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Dumortierite from Iran: a first record

DUMORTIERITE, not previously recorded from Iran, has recently been found by the writer at an old quarry, Maaden-e-Tala, one km south of Kohrud village in the Kashan district, north-central Iran. The approximate co-ordinates for the locality are: lat. 34° 20′ N, long. 51° 25′ E. In this area the main rock formation is a large dioritic to granodioritic intrusion cutting a volcano-sedimentary sequence of Eocene age (H. Huber, priv. comm.). The intrusion is cut by porphyritic dykes of similar composition to the main mass, and a later stage of activity is defined by pegmatitic quartzo-feldspathic veins. The dumortierite appears as an apparently pneumatolytic mineral giving conspicuous deep-blue spots on the broken surface of the pegmatitic rock.

Under the microscope the dumortierite is almost invariably in irregular fibrous and felted aggregates, up to one cm across, of minute acicular crystals only a few microns long. Many of the aggregates, and individual crystals where these are observable, are colourless in thin section; in thick sections, however, the aggregates are coloured and are markedly pleochroic from deep-blue to light rusty- or pinkish-brown. The needle-like crystals are elongated fast and have straight extinction. The mean refractive index of the aggregates is close to 1·686; $\gamma-\alpha$ is about 0·012. Identification was confirmed from a powder photograph of hand-picked dumortierite-rich aggregates containing some quartz and sericite.

The main minerals present in the rock are quartz, acid plagioclase, dumortierite, and sericite, with small amounts of epidote, opaque grains (probably ilmenite), sphene, and zircon. In addition, there are rare grains of a mineral with medium refractive index, low to medium birefringence, and rather poorly developed wedge-shaped outline; this is tentatively identified as axinite. From the textural relations the sericite present appears to have partly replaced both feldspar and dumortierite.

The geological and petrographic evidence suggests that the dumortierite is connected with late-stage pneumatolytic activity, the residual boron-bearing fluid having affected the earlier-formed pegmatitic rock and reacted with the feldspar, which appears to have been unstable at this stage. The sericitization observed is possibly connected with later tectonic movements in the area.

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Levyne in the Deccan traps

THE Deccan traps carry a wide variety of zeolites, mainly calcic, but levyne has not hitherto been reported from this area. However, a coarse-grained basalt flow of this age from near Bhopal, contains white tabular crystals, often in sheaf-like aggregates; these are optically uniaxial negative, n 1·490 to 1·491; this agrees with the characteristic optics of levyne, though the refractive index is rather less than that of Icelandic levyne (1·491 to 1·495, Walker, 1951), but like the latter the mineral is often accompanied by an altered fibrous material. Dr G. P. L. Walker kindly confirmed the identification while on a visit to this laboratory.

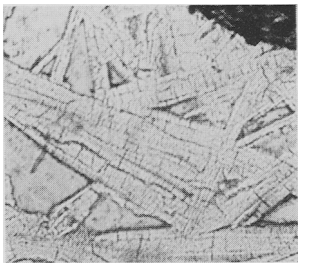

FIG. 1. Levyne in vesicles of the Deccan trap flow, Bhopal.

Fermor regarded the formation of these secondary minerals as a late magmatic process, but according to Nashar and Davies (1960) meteoric water plays a role in the formation of the zeolites. The levyne in the present area occurs in association with heulandite, whose temperature of formation is over 240 °C according to Fermor (1925), hence a source of hot meteoric water is required. According to Walker (1951), hydration of olivine, pyroxene, etc., by percolating meteoric water is an exothermic reaction and causes the formation of