CHAPTER VIII

SUMMARY AND CONCLUSION

The author has given an account of the stratigraphy, metamorphism and structure of the area, and also established a local stratigraphical succession and a sequence of metamorphic and structural events. To conclude the present study, the author proposes to summarise the main geological events which took place in the Pilkholi area.

(A) OUTLINE OF THE GEOLOGICAL HISTORY:

The history of the area begins with the deposition of the sediments in the geosyncline, and their intense folding. This resulted in the formation of a (? or several) reclined

folds. This folding was accompanied by progressive regional metamorphism with the development of a schistosity (S_1) which coincided with the axial plane of the fold. Mineral assemblages characteristic of pelitic, semi-pelitic and psammitic groups, suggest a metamorphic grade as high as that of the 'almandine zone'. The folding seems to have continued for a considerable time. Migmatisation followed the progressive phase of metamorphism. The migmatisation proceeded from the core of the reclined fold and was facilitated by the axial plane schistosity. Ultimately, due to continued activity of differential stresses, the reclined fold culminated into a thrust. This dislocation crushed and granulated the rocks, and also brought down the metamorphic grade, thus causing retrogressive effect on the rocks of the overlying thrust sheet. The retrogression is characterised by alteration of garnet and biotite to chlorite, and of muscovite to sericite, ultimately giving rise to the development of phyllonites with a strong cleavage (S_2) in the vicinity of the thrust.

The underlying rocks (? Nagthat) which were metamorphosed to slates and quartzites previously, show a

slight rise in metamorphic grade. The rocks nearer to the thrust are characterised by green phyllites. The thrust has metamorphically connected the two tectonically and metamorphically distinct units. The area in a way, affords an example of Read's 'Metamorphic Convergence'.

Sometime later, the area was affected by another folding (second). This post-thrusting deformation has folded the main axial plane schistosity (S_1) as well as the foliation of the rocks below the thrust, and has given rise to a strain-slip cleavage (S_3).

The entire area, at some later stages, appears to have been affected by a N-S folding (third). This has given rise to the development of open flexures.

Last came the faulting. All the faults are straight and two of them have affected the thrust which indicate that the faulting is not only post-thrusting but also later than the N-S folding (third).

(B) CONCLUDING REMARKS:

(1) The most striking fact that emerges out of the present study is that the various phases of regional metamorphism

and the different tectonic episodes of deformation are closely interwoven, and form part of a connected orogenic event. It is amply proved that the early folding and the Upradi thrust (Garhwal thrust) are the first and the last events respectively, of a single orogenic phase, the deforming stresses for both being identical, and the two events marking the beginning and the end.

(2) The 'progressive' and 'retrogressive' phases of regional metamorphism, too, are closely connected with the deformational history, and the metamorphic study can not be satisfactorily made without taking into account the structural history.

(3) The gneissic rocks too reveal very interesting facts. They are of the nature of migmatites and appear to have originated closely after the formation of the surrounding metamorphics. Thus, it is logical to consider them to belong to the same period during which the metamorphism and early deformation was initiated. These rocks therefore, could, with

considerable certainty be considered as early Tertiary.

It is obvious that the gneisses of Ranikhet are not deformed granites, but are transformed pelitic schists - soaked with felspathic emanations. The neighbouring granitic rocks of Almora region could be connected with these emanations. But the author would however, refrain at this stage, to enlarge upon the subject of the ultimate source of the migmatising emanations, and of the genesis of the neighbouring granites. It is hoped that future work on Almora area may reveal the true nature of these granitic rocks.

(4) It is evident that the folding of the Garhwal thrust into Upradi-Someshwar Synform, resulted into the widespread development of chevron folding and a vertical strain-slip cleavage running E-W or ESE-WNW. It is quite possible that the synform is a complement of the antiform at Bhowali. It will be worthwhile investigating if this synformal and antiformal folding is in anyway related with the drag experienced by the overthrust mass during Krol thrusting.

Before concluding this treatise, the author would like to emphasize that the present study has not only revealed for the first time details of the structural and metamorphic characters of the rocks of Ranikhet-Pilkholi region, but has thrown open avenues for future investigations in the adjoining areas, which in turn may shed considerable light on a number of unsolved problems of the geology of Kumaon Himalaya.