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### PALEOTEMPERATURE AND PALEOSALINITY HISTORY OF THE EASTERN MEDITERRANEAN DURING THE LATE QUATERNARY

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Paleoenvironmental Reconstructions

Faunal composition and oxygen isotopic analyses of foraminiferal shells were utilized to reconstruct the paleoclimatic and paleohydrologic history of the Eastern Mediterranean during the last 500 K years. The main factors considered important in determining the composition of planktonic foraminifera and pteropods are temperature, salinity, food and oxygen.

Paleotemperature and paleosalinity reconstructions were made separately for surface and intermediate water. *Globigerina bulloides*, *Globigerinoides gomitulus*, *Globigerinoides ruber* and *Globigerinoides sacculifer* were employed for surface water, while *Globorotalia inflata*, *Globigerina pachyderma* and *Globorotalia scitula* were utilized for intermediate water paleoenvironmental interpretations. The reconstruction was done by mapping recent fauna in core "tops" deposited during the Holocene and their calibration against observed present-day temperatures and salinities in the water column. The broad data base, using published faunal distributions from the world ocean covers a wider range of temperatures and salinities and a combination of these factors, than those which are thought to have existed during glacial periods in the Mediterranean. The longest, nearly continuous record, spanning ~ 500 K years is contained in LDGO core RC9-181 (Herman, 1981). This core was less affected by tectonic activity than other cores, although in the upper 150 cms reworked upper Miocene coccoliths were observed. Within the time interval represented by RC9-181 six major cold-warm cycles, correlateable to Emiliani's isotopic stages 1-12 (Emiliani, 1970) were recognized. Calcareous nannoplankton biostratigraphic and biochronologic framework have been utilized for estimating rates of sedimentation and ages. Two important datum levels were recognized: the extinction of *Pseudoemiliania lacunosa* between 899 and 938 cms, suggesting an age of 0.44-0.46 m.y. for this level and the first appearance of *Emiliania huxleyi* 0.26-0.27 m.y.a., between 455 and 479 cm depth in core.

During glacial temperature minima, surface water temperatures were ≈ 3°C lower in summer and ≈ 3-4°C lower in winter (Herman, 1981). Stadial and interstadial salinities were variable, reaching highest values (at least 1°/oo higher than today) during the last glacial temperature minimum when climates were more arid than today (van der Hammen et al., 1971; Fairbridge, 1972; Flohn, 1973) sea level stood very low, the Nile discharge was greatly reduced and the connection between the Mediterranean and the Black Sea, which is a major supplier of low salinity water was severed (ibid.). Following global warming and subsequent massive deglaciation, sea level rose. When the sea stand reached the Bosporus sill (≈ 36 m) the connection between the Mediterranean and the Black Sea was reestablished and the low salinity Black Sea water spilled over into the Mediterranean. A significant increase in precipitation and river runoff is also recorded during transitional climatic periods (Kullenberg, 1952; Fairbridge, 1972). These compounded effects, namely warming of the surface water, together with the flooding of the Eastern Mediterranean by large volumes of fresh and low salinity water produced a low density surface water layer which restricted thermohaline convection (Kullenberg, 1952). The result was stagnation of the sub-surface water and subsequent deposition of sapropels (ibid.). Some of the sapropels including the most recent one deposited between 11,000 and 7,000 years BP (ibid.) were deposited during such intervals of pronounced density stratification. Surface water salinities dropped to low values during the deposition of sapropels as evidenced by oxygen isotope data (e.g. Vergnaud-Grazzini and Herman-Rosenberg, 1969).

Today sub-surface water forms in the Mediterranean and it probably did so in the past. We estimate that sub-surface temperature during glacial temperature minima were ≈ 3-4°C lower than today and salinities were ≈ 1°/oo higher as compared to present day values.

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## X-I2

### MICROFAUNES ET MICROFLORES TÉMOINS DE L'INFLUENCE DES OSCILLATIONS EUTATIQUES ET CLIMATIQUES DANS LA GENÈSE DES SÉRIES MIOCÈNES EN TUNISIE SEPTENTRIONALE

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Les auteurs font la synthèse d'une série d'études conduites au niveau de treize (13) coupes stratigraphiques. Ces études ont comporté:a) des analyses micropaléontologiques avec étude des microfaunes et des microflores. b) des analyses sédimentologiques. c) des reconstitutions de la dynamique des bassins.

Comme ces séries se répartissent entre Bizerte (axe du sillon tunisien) au Nord, Sbeitla (Archipel de Kasserine) au Sud Ouest et le haut fond de Halk El Menzel (Marge du Sillon tuniso-libyen) à l'Est, on peut comparer,entre les principales zones géodynamiques, l'intéraction tectonique-eustatisme au cours de la genèse des séries néogènes classiques en Tunisie.

L'analyse des microfaunes révèle ainsi que :

1°) La base des dépôts transgressifs néogènes est diachrone et s'étale de l'oligomiocène (zone N7) au Serravalien (zone N10)

a) La transgression semble plus ancienne sur les bordures de l'île de Kasserine (elle est oligomiocène au J.Anaied Biozone N7) que dans le Nord Est de la TUNISIE.

b) Au Nord Est elle provoque la superposition de formations d'âge et de caractères différents qui ennoient progressivement du Langhien au Serravalien des reliefs préexistants. (Formation A dans les fonds de vallée, Formation Oued Hammam qui déborde la précédente et Formation AIN GRAB qui recouvre la majeure partie du secteur.

c) Cette transgression est essentiellement eustatique et la Formation Mahmoud largement développée en surface correspond au au plus haut niveau du géoïde.

2°) L'abaissement du niveau moyen des mers qui intervient au Serravalien se traduit par la réduction des bassins marins largement ouverts sur la mer. Les dépôts marins du Tortonien sont localisés dans certains sillons subsidents (de type sillon le long de décrochement ou bassins losangiques) actifs aux abords de la Mer pélagienne. S'accumulent ainsi d'épaisses séries lagunaires paraliques à intercalations marines épisodiques.

L'étude des microflores complète le schéma esquissé. Elle permet ainsi de montrer:

a) que la barre calcaire de l'AIN GRAB se met en place sous climat chaud et humide durant une période de stabilité du géoïde (Régime biostasique)

b) que l'abaissement du géoïde serravalien survenant au terme d'une période d'évolution du climat vers l'aridité induit une reprise d'érosion et l'épandage d'une série gréseuse littorale à la base puis dunaire

c) Les séries lagunaires paraliques se déposant sous climat tropical à subtropical sont intercalées de lignites.

Microfaunes et microflores traduisent ainsi fidélement les oscillations climatiques et eustatiques.

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