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Selective joint-controlled oxide leaching in greenschist facies phyllites, Ottré

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Metamorphism of highly oxidized, Mn-rich metasediments at the southern margin of the Stavelot Massif in Ardennes, Belgium, resulted in a well-known, classic example of a series of greenschist facies assemblages in which silicates are dominated by Mn (e.g. Mn-rich chloritoid (*ottrelite*), spessartite-rich garnet, kanonaite (*viridine*), ardennite, carpholite) and coexist with hematite. Abundant hematite grains in the matrix and hematite inclusions in chloritoid, give the phyllites their purple appearance. At Ottré, a second phase of greenschist facies metamorphism is overprinting the former, resulting in a kind of rock resembling in appearance the well-known vein-type charnockites. Along a grid of small joints, phyllites are discoloured over a few mm away from the joints, shifting the macroscopic colour of the rocks from purple to green. In the original (purple) rock, the greenschist facies assemblage consist of Mn-Fe-Mg chloritoid + Na-bearing K-rich white mica + spessartite-rich garnet ($\sim$91 % Sps) + hematite + rutile + quartz; in addition, an unidentified REE-Al-rich phosphate is present in the matrix. In the discoloured zone along the joints, hematite is absent in the matrix. Chloritoid is the main Fe-Mg-Mn silicate in both the discoloured zone and the original rock. In both zones, chloritoids is present as pale green pleochroitic, euhedral to subhedral blasts. The blasts have a core containing abundant very fine grained inclusions (mica, hematite, spessartite), and a clear rim with a few hematite inclusions. There is no petrographic difference between the chloritoids in both zones. Detailed, careful EMPA profiling over these veins in to the original rock also demonstrates that any systematic change in chloritoid or white mica chemistry across the veins is absent. In both zones, intermediate Fe-Mn-Mg chloritoids are present (both rim and core). Evidently, metamorphism involved selective leaching of the oxide mineral hematite, without recrystallization of chloritoid and partitioning of Fe into that mineral. Disso-

lution of hematite is responsible for the observed discolouration. Most likely, Fe was transported out of the system along the central joints in the veins. At the surface of the joints, a very thin, anhedral brownish Fe-rich deposit is present, a remainder of the iron flushed from the system.