

ART. XXVIII.—*Note on Mud Cracks*; by FREEMAN WARD.

One of the important facts brought out by Mr. Kindle's¹ experiments with and observations on mud cracks is that when soluble salts are present (such as in marine sediments, etc.) the dried mud is flat or curved downwards while under ordinary conditions the usual concave fragment is the rule. In view of this fact it seems worth while to record an observation made along the Missouri River flood plain in South Dakota.

During the summer season when the river is low one will find exposed portions of mud flats built during the time of spring flood some months earlier. On one such

FIG. 1.



fragment, some 50-75 square yards in area, the writer found that mud cracking had formed two styles of fragments. One was the regulation concave fragment and the other was the less frequently found convex fragment. The curvature was very marked in each case, as may be seen by reference to the photograph (fig. 1). The two varieties were not more than ten or twelve feet apart. The cracked material (a silty, very fine sand) was continuous over the whole tract, was absolutely uniform, and was unmistakably laid down at one operation.

Flood plain deposits do not commonly contain much soluble material. It is also obviously impossible for the river to deposit simultaneously sediment both with and without soluble material in two parts of its flood plain only a few feet apart. The only difference observable between the two spots was seen when the fragments were picked up. Beneath the unusual convex fragment the

¹ Jour. Geol., 25, 135-44, 1917; *ibid.*, 31, 138-45, 1923.

surface was rippled, while beneath the usual concave fragment the ripples were absent.

Later, in the laboratory, an attempt was made to reproduce the conditions. Mud was deposited on artificial ripples (made in plaster of Paris). The fragments formed on drying did not curve downward but did remain flat, showing that there was some relation between the rippled surface and the shape of the dried mud.

It would seem, then, that the convex (or flat) fragments developing on the formation of mud cracks need not always signify a saline mud but that the character of the surface on which the mud is deposited is also a determining factor.

A possible explanation of the phenomenon observed may be as follows: The area of the under side of the fragment which rested on the rippled surface is greater than the flat upper side; the total shrinkage would therefore be greater. If the conditions (texture, etc.) are such that the upper surface dries and shrinks very decidedly and rapidly and so more quickly develops added resistance due to its drier condition, then the greater total shrinkage of the lower surface can do no more than keep the fragment flat. If, however, the rate of drying is more uniform throughout the layer the resistance of the upper portion is more than overcome, with the result that the greater shrinkage below produces the downward curvature of the fragment.

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