SCIENCE

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MSS. intended for publication and books, etc., intended for review should be sent to the responsible editor, Prof. J. McKeen Cattell, Garrison-on-Hudson, N. Y.

A CENTRAL WISCONSIN BASELEVEL.

THE crystalline rocks of central Wisconsin north of the Potsdam sandstone, in the district including Grand Rapids, Stevens Point, Mosinee, Wausau, Marshfield, Merrill, and other towns, are of a very complex character.* In the southern part of the district is found a large area of the typical rocks of the Archean. North of this is an area composed of sedimentary and igneous rocks belonging to the Huronian. The igneous rocks have the greatest variety, including plutonic and volcanic varieties, as well as basic, acid, and intermediate facies. The whole region is one of intense folding and metamorphism. The schistosity of the rocks is at most places nearly vertical, and the beds of quartzite on Big Rib and Mosinee hills are on end.

Notwithstanding the complicated folding and great variety of rocks, resulting in different resisting powers, there is in this district as nearly perfect a baseleveled plain as it has been my good fortune to see. One of the most convenient localities in which to see this plain is near Mosinee. Following the wagon road which is east of the Wisconsin river a short distance south, so as to get above the valley of the Wisconsin, an almost perfect plain is seen to the northwest, west, south and east, large areas of which are but little dissected by any of

*See Geology of Wisconsin, Vol. IV., pp. 623–714; also Pl. I., Geol. Atlas of Wis.

the tributary streams of the Wisconsin. South and west of Mosinee the streams wander about in an area which is largely swamp, and as yet has not been fully divided between them. This swampy plain is crossed between Knowlton and Centralia by the Wisconsin Valley Division of the St. Paul Railroad. This baseleveled plain is easily recognized because over it is spread only the very thin mantle of drift of one of the earlier glacial epochs, the ice of the later Wisconsin epoch not having reached it.*

From the plain south of Mosinee the eye sweeps to the north over the Wausau area, where the plain is much dissected by the Wisconsin and a number of its larger tributary streams, on the west side the Little Eau Pleine, the Big Eau Pleine, and the Big Rib rivers, and on the east side the Eau Claire river. Rising from this lowland, about 1,850 feet above sea level, is Big Rib Hill, one of the highest points in the State of Wisconsin. As determined by aneroid measurements by E. R. Buckley and Samuel Weidman, the summit is about 450 feet above the ancient baseleveled plain. Another hill, some 12 or 15 miles to the west, of unknown character, rises to a lesser elevation above the plain. The exceedingly resistant character of the Big Rib Hill quartzite sufficiently explains the existence of this monadnock.

From the top of Big Rib Hill itself, about 5 miles southwest of Wausau, the immediately surrounding country is seen to be dissected by the large tributary rivers of the Wisconsin already referred to. However, to the northward, 12 or 15 miles away, is again seen the horizontal line marking the extension of the baseleveled plain in that direction, and to the southward at an almost equal distance may be seen the almost perfect plain already described which extends southward from Mosinee.

Along the Wisconsin river from Wausau to Mosinee, and adjacent to the larger tributary streams, is seen a beautiful system of terraces. The higher glacial flood plain of the Wisconsin and its tributaries is here very extensive. Descending a steep embankment 20 or 25 feet high, one reaches a lower terrace, which has very considerable width in proportion to the size of the streams, both in the case of the Wisconsin and in the tributary streams. The present channels and flood plains of the rivers are cut in this intermediate terrace. The subordinate streams are but a few feet below its surface, and as the material is soft sand and gravel they have taken different courses at different times. One may see old channels of these subordinate streams so recently abandoned, that as yet, no forests have sprung up. Older channels have forest growths in different stages of development. On account of not having any topographic map of the area and lack of time, no attempt was made to work out in detail the drainage history of the district.

South of Stevens Point and Grand Rapids is the plain of Potsdam sandstone which extends to the Baraboo bluffs, upon the south, and west to the Mississippi river. This is part of the driftless area of Wisconsin. At numerous points in its eastern part may be seen various sandstone buttes with flat tops. It has often occurred to me that these all rise to approximately the same elevation, and at various times I have suggested to my students that their tops probably represent an ancient baseleveled plain. While not demonstrated by a comparison of levels, I have little doubt that the tops of the Potsdam buttes are a continuation of the plain in the crystalline area to the north. The advanced stage of denudation of the Potsdam is due to its softness. Above the

*The Driftless Area of the Upper Mississippi Valley, by T. C. Chamberlin and R. D. Salisbury. Sixth Ann. Rept. U. S. Geol. Surv., 1885, Pl. XXVII.

Potsdam, as a consequence of differential erosion, rise the ranges of the Baraboo bluffs, which also are probably monadnocks reaching a considerable height above the baseleveled plain of central Wisconsin. As to the extent of territory over which this central Wisconsin plain may be traced, I can say nothing, but I anticipate that the area will be found to be large.

While accurate measurements were not made, the plain in the crystalline rocks apparently has a southern slope. From numerous aneroid measurements from the railroad, near Wausau, by Messrs. Buckley and Weidman, the dissected plateau both east and west of the Wisconsin River rises at many places to a uniform elevation of about 1,400 feet. At the Wausau bridge the river is about 1,180 feet above the level of the sea. In order to reach the baseleveled plain, one must therefore climb to a height of about 320 feet above the river. At Mosinee the river is about 1,100 feet above the level of the sea, and here the plain is estimated to be 200 feet above the river level. This gives a southern slope to this plain between Wausau and Mosinee, a distance north and south of about 12 miles, amounting to at least 100 feet.

On the geological map of Wisconsin* it will be seen that the Paleozoic formations about the pre-Cambrian core of central Wisconsin constitute a very gently southward plunging anticline. How far erosion had gone toward a baselevel in the crystalline area before Cambrian time is undetermined, but the uniform fashion in which the streams cut the Potsdam and strike the crystallines at about the same level for considerable distances away from the main Archean area indicates that if not baseleveled at the time of the Cambrian transgression, the area approached a peneplain.

As to the age of the central Wisconsin baseleveling no more than conjectures can at present be given. One naturally connects it with the Cretaceous transgression, which extended very far over the Upper Mississippi valley, and perhaps over all of it.

As to the agent or agents which accomplished the baseleveling, no evidence was obtained, but because calculations show that running water is far more potent as a denuding agent than the ocean, I incline to the belief that the major part of the work was done by rivers, although it is possible that as a result of the transgression of the ocean some of the final work may have been that of marine denudation.

Observations upon which the above article is based were made by me while on a trip with some of the advanced students of the University of Wisconsin, the primary purpose of the trip being to study the crystalline formations of central Wisconsin. It is hoped at a future time to take accurate measurements of the heights of the river terraces and of the baselevel at various points, in order to give a more exact account of them.

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* L. c., Pl. I.

DECIMAL NUMERATION IN THE UNITED STATES.

MR. HERBERT SPENCER'S arguments against the adoption of the metric system, republished in the June number of *Appleton's Popular Science Monthly*, are chiefly based upon the idea that the division of measures into tenths is so inconvenient that men 'under the pressure of business needs' tend to abandon the decimal system in favor of the duodecimal. Whatever may be the case in England, it is evident that in the United States the tendency is quite the opposite, and that we are gradually bringing the divisions of our weights and measures into accord with our notation. This evolution is not being accomplished by 'Bureaucratic Coercion,' but by the free action of natural forces, the beneficient results of