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## The Fauna of the Magnesian Series

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Then, too, a study of the plants introduced through the agency of the railroad would be of interest. But in a section so near to the original in nature a notice of the abundance of peculiar Saprophytic plants must be taken. Everywhere in the different timbered localities, in the swamps and over the burnt woodlands Agaricinæ and other fleshy fungi were especially noticeable.

The flora of the "Thousand lakes" must also be noted, and it is well to notice that even in the counties most thickly studded with lakes, each has its characteristic alga.

November 13, 1892.

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[*Paper F.*]

THE FAUNA OF THE MAGNESIAN SERIES.

DESCRIPTIONS OF FOSSILS.

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*F. W. Sardeson.\**

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The object in presenting the following notes on the faunal characters of the Magnesian series is to establish a systematic table as a basis for the rational division of the formations of the series. A mere compilation of species already described and referred to this series would seem to prove the existence of two faunas, one for the "Lower Magnesian" and another for the "Potsdam" or "Lower Sandstone" of the Upper Mississippi basin. But no such two faunas exist. Each is a confusion of different faunas. There were also very few species known and these of very rare occurrence. In searching for these old species—for all data had to be verified—several new species have been discovered.

All fossils collected have been referred with the greatest care to their proper division of the "Lower Magnesian" (Owen), viz.:

1. Shakopee dolomite.
2. New Richmond sandstone.
3. Oneota dolomite.

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\* Partially revised November 18, 1895.

Or to those of the "Potsdam:"

4. Jordan (Madison) sandstone.
5. Saint Lawrence (Mendota) formation.
6. "Dresbach" or "Saint Croix" sandstone and the undivided series beneath it.

Only numbers 1 to 5, i. e., the Magnesian series (Hall and Sardeson), are fully included in this discussion.

Of these five formations it is found that the Shakopee has a fauna consisting of species of mollusca, all of which are peculiar to that formation. The New Richmond sandstone has so far yielded no fossils. The Oneota, Jordan and Saint Lawrence, on the contrary, are not only fossiliferous, but the species of each are in part the same as those of the other two. The fauna of the Oneota dolomite consists mainly of Gasteropoda, Cephalopoda, a few brachiopoda, and no others except one fragment of a trilobite (*Asaphus*). The Jordan fauna resembles that of the Oneota, but embraces also trilobites like the Saint Lawrence. The last named has yielded but one molluscan species as yet, and several Brachiopoda besides Trilobita. This account may be enlarged in future.

Nearly all the Trilobita are omitted here, both because they aid only in comparing the Jordan and Saint Lawrence with each other and with underlying strata, all of which have been heretofore united ("Potsdam"), but also because the species have been described from fragments and rare occurrences, most of which the author has not yet had the opportunity to verify. These will form a problem for the future. The Mollusca and Molluscoidea are presented below, and from a study of them it has been concluded that the Shakopee is faunally separate from the Saint Peter sandstone above and to a less degree also, from the Oneota below. The New Richmond sandstone maintains uncertain relations between them. With the Oneota are united the Jordan and Saint Lawrence, which last contains a fauna distinct from the next known fauna below it, i. e., that with *Obolella polita* Hall, *Lingula ampla* Owen, *Hyolithes primordialis* Hall.

The Mollusca, like the Trilobita, occur as casts. In the Oneota particularly, the casts have sometimes filled with chert and are locally more abundant for that reason. A



dolomitized shell rarely occurs. The Brachiopoda more often have their shells preserved and can thus, like the silicified casts of molluscs, be found even where the reduction of the strata has obliterated the hollow casts. Such obliteration is often noted in the Shakopee and Oneota, and very frequently in the Jordan and Saint Lawrence.

The following table shows the distribution in vertical range of the species collected, and following it are notes upon and descriptions of the same.

TABLE OF FOSSILS IDENTIFIED FROM THE MAGNESIAN SERIES.		St. Lawrence.	Jordan.	Oneota.	New Richmond	Shakopee.
Asaphus sp.....				*		
Dikelocephalus minnesotensis Owen.....	*					
Lingula aurora Hall.....	*					
Lingula dolata n. sp.....				*		
Lingula mosia Hall.....	*			*		
Lingula winona Hall.....	*					
Orthis (Billingsella) pepina Hall.....	*	*	*	*		
Bellerophon antiquatus Whitfield.....		*				
Euomphalus winonensis n. sp.....				*		
Helicotoma (?) peccatonica n. sp.....						*
Holopea obesa Whitfield.....				*		
Metoptoma barabuensis Whitfield.....			*			
Murchisonia argylensis n. sp.....						*
Murchisonia putilla n. sp.....			*	*		
Ophileta alturensis n. sp.....			*	*		
Pleurotamaria sweeti (Whitfield).....			*			
Raphistoma leisomellum n. sp.....				*		
Raphistoma lewistonense n. sp.....						*
Raphistoma minnesotense Owen.....	*	*	*	*		
Raphistoma oweni n. sp.....				*		
Raphistoma ruidum n. sp.....						*
Straparollus intralobatus n. sp.....				*		
Subulites exactus n. sp.....						*
Tryblidium (?) repertum n. sp.....						*
Ascoceras gibberosum n. sp.....				*		
Cyrtoceras dresbachense n. sp.....				*		
Cyrtoceras winonicum n. sp.....				*		
Endoceras consuetum n. sp.....						*
Piloceras corniculum n. sp.....				*		

DESCRIPTIONS OF SPECIES.

*Dikelocephalus minnesotensis* Owen.

*Dikelocephalus minnesotensis* Owen, Report of Geological Survey of Wisconsin, Iowa and Minnesota, p. 574, Tab. I, figures 1, 2, 10; and Tab. I, A, figures 3 and 6.

*Dikelocephalus minnesotensis* Hall, 16th Annual Report New York State Museum of Natural History, p. 138, pl. XI, figures 1, 3 and 4.

This species is found in the Saint Lawrence dolomite at Osceola, Wisconsin, and Hokah, Minnesota, and intermediate. At the last-named place specimens were taken out five feet below the firm stratum of dolomite or about 35 or 40 feet below the top of the Saint Lawrence formation.

*Lingula aurora* Hall.

*Lingula aurora* Hall, Annual Geological Report of Wisconsin, 1861, and 16th Annual Report, New York State Museum of Natural History, p. 126, pl. VI, figures 4 and 5, 1863.

Associated with *Dikelocephalus minnesotensis* Owen in the Saint Lawrence formation at Osceola, Wisconsin, Otisville, Minnesota, along the St. Croix river and in exposures along the Mississippi river in Minnesota and Wisconsin are three abundant species of lingula, of which this one is the largest. It is easily recognized by the surface ornamentation of the shell.

*Lingula dolata* n. sp.

Plate VI, figure 12.

Shell of medium size, ovate, length not much exceeding the breadth; slopes from the beak nearly straight; lateral and anterior margins uniformly rounded; beak probably acute. The convexity of the shell is moderate and seems to have been greatest towards the beaks. The surface is shining but marked by numerous fine, irregular concentric lines which run out on either side along the slopes from the beak.

From the Oneota dolomite near Stillwater, Minnesota.

*Lingula mosia* Hall.

*Lingula mosia* Hall, 16th Report New York State Museum of Natural History, p. 126, pl. VI, figures 1 to 3, 1863.

This species is referred by James Hall to the same formation as *Dikelocephalus minnesotensis* Owen. Very good shells agreeing in every respect with the figures 1, 2 and 3 and with the original description have been found at several exposures of the Saint Lawrence formation. Some of them retain the glossy surface of the shell and the coarse concentric striations. Other specimens, not distinguishable from these, occur in the middle or upper portions of the Oneota along the Saint Croix river. But these, as preserved, retain a stronger convexity of the shell.



*Lingula winona* Hall.

*Lingula winona* Hall, 16th Annual Report New York Museum of Natural History, p. 126, pl. VI, fig. 9, 1863.

This species was described by James Hall from specimens obtained at Lansing, Iowa, "occurring more than two hundred feet below the Lower Magnesian limestone and near the middle of the Potsdam sandstone." The specimens here identified with it occur in numbers with other *Lingula* in the Saint Lawrence formation near Osceola, Wisconsin, and other places along the Saint Croix river. They have the sub-quadrate outline, a thick shell and show a deep pedicel groove.

*Orthis (Billingsella) pepina* Hall.

*Orthis pepina* Hall, 16th Annual Report New York State Museum of Natural History, p. 134, pl. VI, figs. 23 to 27, 1863.

*Orthis pepina* Whitfield, Geology of Wisconsin, vol. IV, p. 170, pl. I, figs. 4 and 5, 1882.

*Orthis (Billingsella) pepina* Hall (1892), Palæontology of New York, vol. VIII, pt. I, p. 230, pl. VII, a, figs. 1-9.

This species is found at Osceola, Wisconsin, and vicinity in the Jordan sandstone and it occurs also in the Oneota dolomite a few miles further south, near Stillwater, Minnesota. It occurs also in the Saint Lawrence formation.

*Bellerophon antiquatus* Whitfield.

*Bellerophon antiquatus* Whitfield, Annual Report for 1877, Geological Survey of Wisconsin, p. 52; and Geology of Wisconsin, vol. IV, p. 176, pl. I, figs. 13 and 14, 1882.

Described by Mr. Whitfield from the "soft friable sandstone of the Potsdam group at Osceola Mills, Wisconsin." It has not yet been found on the Minnesota side of the Saint Croix river, although specimens have been found in the Jordan sandstone at the locality cited.

*Euomphalus winonensis* n. sp.

Plate VI, figure 1.

Shell of more than two and one-half volutions; rapidly expanding and in contact for about two volutions. The apex and flattened surface are nearly in the same plane. The suture is deep and the umbilicus wide. Aperture circular except for a deep notch on the upper outer margin, the successive stages of which have produced an angular keel, a flattened upper surface to the coil and a slightly concave band just beneath the keel. On the volutions that are in contact the upper inner surfaces are concave or of reduced convexity. The surface is marked by strong, irregular lines of growth, which curve obliquely back on either side of the keel, forming an angle at the acute edge of the carina. The shell was apparently very thin, and the apical portion of it was either filled solid or crossed by strongly

concave septa for nearly one and one-half volutions on the largest specimen found.

From the Oneota dolomite near Dresbach, Winona county, and near Red Wing, Goodhue county, Minnesota, and at Blanchardville, La Fayette county, Wisconsin.

*Helicotoma* (?) *peccatonica* n. sp.

Plate V, figures 1 and 2.

Known casts of the shell are of about three volutions. These are strong and evenly convex on the inner and lower surface, while the outer surface is flattened and is bounded above and below by angular carinæ, of which the upper may prove to be of the nature of a band. The upper surface of each volution is divided into an outer concave surface, a convex median ridge and an inner flattened slope that joins the suture, and each volution is impressed on the upper inner side by the preceding one.

The coil is turbinate with an apical angle of about  $130^{\circ}$ , with a wide umbilicus and deep sutures. The aperture is circular in general outline. The growth lines are not distinctly preserved.

From the Shakopee dolomite in the Peccatonica river valley, near Argyle, Wisconsin.

*Holopea obesa* Whitfield.

Plate V, figure 19.

*Holopea obesa* Whitfield, Geology of Wisconsin, vol. iv, p. 348, pl. XXVII, fig. 11, 1882.

Shell large, of five strongly convex volutions, and with an apical angle of  $90^{\circ}$  or less. Each volution is indented by the preceding one, but otherwise the upper surface is strongly convex. The lower portion of each volution is rounded, while the outer surface is less and the umbilical surface still less convex. The sutures are deep. No surface marks or growth lines are visible on the quartz casts that have been found.

Found among fossils from the upper portion of Oneota formation at Dresbach and Altura, Minnesota, and Blanchardville, Wisconsin.

*Metoptoma barabuensis* Whitf.

*Metoptoma barabuensis* Whitf., Geology of Wisconsin, vol. iv, p. 195, pl. III, figs. 16 and 17.

One specimen, a little smaller but otherwise not distinguishable from this species as figured and described, comes from the Jordan sandstone at Osceola, Wisconsin, where it is associated with *Pleurotomaria sweetii*, Whitf., etc.

*Murchisonia argylensis* n. sp.

Plate V, figures 11 and 12

Shell of many volutions (about fifteen), closely coiled; apical angle  $160^{\circ}$ . The columella is slender and imperforate, the sutures deep and the



outer surface of each coil flattened. Casts of the interior are more uniformly convex and end acutely about one-fourth the distance from the apex.

The aperture is vertically sub-quadrate, and there are indications that it was deeply notched on the outer margin. Along the coil there appear two minute longitudinal grooves, dividing the outer surface into three nearly equal areas, the middle one of which is probably the band.

Figure 11, plate V, is a sketch of a specimen showing the cavity left by a shell, the apical third being entirely empty, the middle portion enclosing a cast of the interior, and the lower volutions containing the replaced shell, which is broken open and shows the columella.

From near Argyle, Wisconsin, in the Shakopee dolomite. Found also at Shakopee and Cannon Falls, Minnesota, in the Shakopee dolomite.

*Murchisonia putilla* n. sp.

Plate V, figures 5 and 6.

The specimens of this species are small turreted coils of six to eight or more volutions with an apical angle of  $45^\circ$ . The outer surface is marked by a strong angular carina a little below the middle height of each volution, and a second and third subangular carina divide the outer from the upper and lower surfaces respectively. The lower surface of the body whorl is moderately convex and is joined with the inner surface somewhat abruptly. There is a large perforated columella formed by the vertical, moderately convex inner side of the volutions. The upper side of each volution coincides in form with the base of the preceding one, so that the suture is close, and in fact it is formed by the contact of two carinae.

Previous to fossilization or silicification several of the specimens have been indented deeply by the sharper crushing processes of some animal. These wounds, besides being peculiar tooth marks in appearance, seem to show distinctly from their form and from the compression of the shells that the latter yielded by bending or folding and not by fracture. One shell had been also partly uncoiled.

Found in the top of the Oneota dolomite near Dresbach, Winona county, and at Stillwater, Minnesota, and Blanchardville, Wisconsin. Also from the Jordan sandstone near Rapidan, Blue Earth county, Minnesota.

*Ophileta alturensis* n. sp.

Plate V, figures 3 and 4.

Shell a dextral coil of six or more slowly expanding volutions, the spire of which does not rise above the carina of the body whorl. The volutions are strongly convex below, but are flat or concave in the umbilicus, and straightened or slightly concave below the carina on the outer side. This high, acute carina on the upper outer angle gives a concave upper surface, which, however, curved down to the suture on the inner side. The umbilicus is very wide.

The growth lines are coarse and indistinct. They curve obliquely back from the sutures to the carina for a distance equal to the width of the upper



surface of the volution, forward again down to the base and thence with a back and forward curve across the umbilical surface.

Found in the Oneota dolomite near Dresbach, at Altura and Mankato, Minnesota, near the top of the formation. Also at Caledonia, Houston county.

*Plurotomaria sweeti* Whitfield.

*Holopea sweeti* Whitfield, Geology of Wisconsin, vol. IV, p. 174, pl. X, fig. 3, 1882.

Casts of this shell occur at Osceola Mills, Wisconsin, in the Jordan sandstone. They agree with Mr. Whitfield's description and the figure of his specimen except that the growth lines on casts of the exterior show that the aperture had a very deep sinus which has left on some an elevated, broadly rounded band just below the middle of the outer surface of the last volution. This species is of the same type as the *Pleurotomaria aiens* Sar., from the Saint Peter sandstone.

*Raphistoma leiosomellum* n. sp.

Plate V, figures 7 and 8.

The shell of this species, as shown by the quartz casts found was small and consisted of about four rapidly increasing volutions, which embrace in such a manner as to form a lenticular coil. Each volution conceals about one-half of the surface of the preceding one. The suture is channelled, the periphery is marked by a rounded somewhat swollen band, and the umbilicus, which is about one-fourth the entire width of the coil, is abrupt and ascends by degrees quite to the apex. The surface is smooth and nearly equally convex above and below.

From the upper portion of the Oneota dolomite near Dresbach, at Altura, Winona county, and near Caledonia, Houston county, Minnesota.

*Raphistoma lewistonense* n. sp.

Plate V, figures 9 and 10.

The only specimen of this species found is a hollow cast of the exterior of a shell, and from this rubber casts have been taken. These show a coil of about four volutions which are flat above and strongly ventricose below. The suture of each volution falls a little below the periphery of the preceding volution. The umbilicus is about one-third the entire width and ascended probably to the apex. The varices of growth appear to run obliquely back from the sutures to the periphery and thence directly down and into the umbilicus.

Found in the Oneota dolomite near Lewiston, Winona county, Minnesota. Identified also at Shakopee and Cannon Falls, Minnesota.

*Raphistoma minnesotenses* Owen.

Plate V, figures 15, 16 and 17.

*Straparollus (Euomphalus) minnesotensis* Owen (1852), Report Geological Survey of Wisconsin, Iowa and Minnesota, p. 581, tab. II, figs. 12 and 13.

*Euomphalus vaticinus* H., 1863, 18th Rep. N. York Mus. Nat. Hist. p., 136.

Shell large, of *eight* or *nine* slender whorls, which gradually expand and remain in contact throughout. The apical angle is very obtuse at first but gradually decreases to about  $120^\circ$  as the coil expands, giving a somewhat lenticular outline. This character also varies in specimens of the same size; umbilicus very wide. The volutions are strongly convex below and above, but gently concave along the strong angular carina upon the outer side and strongly concave along the same above. The carina rises above the sutures on the internal casts, but not so strongly on the exterior of the shells. The aperture is subquadrate and deeply notched.

This is an abundant species in the upper strata of the Oneota, but is found only as imperfect specimens, the smaller ones of which are easily mistaken for a distinct species. There are, however, no others with which this one could be confused known to occur in the same formation.

Found at Dresbach, Winona county, near Red Wing, Goodhue county, at Mankato and other places in Minnesota, and Blanchardville, Wisconsin. Also found in the Jordan sandstone near Rapidan, Blue Earth county, Minnesota. At Red Wing also in the Saint Lawrence.

*Raphistoma oweni* n. sp.

Plate V, figure 18.

Shell of ten or twelve very slender whorls in close contact, but not always uniformly coiled. The apical angle of the shell varies a little from  $140^\circ$ . The umbilicus is very wide. A transverse section of each volution presents a quadralateral figure which is approximately a parallelogram with the outer angle acute, equal to about  $75^\circ$ . Upon the outer angle or carina is a small band which on the spire rises a little above the sutures. The upper surface of a volution has a depression along the carina, is nearly flat over most of the surface, but strongly rounded on top into the suture. Below, the surface is flattened or gently concave on the outer and umbilical areas, but has a strongly convex or subangular area between these two. In the umbilicus each volution leaves exposed to view a part of the outer surface of the preceding one, while on the apical surface the sutures are close or only slightly channelled. The surface is indistinctly striated on internal casts by transverse lines which on the upper surface curve back at an angle of about  $45^\circ$ , from the suture to the carina. The irregularity in coiling does not seem to be due to distortion.

From the Oneota dolomite of the Magnesian series in the Saint Croix valley, above Stillwater, Minnesota.



The first specimens seen of this species were collected by Mr. A. D. Meeds, of the University of Minnesota. The name is given in honor of Dr. David Dale Owen.

*Raphistoma ruidum* n. sp.

Plate V, figures 13 and 14.

Shell of four or more volutions rising in a low spire. The volutions are convex above with a narrow concave area along the periphery. Below, the surface of each is moderately convex along the periphery and strongly convex next the umbilicus, but gently concave for the greater distance between these two areas. The umbilical surface is flattened also and is the shortest of the four sides of the subquadrate figure presented by a cross section. The outer side next the umbilicus is the longest, and the sides are about in the relation of 5, 6, 7 and 8. The umbilicus is wide and deep.

A cast of the interior shows that the shell was ornamented by sharp elevated striæ of growth. These are evident also on casts of the interior, and curve obliquely back for a distance greater than one-eighth of a volution and suddenly out in a reversed curve near the acute edge of the volution.

Specimens of this species were found near Argyle, Wisconsin, in the Shakopee formation, and at Shakopee, Minnesota, in the quarry at that place. Also near Cannon Falls, in the Shakopee formation.

*Straparollus intralobatus* n. sp.

Plate V, figure 20.

Coil small, of three to four volutions, in the same plane, or nearly so, and in close contact. The aperture is transversely oval except where indented on the inner margin by the penultimate volution. The surface of the cast is marked by growth lines that are rather variable and indefinite and run a little backwards near the dorsal side.

Found at Altura, Winona county, above the middle of the Oneota dolomite.

*Subulites exactus* n. sp.

Plate VI, figure 14.

Casts of the interior of shells of this species show a long, slender spiral of twelve or more whorls in all. The accompanying figure shows a cast of probably the fifth to eighth whorls. The whorls are gently convex on the outer surface, but are more strongly rounded near the sutures, which are wide and deep on the casts and appear to have been equally strong on the exterior of the shell. Surface marks can not be detected and the form of the aperture is not well shown but must have been elongate, rounded very narrowly above and more broadly below, and with the centers of the inner and outer lips somewhat increased in convexity.

Found at Shakopee, Minnesota, in the Shakopee dolomite, and in the same formation near Cannon Falls, Minnesota.

*Tryblidium repertum* n. sp.

Plate V, figures 21 and 22.

Shell small, low, with the apex towards the posterior and directed backward. Aperture oval, about 11 mm. in longitudinal and 9 mm. in transverse diameter. Apical elevation of the shell 6 or 7 mm. From the apex the surface curves gently down to the anterior margin, while on the posterior and along the lateral portions the surface is concave. There are some slight indications of concentric undulations, but other characters are not visible on the casts of oölitic dolomite.

One specimen referred to this species has a much higher apex and a proportionally narrower aperture supposed to have been caused by contortion previous to its deposition in the stratum, but it is in every respect symmetrical.

From the Shakopee dolomite formation near Argyle, Wisconsin.

*Ascoceras gibberosum* n. sp.

Plate VI, figures 8, 9 and 10.

All that is known of this species are casts of the septate portion, one of which is sketched. The specimens do not show conclusively that they represent the hollow chambers extending along the chamber of habitation, but presumably that is their nature. The septa, eight or nine in number, are not regularly equidistant, and grow one above and over the other in the dorsal (or ventral) portion of the shell somewhat irregularly but always overlapping the last above and on the sides, but slightly underlapping below. This last character gives some indication that there may have been also a regular system of septa in the base of the shell. The entire shell must have been short and small, with the aperture contracted and oblong ovate dorsoventrally.

From the Oneota dolomite at Dresbach, Minnesota.

*Cyrtoceras dresbachense* n. sp.

Plate VI, figure 4.

Shell small, expanding somewhat rapidly, and curved. Transverse section ovate, with the apex on the dorsal side. The septa are numerous and arch rather strongly forward on the outer, and also on the inner, surface. The siphuncle is small and is situated near the inner side of the shell. The chamber of habitation and the surface of the shell are not known. Septa arched dorso-ventrally, otherwise nearly flat.

From the Oneota dolomite near Dresbach, Minnesota.

*Cyrtoceras (?) winonicum* n. sp.

Plate VI, figures 2 and 3.

Shell small, very slowly expanding, straight or slightly curved. The septa are strongly concave in dorso-ventral direction, very gently so across



from side to side, and the sutures curve forward above and below and backward across the sides. The depth of the chamber of habitation is not known. The septa are very close together, eight or ten falling in a length equal to the transverse diameter. The siphuncle is small, marginal and flattened next the outer wall. Transverse section of the shell oval. The surface of the shell is not preserved on any of the specimens, but the casts are smooth.

Found near Dresbach, Winona county, Minnesota, among other fossils from the Oneota dolomite.

*Endoceras consuetum* n. sp.

Plate VI, figure 11.

The shell long, straight, slowly expanding. The chamber of habitation is deep, about two and one-half to three times as deep as high. Transverse section vertically suboval, with the outline of the siphuncle circular and about one half as great in diameter as the shell. Siphuncle close to the ventral side. The septa are close together and concave. The sutures arch forward slightly near the dorsum and apparently backward on the ventral side, and in general they are oblique to the longitudinal axis. The shell was very thin, and on the cast leaves indistinct undulating growth lines along the body portion, parallel to the sutures of the septate portion. There is a concave band on the surface of the first septum on the specimen, near the siphuncle, but which may be due partly to distortion.

From near the top of the Shakopee at the crossing of the Chicago, Milwaukee and Saint Paul and the Illinois Central railways, ten miles west of Monroe, Wisconsin, and one-half mile below Pickett station.

*Piloceras corniculum* n. sp.

Plate VI, figures 5, 6 and 7.

The siphuncles of four shells have been found as quartz casts. These show a rapidly, uniformly expanding shell of small size. The sutures on the siphuncle are distant about one-fourth the vertical diameter of the same, but on different specimens have a varying direction. The concavity of the septa appears to decrease as the shell increases and their apices are not uniformly directed on different specimens, and in one case the apex is toward one side. A transverse section of the siphuncle is vertically oval, on all alike. A third specimen, not figured, retains a portion of the outer surface and septa, and indicates the position of the siphuncle as close to the dorsal (concave) side and its diameter about one-half that of the shell. Surface of the shell probably smooth.

Without an extensive series of specimens it is quite impracticable to determine whether one or two species are here described, but the great variation of some characters seen in the specimens at hand seems to indicate strong variability rather than specific difference.

From the Oneota dolomite, near Dresbach, Winona county, Minnesota.

Besides the above list of fossils Professor Calvin\* has described several species, viz.:

- Metoptoma alta* Whitf.  
*Tryblidium* sp.  
*Straparollus claytonensis* Calvin.  
*Straparollus pristoformis* Calvin.  
*Raphistoma pepinense* Meek.  
*Raphistoma multivolvatum* Calvin.  
*Raphistoma paucivolutum* Calvin.  
*Holopea turgida* Hall.  
*Murchisonia* sp.  
*Orthoceras primigenium* Vanuxem.  
*Cyrtoceras luthei* Calvin.

from the Lower Magnesian of northeastern Iowa. But his descriptions leave us in doubt wheather they are Oneota or Shakopee or both. I could not clearly recognize in the short descriptions, which are not accompanied by figures, any of the species described by me. The Shakopee and Oneota were examined near McGregor, Iowa, and although I found no fossils, still fossils ought to be found there in both formations. These two formations present their normal stratigraphic and lithologic character in Iowa. Fossils from southeastern Minnesota and southwestern Wisconsin, which are on opposite sides of northeastern Iowa, present the same faunas in each of the formations, Shakopee and Oneota. In Iowa they should also occur. *Raphistoma multivolvatum* Calvin may be *R. minnesotense* (Owen). His other two species of *Raphistoma* one can only reject. His *Holopea turgida* H. may be *H. obesa* Whitf. The others seem to be some that I have not found.

The Shakopee fauna is most like that of the "Upper Calciferous." That of the Oneota, Jordan and Saint Lawrence is likewise comparable to the Lower Calciferous of New York. It, in fact, resembles the Calciferous far more than it does the peculiar fauna described by Whitfield† from the Baraboo district of Wisconsin which has been supposed to be "Lower Magnesian." These are:

\* Amer. Geol., vol. 10, pp. 144:148 (1892).

† Geol. Wisconsin, vol. IV, p. 194.



*Leptæna barabuensis* Whitf.  
*Metoptoma barabuensis* Whitf.  
*Metoptoma recurva* Whitf.  
*Metoptoma similis* Whitf.  
*Metoptoma retrorsa* Whitf.  
*Scævogyra swezeyi* Whitf.  
*Scævogyra elevata* Whitf.  
*Scævogyra obliqua* Whitf.

I mention also:

*Euomphalus strongi* Whitf.  
*Ophileta (Raphistoma) primordialis* Winchl.  
*Palæacma irvingi* Whitf.

Of the above *Raphistoma primordiale* Winchl. may be again *R. minnesotense* (Owen)—Oneota to St. Lawrence. One other—*Metoptoma barabuensis* Whitf. I think is represented by one specimen from the Jordan sandstone at Osceola, Wisconsin. It is not improbable that the whole list contains really the missing Gasteropoda of the Saint Lawrence formation. If so then this formation is wider from the Oneota than I think it to be. Still this fauna may belong to an older formation, preceding the Saint Lawrence.

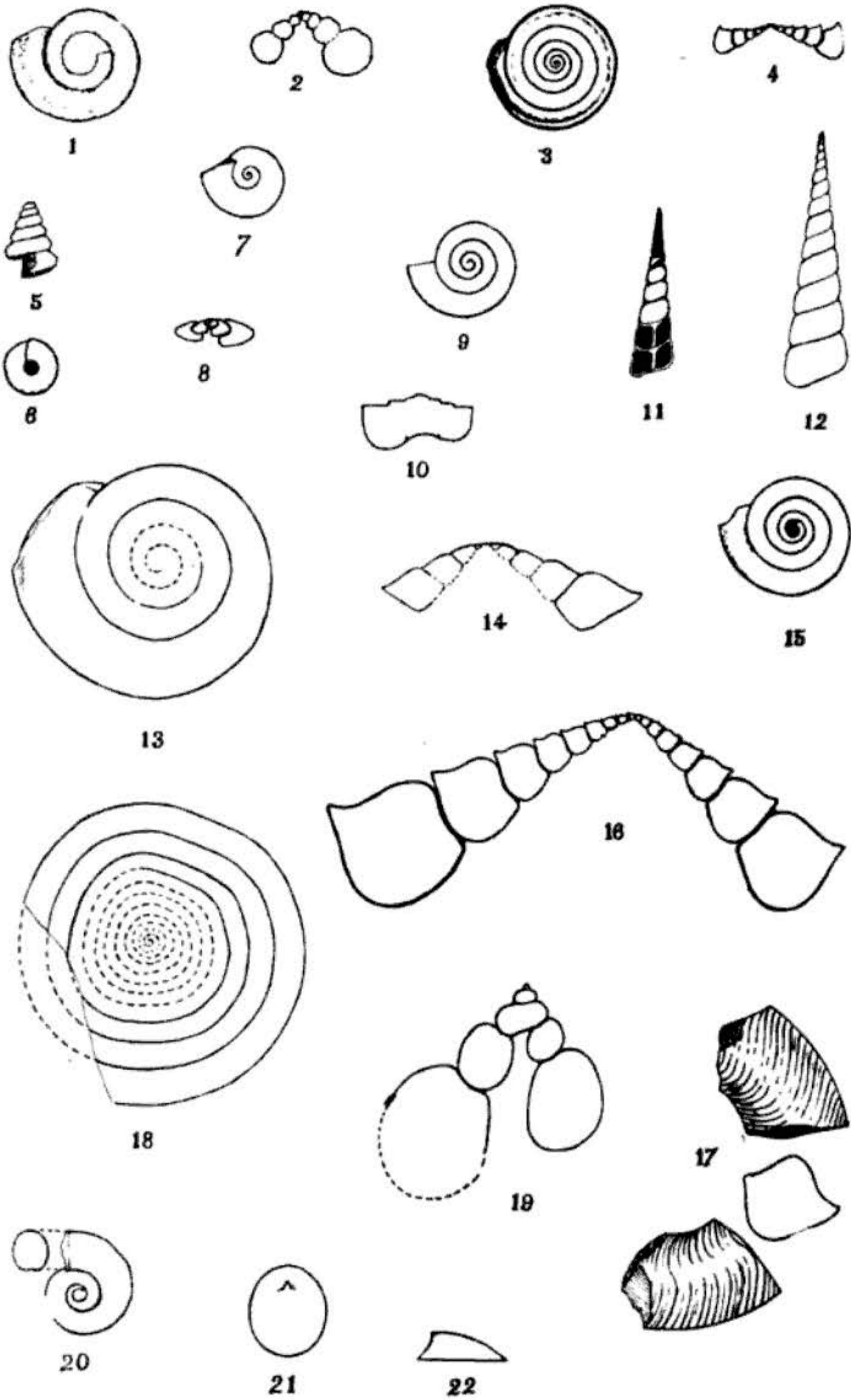
Regarding the biological side of the question of the relations of these fossils, it must be observed that to associate, for example the species *Raphistoma leisomellum*, *R. lewistonense*, *R. minnesotense*, *R. oweni* is to extend the limits of the genus. These with *Ophileta alturensis* form an interesting series of forms which, however, is best not further enlarged upon here. There may in the future be some interesting discoveries, for there occur here and there "fucoids" and other structures like fig. 13, pl. 6, from the Shakopee near Pickett Station, Wisconsin, that show the former existence of still other fossils than those thus far found.

December 6, 1892.

PLATE V

- 1 and 2. *Helicotoma peccatonica* n. sp. Apical view and reconstructed transverse section of the coil.
- 3 and 4. *Ophileta alturensis* n. sp. Apical view of the coil and cross section of the same.
- 5 and 6. *Murchisonia putilla* n. sp. Outline of the coil and of the umbilical side of part of a coil with three or four volutions wanting.
- 7 and 8. *Raphistoma leiosomellum* n. sp. Apical view and an ideal cross section of the coil.
- 9 and 10. *Raphistoma lewistonense* n. sp. Apical view and cross section of a rubber cast of the exterior.
- 11 and 12. *Murchisonia argylensis* n. sp. Natural cast of a smaller specimen and an outline of the exterior of a shell obtained on a rubber cast.
- 13 and 14. *Raphistoma ruidum* n. sp. Apical surface of an interior cast and ideal cross section of the same.
- 15, 16 and 17. *Raphistoma minnesotense* Owen. (15) Apical view of a few of the first volutions; (16) a reconstructed cross section of an interior cast; and (17) a fragment of about the eighth volution. The upper figure shows the upper surface with growth lines, the next is a transverse section, and the last shows the lower surface.
18. *Raphistoma oweni* n. sp. Apical view of the coil.
19. *Holopea obesa* Whitfield. A broken cast showing in part a transverse section.
20. *Straparollus intralobatus* n. sp. Apical view and outline of the aperture of the shell.
- 21 and 22. *Tryblidium repertum* n. sp. Apical and side views.









## PLATE VI

1. *Euomphalus winonensis* n. sp. Upper surface of a fragment reconstructed from other specimens.
- 2 and 3. *Cyrtoceras winonicum* n. sp. Fragments of two shells preserved as interior casts. The last has a part of the chamber of habitation attached.
4. *Cyrtoceras dresbachense* n. sp.
- 5, 6 and 7. *Piloceras corniculum* n. sp. (5) Specimen, drawn with the concavity of the last septum indicated in dotted lines. (6) Another specimen and (7) cross section of the same.
- 8, 9 and 10. *Ascoceras gibberosum* n. sp. Side view of the septate portion as an internal cast, and (9) longitudinal and (10) transverse sections of the same.
11. *Endoceras consuetum* n. sp.
12. *Lingula dolata* n. sp.
13. Receptaculites-like structure from the Shakopee.
14. *Subulites exactus* n. sp.

