

# CLIMATE RECONSTRUCTION AT ARSLANTEPE (MALATYA, TURKEY): THE CONTRIBUTE OF THE STABLE CARBON ISOTOPE

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The anthropogenic hill of Arslantepe

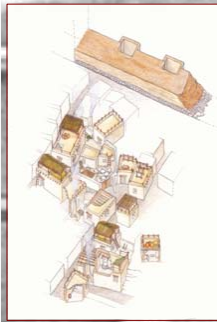
The site of Arslantepe (Arslan = Lion; Tepe = mound) is located in the Malatya plain (eastern Turkey). Today is a hill, 30 m high, formed by a series of settlements built and destroyed in five thousands years of almost uninterrupted occupation. Arslantepe has been bringing to light extraordinary remains of past prehistoric and protohistoric cultures of Eastern Anatolia.

The excavation is still ongoing, the oldest archaeological level dates back to the 7th millennium BP, the youngest is of Byzantine times.

Excavations of "La Sapienza" University of Rome at the site have been carried out uninterruptedly since 1961, bringing to light a lot of archaeobotanical material coming from the entire sequence of occupation of the site.



Monumental palatial complex of VI A period



Village of VI B2 period



Pottery bowls of VI A period

Late Roman and Byzantine age		I	
Iron age	II - III	1100 - 712	Neo-Hittite kingdoms
Late Bronze age II	IV	1600 - 1200	Middle Hittite kingdom and Hittite empire age
Late Bronze age I	V B	1750 - 1570	Old Hittite kingdom
Middle Bronze age	V A	2000 - 1750	Age of old Assyrian colonies
Early Bronze age III	VI D	2500 - 2000	Protodynastic III B, III Ur dynasty in Mesopotamia
Early Bronze age II	VI C	2750 - 2500	Protodynastic II - III a in Mesopotamia
Early Bronze age I	VI B2 / VI B1	3000 - 2750	Period of Jemdet Nasr and Protodynastic in Mesopotamia
Late Chalcolithic 5 / Late Uruk	VI A	3350 - 3000	Late Uruk Culture in Mesopotamia
Late Chalcolithic 3-4	VII	3800 - 3400	Old and middle Uruk Culture in Mesopotamia
Late Chalcolithic 1-2	VIII	4250 - 3900	End of Ubaid culture in Mesopotamia

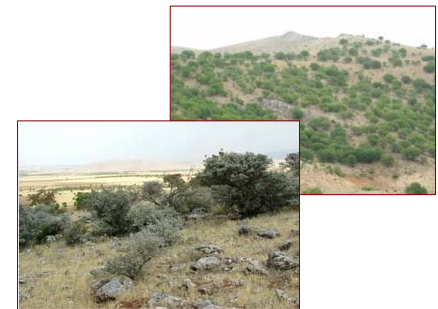
Chronology

The archaeobotanical studies highlighted the presence of various botanical taxa preserved by charring, belonging to arboreal and crop species. Great variety was found, the diversity in cultivated taxa and the selective use of wood can be either due to a choice or even to environmental availability.

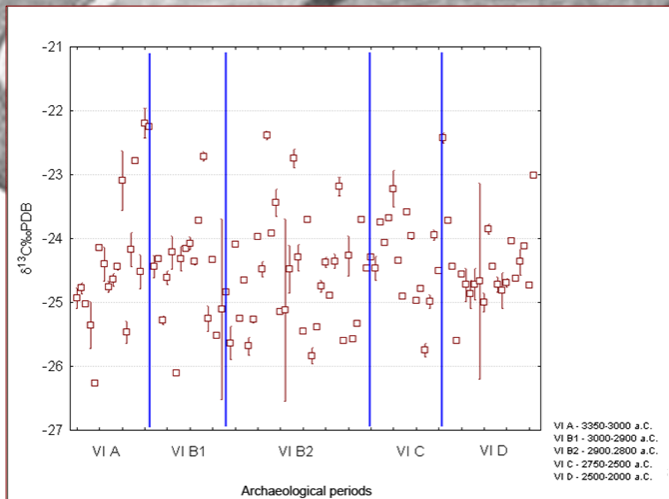
A lot of studies correlated cultural changes with environmental factors. At Arslantepe a number of important changes is found. It is not clear, however, if the important variations found in plants use by the successive settlers are due to cultural choices or to environmental changes.

A contribute comes from the study of the stable carbon isotope carried out both on ancient and present-day plants. The relationship between the fractionation of carbon isotope and climate condition is well known. The <sup>13</sup>C/<sup>12</sup>C ratio depends mainly on moisture and isotopic ratio of atmospheric CO<sub>2</sub>. Such independent information of environmental variations permits to discriminate between cultural and environmental change.

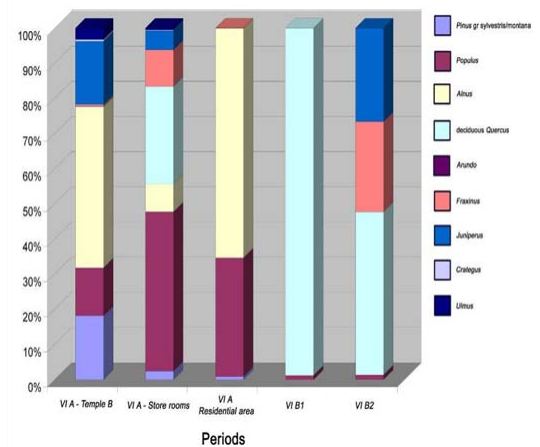
More than one hundred charred samples of deciduous *Quercus* and *Juniperus* were analyzed. They come from five archaeological periods of Arslantepe, ranging from late Chalcolithic V (5350-5000 BP) to Early Bronze Age III (4500-4000 BP). The variability of data is high, however a  $\delta^{13}C$  variation is present and some trends recognizable. The data coming from fossil assemblages will be compared with those from living plants of the same genus in order to reconstruct past environment and climatic trend through more than one millennium.



Patches of natural arboreal vegetation on the hills surrounding the Malatya plain



VI A - 3350-3000 a.C.  
VI B1 - 3000-2800 a.C.  
VI B2 - 2500-2800 a.C.  
VI C - 2750-2500 a.C.  
VI D - 2500-2000 a.C.



Woody taxa distribution in VI A, VI B1 and VI B2 periods