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The Significance of Hazara to Himalayan Geology

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The publication of the map of SE-Hazara by M. A. Latif is, though the explanatory text had to be rather brief, a valuable contribution to the geology of the Himalayan region. Hazara is one of the few well-known areas in the Himalayas, since the geological investigations started as early as of the second half of the last century.

M. A. Latif restudied the area with special interest in the investigation of the sedimentary sequence. For the reader who is not familiar with the most recent work of Pakistan geologists, comparison with other regions could be difficult. Following the Stratigraphic Code of Pakistan 1967 many new, formal names are introduced instead of old, well-known, but informal terms. We should therefore like to make some remarks on M. A. Latif's paper on the basis of our experience in other parts of the Himalayas.

Situated W of the North-West-Himalaya Syntaxis (Wadia, 1931) Hazara is in the neighbourhood of the Salt Range, Kashmir, and of the Lower Himalayas of the region SE of the syntaxis. This seems to be responsible for its unique sedimentary development. It is well-known that the succession of the Lower Himalayas is very poor in fossils, in contrast to the wealth of the palaeontological record in the Tibetan Zone, N of the Great Himalayan Range. Therefore we concluded that the trough of the Lower Himalayas was separated from the sea by a ridge (G. Fuchs, 1967). In Kashmir a fossiliferous Palaeozoic to Mesozoic succession comparable to that of the Tibetan Zone (e. g. Spiti), but containing some peculiarities of facies is found on that ridge.

In Hazara sedimentation seems to have been related closely to the Lower Himalayan basin throughout the Palaeozoic. From the highest part of the Triassic onwards the rocks of Hazara resemble those of the Tibetan Zone. Apparently there are more similarities between the Hazara rocks and those of Spiti than those of Kashmir.

The Hazara succession commences with the Hazara Group (former "Hazara Slates"), which corresponds to the Dogra Slates and the Simla Slates, all thick slate complexes of geosynclinal character.

The break in sedimentation between the Hazara Group and the following Abbottabad Group, stressed by Latif and other writers, seems to correspond to the unconformities found in the Palaeozoics of Kashmir (Wadia, 1934, p. 144—146) and the Salt Range. In the Lower Himalayas this break is represented by only a change in the conditions of deposition. The Abbottabad Group (former "Infra Trias", Middlemiss, 1896) apparently shows so many similarities to the Nagthat-Blaini-Krol (Shali)

succession that we cannot doubt their equivalence. Even though it was shown by MARKS and MUHAMAD ALI (1961) that the Tanakki Boulder Bed was not a tillite, the author favours an Upper Palaeozoic age for the Abbottabad Group, a conclusion, which is not ruled out by the above observation *). In the lithologically equivalent Blainis glacial boulder beds are proved.

However, there is still dispute concerning the age of the successions and at present a definite statement cannot be given.

The stratigraphic significance of the Hazira Formation is another unsolved problem. Following GARDEZI and GHAZANFAR (1965) the Hazira Formation is still grouped as highest formation of the Abbottabad Group by LATIF. But this author suggests that in a later regrouping the Galdanian and Hazira Formations could form a separate group (Tarnawai Group). To me it seems reasonable to distinguish the flysch-like rocks of the Hazira Formation from the typical orthoquartzite-carbonate association represented by the underlying formations. However, the Galdanian and Hazira Formations may be of very different ages. Shale formations similar to the Hazira Formation are found in the Upper Triassic (Noric) of the Tibetan Zone (Kuti Shales, Tarap Shales). As shown by the map of LATIF the Hazira Formation is found in the N only, therefore the author suggests the possibility of a different interpretation. The sea which transgressed southern Hazara in the Jurassic could have reached the northern parts of Hazara already in the Upper Triassic.

There is not much doubt about the correspondence of the Maira Formation to the Quartzite Series, and the Sikhar Limestone to the Kioto Limestone. As these formations are represented in Hazara, Kashmir, and throughout the Tibetan Zone in the same development, they reflect rather uniform conditions in uppermost Triassic to Lower Dogger times. But it is not quite certain, that these rock units are of precisely the same age everywhere. It is interesting that gradations were observed from the marine Tarap Shales deposited in deeper water to the shallow-water deposits of the Quartzite Series (G. FUCHS, 1967). This means a shallowing of the Tethys sea. So the quartzitic beds reflecting transgression in southern Hazara indicate regression in the Tethys.

The Hothla Group with Spiti Shale, Giumal Sandstone and Chanali Limestone corresponds to the development of the Jurassic-Cretaceous in Spiti (HAYDEN, 1904), the Chanali Limestone probably being equivalent to the Chikkim Series.

LATIF has subdivided the Tertiary rocks by micropalaeontological means. He found a break in sedimentation below the Galis Group. E of Hazara the gap between the Tal Series and the Eocene Subathus seems to correspond to this unconformity.

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*) In a joint excursion Dr. M. A. LATIF and the author found striated and faceted boulders in the Tanakki Boulder Bed of Hazara. Thus the glacial origin is without doubt.

The break at the base of the Rawalpindi Group corresponds to the unconformity between Subathus and Dagshai. The latter resembles the Murree Formation of Hazara.

This brief review shows the importance of Hazara for the understanding of all the Himalayas. In the sedimentary record of Hazara we find the influence of different facies provinces. In consequence the palaeogeography of the area Kashmir-Hazara-Salt Range is apparently rather complicated. A better knowledge of the palaeogeography of this area is, however, essential for better understanding of the geology of all the Lower Himalayas. The work done by LATIF is an important step in that direction.

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