Review & two short reports. 1950-1959?

5 copies

Raasch's remarks on the fact that the fauna of the Trempealeau is very similar to that of both the Madison above and the upper part of the Franconia below serves to ~~negate~~ offset his conclusion that there are marked regional breaks between Jordan and Madison and at the base of the St. Lawrence dolomite. The outstanding feature of Cambrian sedimentation is lenticularity of lithology in detail, although it is possible to trace major divisions over wide areas. It is my opinion that the Cambrian of Wisconsin is the product of two major marine advances followed by recessions. The Mt. Simon is clearly the transgressive phase, the Eau Claire the deep water phase, and the Galesville (Dresbach of Ulrich) the regressive phase of the first cycle. In central Wisconsin the fine-grained phases of the Eau Claire are absent for the water remained shallow throughout the entire time. In the second cycle the Ironton member of the Franconia formation is the initial transgressive phase. The upper part of the Franconia, and particularly the St. Lawrence dolomite, represent deeper water conditions. Progressive shoaling of the waters after this is demonstrated by upward increase in grain size throughout the Jordan member. The erratic Madison member may represent lagoon deposits partially shut in from the open sea by barrier beaches now classed as the coarse phase of the Jordan. Conglomeritic sandstones caused by breaking up of previously-deposited sediments are by no means confined to the suggested breaks. Only at Mendota, Wisconsin have I ever seen any physical evidence which might show of a break at the bottom of the Madison. This is a marked coarse-grained layer a few feet thick. In view of the hypothesis suggested above this could readily occur locally and not demonstrate an emergence.

F T Thwaites
Jan 4, 1950

~~please both ways and return~~

THE GREEN BAY FOREST BED LOCALITY.

The exposure visited in company with Prof. Iltis on 30 June and 1 July, 1953 is located in SE¼SE¼ sec. 22, T. 24 N., R. 21 E. on the farm of Norbert F. Peters, Miscolet Road, R. 1, Green Bay, Wisconsin. The excavation was made for filling in the nearby city and is roughly 35 feet deep and 250 feet long. It was visited on 5 September, 1952 by the writer and Kenneth Bertrand of the Geography Department at The Catholic University of America, Washington, D. C. At that time it was smaller. Logs were collected from a mass of fine sand just below the red till. One of these was run for radiocarbon at the Yale laboratory with the preliminary result of 9330 ± 330 years. Later this was revised to 11940 ± 330 years. This revision illustrates some of the uncertainties of this method of age determination.

The exposure extends from the road which is slightly below 600 feet elevation to a level of 640 feet above sea level. The face was only fairly well exposed at the last visit and the accompanying sketch was made without the use of instruments. It combines several field sketches and is not claimed to be accurate in detail. The top layer is the Valders till which contains much clay although there are some layers of sand. It is pale red in color. The bottom of the till is a fairly level surface not over 8 feet below the top of the exposure. Below the till materials are mixed in a confused manner. Several colored photographs were taken but an accident to the camera caused this work to end prematurely. So far as can be determined the material just below the till in point of age of deposition is a dark red clay. This clay is obscurely stratified and contains masses of fine sand and some ice-rafted glacial boulders. There appeared to be some logs just below the till. At the north end of the exposure the clay is thick and lies on a coarse to gravelly sand most of which is horizontally bedded and in places appears to be ripple-marked. About a third of the distance along the face from the north end is a mass of logs and peat mixed with this red clay. Near to the organic material the clay is a pale green-gray probably due to reduction of the ferric oxide by the carbon. At the south end of the pit there is a considerable thickness, at least 10 feet of fine sand with

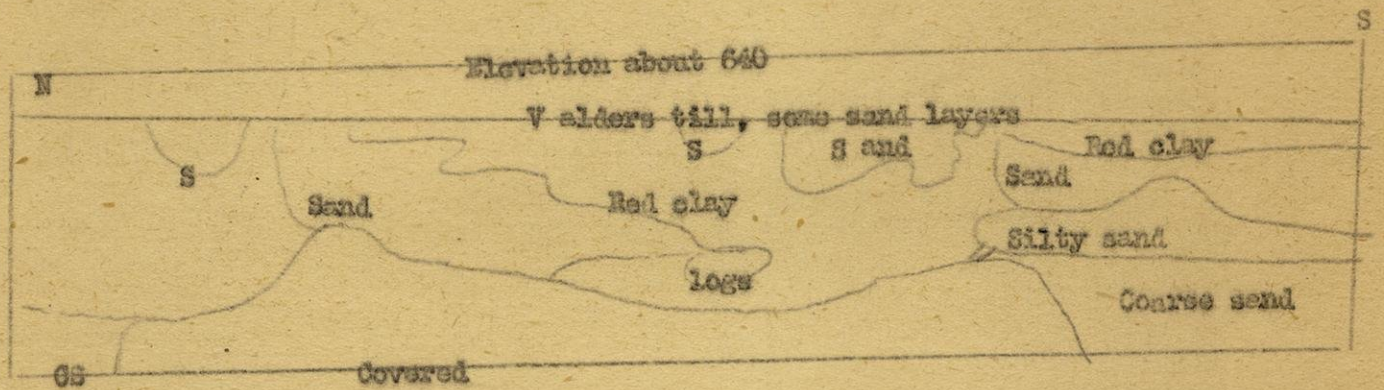
disturbed stratification. A few feet of red clay separates this from the till above Below the fine sand is an irreular thickness of a material which is unstratified like till and yet is not like any known gray till of the region in being very sandy. The writer suggests that this is a flow or slide deposit formed under water. More of it was exposed in the pit just north of Mt. Peters house which was not studied in any detail. Below the gray silty sand of this deposit is the same coarse pebbly sand that is exposed farther north.

The extremely complex deposits of this pit are matched by the results of explorations for building material and for ground water to the east and south of this locality. At least a score of test borings were put down to locate two producing water wells. No two of these even if only a few feet apart showed exactly the same materials. Mr. Peters well was affected by the first on of the producing wells and the level of water was lowered a few feet. There are a considerable number of gravel and sand pits in this area.

The writer interprets the deposit in the Peters pit as laid down in a lake which was impounded in front of the advancing Valders glacier. The rise of water level in this lake must have had a profound effect on stratification. The forest growth was formed mainly before the Valders ice blocked the Straits of Mackinac. [illegible] stratified [illegible] in very turbulent water and is much redder than the overlying till. The extensive disturbance of all the sub-till materials is clearly due to friction with the overriding ice which caused shove. It is not clear just which way the ice moved but presumably it was inland from the Bay.

At Two Creeks on the shore of Lake Michigan relations are much more clear. There the clays deposited on top of the older or gray till are stratified. The Forest Bed grew in this clay for the most part. Subsequently sand with some

clay was laid down on the Forest Bed. Then the Valders ice reached the area and caused disturbance similar to that at Green Bay These exposures clearly place the Forest Bed as older than this pre-Valders lake deposit.



Nicolet Road

Length of exposure about 250 feet(not measured)

Concavity of washed slopes. may be duplicate

Concavity of slopes due to either channel or sheet erosion is an observed fact. ~~It is~~ best demonstrated where both material and water are ~~is~~ from a single source. ~~for~~ Instance, are ~~in the case of~~ outwash plains, alluvial fans, and many pediments. (lower slopes of ash cones) It has been demonstrated by log platting that all such profiles obey an exponential law with a fixed value of n ~~which~~ in each locality although there is some small variation in absolute value. The exponent averages about 7/10 with the coordinates here used. The constant varies through a larger range.

Explanation of concavity, ~~The~~ decreasing slope of washed surfaces in ~~passing~~ descending away from the source has been ascribed to (a) selective transportation in which sucessive descresing sizes of material are left behind, (b) decrease in maximum available size of material due to a combination of wear of fragments and breaking up by weathering, and (c) a curve of uniform force of erosion. In considering all of these, the known facts in respect to competence must be considered along with observational data. Since for particles over ~~2/10~~ 1 mm diameter dimensions of the largest which can be moved are ~~is~~ related to the square of the velocity. Since for turbulent flow velocity is, other things being equal, related to the square root of slope it is evident that diameter of largest particle is in every case directly related to slope (by substitution).

In the case of mixed flow velocity is related to the 7/10 power of slope and diameter of pebble and granule would then be related to 1.4 power of slope. Some observations of average size of gravel stones in streams along slopes of the Black Hills demonstrate a direct relation of mean diameter to slope. Turning to small particles below 2/10 mm ~~below fine sand in diamter~~ diameter is related to square root of velocity and therefore with turbulent flow to fourth root of slope. With mixed flow this would be 7/40 power of slope. To find the value of n we must remember that these coefficients of slope are negative with cooridinates here used and they therefore must be increased by unity to find coefficient of fall in given horizontal distance, ~~must be used~~.

But since observation shows that mean and maximum sizes of particles do decrease

down slope it is evident that we do not have the answer directly.

Just why should some particles be left and others carried further is not obvious. Must there not be a descrease in size due to a combination of both abrasion and weathering? Here the nature of the particles is important. If at the head of a ~~fan~~ pediment pebbles consist of both rather soft sandstone and hard quartz it is obvious that during transit the sandstone will soon diasappear ~~although~~ and the quartz pebbles are much less ~~affected.~~ abraded at a rate Only field observation can give a final answer to these problems. It is evident, however, that the curve of uniform force previously discussed is ~~probably~~ an error. Its primary idea ~~is~~ lay in the shaping of forms by erosion and not by deposition.

Published exponential wear rates are probably erroneous