

crystal; a boundary between the two minerals is sharply marked and is without reaction products. Hornblende without included diopside is rare or absent. It presents the forms (110), (010), and (100), is yellowish brown in colour, with pleochroism: X, pale yellow; Y, light brown; Z, brown, and extinguishes at 14° .

Secondary interstitial chlorite is present, but nothing has been seen to suggest the original presence of olivine. There is a good deal of magnetite.

56. Achchik-bulak, Kuruk-tāgh (01). *Adinole (?)*.

A small fragment of a close-jointed rock weathering brown, breaking along what appear to be planes of lamination with a feathery fracture such as is often presented by clay ironstone, which the specimen much resembles. It fuses to a black bead and colours the flame with sodium and potassium. A qualitative analysis showed the presence of alumina, ferric oxide, and lime.

The microscope reveals the presence of minute angular fragments, crystals, and rounded grains of quartz, sections which appear to be those of some felspar but often isotropic, brownish granules, and associated rhombohedra of calcite or siderite, and finally very minute granules, from .001 mm. to an average of .002 mm., universally distributed through the base, which behaves as an isotropic substance. To clear the thin slice it was treated with dilute hydrochloric acid, which removed all traces of calcite or siderite, but did not affect the brownish or ochreous granules.

The slice was then treated with staining reagents which coloured the very minute granules deeply, but did not affect the base, which was more clearly displayed than in the untreated slice and still preserved its isotropic character.

The specific gravity of the rock fragment was found to be 2.75.

57. Singer, Kuruk-tāgh (01, 02). *Schistose Grit.*

Irregular fragments of grit, including minute pebbles of quartz.

58. Arpishme (02). *Gypsum.*

Thin cleavage flakes of gypsum.

59. Iltar-ghush-bulak (01). *Gypsum.*

A fragment of what must have been a very large crystal.

60. P'o-ch'êng-tzū, Kuruk-tāgh. *Gritty Limestone.*

A fragment of red limestone, very similar in appearance to some of the English Triassic grits.

It consists chiefly of small rhombohedra of calcite, on average .0186 mm. in diameter, and severally bordered by ferric hydrate, which is also dispersed in minute transparent scarlet granules throughout the rock. There are also scattered fragments of quartz, both angular and rounded, altered felspar, and opaque altered ilmenite.

The rock dissolves readily in dilute hydrochloric acid, and the solution yields on analysis alumina, iron, manganese, lime, and a trace of magnesia. The residue consists of ferric hydrate, orthoclase, quartz, cryptocrystalline grains, and a little muscovite, as well as crystals of tourmaline, zircon, and rutile.

A vein of comparatively coarse mosaic calcite traverses the

slice, and accompanying this is a fibrous colourless mineral of about the same refractive index as balsam, of low, double refraction, and optically negative. It much resembles the spherulitic material of a rhyolite; but the quantity at our disposal is too small for its identification.

61. Bakri-changche-bulak, Kuruk-tāgh (01-04).

Granophyre.

These specimens are so similar that they might have come from different parts of the same rock, and a single description will suffice for all.

There is a small quantity of ground mass consisting of minute crystals of quartz and felspar, but the greater part of the rock consists of intergrowths of quartz and felspar as well as abundant spherulites of the typical positive kind. Some of the spherulites contain small elongated crystals of felspar which lie athwart the radial structure.

Phenocrysts of orthoclase and a plagioclase which behaves as albite, some of comparatively large size, are numerous, and biotite, green by alteration, is scattered throughout the mass in ragged flakes and linear strips which resemble agerine.

Pleochroic aureoles are present, surrounding in some cases zircon, in others a small grain of iron ore. The maximum diameter of the radii of the aureoles is .0185 mm.

The felspars are much sericitized, and patches of secondary muscovite are present in all the specimens, in some secondary calcite also.

62. Bakri-changche-bulak (06 and 08). *Adamellite.*

These two specimens are also closely similar, as is 07, which has not been cut.

They are a coarsely crystallized rock composed chiefly of large hypidiomorphic crystals of albite and orthoclase with a little microcline and perthite. The quartz mosaics are mostly interstitial and dentate the margins of the felspar crystals. Occasionally a pegmatitic growth is to be seen.

Biotite is present in small quantity only. The rock has been subjected to considerable pressure, which has fractured, dislocated, and even crushed some of its constituents. The quartz shows undulatory extinction, and in specimen 08 a large albite crystal is crossed, at about right angles to the lamellar twinning, by six more or less parallel cracks, along all of which it has been faulted, and along some completely brecciated.

63. Yardang-bulak. *Quartz.*

Two much water-worn crystals of milk-white quartz.

64. Āltmish-bulak, Kuruk-tāgh (01). *Calcareous Grits.*

A fine-grained, laminated grey grit, composed chiefly of angular fragments of quartz, orthoclase, and plagioclase, with subordinate vesicular volcanic glass, biotite, muscovite, and chlorite. A few grains of calcite appear to be primary, but the greater part of this mineral, which is abundant, is a secondary product deposited in the interstices between the constituent grains and sometimes replacing them.

Another interstitial substance, white by reflected and black by transmitted light, is also present; it lines the vesicles of the volcanic glass and also occurs in well-defined grains. It