

this point, that many bodies belonging to the plutonic masses, have inequigranular to porphyritic textures that closely resemble those observed in the interiors of the thickest dykes. These inequigranular plutonics also frequently develop chilled margins against their older enclosing rocks. Chilled margins of the dykes have low phenocrystic contents and their matrices are fine-grained in some cases, spherulitic in others. Spherulitic matrices are regarded as devitrification products of igneous glasses.

Prismatic or columnar disjunction is often present in dykes and their development is especially good in the chilled margins. Although not as clearly seen, prismatic disjunction is also locally present in the marginal parts of some inequigranular to porphyritic plutonic bodies.

Scantly distributed breccia bodies attributable to explosive phenomena in magma chambers are present and support a very low-pressure of final emplacement. The Alforja breccia body is the best exposed and is described by SERRA in a companion abstract. This body occurs inside of the plutonics, others occur outside. Some of them are located at the intersection of two or more porphyritic dykes, others are simply pebble-dykes with rock-flour matrix or with rock-flour plus igneous material in their matrices.

The proposed high level of emplacement can only be explained if magmas reached it essentially as mobile liquids that can have carried with them minor amounts of suspended solids. This can have been the case if the water content of the magmas was so low that the slopes of their solidus curves were positive in P-T. Actually in many (but not in all) igneous bodies of the complex, minor amounts of an anhydrous mafic silicate, orthopyroxene, coexists in equilibrium with hydrated ones such as biotite and/or amphibole in rock composition from dioritic to granodioritic. Such assemblage are water buffers that demonstrate that no sufficient water was available to hydrate all femic components of the magmas. This also results in expectable high temperatures of formation.

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SIAL A.N.* , FERREIRA V.P.* - *Brasiliano age peralkalic plutonic rocks of the central structural domain, Northeast Brazil*

The Precambrian, SW-NE trending, central structural domain, Northeast Brazil, comprises three segments, namely the Seridó Fold Belt (SFB), the Cachoeirinha-Salgueiro Fold Belt (SFB) and the Riacho do Pontal Fold Belt (RPF). Peralkalic plutonic rocks are widespread in the CSF, where they were emplaced between 450 and 510 Ma and around 660 Ma. They constitute two syenite groups: a) sodic to potassic, quartz-normative, which from ring-dikes, dike sets and small stocks; b) potassic to ultra-potassic, nepheline-normative syenites, aligned along the Southern boundary of the CSF, forming a

syenitoid line, and two dikes swarms with about 50 dikes each. They are sphene and magnetite-bearing and aegirine-augite and riebeckite-arfvedsonite-rich. Fluorite amounts to less than 1% in the first group. In its northern extension, the syenitoid line changes into monzonites with shoshonitic affinities.

The silica-saturated group in the CSF is extremely high in K, Sr, Ba, high in P, Ti and low in Zr, Nb. MORB-normalized spidergrams show Ce, Y and Sm positive anomalies and Nb and Ti negative anomalies. The oversaturated group displays negative P and positive Zr anomalies. High Ba, Sr, K, P, REE contents of alkali-pyroxenite inclusions in the first group suggest an anomalously enriched mantle source. Both groups show similar REE patterns, LREE-enriched and HREE-depleted, with discrete or absent Eu anomaly, due either to the high fO_2 during crystallization or to a possible cumulate nature of these rocks. Alkali-pyroxenite inclusions display LREE-enriched and HREE-depleted patterns. MORB-normalized spidergrams for rocks with shoshonitic affinities show P, Ti, and Nb negative anomalies, and Zr, Rb positive anomalies. REE patterns are LREE-enriched and approximately flat in HREE.

W.R. $\delta^{18}O$ values for the saturated group (+6 to +8 permil_{SMOW}) suggest differentiation from a mafic magma with minor, if any, post-magmatic alteration, or straight mantle with minor crustal assimilation. $\delta^{18}O$ values for the oversaturated group (+8 to +10 permil_{SMOW}), suggest interaction with meteoric water and more significant crustal contamination.

The regional geographic patterns displayed by the peralkaline plutons in the central structural domain in which they seem to follow major sigmoidal fault zones are perhaps related to pull-apart along these zones, connected with Patos-Aurora and Pernambuco lineaments.

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SING R.P.* - *Chemical evaluation of the mica-pegmatites of Gaya-Hazaribagh belt, Bihar (India)*

Recent investigations of the extreme South-Western part of the mica-pegmatite belt, occurring around Chatara in Souht Bihar have revealed that emplacement of the pegmatites has been along a weaker tectonic zone, lying along the border of two Archeans cratons, one to the West and the other to the East of the mica belt. The present paper discussed the applications of geochemical data on the regional distribution-behaviour of the alkali metals leading to enrichment of K, in the extreme South-Western part of the belt; of Na, in the central zones; and of Li, in the extreme North-Eastern part of the belt. The present results show that the mica pegmatites belonging to this belt are undoubtedly derived through the evolution of partial melt from the deeper substratum

in successive stages Li, Na, K. This sequence is the one observed during the differentiation of magnetic liquids following strictly the principles of crystal chemistry. When these geochemical results are correlated with the tectonic history of this over 200 km belt, it is found that tectonism and emplacement worked together during the evolution of the pegmatites. The partitioning of the alkali metals into phyllosilicates and tectosilicates frame works and the formation of rich muscovite books at one place and its absence from other places have been discussed in this paper. The wider applications of the present work in future prospecting techniques pertaining to lepidolite and muscovite have also been dealt with.

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SINGH R.P.* - *Geochemistry and petrogenesis of the granitic rocks occurring around Paraspani, Distt. Mirzapur, U.P. (India)*

The granites are heterogenous in composition and vary from type granites with dominating quartz and equigranular, allotriomorphic texture to adamellites containing mostly K-feldspar and plagioclase. The granitic rocks have been classified as:

- 1) Coarse grained Leucocratic granites.
- 2) Biotite granites with abundant quartz and subordinate microcline.
- 3) Syenite with dominant K-feldspar and abundant zircon and pale yellowish green biotite.
- 4) Biotite gneiss having fine to medium grained gneissic texture and mesocratic appearance.
- 5) Adamellite with approximately equal amount of microcline and albite and dominance of mafic minerals like biotite, and
- 6) Fine to medium grained biotite-granodiorite.

The chemical analyses of the granitic rocks have been given in Table, from which it is clear that these rocks show wide chemical variations. For example, silica varies from 69.53% in the biotite granodiorite to 74.41% in the granites, but the most conspicuous feature of the analyses is the alumina content, which is extremely low in most of the rocks. This has resulted into formation of acmite in the norm. Similarly, Fe_2O_3 and FeO show wide variation and the ratio Fe_2O_3/FeO shows significant change. In respect of the alkali metals in these rocks are very rich.

In the norm «or» molecule dominates over «ab» molecule in the adamellites, syenite and biotite granodiorite, while the «ab» molecule is more in the fine-grained granites as well as the typical granitic rock. The formation of hypersthene molecule denotes a general enrichment of the rock in Fe and Mg.

The oxide ratios given in Table also show conspicuous variations. The ratio SiO_2/MgO varies from 27.7% in the biotite granodiorite to 59.3% in the granites. The ratio CaO/Na_2O does not denote large variation indicating that the plagioclases occurring in these rocks,

do not vary in composition. The ratio Na_2O/K_2O appears higher in the granites than in biotite granodiorite and syenite. Such an abnormal behaviour is due to addition of K in all these rocks at a later stage connected with the metamorphic episodes. The chemical analyses have been plotted on a silica variation diagram. Some conspicuous features appear from a study of the point scatter obtained in this diagram. The first conspicuous feature relates to the segregation of the points along two silica ranges, one around 70% and other around 74%. The points do not indicate any such linear trend from which it may be established that these rocks are a product of differentiation. However, if the points for fine-grained granite and syenite are not taken into consideration, the resulting curves give a linear appearance. Taking into account that these rocks have been subjected to later metamorphic activities during which period besides, mineral re-constitution and alterations, addition of the alkali metals has also taken place, such a behaviour of the the curves obtained can be explained. From the chemical data as well as the resulting diagram the fact which becomes obvious is that the present granitic rocks are not metamorphic and initially they have been derived from an igneous parentage.

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SUARDI M.* - *The metalliferous mineralization of the Cervo Pluton (Biella)*

Rimin S.p.A. on behalf of the Ministry of Industry, is carrying out a large exploration programme to better define the metallogenic potential of the Triassic and Oligocene magmatism of the Alpine arc. As part of this programme, the Biella magmatic complex, with special reference to the Cervo Pluton, has been studied in detail, and the nature of metalliferous occurrence is being clarified.

Two mines are known to have been active in the area from the 17th century to the middle of the 19th century. The first, a copper mine (Ramoletti-Oneglie) was located 1 km south of the Cervo Pluton, in an area of andesites and andesitic volcanoclastics. The second, Sessera (near Teggia l'Artignaga-Costa l'Argentera), lies 6 km to the north of the Ramoletti-Oneglie. This mine produced lead, silver and possibly gold, from the contact of the granite-monzolite pluton with the Sesia gneiss.

Between 1870 and 1940 prospecting and small scale exploration were carried out for Pb-Zn at Sassaja and S. Paolo Cervo, and for Mo at A. Machetto, C.ma Pietrabianca. These were located respectively within the granitic core, and at the synite-monzolite margin of the pluton.

Records show thus from 1950 vein occurrences containing Mo-U-W and Cu have been investigated. These occurrences were shown to be related to post cryxtalline brecciation of the intrusion and particularly of the syenite (at Bogna, Tomati, Orio di Mosso).