Anais da Academia Brasileira de Ciências (2002) 74(3): 539–557
(Annals of the Brazilian Academy of Sciences)
ISSN 0001-3765
www.scielo.br/aabc

SESSIONS OF THE ACADEMIA BRASILEIRA DE CIÊNCIAS

SUMMARY OF COMMUNICATIONS

REGIONAL EARTH SCIENCES SESSION IGc-USP

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GOLD METALLOGENESIS AT THE PARI MINE, NE-QUADRILÁTERO FERRÍFERO, MG-BRAZIL

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Presented by ANTONIO C. ROCHA-CAMPOS

The Pari gold Mine in NE-Quadrilátero Ferrífero is located within the Archean Rio das Velhas greenstone belt/Rio das Velhas Supergroup. Here, this unit consists of the Quebra Osso and Nova Lima groups in normal stratigraphic setting, representing, respectively, the lower ultramafic volcanic and middle mafic volcano-sedimentary units of the greenstone belt.

Pari Au-mineralization is hosted in heterogeneous BIF consisting of variable mixtures of sulphide-carbonate-oxide-silicate facies. The main regional metamorphism, Paleoproterozoic in age, reached lower amphibolite facies (garnet-zone of the epidote-amphibolite subfacies) and affected the Au-mineralization. Two different arsenopyrite generations occur in the ore: the older xenomorphic one, rich in tiny inclusions of chalcopyrite, pyrrhotite, sphalerite, gold and gangue minerals, shows As-in-Aspy-geothermometer metamorphic reequilibration temperatures of 320-445°C; the younger Aspy-generation is idioblastic, barren of inclusions and shows metamorphic peak temperatures of 485-491°C. Gold occurs subordinately ($\leq$ 15% of the total) as refractory inclusion, 5-10μm in size in first generation Aspy and, occasionally, in magnetite. Free gold in grains $\geq$ 100μm predominates by far; it was expelled and grew by accretive crystallization during the metamorphic Aspy-transformations. Refractory and free gold show similar compositions, Au(81-83.5):Ag and Au(83.3-86):Ag, respectively, demonstrating partial Ag-loss and Au-enrichment during progressive metamorphism.

Pari Au-mineralization of exhalative syngenetic origins occurred near an active center of submarine basaltic eruptions during Archean greenstone belt evolution. Wall rock alterations were not observed. Neither the late-Archean nor the far more vigorous Paleoproterozoic regional metamorphism destroyed the well-defined lithostratigraphically controlled primary geochemical characteristics and polarities in the ore horizon, the adjacent host rocks or the associated amphibolites of the Archean greenstone belt succession.

Pari gold mineralization is quite similar to the Oriental-type Kolar Gold Field deposits; there too, exhalative syngenetic volcanic origins have been suggested. In comparison, the São Bento gold mine, $\sim$ 20 km W of Pari in the Nova Lima Group, shows lower to middle greenschist facies metamorphism, As-in-Aspy Au-ore temperatures of $<$ 320-435°C, and three distinct gold generations: refractory gold ($\geq$ 80% of the total) in Aspy with Au(65-70):Ag, in pyrite with Au(82-87):Ag being similar to the free gold. — (*December 14, 2001*) .

PYROCLASTIC BRECCIAS AND RELATED DEPOSITS OF THE POÇOS DE CALDAS ALKALINE COMPLEX, MG/SP, SE-BRAZIL

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Different pyroclastic breccias and related deposits represent important petrogenetic indicators of the magmatic-stratigraphic and tectonic evolution of the Poços de Caldas Alkaline Complex (PAC), the largest in South America and one of the 10 largest such complexes worldwide. PAC is a Cretaceous subcircular volcanic-subvolcanic caldera within Precambrian basement rocks at the eastern border of the Paraná Basin exhumed by differential erosion. It comprises ultrabasic through intermediate alkaline igneous, pyroclastic, volcaniclastic and minor sedimentary and basement rocks; PAC-magmatism lasted from ≥ 92 to ~ 76 Ma b.p.

The oldest breccias in the PAC W-NW sector are of extrusive ankaratrites. Abundant CO_2-rich fluid discharge caused prominent vesiculation, hydraulic fracturing, brecciation and carbonatization of these lava flows. Different pyroclastic, mixed and reworked breccias formed successively during construction of the main regional volcano of miaskitic phonolites and nepheline syenites (with AI. of 0.85-1.15, and giannettite as the most common rare-metal silicate), phonolitic tuffs, mud and debris-flows, until caldera-collapse and emplacement of discontinuous phonolite ring-dikes.

Post-caldera-collapse breccias formed through more local magmatic-tectonic, volcaniclastic and hydrothermal events, with or without temporal and/or spacial superposition. Fragments of typical aphanitic, microporphyritic phonolites, which cut the former nepheline syenites as shallow-subvolcanic dikes, occur associated with carbonate rock, ankaratrite, phonolite, pyroxenite, peridotite, granitic basement and Paraná Basin sedimentary rock fragments in intrusive to extrusive breccias bearing phlogopite-booklets in the phonolitic, locally carbonatized or pyritized matrix; lateral and vertical granulometric grading and interlayering with phonolitic surges and tuffisites and carbonatite flows also occur. These breccias were intruded by phonolite dikes; possibly coeval agpaitic eudialite nepheline syenites (Pedra Balão and Morro do Serrote type) occur as regionally separated minor intrusions.

At the end of regional phonolite and nepheline syenite magmatism breccia pipes formed at foci of magmatic-phreatic explosions and suffered low-grade U-Th-REE-Zr-F-Mo mineralization through strong potassic and pyritic hydrothermalism. Local carbonatization of these breccias suggests nearby carbonatite intrusions (Morro do Ferro type). Finally, at about 76 Ma, dikes of ultramafic ultrapotassic biotite lamprophyres with abundant upper mantle xenoliths intruded the breccia pipes. — (*December 14, 2001*) .

ESKER-LIKE FEATURES IN THE ITARARÉ SUBGROUP (LATE PALEOZOIC), NORTHERN PARANÁ BASIN, BRAZIL*

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Sediments occurring as discontinuous domed, elongated forms, 50 to 200 m in length, 20 to 50 m in width, and about 20 m in thickness, showing intense deformation, under the Lapa sandstone, are interpreted as eskers.

Three facies have been recognized: a) conglomerate of rounded pebbles and boulders in a massive, poorly sorted sandy matrix, sometimes cross-bedded, with lineated and imbricated clasts indicating NW transport, with normally graded sandy layers fragments included. The conglomerates show 1 m in thickness and lenticular geometry; b) two types sandstones: the first one is medium to fine-graded, massive, sometimes cross-bedded, showing NW transport, in layers up to 80 cm thick with tabular geometry; the second one is medium to fine-graded, well sorted, massive, sometimes showing gradacional stratification, with thicknesses of 10 to 20 cm; c) massive tabular diamictite, of decimetric thickness, silty-sandy matrix with dispersed clasts, intercalated and interfingered in the base of its layers with sands and conglomerates and with sandstones in its tops. The layers are in a vertical way and deformed, and parallel to the direction of the channel of the Lapa sandstone.

The basal contact of the ruditic succession is erosional on older shales, while the upper contact also erosional, defines the base of the Lapa sandstone.

The glacial context of the time suggested that the sandstones and conglomerates were deposited by fluvioglacial processes and the diamictites (cohesive debris flows) flowed from the channel walls and interfingered with the sandstones and conglomerates.

The first phase of deformation caused folding with the differential melting of underlying ice below the sediments. Later, the total collapse of the sedimentary stack, due to melting of still existing ice in some parts, associated with the unstable settling of the sediments caused by the previously differential melting, would have led to a second deformation phase, facilitated by the still plastic state of the sediments, resulting in the refolding of the