## CHAPTER VIII

## C O R R E L A T I O N

The Champaner Series has been correlated with the Aravallis by most of the previous workers, though with some uncertainty and doubts. The Champaners differ from Aravallis in many ways and the various dissimilarities have introduced an element of uncertainty in the minds of previous workers.

Blanford (1869,p.27) who was the first to investigate these rocks never gave any correlation. He grouped them into a distinct series (Champaner beds) and included them in Azoic rocks together with (1) Metamorphic Series

(2) Bijawar Series and (3) Vindhyan Series. As he was uncertain of the stratigraphical positions of the various series, he wrote, "In classing together the four lowest series as Azoic, it is intended solely to employ a term which while expressing the fact that all have hitherto proved unfossiliferous, leaves the question of their geological horizon quite open". Fermor (1909, p.240) considered these Panchmahal rocks to be equivalent to the manganese bearing Dharwarian rocks. Rama Rao (1931, p.70) who investigated this terrain thought that the metamorphics of Baria (north of the study area) and those around Shivarajpur-Pani are identical and called all of them as Champaners and correlated them rather doubtfully with Delhis, taking Delhis to be equivalent to upper Dharwars. He wrote, "The Champaner Series cannot be correlated with the Aravalli System or the Lower Dharwars". Fermor (1934, p.25-26), however, categorically correlated the Champaner series with Aravallis. Gupta and Mukerjee (1938, p.73) have also correlated the Champaner Series with the Aravallis. They have written, "In view of the continuous extension of the Aravallis southward into Panchmahals district and adjoining states and the close similarity in lithology and association of Champaners

with these, it has been definitely concluded that the Champaners are the southern extension of the Aravalli System".

This broad equivalence of the Champaner Series with the Aravalli System is now almost an established fact, and the author too is in full agreement with this correlation. But, then the Champaners differ from Aravallis in many ways. The various points of difference between the two are very vital for a proper understanding of the age relationship between Champaners and Aravallis. The present study has fully shown that though both belong to the same stratigraphical age and perhaps to the same depositional cycle, the Champaners represent an environment distinct from that of Aravallis, ideally reflected in the depositional history of the Series. The points of difference, therefore, are those which characterise their distinct depositional and structural histories. The author's investigations have not only added greater details so important for the correlation of this Series, but have also thrown much light on the nature of the granitic terrain of the area.

## CHAMPANER SERIES - A TYPICAL MIOGEOSYNCLINE

It is established that the deposition of the Champaner sequence took place in a basin lying in between a craton and the Aravalli eugeosyncline. The Champaner basin was was thus a typical miogeosyncline, the earlier sediments in which are seen resting over a gneissic basement. To the north, the Series is flanked by a strip of gneissic and granitic terrain, which separates the rocks of this Series from Aravalli rocks of Baria. The author is of the opinion that at least a part of this granitic terrain, could be the original basement acting as a barrier between the Champaner basin and the Aravalli eugeosyncline. If this interpretation is valid, then the metasedimentaries of Baria to the north should not be included as Champaners, though they are equivalent in age. Rama Rao (1931, p.11-28) has in fact shown Pre-Champaner gneissic rocks separating the two, but he grouped rocks on both sides as Champaners.

The miogeosynclinal nature of the Champaners is clearly established by the lithology and structure of the various formations. The depositional history as worked out by the author (Chapter V) shows the various stages of the evolution of the basin marginal to the main geosyncline.

Apart from lithology, the conspicuous absence of ultramafics is an important evidence to support the miogeosynclinal origin of the Champaners.

## STRUCTURAL AND METAMORPHIC DIFFERENCES BETWEEN ARAVALLIS AND CHAMPANERS

Several workers (Merh and Patel, 1968; Naha and Chaudhuri, 1968; Naha and Mukerjee, 1969) have shown that the Aravallis of north Gujarat and South Rajasthan, show clear imprints of two episodes of folding - one superimposed over the other and the present NNE-SSW strike of the Aravallis, was impressed during the Delhi folding. Merh and Patel (1968) have considered the original Aravalli folds to be E-W. The E-W folding of the Champaner Series, thus coincides with the original Aravalli fold trends, and according to the author, the rocks of the present area having escaped the effects of Delhi orogeny, have preserved the original trends.

Similarly the metamorphism of the Aravallis differs from the Champaners on account of this superimposition of deformation. The rocks of Champaner show a low grade of regional metamorphism, such that most of the pre-existing sedimentary structures have escaped obliteration. On the

other hand, the Aravallis in the north, show greater effect of shearing in their metamorphic assemblages. This shearing obviously took place at the time of the Delhi folding. A very conspicuous metamorphic phenomenon shown by the Aravalli schists is the development of crinckling and a late strain-slip cleavage. These structures are absent in the Champaners.

## CHAMPANER SERIES IN RELATION TO THE SURROUNDING GRANITES AND GNEISSES

The granitic and the gneissic terrain association with the Champaner Series, also needs a reinvestigation. Previous workers have considered the entire granitic area as comprising Post-Champaner intrusives. Hobson (1926) has mentioned the Chhota Udepur granites and gneisses (to the E and SE) as Post-Champaners. Gupta and Mukerjee (1938,pp.189-190), however, have correlated the granitic rocks of Chhota Udepur as Pre-Delhi but Post-Aravalli intrusives, and the non-foliated, massive granites of Godhra (N of Champaner Series) equivalent to Post-Delhi Erinpura granites. The author on the basis of his present investigations holds rather different views from those of the previous workers. According to him,

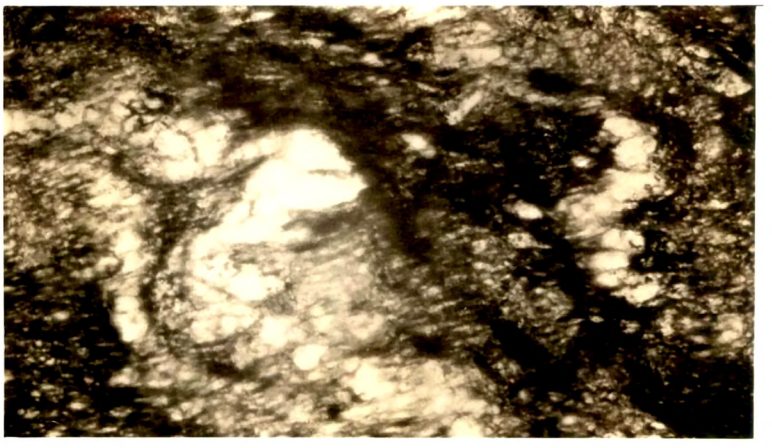
the Godhra granites, in fact, represent the post-kinematic intrusive phase related to the Champaner orogeny only and thus cannot be considered as late as Post-Delhi. In the absence of the rocks of Delhi System in the neighbourhood, it is more reasonable to connect these granites with Champaners. This consideration has, therefore, led the author to conclude that the entire terrain comprising granites and gneisses around the Champaner Series could be classified as per following age relationship:

(1) Pre-Champaner gneissic basement: Occurrences of such a basement have been recorded by the author to the E and SE of the area and which have been briefly discussed earlier (Chapter, III,p. 38 ). It is also likely that part of the gneisses north-east of Rajgad slates and separating these rocks from similar rocks of Baria, perhaps represents this basement.

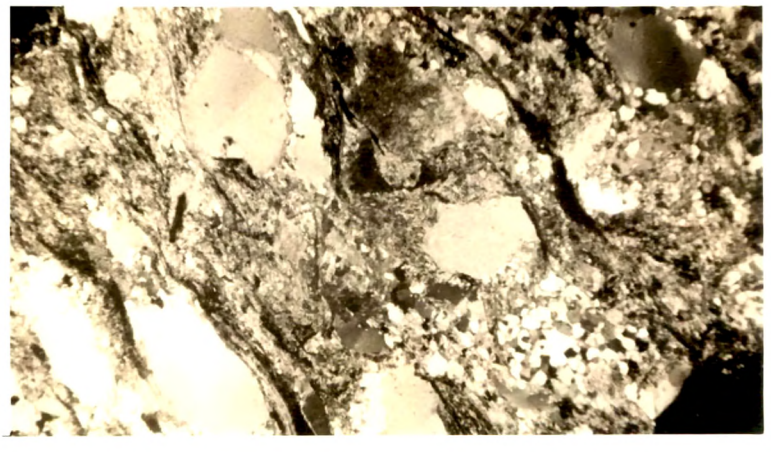
(2) Post-Champaner granites and gneisses: These are intrusive into the Champaners, and consist of an earlier migmatitic phase (represented by foliated gneissic variety) and a later massive intrusive granite. The two varieties represent late-kinematic and post-kinematic granite action, genetically connected with the Champaner orogeny.

Finally, the author would like to point out that field evidences clearly point to the fact that the Post-Champaner granitic rocks were derived by the mobilisation (? palingenesis) of the basement itself during the upheaval.

PLATE XXXI

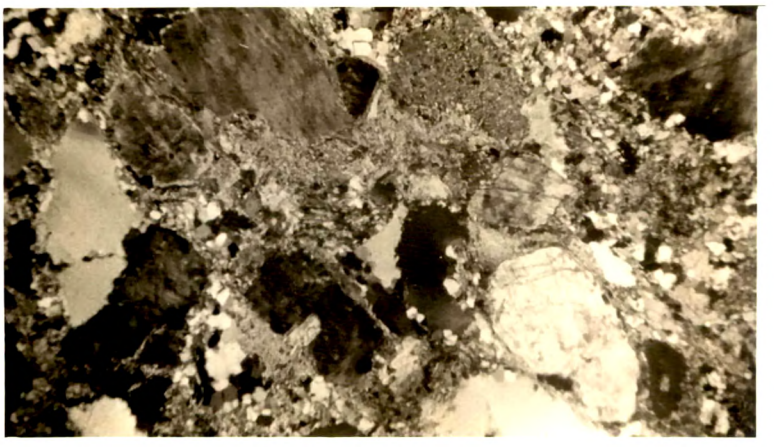


A. Photomicrograph showing oblique relation between cleavage and bedding in Jaban Slates (X60).

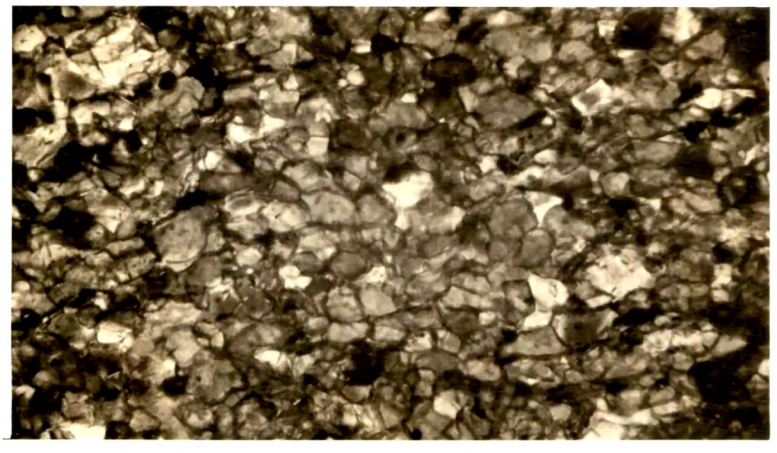


B. Photomicrograph showing textural characters in graywackes (X30).

PLATE XXXII



A. Photomicrograph showing textural characters of protoquartzites (X30).



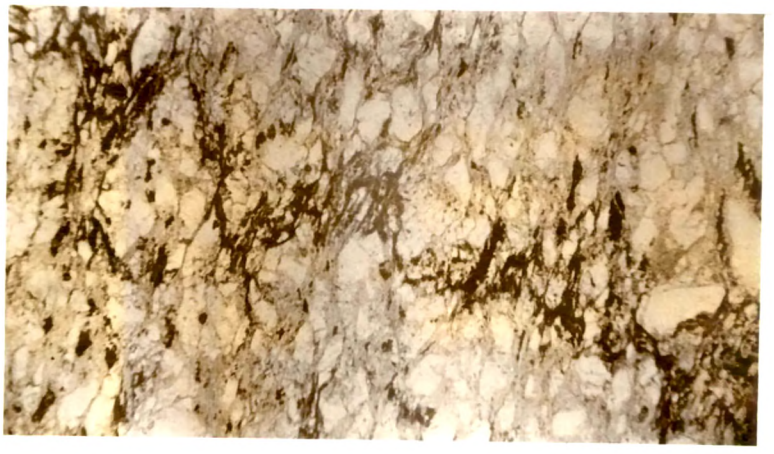
B. Photomicrograph showing textural characters of Bamankua Limestones (X30).

PLATE XXXIII

A. Photomicrograph showing textural characters of Rajgad Slates (X30).

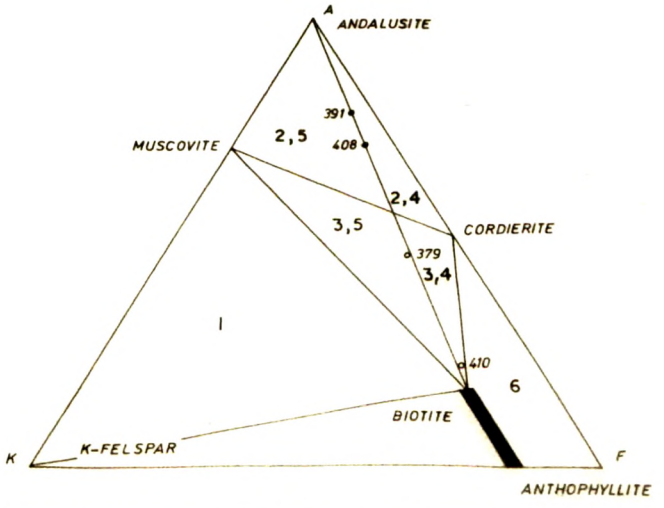
B. Photomicrograph showing textural characters of potash granite (X30).

PLATE XXXIV



Photomicrograph of protoquartzites showing slipping along the metamorphic cleavage (X45).

# PLATE XXXV




*Hornblende-hornfels facies, Orijärvi, Finland. A K F diagram for rocks with excess $SiO_2$ and $Al_2O_3$. Quartz and plagioclase are possible additional phases (after Turner, 1968 p.194).*

*o Plots of the specimens: 379, 391, 408 & 410.*

AKF Diagram for Hornfelses.