

self-fertilizing power. It is, in itself, an unstratified, even-textured, yellowish or yellowish-brown earth of very fine grain. It consists largely of exceedingly fine particles of silica with an admixture of equally finely comminuted silicates, some oxide of iron, and a varying amount of calcareous material which often segregates into concretions of irregular form. It generally contains also various soluble salts of the alkaline earths and alkalis. While it will maintain vertical cliffs apparently for centuries in a dry climate, in which the dwellings of whole villages are excavated, it can be crumbled between the fingers. It is rendered porous by innumerable tubular channels left by the decayed stalks and roots of grasses, and roots of trees may penetrate it to a depth of 100 feet or more.

Loess has played, and still plays, such an important part in the history of man that I shall devote several paragraphs to a description of the manner in which it is formed, and I do so not only because of its importance in connection with the past history of Turkestan, but also because of its general interest.

The most striking illustration is offered by northern China, where it covers a great part of the surface, both on the hills and on the lowlands. Its fertility seems to be inexhaustible, a quality it owes partly, as Richthofen remarks, to its depth and texture, partly to the salts brought to the surface after rains by capillary attraction acting through the tubular channels left after the decay of successive generations of the grass stems inclosed during its accumulation, and partly to the increment of fresh dust that is still brought by winds from the interior. Its self-fertilizing ability is shown by the fact that crops have been raised continuously, through several thousand years, on its immense areas in China, and practically without fertilizing additions. It is on these lands that dense populations accumulate and grow up to the limit of its great life-supporting capacity, the only check being in the fact that in this region of light rainfall, a drought lasting through several successive years produces at times famines that may exterminate many millions of people.

China offers, too, another striking illustration of the influence of this remarkable soil on the history of its fortunate possessors. At repeated intervals of a few centuries, its population has been decimated and over large areas almost annihilated by overwhelming invaders or by civil wars, as in the Tai-Ping rebellion of the past century. In southern China, where there is no loess, the area that can be cultivated is absolutely dependent on the amount of available fertilizers, and since the population is so dense and the holdings are too small to admit of the keeping of live stock, the only available fertilizer is that produced by man. The result of this is that population recuperates rapidly in the loess-covered provinces where cultivation is dependent only on the ability to prepare the soil and to plant the seed; while in the south the ability to support population waits on the slow increase of fertilizing humanity.

Again, great events in our own history are directly connected with the distribution of this wind-borne soil—events which have shifted and radically changed the populations of Europe and have caused the downfall of empires and replaced civilizations by semi-barbarism. For from north of the Caspian to Austria extends