CHAPTER III

GEOLOGICAL SETTING

EXISTING CONCEPTS

The rocks of the Chaukhutia and its neighbourhood belong to two tectonic units, separated by a major dislocation which has been regionally designated as the North Almora Thrust by the previous workers. The southwest dipping crystalline rocks to the south of this 'thrust' comprise a part of the synformally folded Almora-Dudatoli Thrust Sheet of Gansser (1964). The argillocalcareous metasedimentary sequence to the northeast forms a part of the Deoban-Tejam belt, and could be correlated with the identical succession further east in Pithoragarh where

Valdiya (1962) has called it as Calc-Zone of Pithoragarh. Both the authors, consider these to belong to the para-autochthonous Krol Nappe, underlying the folded Almora Thrust Sheet.

In this part of Kumaon Himalaya, these Inner belt Krol Nappe rocks form an assymetric anticlinal structure between the North Almora Thrust and the Kaushani Thrust. Heim and Gansser (1939) and Gansser (1964) have suggested that the North Almora Thrust and the Kaushani thrust (above which lie the Baijnath Nappe) are the two flanks of the antiformally folded Almora Thrust.

The tectonic feature here that has intrigued all the previous workers, is the total absence of a south dipping limb of the anticline. On crossing the North Almora Thrust, one encounters abruptly the metasedimentaries dipping in the opposite direction (i.e. due NE), and the SW dipping crystalline rocks of Almora Nappe are seen abutting against NE dipping slates and quartzites. Heim and Gansser (op. cit., p.43) therefore have referred to this structure as a 'false anticline'. Gansser (op. cit., p.95) has described these rocks (of Badolisera-Pithoragarh Zone) as forming a steep fan-shaped 'anticline' without

corresponding limbs. Obviously, none of these workers could provide a satisfactory explanation for this structural ambiguity. Merh (1968) has tried to explain the structure by suggesting a reverse fault running along the crest of the anticline such that the southern limb has gone down. Munshi (1971), working in the Someshwar area, also visualised an E-W fault cutting the anticlinal crest and extending westward upto Dwarahat. Beyond Dwarahat he thought that the south dipping limb existed unaffected. The present author's work in Chaukhutia has however shown that it is not so, and even at Dwarahat, Chaukhutia and further NW, the tectonic contact continues to show the same anomalous structure.

Recently, Mehdi et al. (1972) have come out with an interesting new structural interpretation, fundamentally different from the previous ones. According to these workers, the South Almora Thrust (= Ramgarh Thrust of Merh, 1968), North Almora Thrust and the Main Central Thrust, are entirely separate dislocations, each being distinct steep faults. As such, the dislocation encountered in the study area referred to as North Almora Thrust, is supposed to be a dislocation, unconnected with the South Almora Thrust, and separating the Dudatoli Group from the Garhwal Group (Mehdi et al., op. cit., p.493). According

to these authors, the Dudatoli Group includes all the rocks between the North Almora Thrust and the Krol Thrust (except the Infra Krol-Krol-Tal sequence), while the Garhwal Group comprises rocks lying between North Almora Thrust and the Main Central Thrust. Though these authors have included the Baijnath Nappe also under the Dudatoli Group, but from the map and section, it is not clear how they could do so without synformally folding the North Almora Thrust.

From the point of view of the stratigraphic age of these rocks, considerable uncertainty prevails in the literature. Heim and Gansser (1939) and Gansser (1964) have considered the rocks of the Almora-Dudatoli Thrust Sheet to be equivalent to Chandpurs (Lower Jaunsar), probably of Precambrian to Palaeozoic age. As regard the rocks to the northeast of the North Almora Thrust, various ages have been suggested. Heim and Gansser (1939) have doubtfully correlated them with Krol while Valdiya (1962) and Gansser (1964) believe them to be equivalent to the Deobans (Late Precambrian to Early Palaeozoic). Mehdi et al. (1972), take the former as Precambrian while the latter as of Precambrian to Ordovician age. Das (1966) has however preferred to follow Heim and Gansser, and has

considered the crystalline rocks to the southwest of the main dislocation to be Chandpurs and those to its north-east as Krols.

FRAMEWORK WORKED OUT BY THE AUTHOR

The present study has enabled the author to suggest a tectonic framework which is rather different from the previous ones. His detailed mapping aided by petrographic studies in the laboratory, have led him to reconstruct a geological picture which for the first time explains various anomalies of structure and stratigraphy. According to the present author, the rocks of the area belonging to two litho-tectonic units, are separated by the dislocation that extends along the Khastari Gadhera but this dislocation is quite distinct from the south-west dipping northern limb of the Almora Thrust.

The framework suggested by the author envisages a major anticline in the metasedimentary sequence, and a major reverse fault along the Khastari Gadhera which runs along the crest of the anticline (referred to as North Almora Thrust by the previous workers). This fault, quite distinct from the Almora Thrust, appears to run all along the north-eastern limit of the Almora Crystalline Zone, and comprises a major tectonic lineament in the Kumaon Himalaya.

The author has preferred to give local names to the main dislocation and the various rock units to avoid further confusion that prevails regarding the term North Almora Thrust.

Mica-Schists quartzites, sheared gneisses etc.	Karchuli Group	Almora Nappe
----------Khastari Fault----------		
Quartzites with Subgraywackes Chlorite schists (foliated spilites, tuffs etc.) Dolomitic limestones Slates and Quartzites	Chaukhutia-Manwa Devi Group	Krol Nappe

As already stated, structurally, the area comprises an antiform which has been designated Chaukhutia anticline. The Khastari fault, runs almost along the crest of this fold. The rocks of Karchuli Group lie on the south-western limb, while the Chaukhutia-Manwa Devi Group forms the northeastern limb of the antiform. The Khastari fault (known in the literature as North Almora Thrust) seems to be a reverse fault, such that slates and quartzites of Chaukhutia-Manwa Devi Group have been pushed over the sheared gneisses of Karchuli Group.

For the convenience of the reader, the author has given in the accompanying table (Table 3.1), a broad structural correlation of the units worked out by him, with those of the previous workers.

TABLE 3.1

		Heim and Gansser (1939), Gansser(1964) & Valdiya (1962)	Mehdi et al. (1972). ~~Gopendra Kumar~~ ( )
Karchuli Group	Mica schists, quartzites, sheared gneisses and phyllonites	Dudatoli-Almora Crystalline Thrust Sheet (Almora Nappe)	Dudatoli Group
----------Khastari Fault----------		----------North Almora Thrust----------	
Chaukhutia Manwa Devi Group	Quartzites Chlorite schists(foliated spilites, tuff etc.) Dolomitic limestones Slates and quartzites	Deoban-Tejam belt Calc-Zone of Pithoragarh etc. (Krol Nappe)	Garhwal Group