Doctoral Thesis

Zur Geologie des Gebietes südlich des Taleghan-Tales Zentral-Elburz (Iran)

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Zur Geologie des Gebietes südlich des Taleghan-Tales
Zentral Elburz (Iran)

Abhandlung
zur Erlangung der Würde eines
Doktors der Naturwissenschaften

der
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ZÜRICH

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SUMMARY

This paper is a geological description of the area south of the Taleghan valley, Central Elburz. The principle aim of the study was the preparation of a geological map; 1:50,000.

The oldest sediments of the area, the Kahar formation, are green silty slates containing scattered intercalations of sandstone and dolomite. Exact dating is complicated by a light metamorphism. Because of its position under the Lalun sandstone of known Cambrian age, the Kahar formation is considered as late Precambrian.

The Palaeozoic strata overlying the oldest sediments can be roughly divided into two cycles of sedimentation separated by a distinct hiatus. The first stretches from lowest Cambrian to Ordovician and the second from lower Carboniferous to Triassic.

Precambrian sediments give way to the Infracambrian epineritic sediments of the Soltanieh formation, a dolomite succession with biostrome structures (Collenia). These widespread, well-developed stromatolitic type structures, together with the "Zellendolomite" in red sandy-silty shales of the overlying Barut formation indicate a slow elevation of the shelf. This pattern continues into the red sandstones and quartzites of the Lalun sandstone formation where scattered mud cracks point to a continental facies in the final stages of the first cycle. After this regression episode, there is a short transgression during which the fossiliferous, sparitic Mila limestone (Cambrian to Ordovician) is deposited. A distinct increase of detrital material can be observed from the bottom to the top within these shallow water strata for the Mila formation. A five member division proposed by Stäcklin et al. (1964) can readily be applied in this area. Of special interest are the fossil discoveries within Member V found north of Fashand. The following forms have been identified:

*Ilaenus* sp., *Dicellograptus* (?). and *Paurorthis* ex. gr. *elegantula* Dalman.

This assemblage indicates Ordovician age.

After the transgressive phase follows a major hiatus in the strata which can be ascribed to epiorogenic movements. The second major cycle of sedimentation begins in the lower Carboniferous. Sedimentation at first is only sporadic and is briefly interrupted during the upper Carboniferous. The lower Permian is represented by the extremely sandy Dorud formation followed by pure carbonates of the fossiliferous Ruteh formation. Directly overlying the Ruteh formation is a thin-bedded limestone of the Triassic Elikah formation. Continental type residual
deposits connected with a short, northward retreat of the sea could be identified in one locality. The Nesen formation which separated the Ruteh and Elikah formation in the northern Elburz is absent in the present area.

In most places the Elikah formation is separated from the overlying, mainly continental sediments of the Liassic Shemshak formation by a heavily eroded surface, representing the end of the second cycle. Abundant, well-preserved plant remains characterize most of the Shemshak formation although in the uppermost, marine portions a few ammonites have been found. The Jurassic sedimentation ends with a soft, marly ammonite bearing Dalichai limestone of the Dogger and the massive Lar limestone of the Malm.

The Cretaceous limestone transgress, after an orogenic phase and subsequent erosion, over the angularly unconformable surface of the Jurassic. The post-Cretaceous to pre-Eocene events remain unknown in this area. The Tertiary is separated in the south and the north from the Mesozoic sediments by important tectonic planes. Widespread volcanics occur along the tectonic line located north of the Taleghan valley. These are discordantly overlain by Miocene conglomerates. This problem has been comprehensively handled in a recent doctoral thesis by P. Stalder (in print).

A large number of dykes and sills showing intersertal textures are observed in the Paleozoic formations. Microscopic and chemical analyses indicate an overall diabasic composition. They are a weakly alkalic association apparently belonging to a mixed petrographic province without a conspicuous character. The Pacific magma types have a slight preference.

The structure of the studied area is relatively simple being made up of three main units. First, in the north, there is the Central Tertiary Zone followed by the Paleozoic-Mesozoic Zone and finally the South Tertiary Zone (Gansser and Huber, 1962). The Central Tertiary Zone consists of Eocene volcanics and Miocene conglomerated and marls separated from the Paleozoic-Mesozoic Zone by the high-angle, EW striking Taleghan fault. They make up the Taleghan valley synclinorium as well as the Feshgel Dareh valley syncline structure. The Taleghan fault was apparently already active during the elevation of the Kahar culmination (in the Cambrian). Thereafter it remained inactive until the end of the Cretaceous when, coupled with the elevation of the Paleozoic-Mesozoic Zone, it was reactivated.

The Paleozoic-Mesozoic Zone is characterized by a large anticlinal structure which, after swerving from an east-west to a southeast-northwest strike, is cut off by the Taleghan fault. The entire structure finally disappears below the alluvial plain around Abjek. Near Abjek the Jurassic limestones are in two places penetrated by horst structures consisting of Cambrian rocks; Lalun sandstone and Mila limestone on one and Soltanieh dolomite on the other. These horsts most probably originated
during the main movements phases of the Plio-Pleistocene. The southern portion of the Paleozoic-Mesozoic Zone is thrust southwards over Tertiary tuffs of the South Tertiary Zone. The thrust plane dips 60° - 70° north with an approximate east-west strike, disappearing eventually, along with the very sparsely outcropping South Tertiary Zone, under the alluvium by Abjek.