

by Borchert (1963) on the formation of chromian amphibole in the chromite deposits of Turkey. Here the amphibole replaces enstatitic rhombic pyroxene, which itself forms the groundmass of disseminated chromite crystals or of nodular chromite aggregates. Borchert emphasized that chromian amphibole was a typical product of the final magmatic stages characterized by the enrichment of the volatile constituents.

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## Clinohumite marble from Vemali, Srikakulam district, Andhra Pradesh, India

CLINOHUMITE marble occurs as thin bands intimately associated with diopsidites and quartz-wollastonite-diopside granulite on the top of the hill to the north-east of Vemali (18° 18.7' N., 83° 25.5' E.). This hill, a member of the Eastern Ghat hill ranges, is composed mainly of khondalites (garnet-sillimanite schists and gneisses) with subordinate amount of the above-mentioned calc-granulites. In parts of this hill and adjacent ones the khondalite is migmatized by the injection of K-feldspar-forming fluid. This note reports some interesting textures of the clinohumite marble and the mineralogy and chemistry of the clinohumite.

In hand specimen the clinohumite marble is white coarse-grained rock composed of carbonate minerals (mainly calcite, 68.2 % with a subordinate amount of dolomite), clinohumite (26.7 %), grossular (2.2 %), diopside (1.8 %), and accessory tremolite, apatite, and shining flakes of graphite (3×3 mm in diameter). Calcite occurs as coarse crystals (average size 1.0×0.6 cm), within which occur other minerals. Dolomite occurs as rectangular rods, rhombs, and ramifying intergrowths with calcite (cf.

Harker and Tuttle, 1955; Van der Veen, 1965); the diverging fingers of dolomite or the occasional anhedral grains occurring in coarse calcite show the same optical orientation as the latter. Dolomite is much clearer than calcite and the contact of these two minerals is invariably marked by crowds of dusty materials, which are commonly disseminated in the calcite. The twin-bands of calcite end abruptly against dolomite and are not seen in the latter. The above-noted textural relations can be best interpreted as the result of exsolution of dolomite from magnesian calcite (cf. Harker

TABLE I. *Chemical analysis, optical properties and cell parameters of clinohumite*

Numbers of ions on the basis of 18(O, OH, F)					
SiO <sub>2</sub>	33.05	Si	3.53	} 3.60 α 1.614 to 1.621 ± 0.003, bright yellow β Pale yellow γ Colourless 2V <sub>γ</sub> = 73° a 13.70 Å b 4.78 Å c 10.34 Å β 101°3'	
Al <sub>2</sub> O <sub>3</sub>	0.20	Al	0.03		
TiO <sub>2</sub>	0.50	Ti	0.04		
Fe <sub>2</sub> O <sub>3</sub>	1.32	Fe <sup>3+</sup>	0.11		
FeO	2.86	Fe <sup>2+</sup>	0.26		
MnO	0.02	Mn	0.00		
MgO	58.19	Mg	9.25		} 9.71
CaO	0.29	Ca	0.03		
Na <sub>2</sub> O	0.09	Na	0.02		
K <sub>2</sub> O	0.11	K	0.02		
P <sub>2</sub> O <sub>5</sub>	0.20	P	0.02		
H <sub>2</sub> O <sup>+</sup>	0.63	OH	0.45	} 2.14	
H <sub>2</sub> O <sup>-</sup>	0.12	F	1.69		
F	5.00				
	102.58				
-O	2.11				
Total	100.47				

Specimen 589. Clinohumite from clinohumite marble, north-east of Vemali, Srikakulam district. Anal. C. Bhattacharyya (Al<sub>2</sub>O<sub>3</sub>, F) and B. P. Gupta (others).

and Tuttle, 1955; Goldsmith *et al.*, 1955; Van der Veen, 1965; Carpenter, 1967). Partial wet-chemical analysis of carbonate minerals from this rock gave CaO 48.16%, MgO 6.11% (anal. B. P. Gupta); the percentage of MgCO<sub>3</sub> is 14.9, which corresponds to an exsolution temperature of 750 °C on Harker and Tuttle's curve (1955, p. 279). This is an estimate of maximum temperature because it is unlikely that all the dolomite within calcite is due to exsolution.

Clinohumite occurs as honey-brown granules or aggregates of granules set in crystals of calcite; under the microscope the grains show smooth outlines. Twinning is rare. Dusty segregations at the grain boundary with carbonate minerals are very common. It frequently contains minute inclusions of carbonate minerals and replaces diopside and tremolite. The wet-chemical analysis, optical properties, and cell parameters of clinohumite are given in Table I. Besides the cell parameter data, the atomic proportions F+OH also conform to the identity of the mineral (see Jones *et al.*, 1969, p. 403).

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## On the use of the term 'Agpaitic'

THE use of 'agpaitic' has undergone considerable change since its introduction by Ussing (1911) for rocks of the Ilímaussaq complex in south-west Greenland (Fersman, 1929; Goldschmidt, 1930, 1954; Polanski, 1949; Gerasimovskii, 1956, 1968; Zlobin, 1959; and Sørensen, 1960). This note is to urge petrologists to avoid using 'agpaitic' as a synonym for 'peralkaline' (cf. Azambre and Girod, 1966; Varet, 1969; Mineyeva, 1972) since 'agpaitic' refers to particular peralkaline rocks characterized by a distinctive geochemistry and an exotic mineralogy.

Usage of 'agpaitic' should conform closely to Gerasimovskii's (1956, 1968) and Sørensen's (1960) proposals with three legitimate uses: (a) For an igneous silica-undersaturated peralkaline rock whose chemistry indicates above-normal concentrations of  $ZrO_2$ , Cl, F,  $Nb_2O_5$ , rare-earth oxides,  $Fe_2O_3$  (relative to FeO), and certain other elements, and lower than normal values of CaO, MgO, and  $CO_2$  compared with alkaline or peralkaline rocks of similar  $SiO_2$  content. Such a rock is an 'agpaite'. (b) To describe a mineral or assemblage of minerals whose composition reflects the 'agpaitic' chemistry of the host rock. Minerals such as eudialyte (F and Cl bearing, Na-rich zirconosilicate), loparite (rare-earth titanosilicate), astrophyllite (Na-rich titanosilicate), villiaumite (NaF) are typical of agpaitic rocks but sodalite cannot be considered as a diagnostic agpaitic mineral since it occurs in both 'agpaitic' and 'non-agpaitic' rocks. (c) 'Agpaitic trend' describes a process by which 'agpaitic' rocks are produced.

'Sub-agpaitic' is appropriate for rocks intermediate between agpaitic and miaskitic types, and not terms such as 'khibinitic'. The term 'agpaitic index' (or coefficient),