The Mogok Stone Tract, Myanmar: Minerals with complex parageneses

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The Mogok Stone Tract of Myanmar (Burma) is legendary for the finest rubies and spinels but also produces gem sapphire, peridot, moonstone, topaz, cat's-eye scapolite, fibrolite, danburite, aquamarine, and enstatite. Although mostly derived from a marble belt attributed to regional metamorphism and contacts with granitic intrusives and associated dikes, oddities like ultramafic and "ijolite" dikes and pegmatites form part of the picture. The hosting Mogok Belt of marbles and schists was formed from Proterozoic sediments (>750 MYa) metamorphosed by collision with a Gondwana fragment (Burma Block) in Cretaceous time (~150 MYa) and later with the Indian block in Eocene time (~50 MYa). The complex geological record helps explain the diverse mineral suites.

Specimens recently returned from Myanmar, particularly minerals in matrix, demonstrate a complex variety of parageneses in the Mogok Tract. Euhedral spinel, graphite, phlogopite, and diopside are consistent with metamorphism within a dolomitic marble, but the F-dominant clinohumite and large spinels with highly modified forms and wormy embayments indicate metasomatic effects. Rubies have been ascribed to metamorphism of aluminous sediments, but Iyer (1953) argued an association with pneumatolytic veins emanating from intrusives, a description typically ignored in reevaluations. Many larger rubies have almost a skeletal appearance which is more consistent with a metasomatic growth/corrosion than high-grade metamorphic growth. A number of small ruby crystals have a coating of blue and colorless davyne, followed by mizzonite and/or nepheline, then phlogopite ± pargasite and diopside before reaching marble facies. These indicate the importance of fluids, as argued by Iyer. Noteworthy among the minerals are large alkali-feldspar moonstone crystals (to >20 cm), typical of volcanic environments, but here hosted in coarse marble. Both mineral and texture require a "magmatic" source and fast, rather than slow, regional cooling. One example has an intricate corona of nepheline, diopside, mizzonite, sodalite/davyne(?), apatite, pargasite, and phlogopite. The sapphire from supposed igneous "urtite" (a rock containing >70% nepheline with clinopyroxene ± apatite, scapolite, and nepheline) dikes must be considered as metasomatized with assemblages resembling the moonstone corona. Thus, the Mogok minerals appear to result from a mix of metamorphism, intrusions, skarn-like reactions, volatile-rich metasomatism, and hydrothermal interactions.

Iyer, L.A.N. (1953) The geology and gem-stones of the Mogok Stone Tract, Burma. Mem. Geol. Surv. India, 82, pp. 100.

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