

A STRIKING CASE OF DIFFERENTIAL EROSION.

FRED J. BREEZE, Ball Teachers College.

Near the mouth of Bear Creek, a small tributary of the West Whitewater, stands a terrace about 50 feet above the bed of this creek. By the undercutting of Bear Creek this terrace presents an almost vertical cliff. The upper 40 feet of this cliff consists of sand, gravel, and numerous slabs of limestone. The lower 10 feet consists of fine textured material, which at some distance away appears to be clay; at a short distance this shows thin layers lying in an almost horizontal position. In a few places where water has trickled down the face of the cliff, an unusual case of differential erosion was seen. In these places the face of the vertical cliff presented a well defined corrugated surface, with the corrugation running horizontal. The corrugated surface consisted of alternate ridges and grooves with an average width of about one-half inch. Each groove was an undercut area beneath the overhanging, very minute projecting ledge of more resistant material. As this band of material was wet there seemed to be no difference in the layers into which the grooves were cut and the layers of more resistant material which stood out as ridges; but samples brought into the laboratory when partly dried showed a striking color difference in the alternate layers. The layers into which the grooves were cut were distinctly light in color. Those standing out as ridges were decidedly dark. Even where the layers were extremely thin, in some cases 20 layers to the inch, the light colored limestone layers stood out in striking contrast to the dark greasy layers of clay. The hydrochloric acid test revealed that the light colored layers consist of limestone silt. The dark layers consist of clay of a texture fine enough to give a distinctly greasy feel to the fingers. In cutting a sample of the material, it seemed to have the consistency of a bar of soap and when a smooth cut surface was held in drip of a faucet a corrugated surface was developed in a minute or two. A rubbing of the dry surface with the fingers in a few seconds produced a distinctly corrugated surface. The calcareous silt exists in such a loose state that a thin stream of water down the face of the cliff produces the very distinct corrugated face.

The upper ten inches of this thin-bedded material was brownish in color, and gave the appearance of a partly consolidated sandstone. Examination revealed that it consisted mostly of iron-stained particles of clay and limestone, with a small amount of very fine silica sand. Some of the layers of this iron-stained material were very thin. The changes from this to the coarse, stony and gravelly material above is abrupt.

A study of this stratified material presents an interesting problem of sedimentation. The source of the limestone silt and the clay is near

at hand. The country rock of this locality consists of alternating thin beds of shale and limestone. Glacial ice reduced these strata to a fine powder; and in areas of still water beyond the edge of the melting ice this pulverized material was deposited. Do these alternating layers of clay and limestone silt represent an alternation of quiet and less quiet water in the area of deposition, due to seasonal or daily variation in the melting of the ice? In other words, what were the varying conditions that caused this type of sedimentation? Are these layers varves? Laboratory trials have failed to obtain this alternation of material in sedimentation. A study of this type of sedimentation is still in progress.