

## **Wetter and cooler: pronounced temperate climate conditions in western Anatolia during the Middle Miocene Climatic Optimum**

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During the course of an ongoing palaeobotanical investigation of the lignite mines of the Yatağan Basin, Muğla province, Turkey, the fossil leaves of the Eskişehir lignite mine were analysed using the Climate Leaf Analysis Multivariate Program (CLAMP).

The investigated fossil leaves derive from the marls and clayey limestones (Sekköy Member) overlying the exploited lignite seam (uppermost Turgut Member). The age of the studied sedimentary rocks is well constrained by vertebrate fossils occurring in the main lignite seam (MN6 → *Gomphotherium angustidens* Cuvier, 1817; *Percrocuta miocenica* Pavlov & Thenius, 1965) and at the Yenieskişehir Mammal locality (MN7/8, uppermost Sekköy Member).

719 specimens were measured and assigned to 65 leaf morphotypes. Using this data, CLAMP reconstructed the following climate parameters: mean annual temperature (MAT) 12.58 (+/-1.5)°C, warm month mean temperature (WMMT) 23.72 (+/-2.5)°C, cold month mean temperature (WMMT) 2.29 (+/-2)°C, length of growing season (LGS) 7.52 (+/-0.75) month, mean growing season precipitation (GSP) 130.1 (+/-40) cm, precipitation during the three wettest months (3-WET) 67 (+/-25) cm, precipitation during the three driest months (3-DRY) 20.4 (+/-7.5) cm.

The reconstructed parameters are too cool for tropical climates (the 18°C winter isotherm being a threshold for tropical climates) and indicate temperate conditions; climates fitting these parameters (Cfb according to the Köppen-Geiger climate classification) can be found today in regions known as “Tertiary relict areas” (e.g. Black sea coast of Northeast Turkey, eastern China, Japan).

Based on a substantial amount of rainfall during the three driest months, it is further possible to exclude markedly seasonal climates such as a summer-dry and winter-wet Mediterranean climate and a summer-wet and winter-dry monsoon climate as commonly found along the southern foothills of the Himalayas and in southwestern China. Instead, a fully humid Cf climate is proposed that has only a weak seasonality in precipitation (lower precipitation in winter).

The findings of our study provide valuable information for inferring palaeoenvironments of middle Miocene rich ungulate faunas in western Turkey (e.g. Paşalar), for which seasonal tropical and subtropical forest communities have been proposed (Andrews, 1990).

The fossil floras of the Tınaz and Salihpaşalar lignite mines, representing the Tınaz sub-basin and the main basin of the wider Yatağan Basin, are investigated at the moment, and a synthesis paper combining and comparing evidence from the macro floral and palynological data is soon to be submitted.

Andrews. (1990) Palaeoecology of the Miocene fauna from Paşalar, Turkey. *Journal of Human evolution* 19:569–582.