PLUMASITE FROM ALAPPANUR, NORTH ARCOT DISTRICT, TAMIL NADU

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A very small outcrop of corundum-albite rock, measuring about 25 sq ft occurs in Alappanur, about 15 miles southwest of Tiruvannamalai, North Arcot District. It occurs as a more or less vertical body within the gneisses of Peninsular gneissic period (Huronian) adjoining the ultrabasics. Corundum occurs as idiomorphic crystals measuring 5 mm to 15 mm in length and up to 5 mm in width, distributed throughout; but in many cases it is concentrated along one side of the body i.e. towards the ultrabasic units. It is more resistant to weathering owing to the higher content of corundum, and the feldspar which is often altered to a far greater extent results in the frequent occurrence of corundum as loose crystals. The margins of the corundum-albite exposure are broken by the country gneisses. Following the nomenclature of Du Toit, (1918) and Larsen (1928) the rock type has been designated as Plumasite.

Petrography: In hand specimen, the plumasite (corundum-albite rock) shows coarse, scattered crystals of grey corundum with more or less idiomorphic outlines. It is rich in feldspar and frequently associated with irregularly distributed biotite.

Due to the presence of corundum in this rock, it is difficult to make good thin sections. Owing to the abnormal thickness, the minerals in them show high interference colour and blur the characters of the individual minerals. However, a few sections are made to attain normal thickness.

Under the microscope, the slide shows the presence of albite, orthoclase and sporadic irregular grains of biotite. The corundum occurs as idiomorphic grains. The corundum grains, at places, do not exhibit any orientation.

When the poles of the feldspar were transferred with reference to β to the centre and superposed on the Nikitin's stereogram, the plots fell near 'O' thereby indicating it to be orthoclase. Albite is optically (+) and $2V_r \equiv 70°$ ($\gamma - \alpha$) = 0.011.

The association of corundum and albite has been experimentally proved by Morozwicz (1889) (quoted by Larsen, 1928). A fresh specimen was chemically analysed following the methods of A. W. Groves; alkalis were determined with an Eel flame photometer.

	S265	A
SiO_2	50.40	52.34
Al_2O_3	32.30	35.05
Fe_2O_3	2.57	0.45
FeO	1.71	nd
MgO	0.20	0.16
CaO	3.88	0.20
Na_2O	3.71	4.77
K_2O	5.60	6.58
H_2O	0.14	0.40
Total	100.51	99.95

S265: Plumasite, Alappanur, North Arcot Dt. India.
Analyst: S. Ramanathan.

A : Corundum syenite, Nikolskajassopka, Ural mountains Russia.
Analyst: J. Morozwicz (1898)

It is remarkable that the chemical analysis of plumasite, coincides so well with the chemical composition of a corundum syenite rock of Ural mountains, analysed by Morozwicz.

Discussion: Du Toit (1918) remarks that corundum-bearing rocks might have been formed by the desilication of pegmatites by reaction with a wall rock of ultra-basic rock. Pratt and Lewis (1905) are of the opinion that the occurrence of corundum might be interpreted as due to crystallisation from a magma with composition of albite or albite and corundum. Hall (1920) states that the separation of corundum is clearly due to the magma being supersaturated with alumina. There are only two alternatives to account for this super-saturation; either certain portions of the parent magma contained a local excess of alumina, or this was brought about through a change in the relative proportions in some constituents under the influence of the magnesian country. Larsen (1928) suggests a hydrothemal origin for the corundum and albitite bodies. Brandt (1947) is of the opinion that corundum is the result of a type of contact metasomatism in the katazone involving Mg–Fe rich country rock intruded by granite pegmatites rich in the muscovite molecule suggesting the presence of much alumina, an excess of alumina being indicated by corundum in a sericite-muscovite matrix.

Moyd (1949) postulates a hypothesis for the formation of corundum in the basic gneisses and dolomitic marbles. He is of the opinion that the circulation of a series of hydrothemal solutions of magmatic origin through the above rock types is responsible for the formation of corundum.

Carlson (1957) suggests that the release of alumina from the older rocks during the transformation of the syenite is a possible phenomenon for the occurrence of corundum in the contact zones.

The field and laboratory investigations in the present case have proved that plumasite is a result of the local enrichment of alumina in the magma due to the reaction of the acid magma of the Peninsular gneissic period with the older magnesian country.

References

BRANDT, J. W., (1947) Corundum 'indicator' basic rocks and associated pegmatites in the Northern Transvaal, *Trans. Geol. Soc. South Africa*, v. 49 (for 1946) pp. 51-102.

CARLSON, H. D., (1957) Origin of the corundum deposits of Renfrew country, Ontario, Canada, *Bull. Geol. Soc. Amer.*, v. 68, p. 1605.

DU TOIT, A. L., (1918) Plumasite (corundum-aplite and Titaniferous magnetite rocks from Natal, *Trans. Geol. Soc. Souh Africa*, v. 21.

HALL, A. L., (1920) Corundum in the Northern and Eastern Transvaal, *Mem. 15, Geol. Surv. South Africa.*

LARSEN, E. S., (1928) A hydrothermal origin of corundum and albitite bodies, *Econ. Geol.*, v. 23, pp. 398-433.

MOYD, L., (1949) Petrology of the Nepheline and corundum rocks of South eastern Ontario, *Amer, Min.*, v. 34, p. 736.

PRATT, J. H. and LEWIS, J. V., (1905) Corundum and the peridotites of Western North Carolina, *N. C. Geol. Surv.*, v. 1.