CHAPTER VII

REGIONAL TECTONIC CONSIDERATIONS

The structural pattern and the fold history of the study area that emerge from the present investigation, throw considerable light on the various major events of tectonism that have affected the rocks of Kumaon in the geological past. In fact, the author's results provide valuable data that fill the numerous gaps in the existing knowledge about this terrain. The structural pattern worked out, has revealed for the first time the correct stratigraphy of the rocks in the area. Secondly, the true nature of the Bhowali anticline has also been deciphered. The Ramgarh thrust and its characteristics have been further

understood. Its extension beyond the Kuchgad stream has been traced for the first time.

Merh (1968) suggested three major fold episodes for the central Kumaon Himalaya. The first fold episode preceded the Almora thrust while the second, according to him, was related to the folding of the Almora thrust. He attributed this folding to the drag effect of the Krol thrust, and according to him, it was during this folding that the Bhowali anticline and Naini Tal syncline were formed. The third and possibly the last major folding was that in a NS direction. In this paper Merh for the first time categorically stated that the Ramgarh Thrust is not the folded continuation of the Almora or Garhwal thrust (Pande 1950, Heim and Gansser 1939). According to Merh (op cit. p.6) "the Ramgarh thrust was a subsidiary dislocation related to the Krol thrust" and was of the nature of a major high angled reverse fault. Later on, in another paper (Merh et al. 1971), her further elaborated his ideas, stating that NW plunging synclines and anticlines developed at the time of the folding of Almora thrust, and it was during this folding that the vertical limb of an anticline reptured, giving rise to the high angled Ramgarh thrust.

The above sequence of three episodes of folding, it appears, was suggested by Merh mainly on the basis of his work on the Almora nappe rocks, because subsequent work by him and his students (J.P. Patel in Ramgarh-Nathaukhan, Devendra Pal in Naini Tal, O.K. Shah in Bhowali and present author in Garampani) in the Krol nappe rocks to the south of South Almora thrust, has furnished data which has considerably altered the tectonic picture of the area (Fig.3.3).

Devendra Pal (personal communication) has established that the synclinal structure of Naini Tal was a late E-W fold, superimposed over a pair of early folds, that these early folds and the Bhowali anticline were probably of same generation. O.K. Shah has also found that the EW folds have distorted the Bhowali anticline also. These late folds of Naini Tal-Bhowali are in turn, affected by the open N-S or NNE-SSW flexures, and thus in all, three fold episodes are revealed by the Krol nappe rocks in this region of Kumaon.

O.K. Shah (personal communication) has further established that the late EW folds (Naini Tal, Bhowali) are truncated by the Ramgarh thrust. As this thrust in turn, is affected by the very late NNE-SSW flexures, it is most obvious that the Ramgarh dislocation originated sometimes after the E-W folding and before the NNE-SSW folding.

According to J.P. Patel (1971, p.143) the Ramgarh thrust which originates from the Krol thrust is genetically related to the latter, and that both came into existence at a date much later than the E-W folding at Naini Tal and Bhowali.

From the above discussion, following facts emerge :-

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1. Bhowali anticline and Naini Tal syncline do not belong to the same fold even as visualised by Merh (1968).

2. Ramgarh thrust is no related to the fold episode that gave rise to the Bhowali anticline. On the other hand, it is a much later dislocation, younger even to the E-W folding (Naini Tal syncline and associated folds that were superimposed over the Bhowali structure).

On the basis of the various consideration discussed above, the following sequence of tectonic events could be suggested for the Krol belt rocks of the Kumaon.

Tectonic episode I : A fold episode that gave rise to the Bhowali anticline. Perhaps it was during this folding that the Almora thrust was folded into a synform (F_1).

Tectonic episode II : Superimposition of several E-W flexures on Bhowali anticline. To this generation belong the Naini Tal syncline (F_2).

Tectonic episode III : Development of Ramgarh thrust. Perhaps this thrust is a subsidiary dislocation of Krol thrust, branching off from the latter.

Tectonic episode IV : Open NNE-SSW folds that developed all over Kumaon including Almora nappe (F_3).

Considering the tectonics of the Kumaon as a whole, the three fold events detailed above took place after the Almora thrust, such that the F_1 folded the Almora thrust sheet into a synform. Thus, the isoclinal reclined folds, encountered extensively in the Almora crystallines, belong to a fold event still older to the synformal folding (F_1) of the present author.

The structure of the study area ideally fits in the above mentioned regional frame work. In the present case also, the rocks reveal a sequence of three fold episodes, and all the three can be correlated with the various major events.

The Garampani-Bardau Malla anticline, being the northern extension of the Bhowali anticline, has been rightly considered as F_1. The distortion of this F_1 ~~by~~

structure by F_2 and F_3 is also seen to be quite similar to that seen in Naini Tal-Bhowali area. The South-Western limb of the F_1 anticline is folded on F_2 whose axial planes and axes are quite identical to those observed by Devendra Pal in the south. The north-eastern limb, on the other hand is seen affected by NNW-SSE to N-S flexures which are affecting the Ramgarh thrust also, and thus they are undoubtedly F_3.

The author has for valid reasons, not considered the flexures and folds encountered in the sub-area (2) as these are local phenomenon related to the Ramgarh thrust movement and do not have any regional significance.