

## SOME OBSERVATIONS ON THE STRUCTURE AND CLASSIFICATION OF THE DHARWARS OF MYSORE STATE

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THE Dharwar Schists in Mysore have so far been considered as occurring in a few isolated well-defined bands. The earlier geologists described them under three separate units, the Shimoga belt, the Chitaldrug belt, and the Kolar belt. Rama Rao<sup>1</sup> further subdivided the first two belts according to their regional distribution and made the following five-fold grouping of the Dharwars of Mysore: (i) *Western* (Kodachadri, Agumbhe and Kuduremukha regions); (ii) *West Central* (Shimoga, Bababudan, Holenarsipur and Krishnarajpet regions); (iii) *Central* (Chitaldrug, Chiknaikanhalli and Nagamangala regions); (iv) *East Central* (Scattered stringers); (v) *Eastern* (Kolar region).

Such a geographical grouping has, of course, certain advantages for descriptive purposes, but this has tended to give unnecessary individuality to each of these belts, and even the proposed systems of classification of the Mysore Dharwars have been somewhat influenced by this regional consideration.

The main reason for the lack of progress in our knowledge of the detailed stratigraphy and tectonics of the Dharwars of Mysore was due to the belief held till recently that their constituent members were igneous in origin. Several of the earlier geologists have often referred in their writings to folds such as anticlines and synclines, but no area was worked out in any detail from the structural point of view, nor was the succession of beds determined. The geological map of Mysore on a scale of 8 miles to an inch which was published in 1915 under the direction of Dr. W. F. Smeeth is a valuable record of the mapping done so far, and though later work has shown that in some cases the boundaries require alteration, and the interpretation of rock types some modification, the main features can be taken as reasonably accurate. A study of this map shows that the Dharwar rocks especially in the northern half of the State have sinuous outcrops and have the appearance of festoons, a fact which indicates that the beds have been thrown into a series of folds.

One of the folds in the Dharwar rocks in the southern portion of the Chitaldrug Schist belt near Dodguni was recently studied in some detail.<sup>2</sup> It was seen that the component beds of the Dharwar Schists here are folded such

that they generally dip away from the fold-axis. In the western limb of the fold the beds have a steep westerly dip, and the evidence of current bedding in the quartzites indicates that the beds in this limb young westwards. Similar observations made in the eastern limb of the fold showed that the rocks uniformly dip east and young eastwards. As the result of the use of this technique, it was found that the beds here are normal and not reversed, and that the nature of the fold is a true anticline. The noses of the beds are towards the north, a feature characteristic of a plunging fold. The pitch in this case was found to be in a north-north-west direction. The Dodguni fold is, therefore, a pitching anticline which closes northwards.

From the geological map of Mysore, it is seen that the folds closing southwards are pitching synclines. Two good illustrations are found—one north of the Sulekere tank in the Shimoga Schist belt, and the other south of Jogimardi in the Chitaldrug Schist belt.<sup>3</sup>

Banded ferruginous quartzite is a very characteristic component of the Dharwar System. Its resistance to erosion has proved invaluable in emphasising the structural pattern of the Dharwar rocks. There is one prominent ferruginous quartzite zone in Mysore which is also manganese-bearing and is associated very often with limestones. This is shown in the accompanying sketch map. Almost all the important manganese mines of the State are situated on this. In the writer's opinion, this zone should be of considerable value in the proper interpretation of the structure and classification of Mysore Dharwars.

This zone commences in the Western Ghats and after undergoing a few crumples near Kuduremukha and Mertiparvata, stretches practically due north through Shankargudda and Kumsi. The trend becomes sinuous, because of folding, southeast of Shikarpur and near Hosur, and proceeds eastwards along the border of the State till it meets the river Tungabhadra. From west of Malebennur, it strikes southeast till it is sharply folded back near Sulekere as a pitching syncline. The right limb runs north towards Hadadi. The trail is lost here because of the intrusion of the Peninsular gneiss, but we can pick it up again southeast of Anaji. After a short break, and

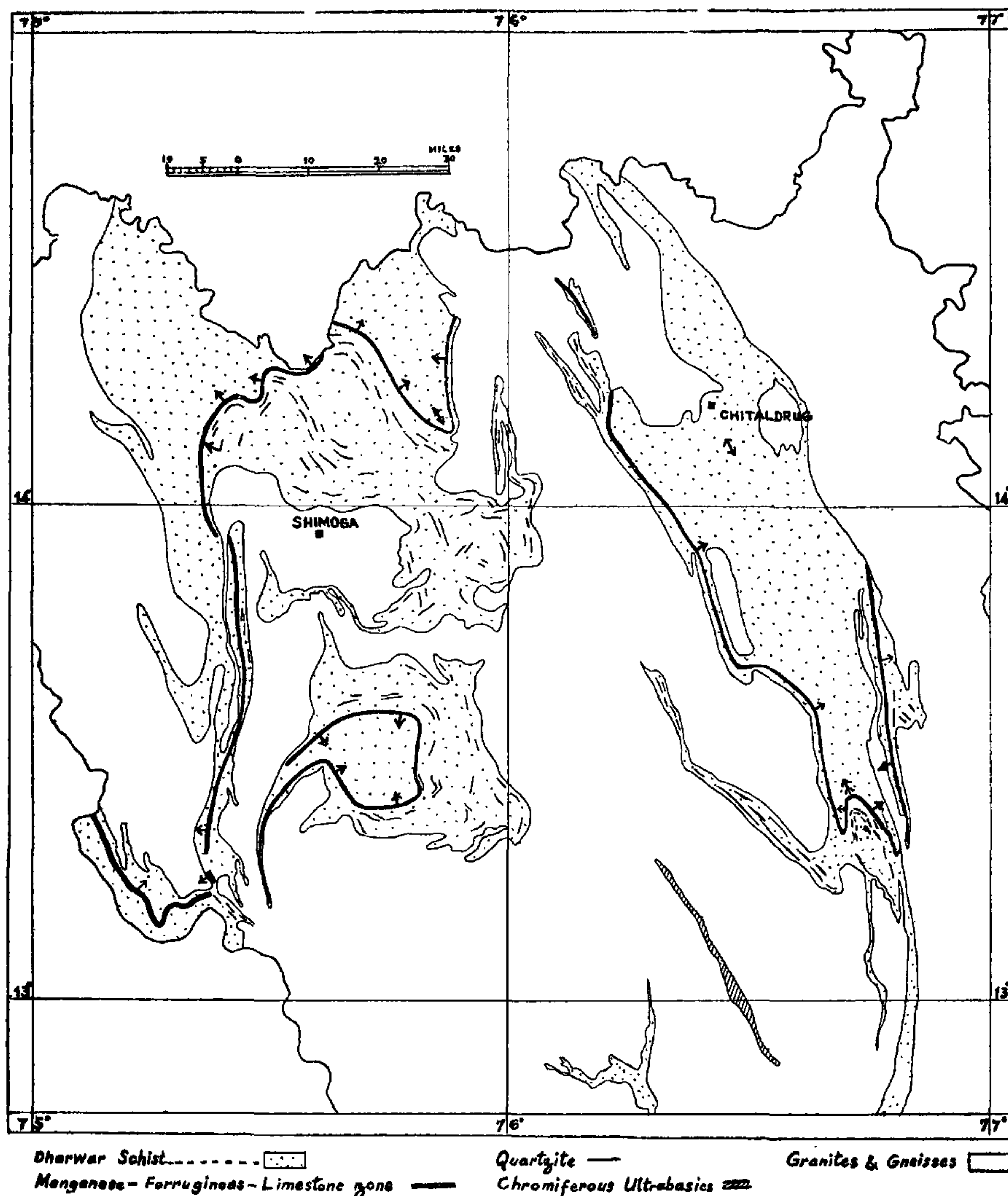


FIG. 1. Geological sketch map of the north-western part of Mysore State to illustrate the main structural features of the Dharwar Schists.



with probably a displacement due to faulting, the zone skirts the western margin of the greater portion of the Chitaldrug Schist belt, and passes through Shivgange, Madadkere, Mattod and Hatyal. At this place the zone is folded into the Dodguni pitching anticline, the right limb of which is sharply folded back. This continues almost due north to the east of Bukkapatna and disappears near Javagondanhalli.

The structure and disposition of this zone indicates that it is a huge anticlinorium with many minor anticlines and synclines, and having a general north-north-westerly pitch.

The Kolar Schist belt is comparatively a very small one and is too far removed from the other Schist belts of Mysore State to be of much use in the interpretation of the general structure of Mysore Dharwars. It is also separated from the other bands by the Closepet granites which runs right across the State in a north to south direction.

Attention will now be drawn to another very significant fact. A reference to the geological map of Mysore shows that numerous quartzite runs are found in the Schist outcrops below this prominent manganese-iron zone and none above it. The schist rocks near Kalasa, Mandagadde, Kumsi, Saulanga, Holalur, Joldhal, Hodigere, Tarikere, Chikmagalur, Chiknaikanhalli, Kondli, etc., are full of bands of quartzite of varying thickness and length. Many of them have well preserved ripple marks and current bedding.

On the other hand, quartzite runs are conspicuously absent in the area occupied by the Shimoga Schist belt towards the west of the Kumsi-Kalasa line. Similarly, the wide expanse of the Chitaldrug Schist belt east of the Anaji-Janehar line is devoid of quartzites. This fact should throw some light on the difficult problem of Dharwar classification.

The middle portion of this anticlinorium is extremely complicated. The Joldhal-Ubrani area is highly churned up and presents eddy structures of baffling complexity. The rock formations have been twisted and broken into small bits, so that they strike and dip in practically all directions of the compass.

Further south, the Bababudan area also presents some difficult tectonic problems. The iron formations occur in the shape of a horse-shoe with the opening on the north-west at Hebbe, but this opening is partially closed and gradually tapers towards the south. The iron for-

mations do not contain workable deposits of manganese, and the association of limestone can only be inferred by the presence now of rhombs pseudomorphous after some carbonate.<sup>4</sup> Here again, the quartzites are found right round only on the outer margins of the hills<sup>5</sup> whereas no runs occur within the horse-shoe in the Jagar valley. The connection between this ferruginous band and the Kumsi-Kalasa zone has been severed by the intrusion of Peninsular gneiss, and so the relationships are not quite clear.

South of the 13th parallel, the Dharwar Schists outcrop in isolated stringers, lenses, and patches. They also exhibit a higher degree of metamorphism and so the elucidation of structure and stratigraphy is rendered extremely difficult. Near Chattanhalli, Sargur and Kandalike, the occurrence of discontinuous runs of limestone and quartzite are the only indications of the southern continuation of the Schist belts. In the extreme south of the State the strike veers towards the west, till finally many of the outcrops have an east-west direction. The zone of mylonite mapped by Jayaram<sup>6</sup> in the Kapini valley appears to demarcate the boundary between the two metamorphisms, one characterised by the NNW-SSE strike of rocks north-west of Heggaddevankote, and the other resulting in an almost E-W strike of rocks to the west and south of Sargur.

The workable deposits of chromite in Mysore occur only in a narrow band of ultrabasic rocks running in a north-west to south-east direction from Arsikere to beyond Nuggehalli, and again south of Mysore. It has always been difficult to explain this, but in the structure of the Dharwar schists proposed in this note, it is seen to occupy a central position in the anticlinorium. The chromiferous ultrabasic rock was probably intruded along the core or axial plane of this huge fold.

A new interpretation is offered in this paper regarding the geological structure of the Dharwar Schists of Mysore. It is hoped that this would throw further light on the problem of classification of these ancient rocks.

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