

CHAPTER VII

SUMMARY AND CONCLUSIONS

OUTLINE OF THE GEOLOGICAL HISTORY

In the preceding chapters, the author has given a detailed account of the various pre-Cambrian formations that comprise the Idar and its neighbourhood. The study has ideally revealed some interesting facts which not only are important from the point of view of the area in particular, but are also vitally significant in understanding a number of problems connected with Rajasthan and N. Gujarat as a whole. The Idar-Vadali area contains a faithful record of almost all the important geological events connected with

the Delhi orogeny. The author has been able to build up a closely connected sequence of events that started with the deposition of Delhi and ended with the emplacement of Erinpura granite. The salient points of this geological evolution are summarised here.

Deposition And Uplift Of Delhis

The Delhi sediments were deposited over an Aravalli basement. The sequence of deposition starting with pebbly arenaceous layers followed by argillaceous and finally calcareous layers is now represented by the following succession:

Calc-gneisses (Impure limestones)

Biotite-gneisses (Migmatised biotite-schists)

Quartzites (Pebbly sandstones).

The uplift of these sediments was accompanied by their folding and metamorphism. In fact, the rocks of the study area lie quite near the nose of the Delhi synclinorium, and show a number of anticlines and synclines trending N.N.E.-S.S.W. The metamorphism that accompanied this orogeny has changed over the various lithological type into corresponding mineral assemblages indicating a medium grade. The regional metamorphism resulted into transfer of (1) sandstones in quartzites, (2) argillaceous

rocks into garnet mica schists, and (3) calcareous rocks into calc-gneisses.

Intrusion Of Mafic Rocks

The next important event of the area is marked by the uprise of a mafic magma in the form of numerous sills. The intrusion of these sills mostly took place after the Delhi deformation. The constituting rock making up these sill like bodies are olivine bearing dolerites and gabbros. The bigger sills show a median portion which is gabbroic while the marginal portions are dolerite. In their present state these mafic bodies show varying effects of granite on them. Smaller bodies are seen to have been changed to epidiorites, while the bigger masses have still preserved their original texture and mineralogy.

Emplacement Of Erinpura Granite

Next comes the granite. The author has collected clear evidences to show that the mafic rocks are older to the granites. The emplacement of the granites that followed the mafic rocks, characterises the closing period of the Delhi orogenic upheaval. The granitic rocks thus typically show the early migmatic phase and the late intrusive phase of the granite action. The

early phase metasomatically converted the biotite-schists of Delhi into biotite-gneisses, and then finally into the gneissic granite which now occupies the low-lying terrain around Idar. The late intrusive phase that came up cutting the gneissic granites is seen to form the bosses, tors and hills. Mineralogically and chemically too, the distinction between these two types is well marked. While the early gneissic type is sodic-almost granodioritic, the late intrusive rock is a potash rich microcline granite.

An interesting phenomenon of the granites is that they have superimposed a contact metamorphism over calc-gneisses. The superimposition has resulted into an interesting mineral assemblage characterised by the development of corundum and wollastonite bearing hornfelses at the cost of calc-gneisses.

Another interesting phenomenon of the granite intrusion is doming effect on the Delhis. The stresses due to the pressure exerted by the intrusion appear to have locally superimposed another conjugate (?) folding with axial plane N.E.-S.W. and N.W.-S.E. This cross folding is responsible for the development of refolded folds and eyed-folds.

The effect of granites on mafic rock is also noteworthy. While the early phase has metasomatically affected only the smaller bodies changing them in a limited way to epidiorites. The bigger mass at Kawa escaped the activity. On the other hand the intrusive granites when emplaced, affected the mafic rock in two ways. Either the potash granite has metasomatically changed the mafic rock by a progressively increasing development of feldspar porphyroblasts along the margins, or it plucked patches and lenses of mafic bodies and assimilated them, both giving rise to hybrid types.

These granites comprise the most striking formation of the area and it is the study of their relationship with the Delhis and the mafic rocks which reveals the true succession of the geological events not only in the study area but also of the neighbouring terrain.

IMPORTANT CONCLUSIONS

- (1) The Delhi rocks show local superimposition of a late-conjugate (?) type of folding, with axial planes N.W.-S.E. and N.E.-S.W., over the N.N.E. plunging early structures. The early folding is related to the Delhi uplift, while

the late folding appears to have been due to the lateral pushing of ^{the} ~~the folded~~ strata northward ~~due to~~ the granite intrusion. The compressional stresses generated by the rising granites, domed up the early folds, such that in some parts, the early structures show southward plunge. The refolded folds and the eyed-folds in calc-gneisses, are the most convincing evidence of this ^{over} ~~cross~~ folding.

- (2) Another important phenomenon shown by the Delhi rocks, related to the granite intrusion, is the superimposition of contact metamorphism over the regionally metamorphosed calc-gneisses. This superimposition has resulted into the conversion of gneisses into hornfelsic rocks, and the development of an assemblage characterising transition between contact and regional metamorphism. Occurrence of corundum and wollastonite together with the minerals of regional metamorphic origin, is a noteworthy feature of the area.

- (3) The Erinpura granite, in its early phase, extensively migmatised the biotite-schists of Delhi system, and as a result of which the pelitic metasediments are now seen as biotite-gneisses. In fact, the entire gneissic granite belonging to this acid igneous activity, are the granitised derivatives of the biotite-schists.
- (4) The mafic rocks that occur as big and small bodies in the area, are not dykes but sills and belong to an age older than the Erinpura granite. These mafic rocks appear to have been emplaced almost after the main period of Delhi folding, but definitely before the rise of the granites.
- (5) The andesitic veins that cut the main Kawa mafic mass are genetically related to the latter and have been found to have derived from a common mafic magma by differentiation in depth.

(6) The various types of granitic rocks, viz.

~~gneissic granite~~ and massive granite with all its modifications including aplite and porphyries, belong to the same acid igneous phase i.e. Erinpura granite. The likelihood of some granitic derivatives either being older than the Erinpura, or of others being younger and of Malani age is not valid.