the rock. They consist of a glassy base in which, as seen between crossed nicols, clearer alternate with darker bands. The clearer bands are sometimes formed of a quartz mosaic, and when they are very thin this mosaic may be reduced to a line of single individuals: sometimes, however, the bands consist of spherulitic growths having a positive sign.

The rock is not a consolidated volcanic ash, as a superficial examination might suggest, but a rhyolite which was broken up during flow, the resulting fragments being caught up and carried along by that part of the stream which still remained fluid.

17. Ming-shui, Pei-shan (014). From rocky knoll two miles NW. of Ming-shui. *Contorted Mica Schist.*

A dark greenish-grey rock with silvery mica on the foliation surface. Sp. gr. 2·78.

Muscovite mica is one of the most conspicuous constituents of the rock, which repeats on a small scale the structure of a much-folded mountain chain with folds, overfolds, and overthrusts in great variety: quartz mosaics follow the course of the mica; their constituent grains are repeatedly broken across in the direction of the once active pressure and show strong undulatory extinction. Grains of felspar sericitized too completely for exact determination contribute to the structure, often occurring as 'eyes'. They extinguish parallel to their cleavage, which is often well marked and sometimes emphasized by lines of muscovite which has developed along them and gives them a fallacious appearance of albite twinning.

Garnets are fairly numerous; they are colourless, sometimes quite fresh and unbroken, but more usually fractured along lines in the direction of pressure. Along these lines chloritization has occurred, sometimes transforming nearly the whole of the original substance. In some cases the garnets are drawn out into lenticles; in others bent into conformity with the cusp of a sharp fold. Streaks of crushed magnetite are interspersed with the muscovite and conform to its folds.

Tourmaline is represented by a few well-formed, bluish-grey crystals, with pleochroism: O, bluish grey; E, almost colourless or faint yellow.

Some stray fragments of biotite may be seen, with pleochroism, X, faint yellow; Y and Z, deep greyish green.

18. Ming-shui, Pei-shan (015). NW. of Ming-shui. Rocky ledge near Wadi, ten miles NW. of Ta-shi-kou.

Salmon-red Granite.

This consists of large crystals of orthoclase, microcline, and oligoclase, mostly hypidiomorphic and remarkably fresh; abundant quartz mosaic; a very little biotite,—pleochroism, X, brown; Y and Z, black; a larger quantity of muscovite which sometimes includes residual biotite, and finally and most interesting, garnets, in much-fractured and corroded crystals of a faint red colour.

Iron ores and apatite do not appear to be present.

19. Ming-shui, Pei-shan (016). From same locality as (015). *White Granite.*

Orthoclase, with occasional perthitic structure, and oligoclase in large as well as small idiomorphic or hypidiomorphic crystals form the greater part of the rock.

Quartz, with numerous gas pores, fills up the wide interspaces between the felspars, sometimes in single individuals, more often as a mosaic.

Biotite is present but not abundant; it sometimes contains zircons with their accompanying haloes, and is generally rich in apatite which forms comparatively large crystals. Most of the biotite has been altered into chlorite and epidote.

Magnetite is well represented, especially in association with the altered biotite.

The felspars, especially the orthoclase, are for the greater part much sericitized, but some are remarkably fresh.

20. Pei-shan (018). Taken from a cliff twenty-three miles NW. of Chin-êrh-ch'üan. *Zoisite Hornblende Schist.*

A fragment of a light green rock, with ill-developed schistosity and traversed by quartz veins.

Under the microscope it presents a marked parallel structure, strands of lighter and darker appearance running in one direction, with which also the long axes of the constituent minerals correspond.

The lighter streaks consist of an almost colourless amphibole (actinolite) which extinguishes at 15° and is only faintly pleochroic—X, colourless; Y and Z, faint green—together with quartz, albite, and sphene. The darker streaks also consist of these minerals, but to them is added another constituent which is granular, and of high double refraction which diminishes its transparency. This was found very difficult to identify, and the rock slice was therefore submitted to Dr. H. H. Thomas, Petrologist to the Geological Survey, who was able to show that it possesses all the distinctive characters of zoisite.

Some thin veins traverse the rock, cutting across the parallel structure; some of these consist of calcite, some of calcite and quartz, and others of an isotropic substance, conjecturally regarded by Dr. Thomas as opal.

Dr. Thomas adds that the rock recalls some of the 'calcflintas' which occur around the granites of Devon and Cornwall.

21. Mou-wu, Pei-shan (01), beyond Mao-mei.

Vesicular Coal.

The collection contains two small specimens of this remarkable substance. One is a laminated fragment, composed chiefly of dull lustreless layers which soil the fingers. With these are intercalated bright lustrous layers, and the whole resembles an impure coal.

Under the microscope this coal, which is opaque and apparently structureless, is seen to be highly vesicular. The vesicles in some of the laminae are comparatively small and elongated for the most part in the plane of the laminae; in others they are much larger and very irregular, extending upwards across the laminae as well as with them. Further, the substance of the layers is found to include, scattered sparingly through it, a number of angular fragments of various