CHARNOCKITES AROUND GUAXUPÉ, MINAS GERAIS, SOUTHEASTERN BRAZIL, COMPARED WITH THOSE OF THE TYPE AREA, MADRAS - CHENNAI, SOUTH INDIA

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Charnockite was first defined from Madras, South India, as an orthopyroxene-bearing quartz-feldspar rock of granitic composition. In a broader definition, this group of felsic rocks includes charnockite, enderbite, hypersthene-quartz syenite and alaskite. Charnockites from the type area of Madras (Chennai), consist of quartz, perthite, orthopyroxene, opaques ± biotite ± hornblende, with clinopyroxene either absent or rare. They are often interlayered with mafic granulites and garnet-sillimanite gneisses (khondalites) in a way that it has been suggested that they were emplaced in these basement rocks and subsequently folded isoclinally together with them. Some of the resulting structures are quite complex owing to several phases of folding and deformation. Here belong the charnockites that are structurally older than the well-known patchy charnockites found further south in South India and considered to be the result of incipient development of charnockites. It has, however, recently been shown that the formation of the latter can be ascribed to partial melting of mafic rocks rather than to the passage of fluids along shear fractures. Some of the Indian enderbites contain garnet and are thought to have been derived from a metasedimentary source. There are also enderbites from an amphibolite-granulite transition zone in South India that contain both Cpx and Opx, and these may have igneous precursors.

In contrast, charnockites around Guaxupé, southeastern Brazil, almost always contain Cpx in addition to Opx, (Minor and local occurrences of enderbite containing Opx >> Cpx or only Opx are also known).They are coarse-grained, generally massive, and extend uniformly for several tens of kilometres. At times they also occur as veins and bands in enderbites that are easier to recognise in thin sections rather than on outcrop scale due to the overall dark colour of granulite facies rocks.

For the generation of K-rich, Opx-Cpx-bearing charnockites of Guaxupé that represent syntectonic bodies and injections, and hence initially much like a crystal mush, one would have to melt an older mafic mineral-rich igneous protolith, or a partly granulite crust of intermediate composition. The question to be raised now is: Are some of the more mafic enderbites and two-pyroxene granulites that occur intimately with garnet-biotite ± sillimanite gneisses, side by side with Brasiliano age charnockites, left over from high-grade metamorphism and dehydration melting of different source rocks (but not necessarily residue) belonging to an older basement and lower crust ? Perhaps, large-scale granitic magmatism during the Brasiliano Cycle produced syntectonic charnockites as dry, high-temperature melts in granulite facies at depth, followed by granites at shallower depths under amphibolite facies conditions. A comparison of charnockites from Guaxupé with those from the type area in India raises the interesting hypothesis that different lower crustal source rocks may give rise to similar products with minor differences in mineralogy and chemistry.

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