

port the animal life. The plains of North America bear in their underlying rocks records of long invasions of the sea, and these form a part of the history of a continent which seems to have been a very old feature.

Much of its early history is very obscure, but we know that at several periods the ocean encroached and almost submerged the continent. The maximum submergence was probably in Ordovician times, when much of the limestone deposits of the continent were formed. Later the seas seemed to have been shallower, and the rocks formed by the debris entering the sea were of a fragmental character, and became better soil makers. The plains of eastern America owe most of their fertility to the decay of these rocks, but the western plains, now called the Great Plains, received still further treatment beneath a shallow muddy sea which covered the sandstones and limestones of the former plain by a heavy coating of mud now hardened to shale. Then when the sea invasion was about over, the great mud flats supported a very rich vegetation, which is preserved in coal seams. The later additions to the building of the plains consist of coarser material, and indicate a nearer source of supply which means an elevation of the land underlying and adjoining the western edge of the basin. With the draining away of the salt water there was an additional elevation in the land area which amounted to mountain building. This consisted of the formation of folds as a partial relief from the tangential strain, but as the movements continued, probably too rapidly for the material to follow without fracture, most of the folds became broken.

We thus find as a typical structure in the Rocky Mountains fault blocks piled one against the other in regular succession, repeating the same series of beds many times. In front of the broken area, or to the east of it, folds and breaks of less intensity and lower elevation occur at present, and towards the east the decreasing disturbance in the rocks show very clearly that the strain was from the west. The formation of the Rocky Mountains is about coincident with the elevation of the plains, for in their slow rise the soft rocks forming the covering of the broken folds were washed down and carried across the plains by the streams or spread out in lakes. On the completion of the first period of erosion, after the appearance of the outer mountains, the plains presented probably a rather rough rock-strewn surface on the higher slopes. The removal of much of this debris was made possible only by a further elevation, and with a steepening of the slope eastward the second scoring began. This was continued until from the surface hundreds of