

IMPLICATIONS OF CHARNOCKITE EMPLACEMENT AND INJECTION AROUND GUAXUPÉ, MG

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Charnockites occur in several ways in the high-grade terrane of the Guaxupé Massif. From their mode of occurrence, mineralogy and texture important inferences can be drawn as to their generation and role in granulite facies metamorphism in this region. These rocks consist predominantly of mesoperthite, quartz, plagioclase, orthopyroxene, clinopyroxene, opaques, and occasional hornblende and biotite. They often occur in close association with garnet-biotite gneisses. The charnockites around Machado town are coarse-grained, massive augen gneisses, and extend as far as Serrania 20 km to the west and further southwest to the Serra dos Pinheiros. They are considered to be syntectonic masses emplaced under granulite facies conditions, as they show textures that are transitional from deformation in a melt stage (melt relocation textures) to solid state ductile deformation and recrystallisation. This is also supported by sigmoidal exsolution in mesoperthite in these rocks that indicates concomitant deformation and cooling. Mesoperthitic feldspars are evidence of exsolution above 600° C, and this means that the consolidation of the charnockite must have been at even higher temperatures. The Machado charnockite has been dated at 627 Ma by U-Pb in zircons.

In the area around Serra dos Pinheiros, these rocks appear to be transitional to perthite-quartz syenite without pyroxenes, but with hornblende instead, possibly due to late hydration. During this hydration stage, retrogression sets in and perthite begins to acquire the typical cross-hatched twinning of microcline. Closer to Guaxupé, charnockite is interlayered with enderbite gneiss, giving a banded appearance to these dark blue-grey rocks that occur near garnet-biotite gneiss. Close by, a charnockite vein cuts discordantly across a granulite facies metagabbro and is easily recognisable. On the other hand, coarse-grained charnockite interlayered with fine-grained enderbite is difficult to discern on a mesoscopic scale due to the dark blue-grey colour of these rocks, but is clearly seen in thin sections.

At places, charnockite encloses bands and schlieren of infolded mafic granulite/mafic gneiss, some of the latter with evidence of partial melting and resultant veins. At other outcrops, banded mafic gneiss is found as schollen "floating" in grey to pink granitic gneiss that may represent a retrogressed and hydrated equivalent of charnockite. Their syntectonic emplacement, injections and association with garnet-biotite gneiss suggest that charnockites were emplaced as dry, high-temperature melts in older, possible "basement" rocks made up of garnet-biotite gneiss, mafic two-pyroxene granulite and enderbite. Alternatively, the generation, emplacement and injection of charnockite may have followed closely on the heels of granulite facies metamorphism in the lower crustal segment now exposed in the Guaxupé Massif.