. cardiiformis*, from the New York Upper Helderberg limestone, though clearly distinct in having much larger costæ as well as a wider and more defined cardinal area.

The group *Megambonia* of Hall, 1859, seems, so far as yet known, scarcely more than subgenerically distinct from the typical forms of *Cypricardites*; and Mr. Billings thinks it exactly agrees with the group for which he proposed the name *Vanuxemia*, in 1855, and placed as a subgenus under his genus *Cyrtodonta*, 1858, a species of which is the type of Conrad's *Cypricardites*, 1841. If the name *Vanuxemia* should be retained for the type under consideration, and that group placed as a subgenus, then the name of our fossil, when written in full, would be *Cypricardites (Vanuxemia) Jamesi*; but, if *Megambonia* is distinct from *Vanuxemia*, and a subgenus under *Cypricardites*, then its full name would be *Cypricardites (Megambonia) Jamesi*.

Locality and position.—Cincinnati group of the Lower Silurian, at Cincinnati, Ohio, about 350 feet above low-water mark of the Ohio. Collection of Mr. U. P. James's, in honor of whom the species is named.

[February 13,

SEDGWICKIA? FRAGILIS, Meek.

Shell rather small, apparently very thin, longitudinally oblong or suboval, rather distinctly convex along the umbonal slopes from the beaks toward the posterior basal margin, and down near the anterior side, while just under the beaks a rather strongly marked impression descends, widening and deepening as it approaches the base; basal margin subparallel in its general outline to the dorsal, but diverging more or less posteriorly, where it is most prominent and distinctly sinuous toward the front; posterior margin wider than the anterior, and more or less truncated; anterior extremity very short, and rounded or somewhat truncated; hinge line straight, and shorter than the entire length of the valves, apparently very slightly inflected behind the beaks, which are raised a little above the cardinal margin, incurved, contiguous, flattened on the outer sides, and placed near the anterior end, with a slight forward inclination. Surface ornamented with moderately distinct lines and irregular minute wrinkles of growth.

The only specimens of this species yet known to me are too imperfect to afford exact measurement, though they seem to have been, when entire and undistorted, about 0.90 inch in length, 0.73 inch in height, and 0.40 inch in convexity. They present some appearance of having been gaping behind and in the anterior ventral region. One specimen looks as if it had been truncated, with a backward obliquity from below upward behind, but this may be due to distortion.

I am far from being satisfied that this shell is congeneric with the forms for which Prof. McCoy proposed the name *Sedgwickia*, as nothing can be determined from the specimens yet known, in regard to its hinge and muscular and pallial impressions. Possibly it would be nearer right to call it *Modiolopsis fragilis*; but there is something in its physiognomy that suggests affinities to Carboniferous types referred to *Sedgwickia* and *Allorisma*.

Locality and position.—Cincinnati group of the Lower Silurian, at about 350 feet above low-water mark of the Ohio River, at Cincinnati, Ohio. Mr. U. P. James's collection.

SEDGWICKIA? COMPRESSA, Meek.

Anatina sinuata, James, 1871. Catalogue Fossils Cincinnati Group, p. 12.
(Not *Anatina? sinuata*, Hall.)

Shell longitudinally oval, compressed, about one-fourth longer than high, cuneate posteriorly, and more convex in the central and anterior regions, with a slight concavity descending from the beak to the base of each valve; posterior margin regularly rounded; base straight, and parallel to the cardinal margin in the middle, and rounding up to the anterior and posterior margins; anterior side short, rounded or somewhat truncated, but apparently most prominent below; hinge line shorter than the valves, straight behind the beaks, but rounding into the posterior margin at the extremity, erect behind, with some appearance of a narrow space for an external ligament farther forward; beaks about one-fourth the length of the valves from the anterior margin, raised a little above the cardinal margin, nearly contiguous, but not much incurved. Surface of a cast, that seems to be a little weathered or smoothed by attrition, showing obscure marks of growth.

Length, 0.77 inch; height, 0.59 inch; convexity, 0.29 inch.

I have only seen a single specimen of this species; and, as it is a mere cast, not showing clearly even the surface markings, little can be said in regard to its affinities. I am even left in some doubts whether its shorter side may not be the posterior instead of the anterior, as there is some appearance about the points of the beaks of their being rather directed toward the longer than toward the shorter side. The appearance, however, of a narrow space along the cardinal margin on the longer side, as if for an external ligament, seems to indicate that this is the posterior. The margins of the valves on the anterior? (shorter) side are a little defective above in the specimen, so as to leave room for some doubts whether it was regularly rounded in outline or not.

Although the specimens of the last-described species are much distorted, it is evident, I think, that they are quite distinct from this, as it would seem impossible to make this shell assume the shape and convexity of the last by any conceivable degree of distortion.

Mr. James referred this species, in his list, to the Upper Silurian form *Anatina? sinuata*, Hall, which it resembles in form. Still, it seems to me to differ too much in its more elevated beaks,

[February 13,

shorter anterior, and straighter basal outline, to be referred to that species, even if found in rocks of the same age, while the rather wide interval between the horizons at which the two forms occur, renders it still more improbable that they belong to the same species.

It is extremely difficult to arrive at correct conclusions in regard to the generic affinities of such shells, from the study of mere casts, and it is, therefore, only provisionally that I have referred this and the last-described species to the genus *Sedgwickia*. We may rest quite well assured, however, that palæozoic forms of the kind cannot be properly referred to the existing genus *Anatina*.

Locality and position.—Same as last. Mr. James's collection.

SEDGWICKIA (GRAMMYSIA?) NEGLECTA, Meek.

Shell transversely ovate, about one-third longer than high, rather distinctly compressed, most convex and most elevated in the central and umbonal regions, and compressed-cuneate behind; anterior margin rounding from the lower end of the lunule into the base, which forms a nearly semi-oval curve, its most prominent part being near the middle; cardinal margin apparently straight, and declining posteriorly from the beaks; posterior margin rather narrowly rounded; beaks moderately prominent, and scarcely one-third the length of the valves from the anterior margin. Surface ornamented with regular, distinct, but not very prominent concentric costæ, that become suddenly obsolete on the posterior third of the valves. Lunule narrow, but sharply defined.

Length, about 1.04 inch; height, 0.67 inch; convexity, about 0.35 inch.

The only specimen of this species I have seen is an external cast of the right valve, which has evidently been, to some extent, accidentally compressed in the region of the beak, but the shell was certainly never very convex. It has almost exactly the general aspect and kind of ornamentation seen in the typical forms of *Sedgwickia*, a group which, since it was first proposed by Prof. McCoy, has been included by him in his genus *Leptodomus*, which seems to me to have been originally founded on a very distinct type.

Our shell also resembles rather closely some forms apparently

falling into the genus *Grammysia*. That is, some of the species presenting the aspect of that genus, excepting that they want the characteristic oblique ridge of the typical species. Until other specimens can be examined, and more is known in regard to the hinges of *Grammysia* and *Sedgwickia*, as well as that of the shell under consideration, its generic relations cannot be satisfactorily determined.

Locality and position.—Upper part of the Cincinnati group of the Lower Silurian, in Clinton County, Ohio. Mr. James's collection.

DOLABRA? CARINATA, Meek.

Shell small, rhombic-cordate, very convex along the oblique umbonal slopes, posterior margin apparently obliquely truncated; posterior basal extremity more or less angular in outline; basal margin rounding and ascending obliquely forward from the posterior basal angle; anterior side extremely short, or with its margin descending and curving backward into the base from immediately in front of the beaks; hinge line short, and a little inflected so as to form a kind of small area or escutcheon behind the beaks; beaks prominent, rather oblique, nearly terminal, strongly incurved or subspiral, and distinctly compressed antero-posteriorly so as to be sharply keeled on top, the keel being continued as a less angular umbonal ridge backward and downward to the posterior basal extremity; flanks in front of the umbonal ridge evenly convex, while the space above and behind it, near the beaks, is somewhat concave. Surface only showing obscure traces of lines of growth. (Hinge and interior unknown.)

Length, measuring obliquely from the posterior basal angle to the most prominent part of the umbonal keels, 0.65 inch; antero-posterior diameter, measuring parallel to the hinge line (the specimen being defective behind), 0.40 inch; convexity of the united valves, 0.50 inch; length of hinge, about 0.30 inch.

The only specimen of this species I have seen has lost, by erosion, some portions of the posterior margin, so as to leave doubts in regard to its exact outline, though it has the appearance of having been, when entire, more or less truncated behind. The most remarkable features of the species are its prominent subspiral, and very strongly carinated beaks, short hinge, and nearly obsolete anterior side. Its front margins seem to have been a

[March 19,

little gaping; and the posterior side may have been more or less so, though the specimen is not in a condition to show whether this was the case or not.

Although I refer this shell, for the present, provisionally, to *Dolabra* of McCoy, I really have very little idea that it properly belongs to that genus (as typified by *Cucullæa angustata* of Phillips), to which I have in some other cases referred similar shells, the generic relations of which could not be determined. On the contrary, I strongly suspect that it will hereafter be found necessary to establish a new genus for such forms, when specimens showing the hinge can be examined. If so, I would propose for the group the name *Rhynchotropis*, in allusion to the sharply carinated character of the beaks in the typical form now under consideration. The group, whatever name may be retained for it, evidently includes *Dolabra? Sterlingensis* of Meek and Worthen.

Specifically, the form under consideration will be distinguished from *D.? Sterlingensis* by its much smaller size, and more spiral and much more sharply keeled beaks, as well as by its shorter anterior margin. It must be very rare, as I have only seen among all the collections the single typical specimen.

Locality and position.—Cincinnati group, about 175 feet below tops of hills at Cincinnati, Ohio. Mr. Dyer's collection.

CARDIOMORPHA?? OBLIQUATA, Meek.

Shell small, rhombic-cordate, very convex, higher than long; posterior margin sloping rather abruptly, and subtruncate, or a little convex in outline from the posterior extremity of the hinge to the posterior basal extremity, which is more or less angular, or narrowly rounded; basal margin short, nearly straight or a little convex from the posterior basal extremity to the front; anterior margin short or truncated from immediately in front of the beaks obliquely downward and backward to the base, which it joins at an obtuse, slightly rounded angle; hinge line very short, ranging at an angle of about fifty degrees to the umbonal axis, and apparently having its margins a little inflected behind the beaks; beaks very prominent, oblique, nearly or quite terminal, and strongly incurved; posterior umbonal slopes subangular near the points of the beaks, but becoming rounded below, while the dorsal region between this and the hinge is a little concave; anterior umbonal slopes, forming a kind of ridge that extends, at 1872.]

something less than a right angle to the hinge, to the anterior basal margin, the anterior side, thus circumscribed, being somewhat flattened, and, as seen from the front, presenting a cordate outline. Surface ornamented with small, very regular, simple concentric costæ, that seem to be obsolete on the anterior and posterior portions of the valves. (Hinge and interior unknown.)

Length, parallel to the cardinal margin, about 0.45 inch; height, at right angles to hinge, to the tops of the beaks, about 0.45 inch; length, measuring from the points of the beaks obliquely to the posterior basal extremity, 0.57 inch; convexity, 0.39 inch.

I have referred this shell provisionally to *Cardiomorpha*, rather because it seems to present at least as many external points of resemblance to some species of that genus as to any known palæozoic group, than from any strong impression that it really belongs to the same. In some respects, its general physiognomy suggests affinities to the group of secondary shells for which Prof. Agassiz proposed the name *Ceromya*, though I do not think it would fall into that genus. When all of its characters can be determined, it will probably be found to belong to an undescribed genus. If so, I would propose for the group the name *Ceromyopsis*, from its resemblance to some species of *Ceromya*.

Although presenting some points of resemblance to the last-described species, this shell may be distinguished at a glance, not only by its small distinct concentric costæ, but by its much less sharply carinated beaks, and more rounded posterior umbonal slopes, as well as by its flattened anterior side; this flattening imparts a subangular character to its anterior umbonal slopes, not seen in the last.

Locality and position.—Cincinnati group of the Lower Silurian in same bed as the last at Cincinnati, Ohio. Mr. Dyer's collection.

GASTEROPODA.

MACROCHEILUS KLIPPARTI, Meek.

Shell attaining a large size, elongate-fusiform, the length being sometimes from two and a half to three times the breadth; spire pointed at the apex, forming about half the entire length, with its lateral slopes concave above and convex below; volutions six to eight or nine, the upper five or six being very compactly coiled, and forming comparatively but a small part of the entire shell,

[March 19,

while those below suddenly increase in size much more rapidly than the others, particularly in the direction of the longer axis of the shell, and form most of its bulk; these larger turns, in large adult examples, sometimes assuming together a subcylindrical outline; the last or body whorl comparatively long, subcylindrical or more or less oval, and somewhat produced below; suture moderately distinct, almost transverse between the smaller upper turns, but becoming decidedly more oblique below; aperture comparatively small and narrow, apparently subrhombic; inner lip much thickened all the way up; columella twisted so as to form a single prominent fold below the middle of the aperture. Surface nearly smooth, or only showing very obscure lines of growth. (Outer lip unknown.)

Length of one of the largest, most elongated specimens, 2.23 inches; breadth, 0.87 inch; length of aperture, about 1 inch.

This fine species most nearly resembles *M. Newberryi* of Stevens, but may be readily distinguished by its form, the slopes of the upper part of its spire being distinctly concave, and the lower part convex in outline, instead of being evenly and moderately convex all the way down. This peculiarity is caused by the sudden enlargement of the middle and lower volutions, and the greater obliquity of their spiral curve; while, in *M. Newberryi*, the volutions increase in size regularly, and have the same uniform spiral curve from the apex throughout the whole length of the spire. Young examples of the form under consideration are proportionately shorter, the elongation being to a considerable extent produced by the obliquity and prolongation of the last two volutions. These less elongated younger shells, however, will be distinguished from *M. Newberryi* by the concave slopes of their spires, and the greater proportional breadth of their body volutions. This is also a larger and more robust species than *M. Newberryi*.

As none of the specimens yet seen have the outer lip and lower part of the aperture entire, the form of the aperture cannot be made out; and there may even be room for some little doubt whether or not it is, in perfect examples, narrowed and produced into a canal below. If this is the case, the name of the species should be *Soleniscus Klipparti*, as it appears to present very nearly the other characters of the type of that group.

The specific name is given in honor of John H. Klippart, Esq., of Columbus, Ohio, Secretary of the State Agricultural Society, 1872.]

and one of the assistant geologists of the Ohio Survey, who discovered the specimens from which the foregoing description was made out.

Locality and position.—Base of Coal-measures, near Somerset, Perry County, Ohio.

CEPHALOPODA.

ORTHO CERAS ORTONI, Meek.

Shell rather rapidly expanding from the posterior toward the aperture; section oval or more or less nearly circular; septa rather closely arranged; siphuncle lateral, being at one of the narrow ends of the compressed section, but not quite marginal, of comparatively moderate size, and apparently beaded; surface of cast showing traces of regular, obscure, longitudinal ridges, that would probably not have been defined on the exterior of the shell, which is unknown.

I have seen but two specimens of this species, and they are accidentally compressed, and incomplete at both extremities. The more nearly complete one of these specimens is about 2.30 inches in length, and septate throughout. At the larger end, it measures about 1.37 inches in breadth, and only 0.44 inch in its smallest diameter; while, at the smaller end, its greater diameter is 0.38 inch, and its smaller 0.24 inch. It has manifestly, however, been accidentally compressed, more strongly at the larger end, which gives the appearance of more rapid expansion toward the aperture than the natural form. The septa near the larger end are separated by spaces measuring 0.15 inch, and at the smaller end measuring 0.07 inch. At the larger end, the very obscure longitudinal ridges measure each about 0.05 inch in breadth, with furrows of the same breadth between, and both diminish proportionally in size, and become nearly obsolete toward the smaller end.

This species evidently belongs to the section of the genus consisting of rather rapidly expanding shells, with a nearly marginal siphuncle, sometimes showing faint longitudinal ridges on the internal cast, that are not defined on the external surface; such, for instance, as *O. compulsum*, *O. robustum*, *O. indocile*, &c. &c., of Barrande. It resembles several of Dr. Barrande's Bohemian species of this type; but, after repeated comparisons, I have been unable to identify it with any of the numerous species described

[March 19,

by him; and it seems to be equally distinct from all of those described in this country and Canada.

The specific name is given in honor of Prof. Edward Orton, of the Ohio Geological Survey.

Locality and position.—Cincinnati group, at Cincinnati, Ohio. Mr. Dyer's collection.

ARTICULATA.

CRUSTACEA.

CYTHERE CINCINNATIENSIS, Meek.

Carapace-valves varying from transversely suboval to subcircular; moderately and rather evenly convex, the greatest convexity being in the central and anterior regions; without any visible tubercle or nodes; ventral margins rounded or semioval, and but slightly unequal or thickened; anterior and posterior margins more or less rounded, the former being more broadly rounded generally than the latter; hinge margin very short, very slightly sinuous just behind the umbones, and rounding into the posterior margin so as scarcely to produce any visible angularity; umbones, near the anterior, a little tumid, rising very slightly above the hinge, and rounding off regularly into the anterior margin. Surface nearly smooth.

Length of one of the larger nearly circular specimens, 0.21 inch; height, 0.17 inch; convexity, 0.11 inch. Length of a smaller more oval specimen, 0.14 inch; height, 0.08 inch; convexity, 0.07 inch.

This species seems to vary a good deal in form, some specimens being, as the above measurements indicate, proportionally higher, and thus presenting a more rounded outline. It is possible that these forms may belong to two distinct species; but, with the specimens yet accessible for study, I have not felt warranted in separating them.

Locality and position.—Cincinnati group, at Cincinnati, Ohio. Mr. Dyer's collection.

The following interesting Crustacea were discovered by Prof. Frank H. Bradley, of Knoxville, Tennessee, at the base of the Waverley group, at Danville, Kentucky. As the same species will doubtless yet be found at this horizon in Ohio, they are here 1872.]

described along with Ohio fossils, and will be described and illustrated in the report of the geological survey of that State.

CERATIOCARIS (COLPOCARIS) BRADLEYI, Meek.

Carapace-valves rhombic-subelliptic, more than twice as long as high, moderately convex; dorsal margins forming a very broad depressed arch from end to end, ventral margin more deeply arched, the most prominent part being near the middle, along which it is abruptly inflected, while its entire length, owing to the obliquity of the posterior end, is shorter than the dorsal margin; posterior deeply and obliquely sinuous, so as to cause the posterior extremity of the dorsal margin to terminate in an acute, downward curved projection, that extends decidedly farther back than the more obtuse termination of the lower margin; anterior end narrowed, with its margin rounded up from below, so as to connect with the dorsal nearly at right angles above. Surface smooth, but showing, under a magnifier, very minute reticulated markings. Ocular spots wanting.

Length, about 2.75 inches; height, about 1.25 inch.

This species agrees most nearly in size and form with *Ceratiocaris? sinuatus*, Meek and Worthen, from the lower coal-measures of Grundy County, Illinois; and was found by Prof. Bradley, enveloped in exactly the same way, in concretions. It differs, however, in being proportionally narrower in its vertical diameter, with the most prominent part of its basal margin more nearly central. The posterior extremity of its dorsal margin also differs in being more produced and more pointed, as well as more curved downward; while that of its lower margin is proportionally shorter, owing to the obliquity of the deep sinus of the posterior end of the valves. The *C.? sinuatus*, however, belongs evidently to the same group.

On first examining this and the following species, I was at once impressed with the general resemblance of the specimens to the genus *Ceratiocaris* of McCoy. On carefully comparing them, however, with the original typical species of that genus, such as *C. solenoides*, *C. ellipticus*, and the more recently described *C. ornatus* of McCoy, from the Silurian, I observed certain differences that led me to doubt the propriety of referring our species to the same group. Consequently, I sent some of the specimens to Prof. Dana, of New Haven, for examination, and he writes that both

[March 19,

Dr. S. I. Smith, of that city, and himself, concur in the opinion that they do not properly belong to the same genus as the typical forms of *Ceratiocaris*.

The differences to which I have alluded consist, first, in the form of the carapace-valves, which, instead of being truncated, with a nearly straight outline from below forward and upward, are truncated from above forward and downward, with a *profoundly sinuous outline*, the sinus being directed forward and upward, while the posterior extremity of the dorsal margin is produced, pointed, and curved downward. Again, they show a peculiar flexure of the ventral margin, so as to form a kind of linear carina. In the species *Bradleyi*, this margin is always inflected along this line, at an acute angle inward and upward; while in the species *elytroides*, it is less strongly deflected, though the linear carina is equally well defined, and sometimes minutely crenated. This species also shows another minutely crenated, obscurely defined carina below the dorsal margin, and would therefore bear some resemblance to *Dilthyrocaris*, in this respect; but otherwise, particularly in form, its carapace-valves are quite different from those of that type.

It is also worthy of note, that none of the several specimens of these species show any traces of the ocular spot or tubercle, constantly seen in the typical species of *Ceratiocaris*; and that they show a clean, smooth outline to the dorsal margins of the carapace-valves, indicating that they were only united by a membrane; while those of *Ceratiocaris* were supposed by Prof. McCoy to be anchylosed, and rigidly united at a fixed angle along the dorsal margin.

I have no doubt in regard to the importance of some, if not all, of these points of difference, but, knowing how slow many geologists (who are generally far behind zoologists in the discrimination of genera) are to accept such divisions, I have merely distinguished these species for the present, as belonging to a subgenus of *Ceratiocaris*, under the name *Colpocaris*, in allusion to the sinus of the posterior margin.

Locality and position.—Base of the Waverley group, at Danville, Kentucky. Prof. Bradley's collection.

CERATIOCARIS (COLPOCARIS) ELYTROIDES, Meek.

Carapace-valves narrow-subelliptic, about two and a half to three times as long as high, anterior end narrower than the other, and subangular above; dorsal margin gently arcuate from end to end, and terminating behind in a pointed projection that extends a little farther backward than the lower margin, and curves distinctly downward; posterior margin truncated obliquely from above forward and downward, and very deeply sinuous, the sinus being directed a little upward and forward; basal margin most prominent near the middle, and behind this straight, or sometimes very faintly sinuous and ascending to the rather obtusely pointed posterior basal extremity, while from near the middle forward it ascends gradually, at first with slight convexity of outline, and farther forward with a stronger upward curve, until it intersects the dorsal margin above, at a more or less obtuse angle. Surface with an obscure linear, sometimes minutely crenate carina, or raised line along near the lower margin, but not exactly parallel to it (being most remote from it along near the middle), and another similar but more distinctly crenate carina, running along parallel to, and about one-fifth the height of the valves below, the dorsal margin; otherwise appearing to the unassisted eye as if perfectly smooth, but, when examined in a favorable light, by the aid of the highest power that can be conveniently used as a hand magnifier, seen to be very beautifully and minutely striated, the striae being very regular, closely arranged, and more or less divaricating from the carinae.

Length of carapace-valves, 1.25 inches; height, 0.46 inch; convexity of each valve, 0.09 inch.

This species may be readily distinguished from the last, not only by its smaller size, but by its narrower form, and its two minutely crenate longitudinal carinae, and particularly by the different nature of its microscopical sculpturing, that of the last-described species presenting a delicate reticulated appearance, instead of minute hair-lines. The basal margins of its valves, below the carina, are also only a little deflected inward and downward, while in all the specimens of the latter, yet seen, they are abruptly deflected at an acute angle inward and upward.

Locality and position.—Same as last.

[March 19,

CERATIOCARIS (SOLENOCARIS) STRIGATA, Meek.

Carapace-valves narrow, and elongated, rather convex, with length about four times the height; dorsal and ventral margins nearly straight and parallel, anterior extremity very narrowly rounded, being most prominent at the middle; posterior end very obliquely truncated from below backward and upward so as to impart a more or less angular or pointed character to the posterior dorsal extremity, which, however, is not curved. Surface of internal cast showing rather well-defined marks of growth parallel to the margins; while moulds of the exterior show impressions of coarse, more or less anastomosing, longitudinal striæ, that do not curve exactly parallel to the free margins, particularly of the ends. No ocular spot or tubercle visible.

Length, 1.24 inch; height, about 0.30 inch; convexity, about 0.25 inch.

I did not submit this form to Professor Dana, but as it differs quite as materially (though in other respects) from *Ceratiocaris* as those I sent to him do, and as widely, or even more widely, from those I sent than the latter do from *Ceratiocaris* proper, I have ventured to suggest for it at least a subgeneric name, *Solenocaris*. It shows no traces of ocular spots, and merely has the posterior end subtruncated obliquely backward from below, without any traces of a sinus. At a first glance, it looks like the valves of a narrow bivalve mollusk; but its sculpturing is decidedly of crustacean type, being like that of some species of *Ceratiocaris*.

Locality and position.—Same as preceding.

ARCHÆOCARIS VERMIFORMIS, Meek.

The specimens of this fossil yet known are too imperfect to be systematically characterized, but they may be described, in a general way, as follows; the description being intended to apply to a side view of individuals as seen more or less compressed laterally in concretions.

Cephalothorax or head, about equalling the length of the first three and a half of the body segments behind it; subtrigonal in form, being somewhat pointed in front, with the posterior margin wider and obliquely truncated from above backward and downward, so as to give more or less angularity to the posterior basal extremity; basal margin apparently with a kind of ridge or fold 1872.]

along most of its length, and ascending with a slightly convex outline forward so as to meet the dorsal margin, which is more nearly horizontal, at a rather acute angle in front; eyes, if there are any, unknown. Abdomen or body, with the six segments of nearly equal size, and strongly imbricating. Telson apparently as long as three of the abdominal segments, flattened, of moderate breadth anteriorly, and tapering behind. Stylets not clearly seen, but apparently one on each side of the telson; other abdominal appendages unknown. Surface of all parts smooth.

Length of head or cephalothorax, from the anterior to the posterior basal extremities, 0.34 inch; height, 0.18 inch; length of the six body or abdominal segments, 0.51 inch; height, 0.16 inch; length of telson unknown.

In one of the specimens, there is a leg-like appendage, seen in the matrix extending close along under and parallel to the basal margin of the head or cephalothorax. This appendage, or rather what can be seen of it, consists of three joints, two long and one short. The posterior joint, although apparently broken at the posterior end, is 0.13 inch long, and rather stouter than the next in front of it, which is of the same length. The third joint only shows a little of one end, which connects with the anterior end of the forward one of the two longer joints, and is flexed at right angles to the latter, so as to pass under the anterior margin of the cephalothorax. This may possibly be one of the abdominal appendages, bent forward, but it has more the appearance of a stout antenna bent backward. Prof. Dana thinks it most probably the latter.

In regard to the affinities of this type, not much can be said without better specimens for comparison. Prof. Dana suggests, however, that it may possibly have some relations to the recent genus *Cuma*. Being unable to find any defined genus to which it can be properly referred, I propose for its reception a new genus, under the name *Archæocaris*, in allusion to the ancient period of its existence.

Locality and position.—Same as preceding.