CHAPTER II

P R E V I O U S W O R K

The entire record of the geological studies in Himalaya during the last 100 years, can be divided into three periods. The first period of sixty years beginning with 1860 is noteworthy, for during this period the work of Meddlicott (1864), Mallet (1874), Middlemiss (1880,1888 and 1890) and Griesbach (1891), laid the foundation of Himalaya's stratigraphy. The second period between 1920 and 1939, is the one during which the structural aspects of Himalayas received greater attention. Important contributions towards

elucidating the stratigraphy and structure of the various Himalayan areas were made by Pilgrim and West (1928), West (1934), Wadia (1931), Auden (1934, 1935, and 1937), Evans, Wadia & Auden (1938) and Heim & Gansser (1939). The impact of the development of the concepts of large overthrusts in the Alps is discernible in the structural studies of Himalayas during this period. During, the third period from 1939 to 1970, considerable knowledge of the local structures in the Himalayas has been added, both by Indian and foreign geologists. Recent work on various Himalayan regions, owe their origin to various sources, viz. (1) studies carried out in connection with major engineering projects and prospecting for oil, (2) mountaineering expeditions and traverses in isolated parts of Himalayas, and (3) research work in various universities. It is not possible to enumerate all the works, and mention could only be made of the works of Petermisch (1949), Pande (1949,1950), Ghosh (1956), Valdiya (1961, 1962, 1964), Nautiyal (1964), Krishnaswamy and Swaminath (1965), Gansser (1964) and Merh (1968). Most recent work on Himalaya consist of a number of papers by various workers included in the proceedings of the Wadia Institute of Himalayan Geology (Jhingran, 1971).

The author does not here intend to give details of the above mentioned previous work and the interested readers may refer to the works of Vashi (1966) and Desai (1968) who have ideally summarised the entire work on Himalayas till 1968.

In order to provide a suitable background to the present study, he has however, included here brief account of the previous work which has direct bearing on the present study.

Special reference to Auden's (1937) work on Garhwal is essential because it has been established that the geological structure of Kumaon is almost an eastern extention of that of Garhwal. In this work Auden gave the following sequence of Garhwal geology:

Formation	Thickness	Probable age
Siwalik	16,000 ft	Upper Miocene to Pleistocene
Nummulitic	-	Eocene
Tal	6,500 ft	Upper Cretaceous
Krol	4,000 ft	Permian to Triassic
Blaini	2,000 ft	Talchir (Uralian)
Nagthat	3,000 ft	Devonian
Chandpur	4,000 ft	Lower Palaeozoic or Pre-Cambrian

According to Auden, the above mentioned rocks are tectonically arranged to show the following structural succession:

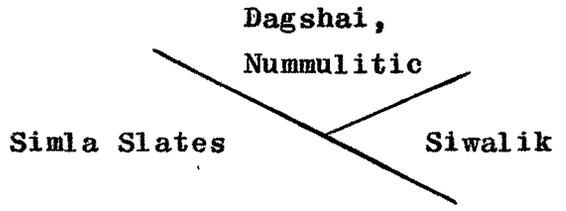
Garhwal nappe	Chandpur (metamorphosed)	
	----------Thrust--------	
	Nagthat Chandpur	Little metamorphosed
	Boulder beds, slates and limestones of uncertain stratigraphical horizon occur in one outlier below metamorphosed Chandpurs	

----------Garhwal Thrust----------

Krol nappe	Nummulitic Tal Krol Blaini Nagthat Chandpur	Metamorphosed and unmetamorphosed

----------Krol Thrust----------

Autochthonous

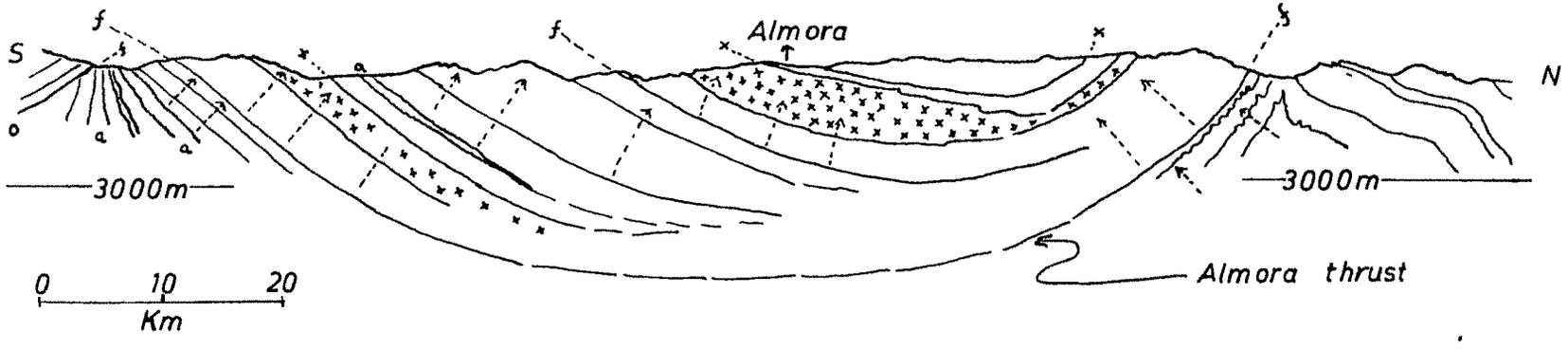


Heim & Gansser (1939), whose contribution forms another land-mark, extended the Auden's structural framework to Kumaon as well, and called the structural unit equivalent to Garhwal nappe as Almora nappe. Thus the Almora thrust of Kumaon was considered to be the same as the Garhwal thrust, Structurally, the Almora nappe also has been shown by them to be a synform. They took a traverse from Bhowali to Almora via Ramgarh and Nathuakhan, and along this trail, they encountered a series of various rock types. According to them this series appeared to be reversed in its north-eastern part and they thought that possibly the tectonical position of Nathuakhan is that of a recumbent syncline. Heim & Gansser and later Gansser (1964) have joined the Ramgarh thrust doubtfully with North Almora thrust (Fig.II.1). They have designated the crystallines rocks of Ramgarh as 'metamorphic gneissic quartz porphyry'.

Pande (1950) who investigated the Ramgarh area in some detail, suggested that the Ramgarh thrust might be the eastern extension of the Garhwal thrust or may be equivalent to it in age. According to him, the rocks above the thrust formed a syncline, and could be correlated to the Chandpur of Jaunsar Series.

Fig.II.1

The crystalline thrust masses in the Kumaon Lower Himalayas Almora.



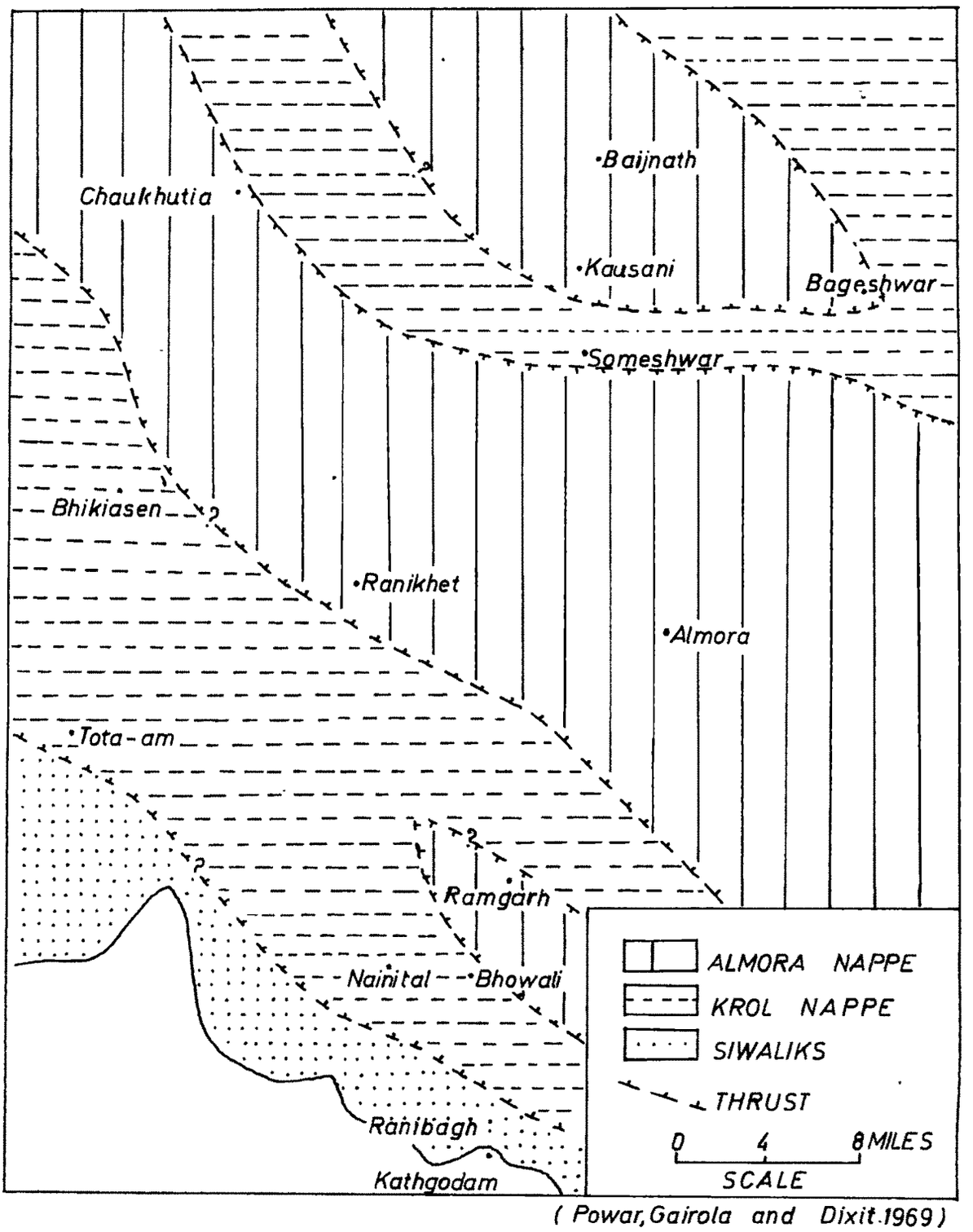
(A. Gansser 1964)

Powar, Gairola and Dixit (1968, p.2) also believed that the Ramgarh rocks formed a small synform of Almora nappe (Fig.II.2).

Merh (1968), however believes that there are few evidences to support the existence of any folded thrust in Ramgarh area. The uniform NE dipping rocks hardly show any evidence to suggest the possibility of a folded thrust, open or tight, to form the so called Ramgarh nappe. A critical examination of current bedding in the quartzites, also rules out the existence of the recumbent syncline as postulated by Heim & Gansser (1939, p.28). On the other hand, Merh (p.2) suggested that the thrust at Ramgarh is of a later date than the South and North Almora thrusts (Almora thrust or Garhwal thrust), has affected only the Krol nappe, and is in some way connected with the synformal folding and Krol thrust movement.

The most recent work in the Ramgarh-Nathuakhan area is of Kashyap (1971). It is not clear from his account if he believes in the existence of any major fold in the area. He has reported three episodes of deformation and to quote his own words, "the phase I

Generalised tectonic map of Nainital-Almora-Kausani area.



(Powar, Gairola and Dixit 1969)

structures seem to have been associated at their culmination point by dislocation plane of first generation. The fold geometry of phase II deformations varies in three tectonic divisions separated by major Mukteswar thrust and Nathuakhan dislocation. The phase III structures are characterised by the upright and open folding. In this phase, thrust plane also shows folding and complex refolded structures".

The present investigation by the author hardly substantiates any of Kashyap's postulations.