

(c) *Rhythmic Warping Theory*.—The third possible explanation of the stratigraphic series at Sistan is a warping of the crust, whereby the lake was again and again poured from one side of the basin to the other or, what amounts to the same thing, the streams were deflected and a lake accumulated first on one side and then on the other. This theory possesses one inherent though not insurmountable difficulty. It demands a form of warping of which we have no proved examples elsewhere, and which is radically different from that which has taken place in neighboring basins and in the world at large. The progress of geology has led to two conclusions which are not in harmony with the theory of warping as applied to Sistan. In the first place, earth-movements are characterized by irregularity rather than regularity. They occur spasmodically, now a great movement, now a minor one; now a short interval of rest, now a long interval. The phenomena of Sistan demand an opposite character, approximately equal movements occurring at approximately equal intervals. In the second place, earth-movements are cumulative; that is, the main changes of a given period consist of repeated impulses in the same direction. For instance, if the world as a whole be taken as an example, the old idea that the oceans have become continents and the continents oceans is abandoned. Almost everyone now believes that the continents and oceans were differentiated far back in early eras, and that in spite of temporary depressions the continents have steadily increased in height and area and the seas have grown deeper. The same holds true in smaller areas. For example, in the faulted basin region of the western United States, it has been shown by Gilbert, Russell, Davis, and others that there has been continued movement along the same fault lines, and during a given epoch that movement has been uniformly in one direction. If there have been reversals, they have only occurred after a long lapse of time, during which the internal forces suffered an entire readjustment. Or lastly, to take an example close to Sistan, the basins of Eastern Persia, as has been shown above, have gradually grown smaller through Tertiary and perhaps Quaternary times, by the progressive warping and elevation of the strata along their edges. In not a single instance has evidence been found to show that a basin has alternately grown smaller and then larger. To put it briefly, the movements have been cumulative, not undulatory. If the red and green clays of Sistan, however, are to be explained by movements of the crust, those movements must have been preëminently undulatory—rhythmic pulsations as regular almost as the beating of the heart; and the final result of a long series must have been to leave the country in the same condition as at the beginning. These objections do not prove that the theory of warping is untenable. They merely show that a warping of a peculiar sort is demanded different from anything of which we have knowledge elsewhere.

Granting, then, the possibility of rhythmic crustal movements by which the lake and rivers of Sistan may have been deflected first to this side of their basin and then to that, do the red and green clays show all the expectable features? In all but one respect they do. The amount of warping demanded by the theory is so slight and may have taken place so slowly that the streams encroaching upon the abandoned lake bed would spread into broad sheets and would lay down subaerial