

exception of two on the Helmund River, each section contains three distinct parts. At the top, lying unconformably on the other strata, are beds of gravel from one to a hundred or more feet thick. Below these are numerous alternations between thick pinkish strata and thinner strata of a greenish or whitish color.

The pink beds consist largely of clays and very fine silts, but often pass into layers of fine brown sand. Viewed as a whole, the pink layers are very continuous, and preserve the same character for mile after mile. In detail, however, they vary considerably, even in short distances. For instance, a layer of clay is often interrupted by a band of fine sand which continues a few hundred feet and then dies out. More rarely a layer of grit or gravel occurs and, rarest of all, a distinct fossil stream-bed of gravel is exposed. Again, in certain places slight unconformities are discernible, as though a brief period of erosion had taken place between the deposition of one layer and the next. Among the more sandy layers there are further evidences of exposure to the air. In one place, for instance, the sand shows ripple-marks, worm-casts, and rain-drop prints. Lastly, the layers of this formation are everywhere of a reddish tint, varying from pink to brown. The only exception is found in some of the sandier, more quartzose layers, which are gray for a few inches. Everywhere the materials seem to have been exposed to oxidization for a considerable period. They bear the marks of having been deposited subaerially by widely spreading floods or in temporary playas.

The white or, more exactly, the greenish clays, on the other hand, present a very different appearance. On the edges they are mixed with fine sand or are more or less banded. Occasionally a purple layer occurs, or a band of yellow clay, in which are what appear to be fossil leaves and reeds. The main mass of each stratum however, consists of solid, unbroken layers of pure clay, uniform in texture and color, and showing none of the slight variations which characterize the pink beds. The color indicates that the materials were brought rapidly from their place of origin in the mountains and were not long exposed to oxidization on the way. The green strata as a whole show no sign of subaerial origin, and appear to be typically lacustrine.

The pink beds and the green beds differ from one another chiefly in manner of deposition. The material of the clayey portions of the pink is identical with the green, except that it is more weathered, and it is reasonably certain that they were derived from the same source. The discontinuous, highly-weathered pink layers, however, appear to have been deposited subaerially after long exposure to the atmosphere, while the uniform, slightly-weathered green layers appear to have been deposited subaqueously after a relatively short exposure to the atmosphere. Such alternations of subaerial and subaqueous conditions indicate that the lake of Sistan has been subjected to changes whereby a portion of its bed has been alternately exposed as dry land and submerged under water. The duration of each epoch of submergence or exposure must have been considerable, for the accumulation of from 5 to 20 feet of the finest clay, or of a greater thickness of clayey silt and sand, is a slow process measured in our small unit of years. This is especially true if in former times deposition was as slow as at present. Mr. Tate told me that during