

the microscope this dust proves to consist of angular quartz and mica. A magnification of 600 is needed to distinguish its particles, the larger grains measuring 0.0007–0.007 mm., and the smaller ones 0.0004–0.0007 mm.

Specimen No. 9 is an angular quartz dust with plentiful mica. I found in it also some very tiny pieces of gypsum. It is considerably more chalky than the soil of the light-coloured upper layer. The finest grains have a diameter of 0.007–0.070 mm. Very rarely there appear in it also grains of 0.014 mm. diameter.

All the specimens briefly described so far are fine mud which is formed mainly by angular quartz and besides by mica, both black and white (biotite and muscovite). Of clay or chalk dust it contains very little.

This quartz dust is finer than the fine clayey and chalky dust of the Chinese loess (Lan-chou 0.004–0.007 mm., Hui-ning 0.0014–0.0028 mm.). It cannot be doubted that this fine mud has formed by the same process in the darker culture-stratum as in the cultivated soil of the surface. It belongs to that category of desert deposits which I have described in Count Béla Széchenyi's work on the scientific results of his East-Asiatic expedition, i. pp. 478–89, i.e. to the group of riverine loess.

It seems scarcely doubtful that the strata of Yōtkan owe their origin more to the dust which has been deposited among the vegetation of old cultivated ground and there retained, than to mud carried by the river. The origin of the mud has to be sought for in riverine deposit; this, however, could not have brought to the area watered by the Kara-kāsh and Yurung-kāsh such fine mud as we have recognized in the mud strata of Yōtkan, exceeding 20 ft. in thickness. The two rivers debouch from the hills on to the alluvial fan formed by the bare pebble *Dasht*, at a distance of about 10–12 miles south of Khotan. Their water must have a rapid flow, not only in their beds but also in the irrigation canals distributed from the foot of the hills. It is probable that Khotan is situated on an alluvial fan similar to those occupied by Liang-chou, Kan-chou, &c., near the Gobi of Kan-su. I think I may identify the Yōtkan soil with the thin, horizontally stratified riverine loess which I observed on the alluvial fans of all hill streams at the northern foot of the Nan-shan and also near the Su-la-ho river.

My view is confirmed by the 'sandy' layer, 10–12 inches in thickness, found between the upper layer and the culture-stratum. This, in spite of its fineness, may be more readily taken for mud deposit from river or canal than the very fine soil of the layers above and below. Even this sandy material is still very fine; chiefly 0.00952–0.095 mm., with the coarsest grains 0.19 mm. in diameter. It is thus far finer than, e.g., the mud of the Tisza near Szeged (0.04–0.10 mm.).

I am inclined to attribute to the Yōtkan deposits an origin similar to that of the stratified riverine loess near the banks of the Kāshgar Tārīm of which Dr. Futterer has given a good account (*Durch Asien*, i. p. 89; Pl. v). Such banks of stratified loess are to be found also below Khotan, and near the hamlet of Tam-öghil, towards Ak-sipil.

The Yōtkan sand represented by specimen No. 11 consists mainly of angular quartz and mica scales. Its finest grains measure 0.128 mm. in diameter, its coarsest (chiefly biotite and muscovite) 0.76–0.95 mm. Its greatest portion is made up of angular quartz flakes and fresh biotite, measuring 0.38–0.57 mm. in diameter. This sand is typical river sand.

II.—AK-SIPIL.

The sand specimen, taken from the crest of a dune, is composed of quartz, mainly angular, with a few rounded grains; there is a plentiful admixture of large elliptical biotite scales. Magnetite and here and there worn amphibole show also in it.

The finest portion, about 0.095 mm. in diam., consists of quartz, mainly angular, with little mica and still less magnetite and pyrite; the medium-sized portion, which preponderates, 0.14–0.38 mm., has the same composition; the large-grained portion, 0.6–0.76 mm., is made up chiefly of worn biotite and muscovite scales.

The sand of Ak-sipil closely resembles that of Yōtkan, being only slightly finer. It can scarcely be doubted that this sand is alluvium from the Yurung-kāsh river; nor is it difficult to trace its origin. South of Khotan, within the drainage area of the river, rises the Tikelik range, in which Bogdanowich found gneiss and granite. It is evident that the sand of Yōtkan and Ak-sipil is derived from these mountains.