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Archaean Gold on the Kaapvaal Craton of South Africa with Special Reference to the Barberton Greenstone Belt

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In addition to the unique 2.9Ga Witwatersrand Basin, significant quantities of gold have been recovered from Archaean greenstone belts of the 3.6 to 2.7 Ma Kaapvaal Craton as well as from deposits in the 2.6-2.2m Transvaal Supergroup. The most important deposits occur in the Barberton and Murchison greenstone belts. The greenstone belts generally have a large ultramafic (komatiitic volcanic) component generally overlain by mafic to felsic and /or greywacke-shale sequences and younger arenaceous lithologies with gold hosted in all of these lithologies, where tectonised. In the Barberton belt. In the northwest part of the belt, gold is hosted by juxtaposed differing rock types particularly in the vicinity of the Sheba fault which separates the quartzitic Eureka Syncline from the dominantly argillaceous Ulundi syncline. Of fundamental importance is the presence of steep tight anticlinal structures of ultramafic rock with chert layers (the Zwartkoppie formation) within the argillaceous rocks in the Ulundi syncline as well as in part along the Sheba fault. Best mineralisation occurs where the succession has been refolded about a northwest trending axis to form a broad, arcuate feature. This area hosts the Sheba/ Fairview complex with the locus of much of the mineralisation being related to faulting and / or shearing in the less -competent ultramafic rocks, particularly at or close to the contact with the greywacke-shale assemblage which is typically marked by the occurrence of a chert bar and / or B1F horizon. An important style of mineralisation is associated with sheared and highly carbonate replaced ultramafic rock. They frequently contain enrichments in potassium which gives rise to a green fuchsite carbonate containing arsenic, antimony and gold with abundant quartz veining which can also occur locally within adjacent banded chert such as in the Zwartkoppie section of Sheba mine. Mineralisation in shear zones within adjoining argillaceous rocks is associated with abundant arsenopyrite as developed in the MRC and MRT sections of the Sheba / Fairview area. Mineralisation associated with the Sheba fault has locally given rise to brecciated alteration zones or fractures within competent quartzite such as in the Golden Quarry. Steep radial fractures in competent quartzitic rocks and emanating from the Sheba fault contain gold bearing quartz lodes with free gold. Finally gold mineralisation is also associated with sulphide (pyrite) replacement of iron rich (siderite) layers along shears in banded chert and bif as at Royal Sheba mine.

At the nearby Consort Mine gold mineralisation occurs in and below a cherty layer (Consort Contact) between ultramafic rocks and overlying argillaceous rocks. The important antimony / gold mineralisation of the Consolidated Murchison mine also occurs in sheared and carbonate altered ultramafic rocks while the Kalgold and other smaller gold deposits in the Kraaipan greenstone belt occur in fractured BIF.

Hydrothermal gold mineralisation in overlying dolomitic and argillaceous rocks of the Transvaal Supergroup, occurs in structurally controlled transgressive as well as bedding parallel lodes.

