NEW SPECIES OF DEVONIAN FOSSILS FROM WESTERN ILLINOIS

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The Devonian limestones of Rock Island County, Illinois, were deposited in a basin that was connected northwestward with the Arctic Ocean, and are said to belong to the northern or Interior Continental province. They are an eastward continuation of the Devonian limestones of eastern Iowa, with which they entirely correspond. These limestones in Iowa were described by Owen[1] in 1852 as "The limestones along Cedar Valley[1]", and he considered them equivalent to the upper Helderberg (Onondaga) and Hamilton formations of the New York section.

James Hall[2] in 1858 also referred the Devonian limestones in Iowa to the upper Helderberg (Onondaga) and Hamilton formations.

In a report on the Geology of Iowa in 1870 White[3] assigned all of the Devonian limestones of Iowa to the Hamilton formation, under which name the strata were described.

Three years later Hall and Whitfield[4] restudied the Devonian Limestones of Iowa and correlated the limestone in the vicinity of Waterloo with the upper Helderberg (Onondaga); the white limestone near Raymond with the Schoharie; and the limestones at Waverly and Independence with the Hamilton of New York.

In 1878 Calvin[5] referred the Devonian limestones in eastern Iowa to the Hamilton formation.

Barris,[6] who had studied the Devonian limestones in the vicinity of Davenport and Rock Island, reported one or more unconformities in those beds and considered the upper limestones of that region equivalent to the Hamilton of New York, and the earlier Devonian limestones to the upper Helderberg (Onondaga).

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1 Owen, D. D., Rept. Geol. Surv. Wis., Iowa and Minn., pp. 77-89, 1852.
2 Hall, James., Geol. of Iowa, Vol. I, pt. I, pp. 81-88, 1858.
3 White, C. A., Geol. of Iowa, Vol. I, p. 109, 1870.
4 Hall, James and Whitfield, R. P., 23rd. Ann. Rept. of Regents of N. Y. State Cabinet, pp. 223-226, 1873.
5 Calvin, Samuel, Am. Jour. of Science, 3rd ser. Vol. 15, pp. 460-462.
6 Barris, James, Proc. Davenport, Acad. of Science, Vol. 2, pp. 261-269 and 282-288, 1870.

In volume I. of the reports on the Geological Survey of Illinois Worthen[7] referred the Devonian limestones of Rock Island County, Illinois, to both the upper Helderberg (Onondaga) and the Hamilton formations. In discussing the Geology of northeastern Iowa in 1891 MaGee[8] considered the Devonian limestones as a unit and revived the name "Cedar Valley limestones" applied by Owen to these strata more than 40 years before. MaGee proposed to distinguish the lower, brecciated member of these limestones as the "Fayette breccia" from the town of Fayette, Iowa, where they are well exposed.

The same year Calvin[9] gave the name Gyroceras beds to the strata a few feet in thickness lying immediately above the brecciated limestones containing many Gyroceroid shells.

In 1895 Norton[10] proposed the name Wapsipinicon limestone for the Devonian strata included in the Fayette breccia of MaGee, and the Gyroceras beds of Calvin, from the Wapsipinicon River in eastern Iowa where these rocks are well exposed. He restricted the name Cedar Valley limestone to the more shaly and very fossiliferous strata, that occur above the Gyroceras beds in eastern Iowa. Norton[11] also divided the Wapsipinicon limestone into the following members: Otis beds at the base; Kenwood shale; Lower Davenport limestone, equivalent to the Fayette breccia of MaGee; and Upper Davenport limestone, corresponding to the Gyroceras beds of Calvin. This classification has generally been followed by the Iowa Geological survey. Weller[12] has considered the Wapsipinicon limestone of Iowa in the main equivalent in time to the later Hamilton of the New York section and the Cedar Valley limestone about contemporaneous with the Portage group of New York.

The writer[13] has recently correlated all of the Cedar Valley and Wapsipinicon limestones of Iowa and Illinois about

7 Worthen, A. H., Geol. Surv. of Illinois, Vol. 1, p. 120, 1866.
8 MaGee, W. J., Eleventh Ann. Rept. U. S. Geol. Surv., p. 319, 1891.
9 Calvin, Samuel, Am. Geologist, Vol. VIII, p. 142, 1891.
10 Norton, W. H., Iowa Geol. Surv., Vol. IV, p. 155, 1895.
11 Norton, W. H., Proc. Iowa Acad. of Science, Vol. I. pt. 4, pp. 22-24, 1893.
12 Weller, Stuart, Outlines of Geological History with Especial Reference to North Am., p. 101, 1910.
13 Savage, T. E., Devonian Formations in Illinois, Am. Jour. of Science, 4th Ser., Vol. 49, Mch., pp. 181 and 182, 1920.

with the Tully limestone of the New York section. The Wapsipinicon and Cedar Valley limestones are both present in Rock Island County, Illinois, and the following members of the Wapsipinicon limestone are recognized in that region: Otis beds; Lower Davenport limestone; and Upper Davenport limestone.

WAPSIPINICON LIMESTONE

The Otis Beds outcrop on Campbell's Island in the Mississippi River above Moline, and a few low exposures occur in the Illinois bank of the River in that vicinity. This is gray to dark non-magnesian limestone, commonly rather fine grained, and somewhat irregularly bedded. The thickness does not exceed 15 or 20 feet. It is succeeded in this region by the Lower Davenport limestone without any trace of the Kenwood Shale. The Lower Davenport member consists of strongly brecciated nonfossiliferous limestone, the fragments of which are gray to dark, fine grained, and show fine laminations on weathered surfaces. The matrix is also fine grained, but is somewhat lighter in color. This brecciated limestone is exposed in the Government Island at Rock Island, and is the horizon formerly quarried in Rock Island and Moline. The Lower Davenport limestone is overlain in apparent conformity by the Upper Davenport member which is composed of gray, granular, subcrystalline limestone, in irregular layers from a few to twelve inches or more in thickness, and contains several fossils, among which Phillipsastrea billingsi, Diplophyllum major, Schizophoria macfarlanei, Gypidula comis, and several Cephalopod species are characteristic. This member is well exposed in the vicinity of Sears and Milan.

CEDAR VALLEY LIMESTONE

The Cedar Valley limestones are commonly more shaly, more evenly beaded, and more richly fossiliferous than those of the Wapsipinicon which they succeed without any sedimentary break. They outcrop in the banks of Mill Creek, and farther west along several of the creeks both east and west of Andalusia. These limestones are commonly rather thin bedded, shaly and obliquely jointed in the lower part.

The Acervularia coral reef is near the middle, above which the layers are mostly limestone or dolomite. The total thickness of the formation is nearly 70 feet.

The general succession and relations of the Devonian rocks in Rock Island county are shown in the following section:

Generalized section of the Devonian rocks in the vicinity of Rock Island, Illinois:

		Feet
CEDAR VALLEY LIMESTONE.		
10.	Dolomite, yellowish-gray to brown, in layers 6 to 24 inches thick, alternating with thinner partings of shale, containing many stromatoporoids and other fossils. Exposed along the creeks both east and west of Andalusia	20
9.	Limestone, thin bedded, gray, with partings of shale, containing many stromatoporoids, Stropheodonta demissa, Schizophoria iowensis, Athyris fultonensis, Atrypa reticularis (large shells), Gomphoceras cf. ajax, and other fossils. Exposed near the mouths of a few streams near Andalusia	4
8.	Dolomite, yellowish-gray, in layers 12 inches or less, containing Cystodictya hamiltonesis, Athyris fultonensis, Spirifer asper, S. subvaricosus, Cyrtina hamiltonensis, small shells of Atrypa reticularis and other fossils	6
7.	Limestone, the upper 1½ feet the Acervularia davidsoni coral reef. The lower part is an organic breccia which in places projects by intersecting vertical plates into the underlying layer. Exposed in the bank of the river below Andalusia, and in the bank of Mill Creek near the center of Section 25, T. 17 N. R. 2 W.	8
6.	Limestone, impure, bluish-gray, crinoidal, thin bedded, containing Cladopora iowensis, Megistocrinus latus, Chonetes scitulus, Leptostrophia perplana, Spirifer asper, S. iowensis, S. subvaricosus, Cyrtina umbonata, and other fossils. Exposed at the most of the localities where the overlying coral reef outcrops	5
5.	Limestone, blue, argillaceous, fine grained, with very oblique and prominent jointing. Containing Spirifer iowensis, S. subvaricosus, Cyrtina umbonata, Atrypa aspera var. hystrix, and other fossils. Exposed along Mill Creek; and in the quarries near Linwood and Buffalo, in Iowa	20
4.	Limestone, fine-grained, rather thin bedded, with shaly partings, containing Acervularia profunda, Favosites alpenensis, Schizophoria iowensis, Pentamerella dubia, Productella subalata, Spirifer asper, S. bimesialis, and S. iowensis. Exposed in the quarries and ledges in Rock Island, Sears and Milan	5
WAPSIPINICON LIMESTONE.		
Upper Davenport Beds.		
3.	Limestone, hard, gray, in imperfect layers 6 to 24 inches thick, containing Astraeospongia hamiltonensis, Chonophyllum cf. magnificum, Diplophyllun major, Phillipsastrea billingsi, Spirifer subundiferous, and other fossils, exposed near the railroad bridge across Mill Creek, and near the wagon bridges across Rock River. This is the horizon formerly worked in the old quarries in Milan and Rock Island	8

PLATE I.

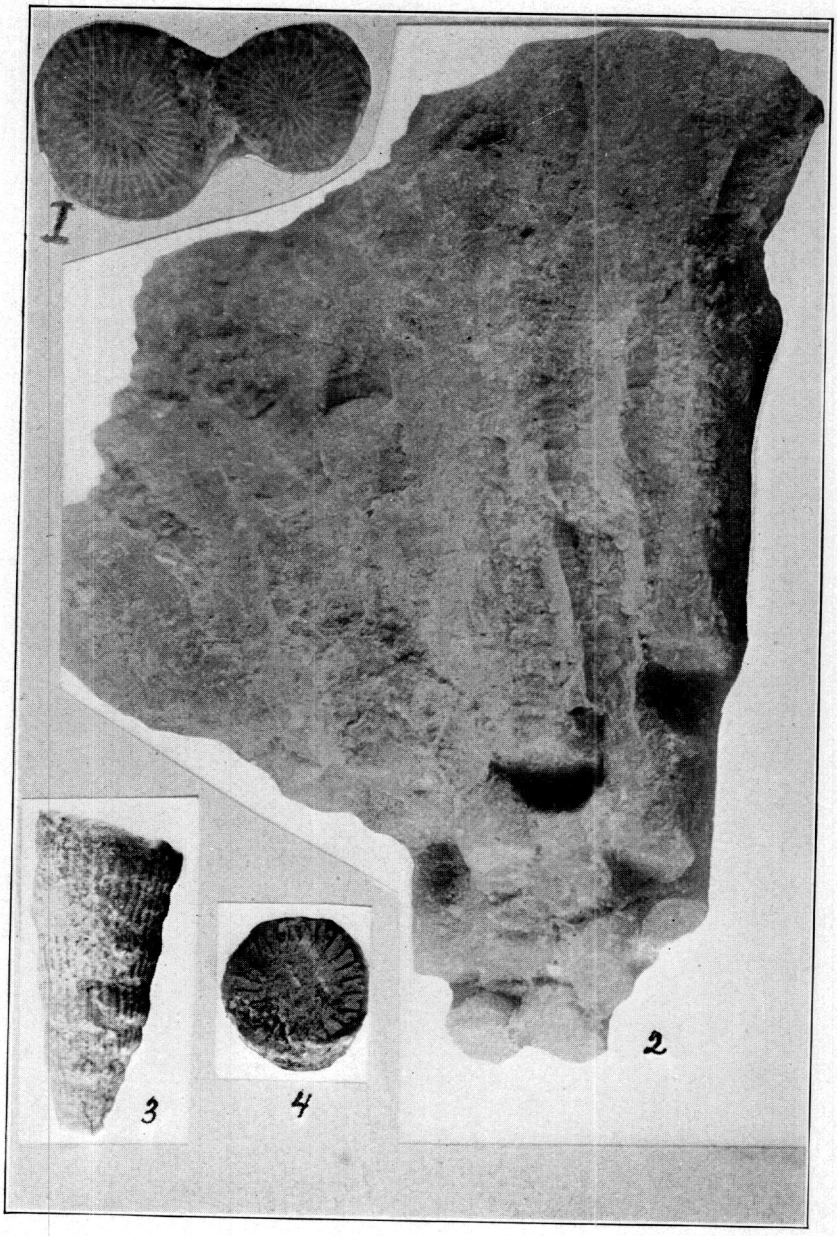


PLATE II.

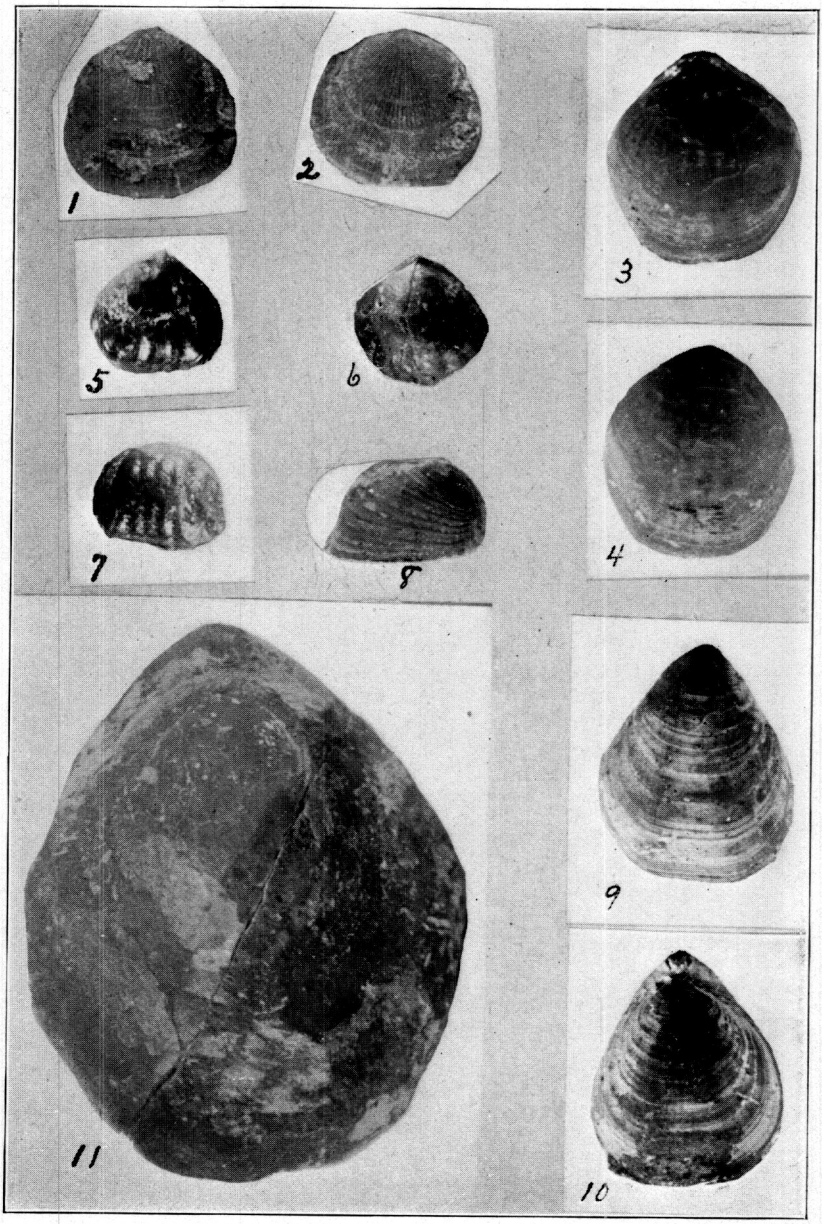
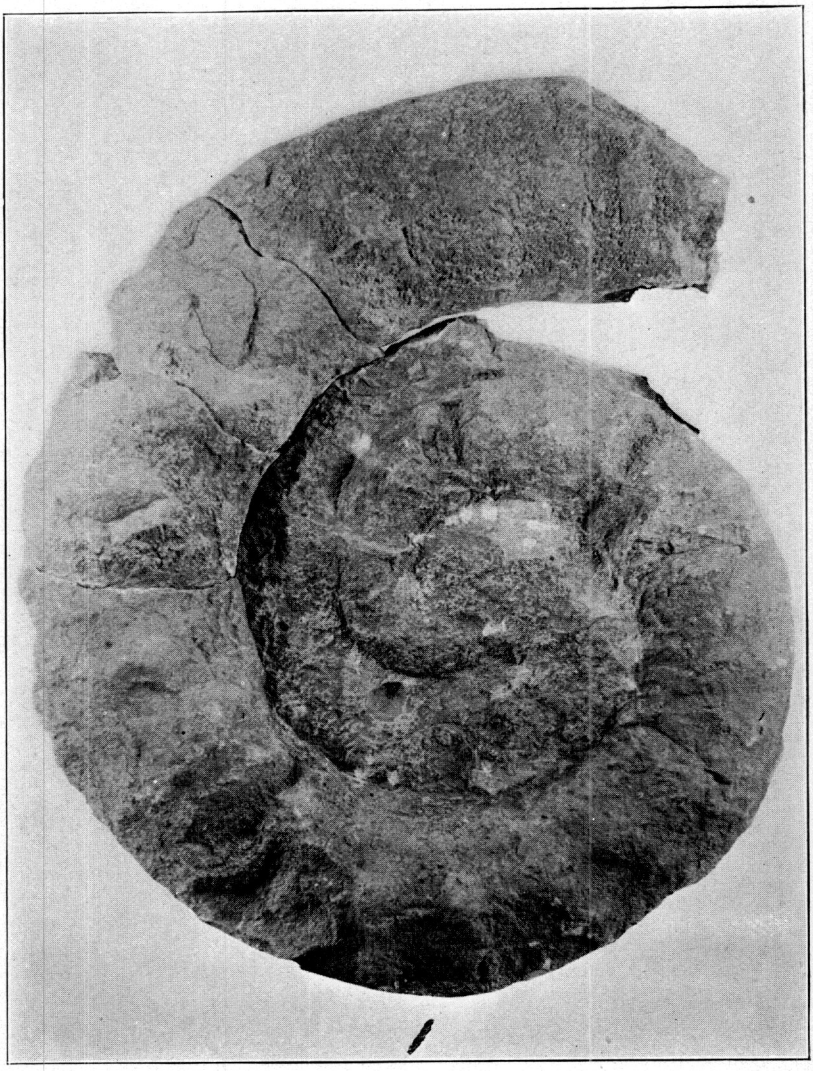


PLATE III.

PLATE IV.



Lower Davenport Beds.

2. Limestone, white to dark gray, fine grained, in layers ½ to 3½ feet thick, with few fossils, in places finely laminated, usually much fractured and brecciated, with fragments 1 to 24 inches in diameter. Exposed in the Cady quarries in East Moline, in the the Government Island, in the south bank of Mississippi River in Rock Island, and forms the bed rock in Rock River valley between Milan and Sears—fossils few or none..... 55

OTIS LIMESTONE.

1. Limestone, light to dark gray, fine grained, not brecciated, in irregular layers, containing spherical concretions of chalcedonic quartz, and numerous shells of Martinia subumbona. Exposed on the east side of Campbell's Island above Moline, and in the east bank of Mississippi River opposite the island..... 20

ZAPHRENTIS PUTILLA N. SP.

Plate I, Figures 3 and 4.

Description:—Corallum simple, conical straight or slightly curved, sub-circular in cross-section, diameter increasing gently and at a rather uniform rate from the apex. Surface marked by rather distinct septal furrows, and by occasional transverse wrinkles, or ridges and depressions, which are usually small; rim of calyx thin, very little oblique; the calyx moderately deep contracted below, with a rather large fossula; major septa commonly about 24, ranging from 20 to 30, depending on the size or age of the corallite, their inner extremities nearly or quite reaching the center; alternating with the major septa are an equal number of low, secondary, septa which are sometimes scarcely more than septal ridges.

The dimensions of two individuals are: Length 20 to 30 mm., diameter of calyx 10 to 14 mm.

This species differs from most species of Zaphrentis in its small size, the slight, if any, curvature, and the very gradually expanding corallum. It lacks the pseudecolumella or vesiculose central area of Stereolasma rectum Hall, and Streptelasma strictum Hall, with which it most nearly corresponds in size. It is distinguished from Zaphrentis calcareforme in that the shorter septa do not join the longer, and the latter are not united with the wall of the fossula.

Horizon and Locality:—Common in the Cedar Valley limestone along Mill Creek, near Milan, where it occurs a few feet below the Acervularia coral reef.

DIPLOPHYLLUM? MAJOR N. SP.

Plate I, Figures 1 and 2.

Description:—Corallum compound, in rather dense masses 1 to 2 feet in diameter. The corallites are cylindrical, more or less parallel, nearly contiguous or separated from one another by a distance less than the width of the corallites, not connected by prolongations of the epitheca, circular in cross section, varying from 8 to 12 mm. in diameter; marked on the surface by indistinct longitudinal lines resembling septal ridges, and also by fine transverse lines, and rather strong annulations and constrictions. The calyx is moderately deep, septa about 40, more or less undulating, half of them longer than the others and joined together irregularly at the center, or uniting near the center, to form an inner ring or wall surrounding a small central area. The alternate or secondary septa are shorter than the primary ones, and extend slightly more than half the distance from the periphery to the center; the disseppiments are numerous, and the septa carinated in the outer zone through which both sets of septa extend; a few disseppiments are present in the more open, central zone penetrated only by the longer septa. A few of the corallites —about 1 out of every 5 in the same corallum,—show a small central area about 1 millimeter in diameter surrounded by a distinct wall formed by the

coalescence of the inner edges of the longer septa, the other four-fifths of the corallites show no such central area, the inner edges of the longer septa uniting irregularly in the central part of the corallite without forming a definite ring.

Horizon and Locality:—Common in the upper part of the Wapsipinicon limestone in the vicinity of Milan, where it is associated with Phillipsastrea billingsi, Gypidula comis, and the cephalopods described on a later page of this paper.

RHIPIDOMELLA MINIMA N. SP.

Plate II, Figures 1 and 2.

Description:—Shell small, biconvex, length and width about equal, the greatest width anterior to the middle; hinge line about equal to ½ the greatest width of the shell; the cardinal extremities rounded. Ventral valve most convex in the umbonal region from which the surface curves rather abruptly to the cardinal margin, and more gently to the lateral and anterior margins; without trace of mesial fold or sinus, beak small, extending only a short distance above the hinge line; cardinal area small, concave, its margins sharply defined; delthyrium rather broadly triangular. Dorsal valve not quite so convex as the ventral, the greatest convexity posterior to the middle from which the surface slopes gently in all directions, the median portion of the valve depressed into a distinct sinus which begins near the beak, and becomes stronger anteriorly but is poorly defined laterally; the beak is small, not incurved; cardinal area very narrow, lying almost in the plane of the valve.

The surface of both valves marked by numerous radiating striae which begin near the beak, and bifurcate 3 or 4 times before reaching the front margin where about 3 are present in a distance of one millimeter. These striae are strongest and subangular on the unbones, decreasing somewhat in size towards the front. A few concentric lines of growth are present near the front and lateral margins.

The dimensions of the shell are: Length 8 to 11 millimeters, greatest width 8 to 11 millimeters, thickness 3 to 3.5 millimeters.

Remarks:—In the small size, and in the mesial sinus of the dorsal valve this species resembles Rhipidomella jerseyensis described by Weller from the Kinderhood of Illinois and Missouri. It differs from that form in its typically smaller size, the more nearly circular outline, the more angular and stronger striae on the unbones, and the fewer and coarser striae over the surface of the shell, the more concave or arched cardinal area of the vertical valve, the less compressed cardinal extremities, and the more rounded front margin which is not emarginate.

From Rhipidomella dubia (Hall) it is distinguished by the broader posterior portion, more circular outline, longer hinge line, and the presence of a mesial sinus in the dorsal valve, and its absence in the ventral.

From R. tenuicosta Weller from the Kinderhook our species differs in having coarser striae, and a more distinct mesial sinus in the dorsal valve.

Horizon and Locality:—Common in the Cedar Valley stage of the Devonian, along Mill Creek, near Milan, where it occurs a few feet below the Acervularia davidsoni coral reef.

PUGNOIDES SUBOVATA N. SP.

Plate II, Figures 5, 6 and 7.

Description:—Shell broadly subovate to subtrigonal in outline, width and length about equal, the greatest width slightly anterior to the middle of the shell. The dimensions of 6 individuals range as follows: Length 8 to 10 mm., width 8 to 10.5 mm., thickness 5 to 8 mm.

The ventral valve is less convex than the dorsal except at the front, the postero-lateral margins nearly straight, and meet at the beak at an angle of nearly 90 degrees, the lateral and anterior margins rounded; the surface is convex in the umbonal region, curving abruptly to the postero-lateral margins, and less abruptly in the antero-lateral portion. The beak is pointed, not greatly

produced beyond that of the dorsal valve, only slightly incurved, closely appressed over the beak of the opposite valve so as to conceal the foramen; mesial sinus obsolete in the posterior part of the shell, but becomes rather broad and deep in the anterior portion where it is produced in a rather broad linguiform extension that curves strongly towards the dorsal valve. The anterior part of the shell bears low, rounded plications of which 3 to 5 are depressed in the mesial sinus, on each side of which 3 weak ridges are visible for a short distance on the antero-lateral slopes.

Dorsal valve more convex than the ventral, the greatest convexity along the middle part, from which the surface curves rather steeply to the postero—and antero—lateral margins, and much less strongly towards the front margin; a broad, low, mesial fold appears in the posterior half of the shell, becoming well defined, and distinctly elevated at the front where it receives the extension of the opposite valve; near the front are a few low, rounded radiating ridges, 4 to 6 of which are elevated on the mesial fold which is well defined, and is bordered on each side by 2 or 3 weaker ridges, none of which extend to the middle of the valve.

Besides the short, low, rounded, radiating ridges and furrows, the surface is marked by numerous fine concentric lines which are visible with a lens; a few stronger lines of growth are also usually present.

Remarks:—This shell is easily distinguished from Pugnoides pugnus, and Pugnoides pugnus var. alta, in the weak and rounded character of the radiating plications, in which characters it more closely agrees with forms like Pugnoides ottumwa of the Ste. Genevieve limestone, of Mississippian age. It differs from the latter species in being much shorter and thicker in proportion to its length.

Horizon and Locality:—It occurs abundantly in the Cedar Valley limestone, a few feet above the Acervularia davidsoni coral reef, about two miles east of Andalusia, in Rock Island County, Illinois.

CRANAENA SUBOVATA N. SP.

Plate II, Figures 9 and 10.

Description:—Shell subovate to subtriangular in outline, longer than wide, the greatest width anterior to the mid-length, the postero-lateral margins nearly straight, converging to the beak at an angle of about 75 degrees; antero-lateral margins rather strongly and regularly rounded, front margin truncate or nearly straight. The dimensions of a shell of about average size are: Length of ventral pedicle valve 17 mm.; of dorsal valve, 14.5 mm., greatest width 14 mm., convexity 9.5 mm.

Surface of ventral valve arched along the meridian line from beak to front, the greatest convexity slightly posterior to the middle where a faint depression appears, and increases in prominence toward the anterior margin where it forms a broad, shallow, poorly defined mesial sinus. In the posterior part of the shell the transverse curvature is rather strongly convex, being inflected a little toward the cardinal extremities; the curvature is more gentle on the anterior and antero-lateral portions of the valve; the beak is truncated, not strongly incurved, perforated with a moderately large foramen; delthyrium concealed by the beak of the opposite valve.

Dorsal valve about as convex as the ventral, the greatest convexity posterior to the middle, gently arched from the beak to the front margin; the transverse convexity greatest in the posterior portion, the surface curving rather steeply from the median line to the cardinal and lateral margins, and more gently over the anterior and antero-lateral areas; no mesial fold or sinus present; beak pointed, and incurved beneath that of the ventral valve.

The surface of both valves is marked by numerous, well defined concentric lines of growth which vary in number, strength, and distribution in different shells. Shell structure punctate.

Remarks:—This species is more closely related to Cranaena iowensis, described by Calvin from the Cedar Valley limestone in Fayette County, Iowa, than to any other known species. At the type locality in Iowa the shells of Cranaena iowensis are commonly much larger than the most of those belonging to that genus at the Illinois locality from which our specimens were collected. Besides the smaller size the shells of our species are much more triangular in outline, the beaks more attenuate, and the greatest width of the shell much farther anteriorly than in Cranaena iowensis. Associated with Cranaena subovata are shells which in form resemble Cranaena iowensis, and are referred to that species although they are much smaller in size.

Horizon and Locality:—Abundant in the Cedar Valley limestone a few feet above the Acervularia davidsoni coral reef, a short distance west of Andalusia, in Rock Island County.

CRANAENA ELLIPTICA N. SP.

Plate II, Figures 3 and 4.

Description:—Associated with Cranaena subovata, and Cranaena iowensis at the locality last mentioned are shells belonging to the genus Cranaena which differ from either of the above mentioned species in their more elliptical outline, the greatest width being at or posterior to the mid-length; the cardino-lateral margins are straight, and form an angle of about 90 degrees at the beak. An average individual has a length of 15 mm., a width of 14 mm. and a thickness of 10 mm. The surface is marked by numerous, rather fine concentric lines near the front and lateral margins, the anterior margin is truncated, and there is no trace of mesial fold or sinus. These shells have every indication of being fully grown and it is proposed to designate them by the name of Cranaena elliptica.

CRANAENA MAXIMA N. SP.

Plate II, Figure 11.

Among the shells of the species of Cranaena above mentioned there are occasionally found shells that rather closely resemble Cranaena iowensis in outline, but are readily distinguished from any described species of the genus by their very large size. The individual figured measured 40 mm. long, 32 mm. wide, and 15 mm. thick. Such shells may be approximately referred to as Cranaena maxima.

CYPRICARDINIA ORNATA N. SP.

Plate II, Figure 8.

Description:—Shell small, subquadrate to rhombic-ovate in outline; hinge line straight, about half the greatest length of the shell; beaks situated near the anterior margin, directed forward, incurved so that they rise but slightly above the hinge line. The right valve is rather strongly convex; the anterior end short, concave immediately below the beaks, rounding to the basal margin which is straight or very gently convex, and slightly indented a little anterior to the middle. The postero-ventral extremity rounded, above which the posterior margin is obliquely truncate, the surface is most convex in the umbonal region from which it curves rather steeply to the front margin, and more gently towards the hinge line; a shallow depression with poorly defined borders appears near the beak and extends obliquely over the somewhat flattened umbo and on to near the middle of the basal margin. A rather prominent elevation extends from the dorsal or posterior margin of the umbo obliquely backward, with decreasing prominence to the postero-basal extremity of the valve; from this elevation the surface curves rather steeply towards the dorsal margin where the shell is somewhat flattened.

The surface of the valve is marked by prominent, somewhat unequal concentric lines, about 5 mm. apart. The concentric lines, and less distinctly the separating furrows, are crossed by two sets of fine striae, one set of which ap-

pears to radiate from the beak, and the other set crosses the first with a curvature that trends forward and downward from the vicinity of the beak, crossing the first set at an angle somewhat less than 90 degrees.

The left valve was not seen.

The dimensions of the type are: Length 9 mm., height 5 mm., thickness of right valve 3 mm.

Remarks:—This shell is most nearly like Cypricardinia indenta Conrad, from the Hamilton of New York and the East, from which it differs in the smaller size, the greater height in proportion to the length, in the less extended postero-ventral border, the shorter hinge line, and in the peculiar ornamentation of the surface of the shell.

Horizon and Locality:—It occurs in the Cedar Valley stage of the Devonian near Andalusia, in Rock Island County, where it is associated with the species of Cranaena above described.

POTERIOCERAS GIGANTEA N. SP.
Plate III.

Description:—Shell large, subelliptical to ovate in cross-section, somewhat curved throughout, the curvature slight on the concave side, but rather strong on the convex; the greatest curvature is a short distance posterior to the base of the body chamber. The length of the preserved part of the shell is 18 inches, the diameter of the posterior end of the specimen is 2 inches, several of the lower chambers having been lost. The length of the entire shell must have exceeded 20 inches. The shell is somewhat flattened in the direction of the curvature; the largest part of the shell is at the second septum posterior to the body chamber where the greatest diameter is 7 inches and the smallest diameter is nearly 4½ inches. Posterior to this the greatest width decreases rather uniformly at the rate of 2½ inches in a distance of 6 inches. The septa are moderately concave, the average width of the chambers in the larger part of the shell is 3/5 of an inch, and the average width of the posterior 3 inches of the shell is 1/3 of an inch. The body chamber is 4¾ inches long, and has a greatest width of 6¾ inches at the posterior end. Anteriorly the width decreases slightly, being a little more than 5 inches at the place of greatest constriction immediately below the aperture. The aperture is mostly concealed, but it is produced somewhat in the direction of the greatest diameter of the shell. The size and position of the siphuncle are not clearly shown, and the surface markings of the shell are unknown.

Remarks:—This form differs from every other species of the genus known to the writer in its very large size. In shape it somewhat resembles Poterioceras hyatti Whitfield, but the latter is much smaller, and is considerably wider in proportion to its length. The relation of the greatest width and the greatest curvature is also different from that of the species above described.

Formation and Locality:—Occurs in the upper part of the Wapsipinicon limestone, a short distance above the strongly brecciated bed, in the old quarry at Sears, near Rock Island, Illinois.

RHYTICERAS ORNATA N. SP.
Plate IV.

Description:—Shell rather large, regularly expanding, loosely coiled in a little more than two volutions; the greatest diameter is 10½ inches; in the internal cast the distance between the volutions in the middle portion is about 1⅛ inches, but the whorls approach to about ½ inch apart towards the body chamber. The transverse section is subcircular or slightly elliptical, the lateral diameter being a little greater than the dorsi-ventral. The greatest diameter of the whorl (cast) is slightly more than 2½ inches; the original shell was doubtless 3 inches in diameter. The greater part of the body chamber is lacking in our specimen, and the aperture can not be seen. The septa are smooth, their concavity about equalling the depth of the chambers, which is about ⅜ of an inch near the aperture of the shell, and about ¼ inch near the middle,

the depth gradually decreasing from the aperture toward the apex. The position of the siphuncle is not clearly shown in our specimen, but appears to be small, and situated near the ventral side, not enlarged in the chambers between the septa.

The surface is ornamented by a row of prominent nodes or spinous projections about one inch apart along each side, which also appear to mark the position of transverse ridges. Traces of a third row of spines or of a longitudinal ridge appear along the ventral margin of the shell. On the dorsal surface of the outer whorl there are preserved in some places rather prominent longitudinal lines or ridges ¼ to ⅜ inches apart; such longitudinal markings probably covered the entire surface of the shell. Numerous fine lamellose lines of growth, some of which appear to be stronger than others, are also conspicuous on the portions of the shell that are preserved.

Remarks:—In the surface ornamentation this form is readily distinguished from any other known species of Rhyticeras. It differs from Rhyticeras cyclops Hall in the more gradual enlargement of the whorls, the stronger transverse ridges, more prominent nodes along the lateral and ventral margins, and in the finer longitudinal surface markings. From Rhyticeras spinosum Hall it is distinguished by the stronger longitudinal ornamentation, and less rapid expansion of the anterior part of the shell.

Formation and Locality:—This species occurs in the upper part of the Wapsipinicon limestone where it is associated with Gypidula comis, Poterioceras gigantea, and Rhyticeras barrisi, near the village of Sears, in Rock Island County, Illinois.

EXPLANATION OF PLATES

PLATE I.

Figures 1 and 2. Diplophyllum? major n. sp. Transverse section of two corallites magnified a little more than two times; and view of a fragment of corallum, natural size.

Figures 3 and 4. Zaphrentis putilla n. sp. Longitudinal view showing septal ridges; and transverse section of a corallite. Both one and one-half times natural size.

PLATE II.

Figures 1 and 2. Rhipidomella minima n. sp. Ventral and dorsal views of the type specimen. A little more than twice natural size.

Figures 3 and 4. Cranaena elliptica n. sp. Dorsal and ventral views of the type; magnified about two times the natural size.

Figures 5, 6 and 7. Pugnoides subovata n. sp. Ventral, dorsal and front views of a typical specimen. Twice natural size.

Figure 8. Cypricardinia ornata n. sp. View of the right valve of a nearly entire specimen; enlarged a little more than two times.

Figures 9 and 10. Cranaena subovata n. sp. Ventral and dorsal views of the type specimen. Enlarged two times.

Figure 11. Cranaena maxima n. sp. Dorsal view of a typical specimen. About twice natural size.

PLATE III.

Figure 1. Poterioceras gigantea n. sp. Longitudinal view of the type specimen. A little less than one-half natural size.

PLATE IV.

Figure 1. Rhyticeras ornata n. sp. View of one side of an exfoliated specimen. About one-half natural size.