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ONEOTA FORMATION, STODDARD QUADRANGLE, WISCONSIN

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The Oneota formation, of Lower Ordovician age, is a division of the Prairie du Chien group. For a detailed study of its lower portion, the area selected is the Stoddard quadrangle, in southwestern Wisconsin, along the Mississippi in Vernon and LaCrosse counties. Here the lower part of the Oneota is repeatedly exposed in the upper portion of the Mississippi bluffs, with numerous quarries and natural outcrops also developed up the side valleys and coulees of the dissected Western Upland.

The data on which the study is based consist of detailed descriptions of outcrops and quarries prepared by the writer more than 20 years ago in the course of field work jointly supported by the Wisconsin Geological and Natural History Survey and the Milwaukee Public Museum. Until the present study, these data had not been plotted, nor was the degree of persistence of most of the strata suspected. Field re-examination of the sections in the light of results brought out by the detailed plotting would almost certainly discover additional occurrences of many of the known key beds.

The results in this limited area strongly suggest that lithologic criteria may be employed more widely over the Upper Mississippi Valley for detailed stratigraphic tracing within the lower part of the Oneota. This in turn should permit the establishment of the degree of unconformity of the Oneota base, and have a bearing on the question as to whether the lower, sandy strata of the formation are equivalent to the Gunter sandstone of the Ozark Region.[1] Since the Ozark and Upper Mississippi facies meet in the subsurface areas of Illinois and Iowa, the study has possible applications to practical problems of subsurface correlation, nomenclature, and underground water resources. The wide variety of lithologies indicated suggests that dolomites of different specifications might be commercially recoverable from different parts of the formation.

Oneota Formation

The Oneota formation in the Stoddard quadrangle lies unconformably on the Cambrian, Sunset Point formation, and is overlain by the Lower Ordovician, Shakopee (or Willow River) dolomite, from which it is generally separated by a limited thickness of sandstone strata (new Richmond sandstone). Pre-St. Peter erosion has removed the Shakopee strata over wide areas, however, so

that commonly the St. Peter sandstone contacts some portion of the Oneota.

Lower Oneota Strata

The lower 35 to 40 feet of the Oneota formation comprise a natural unit, which in turn can be subdivided into two consistent members, and these further into a number of distinctive strata, herein designated by the numbers 1 to 9. In all, 15 strata are numerically designated, among which those numbered 1 to 9 are considered primary, those with lower case letters suffixed secondary, and those given prime symbols, of a tertiary category. The first category are those most persistent in occurrence and consistent in position and character.

Strata discriminated are, in descending order, as follows:

Stratum 9. Rather massive dolomite characterized by a broad-domed *Cryptozoon* occurring in masses several feet in diameter; at other localities, massive, cherty to noncherty dolomite without cryptozoa occupies this position.

Stratum 8. A dolomite stratum bearing a *Cryptozoon* packed as columnar colonies 3 to 6 inches in diameter and rising the full height of the bed. Chert is commonly present.

Stratum 7. Fourth green-specked band. Dolomite, coarsely crystalline, vitreous, clean, gray or buff, *studded with glauconite;* floating sand grains present. "Chitons"[2] may occur.

Stratum 7a. A zone of "chitons" commonly underlies Stratum 7. At other localities cryptozoa (No. 7a) are present in this position.

Stratum 6. *Cryptozoon* stratum, packed with columnar colonies, 1 to 2 inches in diameter and rising to the full height of the bed.

Stratum 5. Third green-specked band. Like 7, with "chitons" locally present.

Stratum 4. Zone of abundant "chitons," commonly associated with rather obscure cryptozoa.

Stratum 3b. Locally developed zone of oolitic dolomite.

Stratum 3. Second green-specked band. Like strata 5 and 7, but no "chitons" reported.

Stratum 3a. Locally developed zone of oolitic dolomite, commonly underlain by obscure cryptozoa.

Stratum 3′, 3″. Small (1cm) subspherical pebbles of yellow-green, argillaceous, dense dolomite in matrix of dolomitic sandstone. Probably not a specific stratum but a characteristic lithology which developed intermittently at various levels within a vertical span of several feet.

Stratum 2. First green-specked band. Like Strata 3, 5 and 7.

Stratum 1. *Cryptozoon,* in dome-shaped masses averaging 1 foot in diameter and compounded of closely packed columnar growths. Oolitic dolomite or oolitic chert commonly fills depressions between domes. *Cryptozoon* conglomerate locally occupies this interval.

Stratum 1a. Locally developed oolitic dolomite or dolomitic sandstone.

Oneota base ("B"). A cobbly sandstone conglomerate lies commonly near or at the base of the formation, but the change from fine-grained, well-sorted Sunset Point sand to the coarser, very poorly sorted Oneota sand is the specific criterion of the contact. Strata within the upper few feet of the Sunset Point formation are in places silicified to a semi-quartzite, as in other parts of Wisconsin. Evidence from other areas strongly suggests that this developed in connection with a pre-Oneota erosion surface.

Among the above key lithologies, the various green-specked bands appear to be highly persistent, as are some of the *Cryptozoon* strata (particularly Stratum 6). The "chitons" occur through quite a considerable vertical span of strata, but their most persistent occurrence is in a bed (Stratum 4) directly underly-

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[1] Willman, H. B., and Templeton, J. S., Cambrian and Lower Ordovician exposures in northern Illinois: Trans. Ill. Acad. Sci., vol. 44, p. 116, 1951.

[2] The term "chiton" is employed herein to the remains of an organism the shell of which, in curvature and size, is best compared to *Dentalium.* The "chiton" shells, however, are closely septate and only hemi-tubular, being open on one side for the full length of the shell. The reference to "chitons" was tentatively made by E. O. Ulrich (personal communication). Where the shells are abundant, their silicified remains may readily be detected on the vertical face of the bed by means of their crescentic cross sections.

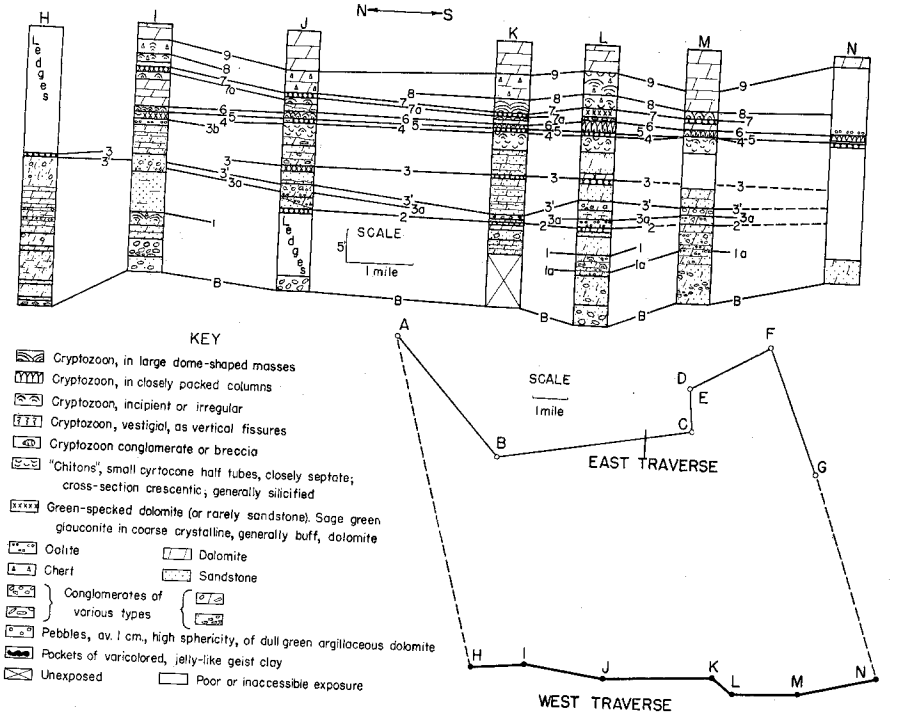

FIG. 1.—Oneota formation, Hickory Ridge and Mound Ridge members. West half of Stoddard quadrangle, Wisconsin.

ing Stratum 5. Oolite, generally in dolomite, is present at nearly all localities, but its persistence in specific strata is less constant than that of glauconite. Chert is even more sporadic in occurrence and is not used for stratal designation; the same may be said for sandstone beds, and for most conglomerates.

HICKORY RIDGE AND MOUND RIDGE MEMBERS

Below the base of Stratum 4 (Chiton stratum) the dolomites are for the most part arenaceous and are interbedded with sandstones, whereas little sand occurs above. On this basis, it seems desirable to divide the unit into two members, the Hickory Ridge below and the Mound Ridge above. Names are taken from physical features in T. 13 N., R. 7 W., Wisconsin, where the type locality is a bluff-top quarry, 1 mile south of Genoa, Vernon Co. (see appended section).

If the member boundary is thus placed, all oolite is confined to the lower or Hickory Ridge member, whereas the "chitons" and most of the chert are confined to the upper or Mound Ridge member. The latter averages 13 feet in thickness, with a range of from 10 to 17 feet; the former 24 feet, with a range of 22 to 26 feet.

Fossils are rare in the Hickory Ridge member, but the trilobite

Symphisurina and small, planispiral gastropods have been found in several areas in Wisconsin. No fossils have as yet been found in the Mound Ridge member.

Genoa Member

Overlying the Mound Ridge member is a stratigraphic section of varied thickness, characterized by strata which are distinctly and evenly bedded, with clean flat bedding planes and smooth vertical jointing. This sequence falls naturally into two divisions, the lower of which ranges from 8 feet in the north to 29 feet in the south. This lower rock unit is light buff, or buffy mottled, commonly in beds 2 to 3 feet thick, which may subdivide under the weather to flagstone dimensions. On the basis of these characters, the unit is called the "buffy bedded zone." Beds are dull in lustre, compact, homogeneous, and generally finely crystalline. Many of the strata are studded with globose, nut-size cavities with facetted walls, which may be lined with dolomite or quartz druse, or solidly filled by white, minutely crystalline quartz. Many beds have zones of horizontal burrows, which are also conspicuous on the bedding planes, where greenish shale partings are commonly present.

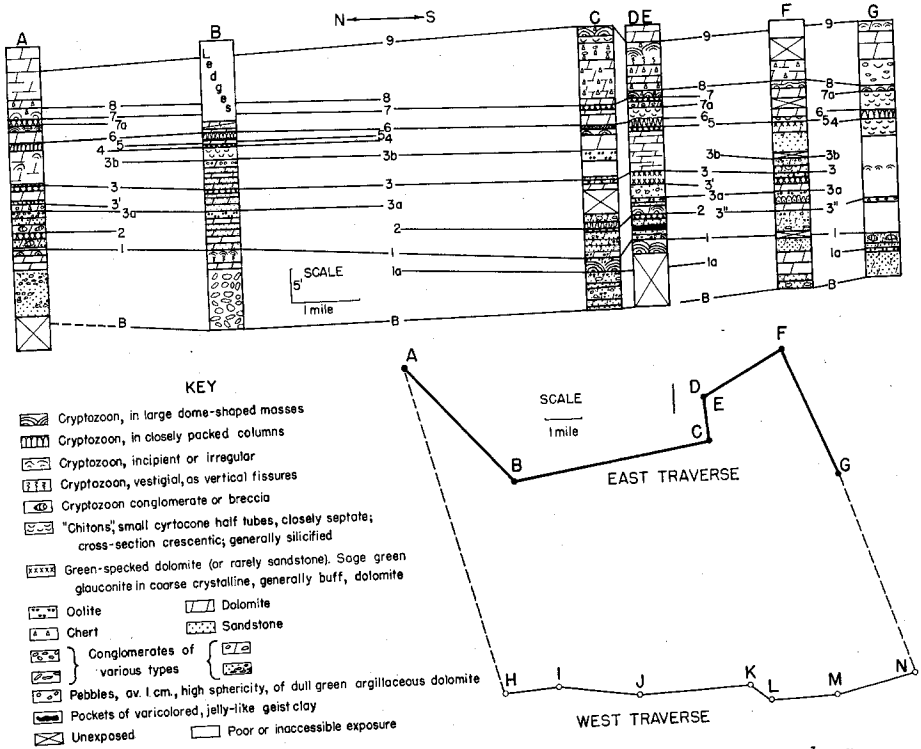

Fig. 2.—Oneota formation, Hickory Ridge and Mound Ridge members. East half of Stoddard quadrangle, Wisconsin.

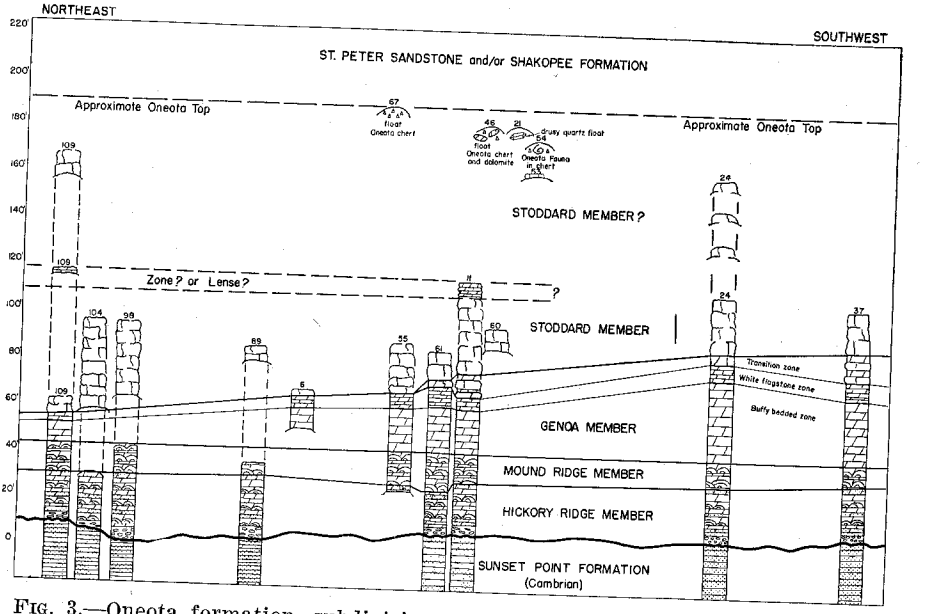

FIG. 3.—Oneota formation, subdivisions. Based on sections related to a line drawn NE-SW across Stoddard quadrangle (lithologic representations are conventionalized).

Chert nodules, in rows parallel to the bedding, occur at a few localities, in the upper part of the unit. Ripple marks were observed at one locality. No fossils were noted.

The higher of the two divisions, the "white flagstone zone," ranges from 3 feet thick in the north to over 8 feet in the south. The dolomite is white, dull, homogeneous, and finely crystalline, and readily breaks to flagstone slabs 2 to 6 inches thick. Nut-sized cavities of the type described in the underlying are generally present; fucoids are scarce or absent, and no chert is reported. Weathering etches out a fine lamination. Dendrites commonly mark the minor joint planes. No fossils have been found.

The white flagstone zone may be directly overlain by massive, rough weathering dolomite of the Stoddard member; or, as much as 12 feet of strata may intervene between the two units. In the main, these strata may be regarded as transitional. Commonly, a few feet of flagstone like the underlying but buff in color will be present at the base, followed by a thicker zone in which these buffy flagstones will be interbedded with Stoddard-type strata. Or, the entire interval may be represented by thick but distinctly bedded buff dolomite, the character of which gradually approaches Stoddard lithology upward. Chert nodules, some of which may be silicified pebbles, occur not uncommonly in this transition zone, in bands parallel to the bedding.

The persistence and relatively constant thickness of the white flagstone zone, in contrast to the varied thickness of the underlying buffy

beds, raises the question as to the presence of an unconformity at the base of the Genoa member. There is, however, no supporting physical evidence. It is quite possible that the buff unit may thicken because of factors other than that of unconformity; moreover, the white flagstone, while continuous lithologically, may not be everywhere contemporaneous. The upward transition of the Genoa member into the Stoddard member seems strongly indicated.

As a result of the variations discussed, the Genoa member ranges from a minimum thickness of 11 feet in the northeast to 46 feet in the southwest part of the quadrangle. The name is taken from the village of Genoa, which lies one mile north of the type locality, which also serves as the type locality for the Hickory Ridge and Mound Ridge members.

Stoddard Member

Above the cleanly bedded, compact, homogeneous strata of the Genoa member, is a massive, rough-weathering dolomite, which may in fact comprise all of the remainder of the formation. Strata of this lithology have been observed to a height of 160 feet above the Oneota base, but the upper beds of the formation are only intermittently exposed on the quadrangle (fig. 3).

The longest continuous exposure of post-Genoa rock was measured in a bluff-top quarry (X 57.11), one mile south of Stoddard, Vernon Co. The 37 feet of rock immediately succeeding the Genoa beds here consist of gray, crystalline-granular, cherty dolomite, massive, virtually without bedding planes, vuggy and traversed by irregular porous areas which cause rough-weathering; the vugs are lined with quartz druses, small calcite rhombs, and marcasite (altered to limonite). Poorly preserved gastropods were noted at several localities.

Above this, at the top of the cliff at the type locality, is a 6 foot thickness of dolomite that is thin-bedded and cryptocrystalline and broken by the weather into small angular pieces 1 to 2 inches in dimension. The only other outcrop of this horizon and lithology is a 2-foot exposure of thin-bedded, homogeneous, medium-grained gray dolomite on U. S. Highway 14 at the north edge of the quadrangle.

Since dolomite and chert of Stoddard type have been found at higher elevations, but in limited exposure, the question naturally arises as to whether the thin-bedded homogeneous strata are local lenses or represent a consistent zone. In the latter case, it may or may not be expedient to designate these beds as a separate member, and to restrict the term Stoddard member to the strata between the thin beds above and the Genoa beds below. Used in this latter way, the Stoddard member would range in thickness from over 50 feet in the northeast to about 25 feet in the southwest part of the quadrangle. Conversely, on the basis of abundant high level chert float of Oneota type, which also yielded Oneota fauna at one place, the member may reach a thickness of over 130 feet.

Strata of Stoddard lithology may be highly fossiliferous, but the fossils have been nearly obliterated by recrystallization of the dolomite, so

that collections are confined to the chert, which has yielded the rich *Gasconadia putilla* Gasconade-Cheppultepec fauna of mollusks, with the trilobite *Hystricurus*.

Post-Oneota Strata

Based on actual outcrop, the Oneota formation in the Stoddard quadrangle has a thickness of at least 160 feet, but high-level residual chert of Oneota type, at one locality also with Oneota fossils, suggests an additional 30 feet may be present under the ridge tops, to give a total thickness of 190 feet. This compares not unfavorably with a thickness of 170 feet reported by Kay[3] for Allamakee Co., Iowa, directly across the Mississippi.

At several localities, masses of St. Peter sandstone, which may or may not be in place, were found far below the Oneota top, and at one place, close to the Cambrian contact. This is a common phenomenon in this part of Wisconsin, where the occurrences are such as to suggest that the pre-St. Peter relief was close to the magnitude of the present topographic relief, and that some of the present topography may be exhumed pre-St. Peter topography.

A Platteville outlier rising into the Mifflin member in SW ¼ sec. 34, T. 13 N., R. 7 W., on Mound Ridge indicates the top of the St. Peter sandstone to lie roughly 325 feet above the Oneota base. Topography and chert float indicate that the 135 foot interval between the postulated Oneota top and St. Peter top is occupied in part by that sandstone and in part by Shakopee (Willow River) strata. Whether the New Richmond sandstone is present between the Oneota and Shakopee could not be determined because of inadequate exposure.

[3] G. Marshall Kay, Ordovician system in the Upper Mississippi Valley: Guide Book 9th Annual Field Conference, Kansas Geol. Soc., p. 282, 1935.

Type Sections

Hickory Ridge, Mound Ridge, and Genoa members

Quarry and Mississippi bluff in NE ¼ SE ¼ sec. 32, T. 13 N., R. 7 W., 1 mile south of Genoa, Vernon Co., Wis.

Oneota Formation, Stoddard member

		Thickness Ft.
Bed 48.	Grassy slope with a few projecting ledges of dolomite.....	50±
Bed 47.	Dolomite, massive, rough-weathering, full of large to small irregular vugs lined with crystals of quartz and calcite; unstratified except for a few bedded layers toward base; occasional chert nodules, especially near top; indistinct cryptozoa throughout.	29

Oneota Formation, Genoa member

Bed 46.	Dolomite, single bed, similar to bed 45, but brownish. "Transition zone."	1.7
Bed 45.	Dolomite, like bed 44 but buffy, thicker bedded, with crystal-lined cavities common in lower part. "Transition zone.".....	1.8
Bed 44.	Dolomite, whitish, flaggy, dull, homogeneous, regularly and distinctly bedded, with many nut-size cavities containing quartz and calcite; fine lamination apparent on surfaces etched by weathering; dendrites along joint cracks. Some beds near base have a buffy cast. Top 2 inches is clayey dolomite, weak, finely laminated. "White flagstone zone."...	7.2

Bed 43. Dolomite, light buff, compact, homogeneous, in distinct and rather thick beds, with nut-size cavities lined with small quartz crystals. Top of bed bears abundant "worm" furrows and is studded with broad, flat chert nodules. "Buffy bedded zone." 3.2

Bed 42. Dolomite, light gray mottled with buff, distinctly bedded, homogeneous, somewhat porous, with very few cavities. "Buffy bedded zone." 2.9

Bed 41. Dolomite like bed 38. "Buffy bedded zone." 3.1

Bed. 40. Dolomite like bed 39, but buffy and less rough. "Buffy bedded zone." 2

Bed 39. Dolomite, gray to buffy, compact, massive, rough-weathering, breaking to irregular blocks under the weather; full of drusy cavities and vugs. Lense of small rounded pebble-like bodies at top of bed. "Buffy bedded zone." .....5.5 to 6

Bed 38. Dolomite, light gray, buff weathering, well bedded with beds subdivided under weather; homogeneous, with horizontal rows of nut-sized cavities lined with dolomite druse and calcite rhombs; "worm" furrows prominent on some bedding surfaces, which may also have bluish green shale partings. Some layers have open, horizontal borings. "Buffy bedded zone." 12

Oneota Formation, Mound Ridge member

Bed 37. Dolomite, brownish to purplish gray, granular, in single layer, massive, rough-weathering, studded with nodules of white chert; abundant cryptozoa in large, subglobose colonies compounded of small, closely packed columnar colonies. Silicified "chitons" present in upper part of bed (cryptozoa absent here). Stratum 9..... 3.5

Bed 36. Dolomite, purplish gray, granular, single layer; 6 inch zone in middle traversed by parallel vertical cylindrical openings (vestigial cryptozoa); a few "chitons" in lower part; impure chert in upper part. Stratum 8..... 2.1

Bed 35. Dolomite, resistant, brittle, abundantly specked by glauconite grains in light gray matrix; numerous floating sand grains; small silicified fossils, mainly "chitons," common. Stratum 7. 1

Bed 34. Conglomerate, with pebbles apparent only on weathering; pebbles well rounded, slightly darker than matrix and less compact, maximum size slightly more than 1 inch; matrix compact, purplish gray dolomite..... 0.4

Bed 33. Dolomite, made up largely of cryptozoa in small, columnar, closely packed colonies, which are not everywhere present. Stratum 6. ..... 1.7

Bed 32. Dolomite, crystalline, specked with moss green, clayey glauconite and studded with floating sand. Stratum 5..... 0.4

Bed 31. Dolomite, irregularly porous to compact, with numerous silicified "chitons"; large, subglobose cryptozoon colonies in upper part; basal contact indistinct. Stratum 4..... 2.8

Oneota Formation, Hickory Ridge member

Bed 30. Dolomite, sandy in upper part, brown, crystalline-granular, firm to friable. 2.2

Bed 29. Dolomite, purplish brown, firm, single layer full of large floating sand grains..... 0.7

Bed 28. Dolomite, purplish gray, compact, with occasional glauconite grains. 0.9

Bed 27. Dolomite, gray, finely specked by moss green, clayey glauconite; rock crystalline-granular, homogeneous; single layer. Stratum 3. ..... 0.7

Bed 26. Sandstone, light brown, poorly sorted, with local dolomite cement, and grading upward to dolomite..... 2.4

Bed 25. Sandstone, irregularly dolomitic, with yellow, clay-like pebbles in middle portion. Stratum 3'..... 1.4

Bed 24. Dolomite, sandy (below) and sandstone (above); well cemented. 1.3

Bed 23. Oolite, rather coarse grained and with scant dolomite matrix. Stratum 3a. 1.1

Bed 22. Dolomite, cryptocrystalline, upper few inches mottled by glauconite, lower portion purplish brown; abundant floating sand, very coarse in lower portion. Stratum 2..... 1.5

Bed. 21. Sandstone, white to yellow, medium fine, well-sorted, clean, very friable, laminated, in places cross-laminated..... 1.3

Bed 20. Sandstone, locally dolomite-cemented; locally colored by greenish clay infiltration; local lenses of fine, earthy dolomite with greenish cast. Rock breaks to irregular fragments under weather. 1.2

Bed 19. Dolomite, purplish and buffy mottled, with irregular openings and stylolites; floating sand and oolite grains in about equal abundance, lacking in upper part; rock compact and resistant. Parallel, vertical, pipelike openings at some horibons (vestigial cryptozoa). Stratum 1..... 2.4

Bed 18. Sandstone, dolomitic; coarse grains separated by yellow-brown dolomite, with small oolitic grains abundant; well bedded. Stratum 1a. 0.5

Bed 17. Sandstone, dolomitic, friable to well cemented, with a few small pebbles of yellowish clay; poorly sorted; locally sand-calcite crystals form pisiform concretions..... 4.6

Bed 16. Sandstone, poorly sorted, variously cross-laminated, irregularly cemented, with pebbles of Sunset Point sandstone, which weather away to cavities. Base of Oneota formation... 3.4

Sunset Point Formation

Bed 15. Somewhat interrupted exposure; sandstone, largely in definite, well cemented beds; white, buffy, or brown; fine-grained, laminated, locally cross laminated; horizontal borings common throughout. Basal bed resistant, forming projecting shelf; succeeded by fine, weak, white, saccharoidal sandstone; highest bed subquartzitic, breaking to firm angular blocks under the weather ("clinkstone"). Pebbles in irregular lenses near base; mudcracks in the weak, white sandstone. 17.7

Bed 14. Sandstone, poorly sorted, weak, dirty, variously cross-laminated, commonly with adjacent laminae of green shale and coarse sand. Pebbles present near top. Upper surface covered with large "wave" ripple marks, about 1 inch high and 4.5 inches apart; rippled surface traversed by furrows of crawling animals. Unconformity at base has a relief of 12 inches. .....Mean, 3.5

Trempealeau Formation, Jordan member

Bed 13. Sandstone, medium to coarse grained, grains rounded, frosted; clean, porous without fine fractions, except for occasional partings of resistant shale which weather in relief; cross-bedded with bedded units having steep foresets of constant direction, prevailingly northwest; no bedding planes, but an alternation of thick, steeply and gently cross-laminated zones, the complex itself having a northerly inclination. Sand basically white and friable but brilliantly stained by ochre. Van Oser submember. .....Mean, 16.5

STODDARD MEMBER

Quarry and Mississippi bluff in NW ¼ NE ¼ sec. 33, T. 14 N., R. 7 W., 1 mile south of Stoddard, Vernon Co., Wis.

Oneota Formation, Stoddard member (?)	
Dolomite, thin bedded, cryptocrystalline, broken by weather into angular chips 1 to 2 inches in diameter	6
Oneota Formation, Stoddard member	
Dolomite, massive, almost without bedding, gray, crystalline granular, compact to porous, vuggy with linings of drusy quartz or rhombic calcite, and less commonly marcasite (limonite pseudomorphs); chert nodules; poorly preserved molds of gastropods	37
Oneota Formation, Genoa member	11.7
Transition zone	4.9
White flagstone zone	12.4
Buffy bedded zone	
Oneota Formation, Mound Ridge member including development of Strata 4, 5, 6, 7, 8, 9	12.4
Oneota Formation, Hickory Ridge member including development of Strata 1, 3a, 3′, and 3b	22.3
Sunset Point Formation	24.3
Trempealeau Formation, Jordan member	14.5
Van Oser submember	

Localities

(Letters and numbers to left correspond to those on charts)

A. Locality 101; center of NW ¼ sec. 7, T. 14 N., R. 5 W.; 1 mile WNW of Coon Valley, Vernon Co.

B. Locality 89; SE ¼ NE ¼ sec. 28, T. 14 N., R. 6 W.; bluff rising above railroad station, Chaseburg, Vernon Co.

C. Locality 61; NE ¼ NE ¼ sec. 27, T. 13 N., R. 6 W.; ravine 1 mile SW of Newton, Vernon Co.

D. Locality 55; SE ¼ SE ¼ sec. 23, T. 13 N., R. 6 W.; quarry on County highway, 1 mile ESE of Newton.

E. Locality 57; NW ¼ NW ¼ sec. 25, T. 13 N., R. 6 W.; ravine west of county highway, 1.5 mile ESE of Newton. (locs. 55 and 57 are combined as a composite section).

F. Locality 50; SE ¼ NW ¼ sec. 6, T. 12 N., R. 5 W.; ravine above bridge on west side of Norwegian Hollow, Vernon Co.

G. Locality 41; SE ¼ SE ¼ sec. 9, T. 12 N., R. 6 W.; bluff on north side of South Fork, Bad Axe River, Vernon Co.

H. Locality 7; west half SE ¼ sec. 21, T. 14 N., R. 7 W.; Mississippi bluff at north edge of Stoddard, Vernon Co.

I. Locality 11; NW ¼ NE ¼ sec. 33, T. 14 N., R. 7 W.; quarry in Mississippi bluff, 1 mile south of Stoddard, Vernon Co.

J. Locality 15; NE ¼ SW ¼ sec. 9, T. 13 N., R. 7 W.; McDonald's Quarry, Vernon Co.

K. Locality 30; NE ¼ SW ¼ sec. 28, T. 13 N., R. 7 W.; ravine ½ mile west of Genoa, Vernon Co.

L. Locality 24; NE ¼ SE ¼ sec. 32, T. 13 N., R. 7 W.; quarry 1 mile south of Genoa, Vernon Co.

M. Locality 28; SW ¼ NW ¼ sec. 9, T. 12 N., R. 7 W.; Mississippi bluff, 1 mile north of mouth of Bad Axe River.

N. Locality 37; NW ¼ SE ¼ sec. 21, T. 12 N., R. 7 W.; Mississippi bluff, 1.5 miles south of mouth of Bad Axe River.

6. NW ¼ NW ¼ sec. 15, T. 14 N., R. 7 W.; quarry on road ascending bluff 2½ miles NNE of Stoddard, Vernon Co.

11. equals "I."

21. NW ¼ sec. 13, T. 13 N., R. 7 W.; road at head of Spring Coulee, Vernon Co.

24. equals "L"

37. equals "M"

46. SW ¼ SE ¼ sec. 7, T. 12 N., R. 5 W.; knoll rising above elevation 1,200', on Nottingham Ridge, Vernon Co.

53. SE ¼ SW ¼ sec. 2, T. 12 N., R. 6 W.; ledge at bend of ridge road, 1.5 miles south of Plainview School, Vernon Co.

54. SE ¼ NE ¼ sec. 3, T. 12 N., R. 6 W.; in ravine 0.2 miles south of State Route 56, 1.5 miles southwest of Plainview School, Vernon Co.

55. see "D"

60. NE ¼ NW ¼ sec. 20, T. 13 N., R. 6 W.; bluff ¼ mile west of mouth of Wire Hollow, Vernon Co.

61. equals "C"

67. SW ¼ NE ¼ sec. 30, T. 13 N., R. 5 W.; ridge top 1.2 miles NNW of White Pigeon School, Vernon Co.

89. equals "B"

98. NW ¼ SE ¼ sec. 19, T. 14 N., R. 5 W.; bluff on north side of valley, 2 miles south of Coon Valley, Vernon Co.

104. NE ¼ NW ¼ sec. 11, T. 14 N., R. 6 W.; on U. S. Route 18, 2½ miles west of Coon Valley.

109. SE ¼ SE ¼ sec. 29, T. 15 N., R. 6 W.; on U. S. Route 18, descending from Brinkman Ridge to Mormon Coulee, LaCrosse Co.