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MYRMEKITE IN CHARNOCKITE FROM SOUTHWEST NIGERIA: A DISCUSSION

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In his paper "Myrmekite in Charnockite from South West Nigeria," Dr. F. H. Hubbard (1966) has presented a number of valuable observations on myrmekite. He particularly stresses that myrmekite development is completely restricted to interfaces between alkali feldspar and a neighbouring feldspar which may be either plagioclase or alkali feldspar. The type and extent of development of myrmekite, according to him, is dependent on the type of alkali feldspar, *i.e.*, whether it is "Strained" type or "Normal" type and the nature of the interface between the feldspars. His observations lend support to Schwantke's hypothesis (1909).

I feel, however, that Hubbard generalizes his particular findings and his observations could be explained more conveniently by Shelley's hypothesis (1964).

Hubbard's observation (1966 p. 770) that " . . . in the immediate vicinity of the myrmekite-alkali feldspar contact, there is generally a narrow zone of myrmekite in which quartz rods are finer and more tightly packed than in the main body . . . " can be explained by Shelley's view that the crushed quartz included in the exsolved plagioclase near the contact with alkali feldspar will have a limited space due to the presence of other quartz grains and alkali feldspar itself and hence on recrystallization will be finer and more tightly packed than the quartz away from the contact which has ample space to recrystallize due to its free energy. Hubbard states that "myrmekite is never formed at interface between perthite plagioclase and its orthoclase host." If the quartz of myrmekite would have exsolved from alkali feldspar, development of myrmekite at this interface also would be expected. As the quartz of myrmekite is of extraneous origin according to Shelley (1964), the absence of myrmekite at the interface of host orthoclase and exsolved plagioclase can be easily explained. The convex nature of myrmekite towards alkali feldspar and the arrangement of quartz rods perpendicular to the curvature of myrmekite plugs is a feature clearly brought out in photomicrographs of Hubbard's paper. This observation is so common in myrmekites that it requires an explanation. Hubbard offers no explanation to this feature but Shelley explained it.

The less strong development of myrmekite and its more irregular morphology at the alkali feldspar-alkali feldspar contact (Hubbard 1966 p. 770) than at alkali feldspar-plagioclase contact can be explained by the fact that exsolved plagioclase will tend to grow on a neighbouring plagioclase due to similarity in lattice. This similarity is not found in the lattice of exsolved plagioclase and orthoclase. The "deficiency of film perthite in the alkali feldspar marginal to myrmekite development", is explained by the migration of exsolved plagioclase to the margin of orthoclase host (Tuttle and Bowen, 1958). That the contact of the myrmekite with the plagioclase is "very occasionally demarcated by aggregation of myrmekite quartz parallel to the contact" is neither a commonly reported observation nor is brought out in Figure 4 of Hubbard's paper (1966).

Hubbard (1966, p. 772) states that " . . . The restriction of myrmekite to interfaces involving perthitic alkali feldspar, the association of quartz with internal vein perthite, the relatively high content of calcium in the exsolved plagioclase . . . support an exsolution origin of myrmekite." A pointed attention should be drawn to the fact that the exsolved plagioclase from K-feldspar is always more sodic in composition contrary to the claim of Hubbard. Being very much convinced by the Na-rich nature of the plagioclase of myrmekite, Shelley (1964) clearly states that "the more acidic nature of the plagioclase of myrmekite is explained in that nearly pure albite will be exsolved from orthoclase." The present writer has studied in detail the myrmekite in the granites and granodiorites of Mt. Abu batholith, Rajasthan, India, and has found plagioclase of myrmekites to be albitic in composition. "The association of quartz with internal vein perthite" as shown in Figure 1 (Hubbard 1966 p. 766) has been taken as an evidence of exsolution of quartz (as well as of vein perthite) from orthoclase microperthite. Alling (1938) always regarded the vein perthites to be of replacement origin. Moreover, silica could be introduced from without with albitic solution Moreover, if the quartz is of exsolution origin, it is difficult to understand why it has not formed characteristic myrmekitic intergrowth with vein perthite plagioclase also, as it does in other places.

Finally, according to Hubbard (1966 p. 771), "During the significant period in the history of charnockites, conditions were thus ideal for myrmekite formation by exsolution scheme of Schwantke. . . ." But the charnockites have been shown to be of diverse origin and there are many igneous charnockites in which no myrmekite has been found despite the "ideal conditions for the myrmekite formation."

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MYRMEKITE IN CHARNOCKITE FROM SOUTHWEST NIGERIA: A REPLY

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In his comments on my paper, Dr. Garg reinterprets my observations of the myrmekites of the S.W. Nigerian charnockites to conform with Shelley's (1964) hypothesis of myrmekite growth by incorporation of intergranular quartz in exsolving albite. For many reasons I found Shelley's proposals unacceptable for the myrmekites I studied. Perhaps the most striking feature opposed to Shelley's development scheme is the fixed proportionality of quartz to plagioclase found throughout the undeformed myrmekites in any one rock of my series (Hubbard 1966, p. 772). Continuing work on this feature serves to confirm this proportional relationship of components, controlled by the composition of the