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four rows of deep, rounded pores or punctures; the rows increase by implantation as they approach the posterior lateral margins, where they number from six to seven.

The thorax consists of six articulations; axial lobe depressed, convex, narrow, and carrying on each side between the segments two rows of minute punctures; lateral lobes flat, and three times as wide as the central lobe; pleuræ straight, and furrowed on the outer half.

Pygidium small, acutely semi-elliptic, being about four times as wide as long, and broadly rounded in outline behind, with a raised and thickened margin; axial lobe very small, and composed of four obscurely defined segments; lateral lobes each with three segments.

Length of largest known specimen, 6 m. m.; length of cephalic shield, 3.5 m. m.; breadth of do., 7 m. m.; length of thorax, 1.25 m. m.; breadth of do., 4.5 m. m.; length of pygidium, .75 m. m.; breadth of do., 4 m. m.

This pretty little species is related to *T. concentricus*, of Eaton, but may be readily distinguished by its small size, the absence of the long spines from the posterior angles of the shield, and the presence of four rows of punctures on the sides of the middle lobe of the thorax, as well as by the differences in the cephalic shield, which is comparatively much longer, more rounded in front, and not straight, but curved backwards at the base in that species. It might be urged, that the specimens from which the description was drawn, are the young of Eaton's species, but I have compared them with young specimens of *T. concentricus*, and found that the differences stated are constant in both the young and mature stages.

Locality and Position.—Found in the lower part of the Cincinnati Group, back of Covington, Ky., at an elevation of 100 feet above low water mark at Cincinnati.

DESCRIPTION OF A NEW GENUS AND ELEVEN NEW SPECIES OF FOSSILS,

With Remarks upon others well known, from the Cincinnati Group.

By S. A. MILLER.

PTILODICTYA MAGNIFICA, n. sp. (Plate III., fig. 1, natural size, fig. 1a, magnified view.)

[Ety.—*Magnificus*, magnificent.]

This polyzoary consists of a thin, explanate, tuberculated frond, which rapidly and irregularly expands from the neck, that evidently connected it to a flattened base, which was attached to some other object.

The neck is striated longitudinally, terminates with a rounded point, at the base, and is prolonged as a central axis for a distance into the frond. The upper part of the frond possesses no central axis. The lower part of the neck is not celluliferous, farther up small distant cells appear between the striæ, these, as we ascend become larger and more numerous, and finally, when the neck may be said to assume the character of a central axis, the cells upon it are arranged between perpendicular, elevated striæ, into rows, which intersect each other diagonally. These perpendicular striæ, however, do not extend to either side of the axis, nor beyond it.

Both sides of the frond are alike celluliferous and tuberculated. The presence of the tubercles destroys the regularity and diagonal arrangement of the cells, which commence at the top of the neck, and hence they are found, on different parts of the frond, arranged crosswise, more or less sharply diagonal, or curving to accommodate themselves to the irregular order and dispersion of the tubercles. The cell mouths are not uniform in shape, many of them are elliptical or somewhat diamond shaped, others are round or oval. The walls between the cell mouths are moderately thick. The cells will number from eight to twelve in a line. The edges of the frond are sharp and perforated, by the apertures of minute cells, for a short distance from the neck. Above this part, however, the cells appear to preserve their size, almost or quite to the margin.

The tubercles are conical, dispersed without order, and usually about a line distant from each other. The summits are solid, or occupied by very minute cells.

The neck and central axis are each about a half line in diameter; the remainder of the frond, between the tubercles, has only about twice the thickness of ordinary foolscap paper. The specimen figured has a length of 1 6-10 inches, and a width of nearly an inch, but it is not complete either in its length or width. Another specimen, having about the same length, and uniformly expanding from the neck upward for a short distance, has a width of 6-10 inch at the distance of 6-10 inch from the point of the neck; above this, the expansion is not so rapid, and at the distance of an inch, the width has only increased to $\frac{3}{4}$ inch.

The specimen figured is from the collection of Mrs. M. P. Haines, of Richmond, Indiana, and was found in the upper part of the Cincinnati Group. I have collected specimens of the same species, on the tops of the hills, at Cincinnati. The range of the species may, therefore, be considered as co-extensive with the upper half of the Group, though good specimens may be very rare.

Bases of *Ptilodictya*, having nearly the form of bases of *Heterocrinus*, radiately lined from the point of attachment outwards, are frequently

collected, at various elevations, in the Cincinnati Group. There is some difference in the appearance of these bases, but all seem to have the radiating striæ. The striæ, on the neck of this species, evinces, that it was possessed of one of these flattened bases, but we are unable at the present time to determine whether it was one of the coarser or finer lined ones.

PALÆASTER LONGIBRACHIATUS, n. sp. (Plate 3, fig. 4.)

[Ety.—*Longibrachiatus*, having long arms.]

Pentagonal; rays more than twice as long as the diameter of the body, and tapering to an acute point at the apices; breadth of the body between rays, about six tenths of an inch; length of rays, about one and three tenths inches.

The marginal plates are small, spheroidal, very gradually enlarging from the tip of the rays toward the body, and much resembling a string of small beads gradually swelling in size. Thirty-two marginal plates are visible, in the specimen illustrated, on one side of a ray, and a perfect specimen would probably show two or three more. Two marginal plates form the junction of the rays instead of one, as in other species. In this respect, it agrees with *Stenaster*, but the arms show adambulacral plates, for which reason we regard it as a *Palæaster*. The adambulacral plates, toward the point of the rays, are of the same form, but a little larger than the marginal plates; near the body, however, the marginal plates are the largest. No adambulacral piece is visible within four plates of the two junctional pieces. The ambulacral groove is exceedingly narrow.

Dorsal surface and madreporiform tubercle unknown.

The specimen illustrated was found near Clarksville, in the upper part of the Cincinnati Group, and now belongs to the collection of Mr. J. H. Harris, of Waynesville, Ohio.

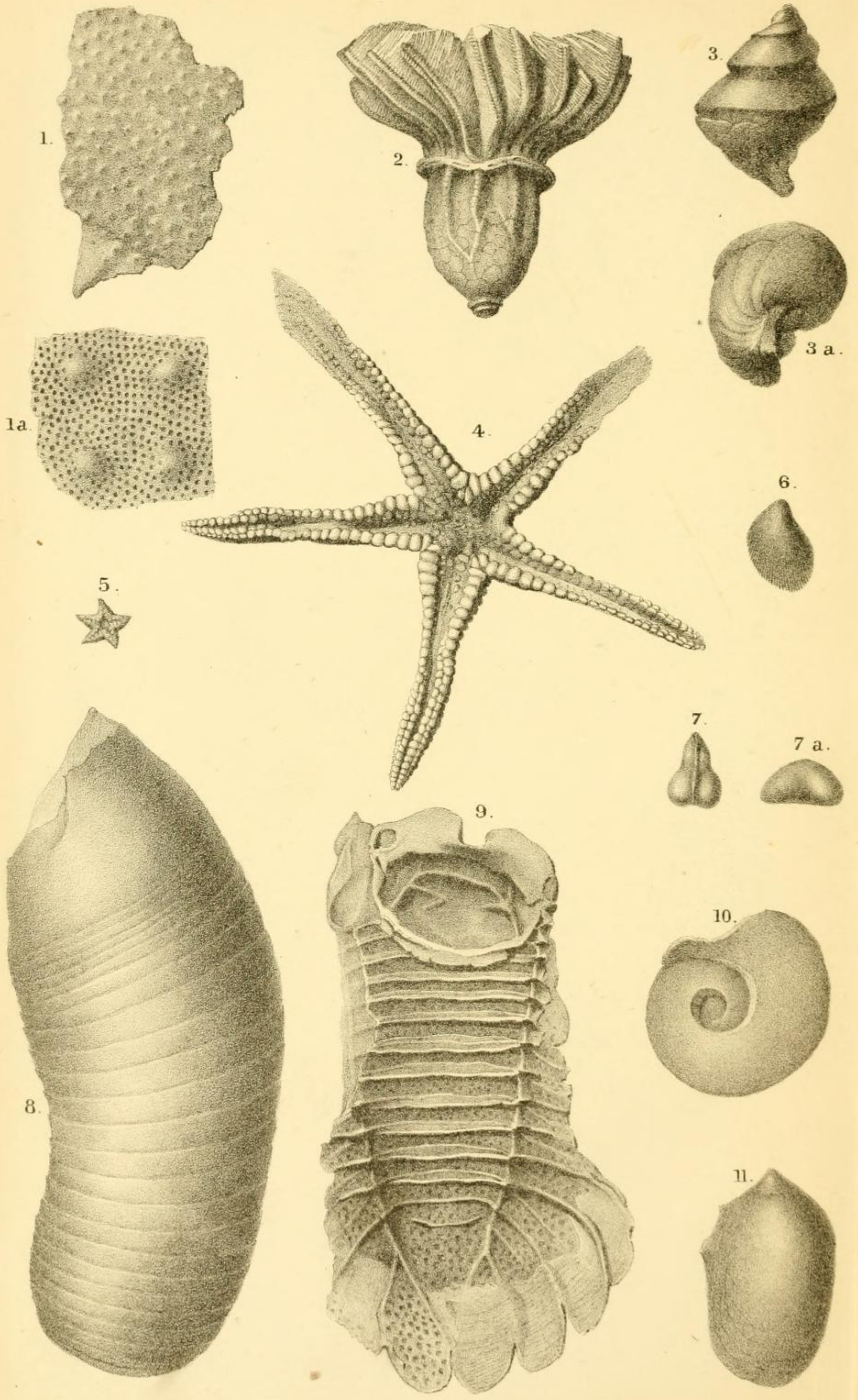
PALÆASTER CLARKEI, n. sp. (Plate III., fig. 5.)

Pentagonal; rays half the length of the diameter of the body, and rapidly tapering to a point. Marginal plates not very distinctly shown in the specimen, but probably do not exceed half a dozen on each side of a ray. Three series of interlocking pieces are shown, upon the dorsal side of each ray, between the marginal plates.

Length of a ray, 1-15th of an inch; diameter of the body, 2-15ths of an inch; and greatest distance from the apex of one ray to that of another, 4-15ths of an inch.

The madreporiform tubercle and ventral side unknown.

This very small *Palæaster* was found on Vine street Hill, in Cincin-



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four rows of deep, rounded pores or punctures: the rows increase in
implantation as they approach the posterior-lateral margins, where
they number from six to seven.

The thorax consists of six articulations; axial lobe depressed, concave,
narrow, and carrying on each side between the segments two rows
of minute punctures; lateral lobes flat, and three times as wide as the
central lobe; pleurae straight, and furrowed on the outer half.

Pygidium small, acutely semi-elliptic, being about four times as wide
as long, and broadly rounded in outline behind, with a raised and
thickened margin; axial lobe very small, and composed of four ob-
scurely defined segments; lateral lobes each with three segments.

Length of largest known specimen, 6 m. m. ; length of cephalic shield,
3.5 m. m. ; breadth of do., 7 m. m. ; length of thorax, 1.25 m. m. ; breadth
of do., 4.5 m. m. ; length of pygidium, .75 m. m. ; breadth of do., 4 m. m.

This pretty little species is related to *T. concentricus*, of Eaton, but
may be readily distinguished by its small size, the absence of the long
spines from the posterior angles of the shield, and the presence of four
rows of punctures on the sides of the middle lobe of the thorax, as well
as by the differences in the cephalic shield, which is comparatively

much longer, more rounded in front, and not straight, but curved backwards at the base in that species. It might be urged, that the specimens from which the description was drawn, are the young of Eaton's species, but I have compared them with young specimens of *T. concentricus*, and found that the differences stated are constant in both the young and mature stages.

Locality and Position. — Found in the lower part of the Cincinnati Group, back of Covington, Ky., at an elevation of 100 feet above low water mark at Cincinnati.

DESCRIPTION OF A NEW GENUS AND ELEVEN NEW

SPECIES OF FOSSILS,

With Remarks upon others well known, from the Cincinnati Group.

By S. A. Miller.

Ptilodictya magnifica, n. sp. (Plate III., fig. 1, natural size, fig. 1«,

magnified view.)

[&—Magnificm, magnificent.]

This polyzoar¹ consists of a thin, explanate, tuberculated frond, which rapidly and irregularly expands from the neck, that evidently connected it to a flattened base, which was attached to some other object.

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Description of a yew Genus and Eleven New Species. 101

The neck is striated longitudinally, terminates with a rounded point, at the base, and is prolonged as a central axis for a distance into the frond. The upper part of the frond possesses no central axis. The lower part of the neck is not celluliferous, farther up small distant cells appear between the striae, these, as we ascend become larger and more numerous, and finally, when the neck may be said to assume the character of a central axis, the cells upon it are arranged between perpendicular, elevated striae, into rows, which intersect each other diagonally. These perpendicular striae, however, do not extend to either side of the axis, nor beyond it.

Both sides of the frond are alike celluliferous and tuberculated. The presence of the tubercles destroys the regularity and diagonal arrangement of the cells, which commence at the top of the neck, and hence they are found, on different parts of the frond, arranged crosswise, more or less sharply diagonal, or curving to accommodate themselves to the irregular order and dispersion of the tubercles. The cell mouths are not uniform in shape, many of them are elliptical or somewhat diamond shaped, others are round or oval. The walls between the cell mouths are moderately thick. The cells will number from eight to twelve in a line. The edges of the frond are sharp and perforated, by the apertures of minute cells, for a short distance from the neck. Above this part, however, the cells appear to preserve their

size, almost or quite to the margin.

The tubercles are conical, dispersed without order, and usually about a line distant from each other. The summits are solid, or occupied by very minute cells.

The neck and central axis are each about a half line in diameter; the remainder of the frond, between the tubercles, has only about twice the thickness of ordinary foolscap paper. The specimen figured has a length of 1 6-10 inches, and a width of nearly an inch, but it is not complete either in its length or width. Another specimen, having about the same length, and uniformly expanding from the neck upward for a short distance, has a width of 6-10 inch at the distance of 6-10 inch from the point of the neck; above this, the expansion is not so rapid, and at the distance of an inch, the width has only increased to f inch.

The specimen figured is from the collection of Mrs. M. P. Haines, of Richmond, Indiana, and was found in the upper part of the Cincinnati Group. I have collected specimens of the same species, on the tops of the hills, at Cincinnati. The range of the species may, therefore, be considered as co-extensive with the upper half of the Group, though good specimens may be very rare.

Bases of *Ptilodictya*, having nearly the form of bases of *Heteroaimcs*[^] radiately lined from the point of attachment outwards, are frequently

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collected, at various elevations, in the Cincinnati Group. There is some difference in the appearance of these bases, but all seem to have the radiating striae. The striae, on the neck of this species, evinces, that it was possessed of one of these flattened bases, but we are unable at the present time to determine whether it was one of the coarser or finer lined ones.

Palæaster longibrachiatds, n. sp. (Plate 3, fig. 4.)

[Ety.—from *palæo*, having long arms -1

Pentagonal; rays more than twice as long as the diameter of the body, and tapering to an acute point at the apices; breadth of the body between rays, about six tenths of an inch; length of rays, about one and three tenths inches.

The marginal plates are small, spheroidal, very gradually enlarging from the tip of the rays toward the body and much resembling a string of small beads gradually swelling in size. Thirteen marginal plates are visible, in the specimen illustrated, on one side of a ray, and a perfect specimen would probably show two or three more. Two marginal plates form the junction of the rays instead of one, as in other species. In this respect, it agrees with *Stenuster*, but the arms show ambulacral plates, for which reason we regard it as a *Palæoas-*

ter. The adambulacral plates, toward the point of the rays, are of the same form, but a little larger than the marginal plates; near the body, however, the marginal plates are the largest. No adambulacral piece is visible within four plates of the two junctional pieces. The ambulacral groove is exceedingly narrow.

Dorsal surface and madreporiform tubercle unknown.

The specimen illustrated was found near Clarksville, in the upper part of the Cincinnati Group, and now belongs to the collection of Mr. J. H. Harris, of Waynesville, Ohio.

Palicaster clarkei, n. sp. (Plate III., fig. 5.)

Pentagonal; rays half the length of the diameter of the body, and rapidly tapering to a point. Marginal plates not very distinctly shown in the specimen, but probably do not exceed half a dozen on each side of a ray. Three series of interlocking pieces are shown, upon the dorsal side of each ray, between the marginal plates.

Length of a ray, 1-loth of an inch; diameter of the body $\frac{2}{3}$ loths of an inch; and greatest distance from the apex of one ray to that of another, 4-15ths of an inch.

The madreporiform tubercle and ventral side unknown.

This very small Palicaster was found on Vine street 1111, in Cincinnati.

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