CHAPTER IX

CONCLUDING REMARKS

The geological study of the Ankola-Gokarn area has revealed a number of interesting facts which are not only important from the point of view of the area in particular, but are of considerable regional significance. The detailed petrological and structural investigation of the rocks of the area could lead to some important conclusions regarding the evolution of the amphibolitic and granitic rocks of the West Coast in general. The present study has thrown considerable light on the various obscure geological processes connected with the Dharwarian orogeny. It is amply established that the various fold episodes, metamorphism and granitisation, which affected the Ankola-Gokarn area, were all inter-related, and constituted integral parts of the orogenic upheaval - each having played its proper role in the evolution of the rocks of the area. In the end now, the author has briefly summarised the more salient features of his findings and conclusions.

GEOLOGICAL FRAMEWORK

The prominent rocks of the study area are amphibolites and granites of Dharwar age. The granitic rocks are derived from the amphibolites by a process of granitisation. These rocks, in turn are intruded by a number of basic dykes. These dykes show much variation in size, and range from coarse gabbro to mediumgrained basalts. Quite a few of them are wholly or partly altered to epidiorites. It is not possible to fix the upper age limit of these intrusions. They are definitely post Dharwar, but it is doubtful if they are as young as Lower Cuddapah. The largescale uralitisation of pyroxenes and alteration of plagioclases, point to the possibility of their emplacement immediately after the main orogenic event. These hydrothermal alterations (?) could have been caused by the last phases of the metasomatic activity that brought about the granitisation.

The laterites that overlie all the Archaean formations, are of Tertiary age, and comprise both the categories - residual ('In Situ') as well as detrital and transported.

STRUCTURE

The amphibolitic rocks and their granitised derivatives constitute a fairly distorted Z shaped band, and show effects of two fold episodes. A sinistral strikeslip fault along the Gangavali river cuts this band, almost in the middle. The Z shape of the band is due to the first folding (F_1) while its distortion is due to the second folding (F_2). The effect of a third folding is only sporadic. The orientation of the early (F_1) minor folds which are isoclinal, varies from place to place, and this variation is mainly on account of the effect of late folding (F_2). Minor folds related to F_2 are seen all over. In a broad way, the axial planes of these late folds are almost NW-SE in the south, but northward after crossing the Gangavali river, these trend ENE-WSW or even NE-SW. It was the superimposition of this second folding (F_2) which considerably destorted the pre-existing Z shaped (F_1) structure.

AMPHIBOLITIC AND GRANITIC ROCKS

Amphibolites perhaps represent metamorphosed basic rocks, gabbros or basalts. These show a medium grade of regional metamorphism, and extensive metamorphic differentiation. In fact, the early deformation (F_1) not only folded the amphibolitic band into a pair of large isoclinal structures, but also aided the metamorphic processes in differentiating the rock into a striped assemblage consisting of bands and streaks of dark and light coloured rocks made up of varying proportions of hornblende, plagioclase and quartz.

The granitic rocks are obviously derived from the amphibolites by a progressive metasomatism. Depending upon the degree and intensity of granitisation, all stages of transition from hornblendic amphibolites to typical biotite-microcline granite, are recorded. As a result, a wide variety is seen in the granitic rocks. Some are dark coloured (grey) and contain hornblende and/or biotite in varying proportions. These may be foliated or massive. Then there are light coloured granitic masses poor in mafic minerals. All these occur together intimately mixed. Such masses in turn, are cut up by numerous veins, dykes, and streaks of leucocratic quartz-felspar matter. For the most part, these quartzo-felspathic bodies have grown metasomatically along foliation, joint planes etc. Metasomatic "filtering" has also given rise to segregation of hornblendic and biotitic lenses and patches.

GRANITISATION

The granitisation is seen to have immediately followed the metamorphic differentiation, and as a result the amphibolitic rocks show an imperceptible change to granitic types. The transformation of amphibolitic rocks, for the most part was brought about by siliceous emanations rich in K_2O. The earliest stages of granitisation are marked by the enrichment of various bands of amphibolites, in quartz, the later phase characterising the progressively increasing addition of microcline. The change over of amphibolites to granites is marked by the -

(1) overall increase of quartz and microcline,

(2) decrease of hornblende content,

(3) change of hornblende to biotite and

(4) replacement of plagioclase by microcline.

This gradual enrichment of SiO_2 and K_2O, was accompanied by segregation of light and dark coloured constituents in bands, veins and patches, and this has appreciably contributed towards formation of a wide variety of granitic rocks. In fact, the diversity in the mineral content has been due to the following three reasons:

(i) original mineral composition of the amphibolitic bands.

(ii) amount of quartz and microcline added.

(iii) segregation of light and dark constituents.

One of the most striking feature of the granitisation phenomenon in the area, is the widespread development of replacement pegmatites. Dykes and veins of quartz-felspar are seen to have metasomatically grown along the foliation, joint planes and axial planes of minor folds.

The entire evolution of the granitic rocks, for the most part was almost synkinematic, and the granitisation closely synchronised with the two deformational episodes.

The early stages preceded or coincided with the first folding (F_1), while the main events of granitisation took place before and during the second folding (F_2). In fact, some pegmatite veins developed even after the F_2.

The ultimate causes of the granitisation appear to be undoubtedly connected with the complex process of geosynclinal folding, the large-scale metasomatic changes of the kind having been brought about by the exhaustion of the giant energy potential gradient controlling the whole phenomenon of orogeny.