It is, of course, risky to transfer conclusions from solution measurement to solid compounds. The values of nephelauxetic ratio (β) which is less than one and covalency paramcter (δ) which is positive in Pr(III) trichloroacetate while in case of Nd and Sm(III) trichloroacetate β is more than one and δ is negative. The negative values of δ is quite surprising in view of highly coordinated nature of trichloroacetate grouping. Sinha[10] also observed negative values for δ which he interpretted in terms of ionic character in the complexes as compared to aquo ion.

The magnetic susceptibilities of Pr, Nd and Sm(III) trichlorbacetates have been measured and the values of magnetic moments of these derivatives have been found to be closer to the values reported by earlier workers[11-14].

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PILLOW BRECCIA FROM THE PRECAMBRIAN METABASALTS OF THE CHITRADURGA GREENSTONE BELT, KARNATAKA

PRECAMBRIAN greenstone belt of Chitradurga is dominantly composed of *2345 m.y. old metavolcarics*[1] associated with metasediments. The metavolcanic rocks are dominantly metabasalts, which exhibit a variety of volcanic structures like pillows, varioles, *vesicles and amygdales,*[2] *and volcanic bombs*[3]. *During* a recent survey, the authors have come across pillow breccias in the greenstone sequence of this belt. The authors are not aware of any reported occurrences of pillow breccias from here or other parts of India.

The pillow breccia reported here occurs close to the village of Kallehadlu, 14 kilometres south of Chitradurga town. The geological map (Fig. 1) shows the setting of the pillow breccia in the volcanic sequence. The pillow breccia is illustrated in Figs. 2*a* and 2*b*. The breccia, distributed in an area of 20 m × 30 m, is immediately associated with well jointed massive epidiorite. The pillow breccia and the associated *epidiorites are underlain by pillowed metabasalts,* which in turn are underlain by variolitic basalt. The volcanic rocks are associated with metagreywackes, quartz sericite schists and banded ferruginous chert, that are interbedded with lava flows.

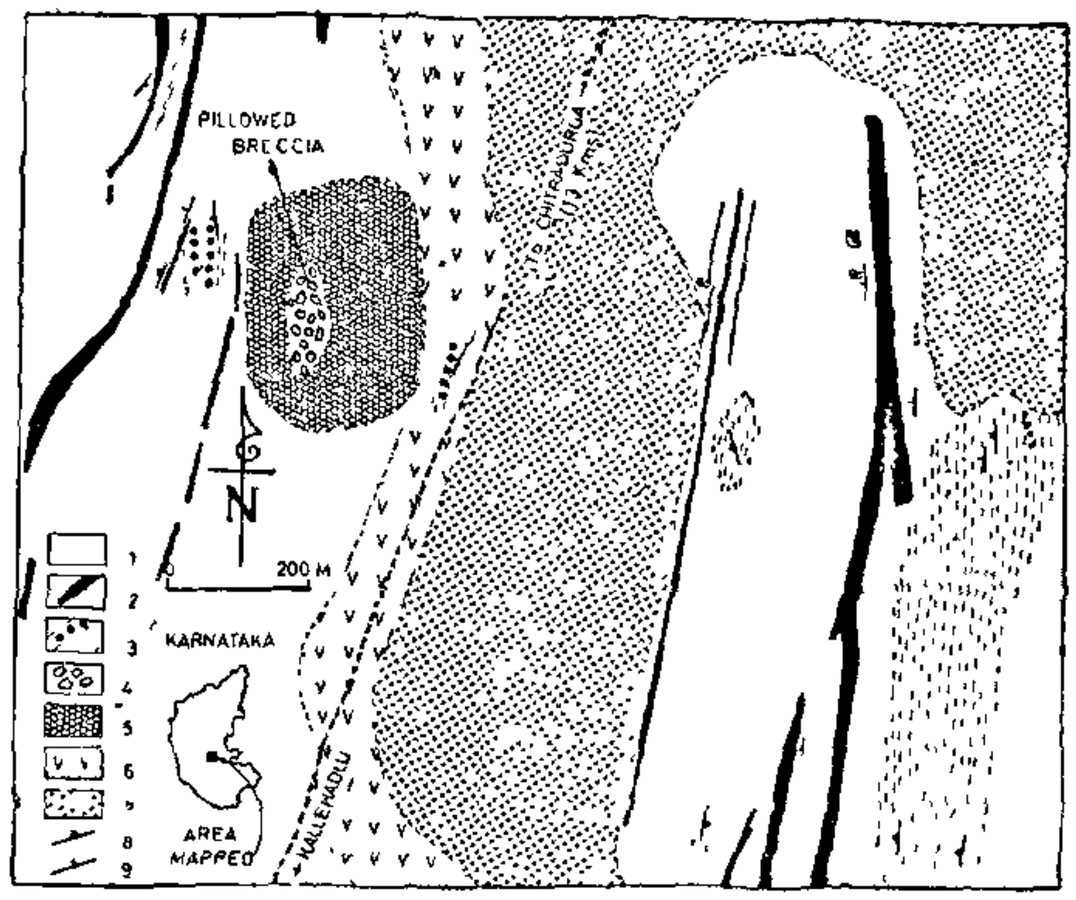

FIG. 1. Geological map of the pillow breccia locality near Kallehadlu village, Chitradurga greenstone belt, Karnataka.

Index: (1) Soil and rock debris. (2) Banded ferruginous chert. (3) Chlorite schist (Meta tuff) intercalated with chert bands. (4) Pillowed breccia. (5) Epidiorite intrusive. (6) Pillowed metabasalt. (7) Variolitic metabasalt. (8) Dip and strike of foliation. (9) Dip and strike of bedding.

Individual pillow breccia fragments have chilled margin all around, and possess radial cracks characteristic of pillow structures. *Unlike in pillow lavas, there* are not many vesicles immediately beneath the chilled margin, *but, quite often a large cavity characterises* the central portion of the breccia fragments (see top of Fig. 2*a*). As the name of structure implies, pillow-like fragments are angular or irregular. The size of *the pillow breccia fragments varies from about 2·5 cm* to 15 cm, although a few larger ones which are as much as 30 cm are noticed. Unlike in the pillow lavas, where the pillow structures predominate over *the matrix, the matrix dominates over the pillow fragments* in the pillow breccia.

Thin section studies show that the pillow fragments are variolitic lavas. The variolites are composed of radiating aggregates of actinolite and tremolite. Some of the variolites have, at their core, prismatic plagioclase laths. The plagioclase also occurs as tabular crystals and exhibits polysynthetic twinning and rarely zoning. The glassy groundmass of the pillow basalt is largely altered to chlorite. Plagioclase is saussuritised and is dusted freely with iron. Epidote and clinozoisite are common alteration products of earlier pyroxene.

FIG. 2*a*. Pillow breccia, Kallehadlu. Note the preponderance of the matrix over the pillow fragments; also the presence of central large cavity in the pillow fragments at the top of the exposure.

FIG. 2*b*. Chert veins and chert fragments in the matrix of the pillow breccia. 1 mm away from the tip of the pen spindle-shaped chert fragment can be seen.

The matrix of the pillow breccia is composed of recrystallised chert and volcanic fragments closely resembling hyaloclastite. The recrystallised chert occurs as aggregates and as veinlets. In some places there are spindle-shaped chert fragments in the matrix (Fig. 2*b*).

Pillow breccias have been described from Precambrian basalts of Canada (Henderson[4]; Henderson and Brown[5]). Noe-Nygaard[6] described such structures from the Quaternary basalts of Iceland. Henderson found that the pillow breccias are commonly developed at the top and bottom of flows. According to him, the pillow breccia differs from the pillow lava in being somewhat smaller, more elongate, and not as perfectly ovoid in shape. Pillow breccia differs from pillow lava mainly in the proportion of matrix to pillows. In view of their close association and transition of one to another within the limits of single exposure, Henderson and Brown proposed a common origin for pillow lavas and pillow breccias.

In the present area, the pillow breccias are not seen in immediate contact with pillow lavas as in Canada or in Iceland, but occur instead amidst massive epidiorites. More detailed studies are needed to work out the relation of pillow breccias to the pillow lavas of the region and the investigations are in progress.

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