

Gobi basin. There, as in Fergana and along the base of the Kopet Dagh, these uptilted piedmont formations are a magnificent corroboration of the idea of displacement, as well as of Suess's theory of the encroachment of mountains on plains.

A desert basin, then, is organically divided between mountains and plains, but this is only the beginning of our classification. Functionally, the plains are a vast geologic mill in which the material received is differentially assorted into layers of fine and coarse alluvium, whereof the surface is further sifted into loess and flying sands ere it comes to rest under succeeding layers; and this mill is worked by wind and water. It is a plain whereon the muddy floods of spring and fall give rise to momentary shoals of water spread over many scores of square miles, welcome lakes that vanish under the burning sun, to leave mirage and wind-swept barrenness of sandstorms and yellow days. But of this water some remains more permanently wherever the supply is in excess of evaporation. The life of a desert lake or sea is, according to circumstances, anything from a day to a cycle of geologic time; anything from the momentary existence of a thin watery sheet far out among the dunes to the history of an Aral Sea.

Thus arise four marked subdivisions of deposition—alluvial, lacustrine, flying sands, and loess—two of water and two of wind. Lastly, but perhaps most important in records of Quaternary change is the fifth subdivision of deposition, glacial "till." A desert basin is thus divided into areas of erosion and deposition, mountains and plains; the plains are divided into four zones—alluvial, lacustrine, flying sands, and loess—and the loess zone includes a portion of the mountains, while a fifth subdivision of deposition, glacial, is found on the higher mountains.

#### THE THREE AGENCIES OF EROSION AND FIVE DEPOSITION ZONES.

There are three agencies of erosion and transportation, ice, water, and wind, and five deposition zones, glacial, alluvial, lacustrine, flying sands, and loess arising therefrom.

Rising among the glaciers and snow-clad peaks of the inclosing mountains, small and large silt-laden streams discharge upon the plains. Flood gives way to the drought of a burning sun that stirs the atmosphere into vast cyclonic storms and spiral dust-whorls—tall, shadowy forms that come and go in ever-changing shape, born out of the horizon to wander a while and vanish. By these atmospheric disturbances the surface materials are consumed and sifted over, digested into drifting sands and far-blown dust. Most of the dust is borne far away to rest as loess in the grass of high valleys and plateaus flanking the peripheral mountains, for it can not survive a wind on barren surface; but sand moves slowly to and fro in the shifting winds, and only that which gets beyond the ultimate shores of alluvial activity accumulates to form the larger masses we call dunes. Probably the most important source of this sand lies in the more or less impure sandspits that are invariably to be found after flood along distributary channels of silting streams. Any shifting aggregations that have not found their way onto an area more or less permanently free from alluvial activity must suffer rearrangement by the next flood, but in the vast nuclei of flying sands that characterize the desert plains we have ample proof of the large scale at which the wind has been successful.