A RADIOCARBON CHRONOLOGY OF LATE NEOLITHIC SETTLEMENTS IN THE TISZA-MAROS REGION OF HUNGARY

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An archaeological research program has been ongoing for the past 15 years. We are investigating chronological questions and settlement patterns in the Hungarian Tisza region for the time of transition between the Late Neolithic and Early Copper Ages. In the course of this project, nearly 50 charcoal and bone samples have been dated from the Neolithic stratified tell settlements of Hódmezővásárhely-Gorza, Szeged-Tápé-Lebő, Hódmezővásárhely-Kőkénydomb, Szegvár-Túzkőves and from the broadly distributed settlement of Deszk-Vénő. The new data outline the time sequence of the given settlements of the Hungarian Late Neolithic Age as follows:

<table>
<thead>
<tr>
<th>Settlement</th>
<th>Radiocarbon Date (uncalibrated)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tápé-Lebő</td>
<td>6290 ± 60 - 5760 ± 60</td>
</tr>
<tr>
<td>Szegvár-Túzkőves</td>
<td>6160 ± 60 - 5790 ± 60</td>
</tr>
<tr>
<td>Hódmezővásárhely-Kőkénydomb</td>
<td>6150 ± 60 - 5750 ± 60</td>
</tr>
<tr>
<td>Hódmezővásárhely-Gorza</td>
<td>5970 ± 100 - 5580 ± 100</td>
</tr>
<tr>
<td>Deszk-Vénő</td>
<td>5420 ± 60</td>
</tr>
</tbody>
</table>

DETERMINING THE ORIGIN OF GEOTHERMAL WATERS IN NORTHWESTERN YUGOSLAVIA BY ISOTOPIC METHODS¹

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The origin of geothermal water from several hot springs in northwest Croatia and east Slovenia, Yugoslavia, has been investigated by isotopic analyses. Two contradicting hypotheses on the origin of geothermal water were postulated (meteoric vs volcanic), both based on previous geological studies and physico-chemical measurements of geothermal waters. This work is aimed at solving the problem of the origin of geothermal water in the investigated region.

We measured the physico-chemical properties of geothermal waters (t, pH, conductivity, alkalinity, concentrations of Ca²⁺, Mg²⁺, Na⁺, Cl⁻, SO₄²⁻, dissolved CO₂ and O₂) as well as the concentration of radioactive (¹⁴C, ³H) and stable (¹³C, ²H and ¹⁸O) isotopes. We also analyzed calcareous deposits from hot springs at Varaždinske toplice spa, where the process of calcium carbonate precipitation is very pronounced. The results of measurements at Varaždinske toplice spa indicate a meteoric origin of this geothermal spring.

A comparison of our analyses with chemical and isotopic analyses of geothermal waters in the USA (Mammoth Hot Springs and Pagosa Springs) is presented.

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