TRENDS IN $^{18}$O IN LAND SNAIL SHELLS FROM THE NEGEV DESERT DURING THE HOLOCENE: IMPLICATIONS FOR CHANGES IN RAINFALL SOURCE AREAS

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The $\delta^{18}$O value of the shell carbonate of land snails is related to the $^{18}$O content of precipitation, which in turn, relates to the source region and trajectory of the rain-bearing air masses. Analyses of $^{18}$O of shell carbonate of 76 radiocarbon-dated Holocene samples of the land snail, Trochoidea seetzeni, from the northern Negev Desert were carried out, and the results compared to modern snails from the same region. Early Holocene $\delta^{18}$O values are similar to modern ones, and do not give any indication of the penetration of monsoonal rains into this region at this time. Centered around 6500–6000 BP, a large depletion in $^{18}$O is observed. A change in the atmospheric circulation pattern for this period is thus indicated, most likely an increase in the frequency of storm systems reaching the region from northeastern Africa. By 3500 BP, $\delta^{18}$O values had reached modern levels, and indicate a stable pattern of atmospheric circulation since that time.

DATING OF POST-AD 1650 SAMPLES BY ASPARTIC ACID RACEMIZATION

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An evaluation of the age-predictive abilities of D/L ratios of various amino acids (alanine, alloisoleucine/isoleucine, proline, aspartic acid, methionine, glutamic acid and phenylalanine) was carried out based on 38 radiocarbon-dated Holocene samples of the land snail, Trochoidea seetzeni, from the Negev Desert. Results indicate that each of the amino acids has a similar correlation with age. The rates of racemization or epimerization vary by about ± 10–15% between samples, and thus permit age estimates from D/L ratios with about this precision. Within most of the time range of applicability of radiocarbon dating, this precision is not as good as that of radiocarbon dating. However, for very late Holocene samples, amino acid racemization analysis may offer better precision. Aspartic acid shows a particularly high rate of racemization initially (ie, at low D/L values), and thus offers the best possibility of dating very young samples with good precision. This method should be particularly useful for samples younger than about AD 1650, since radiocarbon analysis provides no time resolution within this age range.

300-YEAR DECLINES IN ATMOSPHERIC $^{14}$C CONCENTRATION OF THE PAST

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Research in the non-random character of natural medium- and short-term $^{14}$C variations of the past has led to many conclusions on the occurrence of cyclicities, as well as the recurrence of characteristic patterns. One of a few independent cyclicities seems to be that of a ca 960-year period, confirmed by both Fourier and MEM analyses. The best known characteristic features are the maxima of Maunder and Spörer types, recurring rather irregularly. Another peculiarity appears to be 300 years long, a nearly monotonical fall of $\Delta^{14}$C, reconstructed by radiocarbon measurements.