

is very finely granular, and it owes its opacity to its structure, its component granules being transparent.

**65. Altmish-bulak, Kuruk-tāgh (02).** *Grit.*

A fine-grained grey grit, breaking with irregular fracture; composed chiefly of angular grains of quartz, but a good deal of feldspar, both orthoclase and plagioclase, is present, much of it quite fresh. There are many opaque white grains

and some iron ores. Secondary calcite exists, but is not abundant. The ground mass is difficult to analyse: richly scattered through it are minute particles which are often rod-like, resembling bacteria in form and size; their refractive index is above that of balsam, and they seem to extinguish parallel to their length; but they are too minute for identification.

SOUTHERN EDGE OF TAKLAMAKĀN

**66. Kara-tāsh (01).** From terminal stony ridge on Sai, three miles to W. of Tailik-tutkan, Endere-Charchan route.

*Fine-grained Grit.*

A remarkably fine-grained grit, composed chiefly of grains of quartz ranging mostly from .004 to .02 mm. in diameter, and so compact that, except for scattered dust of sericite, it appears in ordinary light to be a homogeneous continuum. A few sericitized crystals of orthoclase occur here and there, and also of magnetite and pyrites. One or two veins of quartz mosaic cross the slice, and there is a little secondary calcite.

**67. Kara-tāsh (02).** Same locality as No. 66. *Grit.*

A coarser grit consisting chiefly of angular, and some rounded, grains of quartz with an interstitial finer ground mass. Some sericitized feldspar and fresh oligoclase are present, as well as secondary calcite, chlorite, and ferric hydrate.

**68. Imām-Jāfar-Sādik, S. of Taklamakān (01).** Pebbles from sacred hill of Imām-Jāfar-Sādik Ziarat (25. i. 1901).

*Spherulitic Rhyolite.*

This is a rock of very heterogeneous structure, but its most striking character is its well-marked but much-disturbed fluxional banding.

Between crossed nicols illuminated streaks with a thread-like structure resembling that presented by the material of spherulites are seen, but the threads, instead of being directed radially, run in parallelism with the length of the streak; sometimes minute elongated prisms of orthoclase may be seen within a streak, also running parallel, swimming with the stream. These and the threads themselves extinguish parallel with their length and give a negative optical sign.

On encountering a phenocryst or patch of coarser material they bend round it or enclose it as an 'eye'.

Bordering these streaks and sometimes composing them, negative microspherulites occur, and in places, acting as foreign bodies, large spherulites, which, however, are rarely spherical and are sometimes drawn out into long fusiform bodies in the direction of the flow.

In addition, bands and patches of a comparatively coarse mosaic of quartz or intergrowths of quartz and feldspar are present and as well whole or fragmentary phenocrysts of orthoclase, microcline, and oligoclase albite. From the phenocrysts spherulitic growths sometimes proceed.

No biotite is present, but there are several patches of epidote. Magnetite appears to be replaced by sporadic crystals of pyrites.

**69. Imām-Jāfar-Sādik (02).**

*Rhyolite.*

This is a rather remarkable rock. It is constituted of similar material to that of the preceding specimen, but spherulitic growths are rare. The fluxion structure is clearly shown by the interstitial glassy basis in which the crystalline constituents are immersed; but what is most striking is the fragmentary state of all these constituents. The quartz in particular arrests attention; it has been broken up into forms that recall those of the broken glass in volcanic ash, apparently as a consequence of the presence of vesicles or included globules of base in the original crystals. Sometimes the several fragments of a shattered individual remain in sufficient proximity to show that it has been broken in place.

It would appear that the lava, after ceasing to flow and already on the point of solidifying, but still plastic, had again been set in motion and then completed its consolidation.

The feldspars present are of the same kinds as those present in No. 68, but there is stronger evidence of the original presence of biotite, which is now represented by shreds in the last stage of alteration. The rock is fairly fresh, but a little secondary calcite is present.

**70. Imām-Jāfar-Sādik (03).**

*Rhyolite.*

A completely crystalline, banded rock, which much resembles a granophyre. Spherulites of various degrees of fineness or coarseness form the greater part of the rock; quartz occurs as the final product of consolidation.

**71. Mirān (05).**

*Quartz Hornblende Schist.*

This dark green schist is composed chiefly of a quartz mosaic with foliae of green hornblende and associated brown biotite.

The hornblende is strongly pleochroic: X, pale yellow to almost colourless; Y, deep green; Z, bluish green. Its angle of extinction is  $23^{\circ}$ .

The biotite is also strongly pleochroic: X, faint yellow; Y and Z, deep brown. Both it and the hornblende are devoid of pleochroic haloes.

The quartz mosaic includes grains of anorthite twinned on the albite plan; they are glassy clear, and but for the twinning might easily be overlooked.

Minute crystals of magnetite are scattered through the rock, and are particularly abundant in the numerous 'eyes' formed by the swelling out of the quartz foliae; in one instance the greater part of an eye is formed by a comparatively large lenticle of magnetite.

These eyes are frequently dusty with fine granules of an undetermined mineral, and often contain a good deal of apatite.