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A NEW STRATIGRAPHIC HORIZON IN THE CAMBRIAN SYSTEM OF WISCONSIN.

W. D. SHIPTON.

During the summer of 1915 it was the privilege of the writer to work on the geology of the Sparta quadrangle, Wisconsin. In connection with that work a new stratigraphic horizon in the Cambrian was recognized.

The normal section of the Cambrian in Wisconsin¹ is as follows:

	THICKNESS IN FEET
3. Madison sandstone	35- 50
2. Mendota limestone	30- 45
1. Potsdam Proper sandstone.....	800-1000

In the Sparta quadrangle, the Mendota member is missing, and a new Cambrian member is recognizable. Because of its wide distribution and excellent exposures around Sparta, this persistent, shaly member has been named by the writer the Sparta member. Its base lies 290 feet and its surface about 90 feet below the top of the Cambrian; that is, the member is approximately 200 feet thick and includes the upper 165 feet of the Dresbach member (Potsdam Proper) and the whole of the Mendota member in the normal section for the state. In the Sparta quadrangle the Cambrian is divided into the following members:

	THICKNESS IN FEET
3. Madison sandstone	90
2. Sparta shale	200
1. Dresbach sandstone	820-879

Many exposures of the Sparta beds are to be found throughout the region. Two type localities are a quarry two miles southeast of Sparta in the southwest corner of section 30, township 17 north, range 3 west, and a quarry one and one-half miles north of Sparta in the center of section 1, township 17 north, range 4 west. From the latter quarry good exposures may be seen by visiting the series of quarries along the upland to the northeast. The beds are well exposed along the road and

in a gully one-half mile north of Middle Ridge in the northwest corner of section 2, township 15 north, range 5 west. Another good exposure occurs along the road in Pine Hollow two and one-half miles southeast of Melvina in the northwestern corner of section 19, township 15 north, range 3 west.

The beds of the Sparta member consist of argillaceous layers of sandstone alternating with thin, fissile, arenaceous and calcareous layers, all with more than fifty per cent sand. The arenaceous beds are mostly thin, but a few reach two feet in thickness; the more limy layers are rarely more than one inch thick. The layers apparently become more calcareous near the Madison-Sparta contact. The fissile shales vary in color. Some of the beds are of green glauconitic color, due to disseminated grains of glauconite. Other beds which contain minute glistening micalike scales and small black particles grade from a light gray to a dark gray color. Where the beds are mainly glauconite a greenish color is imparted to the soil. The layers are distinctly laminated and break into thin plates. The laminæ in most places are horizontal; in many places a minor cross-bedding is visible. The rocks tend to split along the laminæ, which are formed apparently of the green grains of glauconite, the diminutive micalike specks, and the minute dark particles. Some fragments of calcite are found. The most shaly beds are nicely ripple-marked, the markings being asymmetrical. A type locality for the ripple-marked layers is two miles northwest of Sparta, along the Big Creek road in the eastern part of section 9, township 17 north, range 4 west.

The Sparta beds are used for quarrying purposes; the member is called "Free Rock" owing to its being quarried so easily, the term being of strictly local application.

This peculiar phase of the Potsdam, here called the Sparta shale, appears not to have been given a distinct stratigraphic horizon previously. Chamberlin² notes a stratum of shales attaining a known thickness of 80 feet somewhat above the middle of the Potsdam formation. Above the shale is 150 feet of sandstone which is overlain by 35 feet of shale and limestone (the Mendota limestone). In the Sparta region the shale stratum reaches a total thickness of 200 feet and is overlain by the Madison sandstone; the Mendota apparently is missing. This may

be a local modification as noted by Chamberlin.³ The Sparta beds differ from the Mendota limestone in several respects, as follows:

1. The maximum thickness of the Mendota at the type locality at Madison is thirty-five feet⁴ while the maximum known thickness is eighty feet.⁵ The Sparta beds reach a maximum thickness of two hundred feet.

2. The Mendota member has been recognized as a limestone or a calcareous horizon⁶ in the upper part of the Potsdam, and, as such, should effervesce upon the application of acid. No such action takes place when the acid is applied to the Sparta beds, although there are minor concentrations of calcium carbonate which would undoubtedly respond to acid. An analysis of the Mendota limestone given by Irving⁷ bears a close similarity to the Prairie du Chien (Lower Magnesian) formation. This analysis shows a high percentage of lime carbonate. As stated above, the Sparta member contains more than fifty per cent sand.

3. The Mendota beds have been considered as a horizon for trilobites,⁸ and where typically exposed numerous trilobite remains have been found. Although many exposures of the Sparta beds were examined carefully, no trace of trilobite remains was found. The presence of certain species of brachiopods belonging to the *Lingula* group⁹ also characterizes the Mendota horizon. The fauna of the Sparta beds includes an uncertain species of *Obolella* and the impressions of a doubtful *Orthis*. Faunally, there is a difference between the Mendota and the Sparta beds.

The Sparta beds do not seem to be the equivalent of the Saint Lawrence member since Calvin¹⁰ recognized the Saint Lawrence member as evenly bedded calcareous strata corresponding to the fifth trilobite bed of Owen and attaining a thickness of thirty-five feet.

In a recent publication of the Wisconsin Geological and Natural History Survey,¹¹ the Upper Cambrian is subdivided into

³Geology of Wisconsin, Vol. I, pp. 121-122.

⁴Bull. XIII, Wis. Geol. and Nat. Hist. Surv., p. 92.

⁵Geology of Wisconsin, Vol. II, p. 259.

⁶Bull. VIII, Wis. Geol. and Nat. Hist. Surv., p. 37.

⁷Geology of Wisconsin, Vol. II, pp. 543-544.

⁸Geology of Wisconsin, Vol. II, p. 261.

⁹Geology of Wisconsin, Vol. II, p. 261.

¹⁰Iowa Geol. Survey, Vol. IV, p. 59.

six formations by Ulrich, one of which is the Franconia. It is possible that the Sparta beds may be the equivalent of the Franconia formation, but since no description of the Franconia beds has been published, it is impossible to make a definite statement to this effect. The topographic position of the Franconia appears to correspond with that of the Sparta member.

Winchell¹² recognized the Saint Lawrence and associated shaly beds as having a total thickness of 200 feet. These beds are probably the equivalent of the Sparta member.

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¹²Final Rept. of the Geol. and Nat. Hist. Survey of Minnesota, Vol. II, p. XXII.