DISCUSSION

This section is intended to provide a forum for the discussion of papers published in our Journal by those working in similar fields of investigation and research. Such a discussion is expected to be of value not only to the actual workers in the concerned field, but also to a wider circle of readers interested in the progress of geological studies.—Editor.

Paper on 'COEXISTING PYROXENES AND ISOGRADIC ZONATION OF GRANULITE FACIES WITH REFERENCE TO THE INDIAN CHARNOCKITES' by C. Bhattacharyya, published in the Journal (Vol. 11, No. 1, March 1970).

Comments by C. Leelanandam (Geology Department, Osmania University, Hyderabad).

Bhattacharyya has adopted the rather unusual practice of computing optical data from the chemical analyses of minerals, and preferred for some unknown reasons, the unexciting and apparently futile venture of plotting the computed optical data (β of clinopyroxene and γ of orthopyroxene) on Fig. 2 of Binns (1962, p. 323), rather than the supposedly rewarding task of plotting the readily available Fe^{+2}/Mg ratios of the coexisting pyroxenes on Fig. 7 of Binns (p. 334), in his attempts to delineate the isogradic areas of granulite facies metamorphism. As a matter of fact, Virgo (1968) has already plotted (Virgo, Fig. 8, p. 342) the relevant data of coexisting pyroxenes on Fig. 7 of Binns, and has come to the conclusion that the Madras area is of a higher metamorphic grade than the Broken Hill area (see also Leelanandam, 1967, p. 168; Howie, 1965, p. 323-324). Bhattacharyya, presumably unaware of this and judging the disposition of points in his Fig. 1, which is admittedly of dubious value, has come to a different conclusion. The views of the persent writer on this aspect of the problem are earlier expressed at sufficient length (Leelanandam, 1967, p. 167-170) and hence are not restated here.

The considerable amount of pertinent data avilable in recent literature on coexisting pyroxenes from different granulite facies terrains of the world could be plotted on Fig. 7 of Binns, but this is unwarranted for reasons which were admirably presented by Davidson (1968). A detailed discussion on the veracity of employing the Binns' method for isogradic zonation of granulite facies terrains is clearly beyond the scope and purpose of this communication. Davidson (1968, p. 257) has rightly summed up: 'By plotting his data according to an empirical relationship, Binns has abandoned the theoretical basis of the concept of the distribution coefficient. The direct application of his pyroxene K_D diagram (Binns, 1962, Fig. 7) to pyroxenes from other areas could prove to be fallacious . . . . . and should not be attempted.'

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Author's reply

I appreciate the comments by C. Leelanandam on my paper published in the last issue of the Journal.

I agree with Leelanandam on the point that it is rather unusual to compute optical data from the chemical analyses of minerals for plotting them on Binns' diagram (Binns, 1962, p. 323), which was based on measured refractive index data (β of clinopyroxene and γ of coexisting orthopyroxene). But the reason for adopting such a practice, clearly stated in my paper, is that the measured refractive index data of many of the analysed coexisting pyroxenes from Indian charnockites are not available. The approach, in my opinion, is new but never pretended by me to be exciting. As a matter of fact, being fully aware of the conclusions reached by others (see Leelanandam's comment) I attempted to close the chapter on the subject with the available data by following the 'unusual' practice. In a short communication, however, there was no scope for a detailed discussion of the conclusions.

Leelanandam has misunderstood my conclusion as to the relative grade of metamorphism of Madras and Broken Hill areas as different from that of Virgo. In fact, I have never tried to come to any straightforward conclusion that Madras area represents a higher metamorphic grade than the Broken Hill; but a critical examination of Fig. 1 of my paper would show that most of the Madras plots lie on the isograd B which represents the highest metamorphic grade af Broken Hill; and two more Madras plots lie sufficiently apart from the isograd B towards higher metamorphic grade. One could draw a separate isograd, say C, through these two plots, which is, however, not advisable because of inadequate data. From Fig. 1 of my paper it is obvious that Madras area corresponds to the highest metamorphic grade of Broken Hill, and, in all probability, represents also some rocks of still higher grade. Therefore, my conclusion is not much different from that of Virgo.

REFERENCE

BINNS, R. A., (1962) Metamorphic pyroxenes from the Broken Hill district, New South Wales. *Min. Mag.*, Vol. 33, pp. 320-338.