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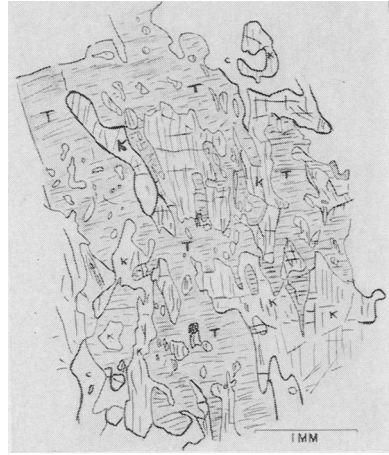
*Note on kornerupine from Ellammankovilpatti,
Madras, India*

WHILE studying the cordierite-bearing assemblages from around Kiranur (10° 47' N., 78° 17' E.) in the Tiruchirappalli district, Madras State, the author noticed kornerupine in them. New data on the mineral are presented in this note. The only other known occurrence of the mineral in India (for which chemical data are not available) has been reported by Murthy (1954, p. 1065).

Kornerupine occurs in a cordierite assemblage exposed in an abandoned pit about 0.8 Km. south-west of Ellammankovilpatti (10° 53' N., 78° 16' E.). In hand specimens the mineral often occurs as stout, green coloured prisms in a matrix of pale blue cordierite and displaying radial arrangement. The density of the mineral, as determined with a Berman Balance, is 3.31 ± 0.03 g/cm³. Pale grey coloured aggregates of sillimanite, flakes of deep brown phlogopite, and rare prisms of anthophyllite are associated with the mineral.

In thin sections of the host rock, aggregates of the mineral (see fig. 1) show characteristic prismatic cleavage and display feeble absorption in shades of green. The cordierite matrix around some grains shows radial fractures suggesting the later formation of kornerupine. Mantles of clinocllore are also observed along the cordierite:kornerupine contacts. Intergrowth of the mineral with brown tourmaline is also observed in some thin sections (see fig. 2). Rutilated phlogopite ($\beta = \gamma = 1.601 \pm 0.002$; negative), sillimanite ($2V_\gamma = 31^\circ \pm 1^\circ$), opaque ores mantled by chlorite (?) and rare corundum are also observed. The cordierite in this rock appears to have a restricted range in composition as indicated by its optics: $\alpha = 1.539$ to 1.542 ± 0.002 , $\beta = 1.543$ to 1.545 ± 0.002 , $\gamma = 1.545$ to 1.546 ± 0.002 , $2V_\alpha = 58^\circ$ to 64° . Rare grains of plagioclase (An₅) with $2V_\alpha$ 79° are also found in the cordierite matrix. Sapphirine has not been observed in assemblages with kornerupine, and

they appear to be mutually exclusive. The optics of the kornerupine are: α 1.668 ± 0.002 , pale yellowish-brown; β 1.685 ± 0.002 , pale green; γ 1.686 ± 0.002 , green; absorption, $\alpha < \beta < \gamma$; $2V_\alpha = 24^\circ$ (calc.); elongation negative; α 11 [001], β 11 [100], γ 11 [010].



FIGS. 1 and 2: FIG. 1 (left): Kornerupine as prismatic aggregates with good cleavage in cordierite matrix. Plain light $\times 7$. FIG. 2 (right): Kornerupine (K) in inter-growth with dark tourmaline (T).

TABLE I. Chemical composition and contents of a quarter of the unit-cell calculated to $\Sigma(O,OH) = 22$ in kornerupine. Analyst: M. N. Balasubrahmanyam

SiO ₂	31.13	B ³⁺	0.519
TiO ₂	0.15	Si ⁴⁺	3.849
B ₂ O ₃	2.40	Al ³⁺	6.421
Al ₂ O ₃	44.09	Mg ²⁺	3.225
FeO	4.68	Ti ⁴⁺	0.015
MnO	0.09	Fe ²⁺	0.482
MgO	17.53	Mn ²⁺	0.007
CaO	nil	Na ⁺	0.007
Na ₂ O	0.03	OH ⁻	0.297
K ₂ O	nil	O ²⁻	21.703
H ₂ O ⁺	0.35		
H ₂ O ⁻	0.03		
Total	100.48		

The chemical composition of the mineral is given in table I. B₂O₃ in the mineral appears to be low. This is confirmed by low percentage of boron in the chemical analysis of the rock. The determination of

B₂O₃ was made following Hillebrand and Lundell (1955, p. 755). Considerable difficulty was experienced in determining FeO as the mineral could not be completely decomposed. As the procedure described by Hey (1941, p. 117) was also ineffective, total iron was determined and recalculated as FeO.

The distribution of ions in the structure of the analysed kornerupine following McKie, 1965, p. 350, is (Na, Mn, Fe, Ti)_{0.511}^[8,6] (Mg, Al)_{4.014}^[6] Al₅^[6,4] (Al, Si)₄^[4] (Si, B)₁^[4] (O, OH)₂₂.

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An occurrence of wüstite

THE occurrence of wüstite or ferrous oxide in nature has not been definitely proved though there have been reports (Brun, 1924; Foshag, 1926; Yudin, 1956). A natural occurrence of ferrous oxide identified by X-ray diffraction pattern is reported in this note.

On examining the heavy fraction of a natural coke obtained from Pathardih colliery, Jharia coalfield, Bihar, India, under a binocular microscope, a few grains were found to be magnetic. Some of them were black in colour and others were brownish. Both were examined by the X-ray powder method using Fe-K α radiation and the 57.3 mm diameter camera. The brownish grains were found to contain magnetite, hematite, akaganéite¹ (β -FeOOH), and goethite. The spacings obtained from a black magnetic grain are given in table I.

It is seen that in addition to magnetite and hematite, both of which give a continuous line pattern, there is another phase giving rise to the

¹ β -FeOOH (akaganéite) was reported by the author from the heavy mineral fraction of a natural coke obtained from a borehole (K. C. Chandy, 1961, *Indian Minerals*, vol. 40, p. 197). The one reported here is the second occurrence of this mineral in a natural coke from a different locality.