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# LES FORMATIONS QUATERNAIRES DE LA RÉGION DE KLEPINI (CHYPRE) ET LEUR PLACE DANS LA CHRONOLOGIE DU QUATERNAIRE MÉDITERRANÉEN

PAR

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Avec 24 figures et 1 carte

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## ABSTRACT

One of the most complete sequences of the Quaternary deposits of the Eastern Mediterranean is exposed in northern Cyprus at the foot of the Central Kyrenia Range and in a narrow coastal belt, near the village of Klepini. This sequence, consisting mainly of continental accumulations and to a lesser extent of marine and lacustrine sediments, was deposited, for the most part, as a series of extensive terraces.

The oldest term of the sequence is represented by large accumulations of cemented talus coating the slopes of the range. In places, this fossil talus grades towards its base into travertine or into chalk, marl and limestone of lacustrine origin which are flat-lying and are remnants of an old base-level whose elevation varies between 300 and 360 meters. In the interior of the range, and also related to fossil talus, one finds accumulations of chalk and chalky gravel forming narrow, high intramontane plains. The surface of the fossil talus, peripheral lakes and intramontane fills is termed here the *Karka Surface*.

Below the *Karka Surface* and entrenched into it, occurs, forming the northern piedmont of the Kyrenia Range, a series of five depositional terraces or glacis of accumulation. These glacis, whose surfaces dip very gently towards the sea, are termed, from the highest to the lowest: *Klepini*, *Trapeza*, *Toumba*, *Ayios Epiktitos*, and *Kyrenia Glacis*. The deposits, building each one of these glacis, form small sedimentary cycles. At the base, there is generally a marine member, usually a fossiliferous calcarenite which is locally associated with eolian sands. Overlying this basal member, which rarely exceeds 4 or 5 meters in thickness, one finds a thicker (up to 25 m) accumulation of continental wash consisting mostly of gravels bound by a chalky matrix. This blanket of heterogeneous material is overlain by a thick calcitic crust which is, in turn, covered by a thin reddish-brown fossil soil. This soil forms the surface of the deposit, with the exception of the youngest glacis (*Kyrenia Glacis*) where there is locally, above the calcitic crust, a layer of kakhi-coloured loam. Each one of the cyclical deposits has been given a formational ranking. They have been termed, in chronological order, as the corresponding glacis: *Klepini*, *Trapeza*, *Toumba*, *Ayios Epiktitos* and *Kyrenia Formations*.

The marine or eolian accumulations forming the base of each formation rest on an erosional platform of marine origin which is cut into Miocene flysch and the overlying Quaternary deposits. These platforms are bounded by fossil cliffs corresponding to ancient shore-lines whose elevations are approximately at 230, 185, 140, 50 and 20 meters.

Below the *Kyrenia Glacis* there is, in places along the coast, the remnants of a narrow marine terrace (*Koupia Terrace*) corresponding to a 5 meter shore-line. The youngest Quaternary deposits of the area are represented by the alluvium of the narrow plains which skirt the lower parts of the streams, and by the modern beach deposits.

The fossil talus, peripheral lake deposits and intramontane fills witnessed a period of much greater rainfall than that of to-day. They correspond to the First Quaternary Pluvial of the region. Each one of the five glacis of accumulation, which were formed later and which rest partly on an erosional terrace, corresponds to a climatic cycle. The erosional terrace marks an advance of the sea. This phase and also the depositional phase of the marine sediments at the base of the formation correspond to an interpluvial. The eolian sands mark the beginning of a regression. The climate was still dry. The thick overlying blanket of chalky gravels corresponds to a pluvial phase during which mean-temperatures were apparently much lower than to-day. The sea-level was then in full regression. The calcitic crust at the top corresponds also to pluvial conditions but climate was warmer than before and the sea-level started to rise. The red fossil soil is regarded as a witness of a warm and semi-arid climate similar to present conditions. The sea-level was rapidly rising.

The formation of the low *Koupia Terrace* corresponds to a marine incursion of the sea, it coincides with an interpluvial phase. The regression which followed was of short duration and apparently was not accompanied by a wet climate. During this regression base-level was below the present sea-level. Drowning and silt-filling of the low part of the coastal valleys correspond to the present day interpluvial conditions. Thus, Cyprus has witnessed during the Quaternary at least six pluvial phases separated by semi-arid interpluvials. These paleoclimatic cycles coincided with oscillations of the sea-level.

Fossil talus, peripheral lake deposits and intramontane fills of the Kyrenia Range are placed, on geological grounds, at the beginning of the Quaternary. They are considered as contemporary with the upper part of the Villafranchian Series of the Central Plain of Cyprus (Mesaoria). The *Klepini Formation* is apparently an equivalent of the Emilian of the adriatic-ionian region. The *Trapeza Formation* correlates probably with the Sicilian of the Western Mediterranean and partly with the Günz Glaciation. The *Toumba Formation* should be placed very likely in the Milazzian stage, it corresponds in part with the Mindel Glaciation. The basal member of the *Ayios Epiktitos Formation* is considered as an equivalent of the Paleotyrrenian, its upper part could be correlated with the Riss Glaciation. The marine beds at the base of the *Kyrenia Formation* are placed, on paleontological grounds, in the Last Interglacial Period (Eutyrrhenian = Tyrrhenian II = Main Monastirian). The overlying continental gravels and crust represent the Last Great Pluvial Phase of the Mediterranean; they correspond to the Würm Glaciation. The *Koupia Terrace* is considered as contemporary with an interstadial of the Würm. The alluvium of the low plains of the valleys belong to the Holocene and mark the Versilian Transgression.

## INTRODUCTION

Au cours d'une étude effectuée en automne 1963 et au printemps 1965, dans le cadre d'une mission de l'Aide Technique des Nations Unies, nous avons eu l'occasion d'examiner et de cartographier les dépôts quaternaires de la partie centrale de la chaîne de Kyrénia et de ses piedmonts dans le Nord de l'île de Chypre. Ces formations qui dans la chaîne se présentent généralement sous la forme de talus fossiles et de dépôts plus ou moins horizontaux remplissant de petites dépressions, se développent largement à la base de la montagne où elles constituent d'imposantes nappes de piedmont. Bien que les versants nord et sud de la chaîne soient largement recouverts de ces dépôts, c'est dans l'étroite plaine côtière septentrionale qu'ils se présentent sous