RE-EVALUATION OF THE NEOLITHIC IN EASTERN HUNGARY BASED ON CALIBRATED RADIOCARBON DATES

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ABSTRACT. The chief objective of this paper is to improve our understanding of the Neolithic in Eastern Hungary using absolute chronological data. To accomplish this we calibrated new measurements as well as previously published dates. The up-to-date, standardized evaluation of 261 calibrated measurements showed temporal overlaps between archaeological cultures defined on the basis of ceramic styles. The increasing number of dates suggest that the Neolithic period began at the turn of the 6th and 7th millennia BC and lasted for *ca.* 1500 yr in the present area of the Great Hungarian Plain (Alföld). Further research should be aimed at complementing the current data set with dates from western Hungary and establishing additional correlations among stratigraphic, typological and radiocarbon dates.

INTRODUCTION

The internal chronological framework of the Hungarian Neolithic was first outlined by Tompa (1927, 1929, 1937). Despite minor disputes, his system was accepted and used internationally until the 1960s. By that time, data from numerous new excavations permitted the creation of a new chronological system, which had its roots in traditional stratigraphic and comparative typological methods. By the 1960s and 1970s, the spirit of this new concept was mirrored by review articles and reports (Bognár-Kutzián 1966; Kalicz 1970; Kalicz and Makkay 1977; Korek 1960, 1972, 1989; Makkay 1969a, 1974; Trogmayer 1966/67, 1968). It is actually this cultural and chronological structure upon which current Neolithic research rests in our region. The system fit within the international trend hallmarked by Childe (1929, 1957), Burkitt and Childe (1932) and Milojčić (1949). This diachronic model was dominated by a strictly sequential series of archaeological cultures within narrowly defined geographical regions. Currently, emphasis has shifted to the clarification of international chronologies within individual cultural entities. In Hungary, the study of absolute dates played a secondary role for a long time. Great efforts were made to trace the chronological boundaries of the Hungarian Neolithic to absolute dates in the Near East. For almost two decades, parallels drawn between Tordos-Tărtăria and Djamdat Nasr served exclusively as the chronological baseline (Vlassa 1963; Milojčić 1965; Falkenstein 1965; Makkay 1969b, 1974/75, 1990; Kalicz and Makkay 1977). This system limited the range of the Middle and Late Neolithic to the first half of the third millennium BC in the Carpathian Basin. The boundaries of this so-called *short chronology* came into question by the 1980s (Kalicz 1985; Raczky 1983). Stratigraphic sequences at Late Neolithic settlements on the Great Hungarian Plain, indicative of long-term occupations, represent only one type of contradictory example (Makkay 1982; Kalicz 1986; Raczky 1987).

DESCRIPTIVE BACKGROUND

Since the 1960s, an increasing number of radiocarbon dates have been published on the Hungarian Neolithic, especially the dates from the Berlin Laboratory (Kohl and Quitta 1964, 1966; Quitta and Kohl 1969). The first such dates, however, were in sharp contrast with absolute chronology estimates based on the traditional comparative method, and Hungarian prehistorians began to question the accuracy of these measurements. Consequently, ^{14}C dates were used merely as illustrations in

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Proceedings of the 15th International ^{14}C Conference, edited by G. T. Cook, D. D. Harkness, B. F. Miller and E. M. Scott. RADIOCARBON, *Vol. 37, No. 2, 1995, P. 239–244*

publications on the Neolithic in Hungary. In other cases, trends seen in absolute chronology were used to support parallel tendencies in relative chronology. The growth in ^{14}C measurements all over Europe, however, made the revision of *traditional* or *conventional* ^{14}C dates necessary. The consequences of calibration were twofold. On tthe one hand, absolute chronological dates became significantly older. On the other hand, the estimated duration of certain cultures lengthened drastically. As a result of these research findings, the *traditional absolute chronological system* collapsed as was convincingly demonstrated by Renfrew (1970, 1971, 1973) and Neustupný (1968a, 1968b, 1970).

New measurements for the Hungarian Neolithic led to similarly dramatic results; for example, food-producing economies supposedly started 1500 yr earlier than previously assumed. The Alföld Linear Pottery (ALP) culture and the Tordos-Tărtăria complex were transposed to the turn of the 6th and 5th millennia. As a result, the famous Tărtăria tablets evidently lost their value as general chronological indicators of the Neolithic of southeastern Europe, especially in the Carpathian Basin (Renfrew 1966; Neustupný 1968b; Zanotti 1983; Kalicz 1985). Another surprising consequence of the calibrated ^{14}C chronology was that the earlier, diachronic series of Neolithic cultures was replaced by a system of temporally overlapping cultures (Szénászky 1983; Sherratt 1985; Petrasch 1991; Gläser 1991; Horváth 1991; Hertelendi and Horváth 1992). Thus, the previous historical concept had to be re-evaluated and the interrelations among Neolithic cultures revised. Establishment of a new Neolithic chronology became inevitable. The first efforts in this direction can be found in partial studies from the 1980s (Bognár-Kutzián 1985; Bognár-Kutzián and Csongor 1987). However, a comprehensive, standardized system still must be created for the Neolithic as a whole. Two noteworthy international summaries (Breunig 1987; Ehrich 1992) represent only tangentially the absolute chronology of the Hungarian Neolithic. In addition, these publications mirror the state of research during the mid-1980s. This study is aimed at eliminating this paucity of absolute chronological data for the Carpathian Basin.

Methods

We collected all relevant ^{14}C dates of the Great Hungarian Plain from the literature and made new measurements. We tabulated the dates by cultural entities, and calibrated them using the computer programs of Stuiver and Pearson (1993) and Stuiver and Reimer (1993). We calibrated the ^{14}C dates from the same culture as a set of related dates and calculated the cumulative probability density functions with selected quartiles and interquartile ranges (Aitchison *et al.* 1991, 1994). We plotted the composite probability distribution of calendric ages of related dates from each culture and estimated the durations of cultures using 68.3% confidence intervals. Probability distributions of dates for different cultures have different shapes, depending mostly on the numbers of archaeological sites and the dates from each site.

Results

We divided the Neolithic cultures from Eastern Hungary into nine general groups. ^{14}C dates available for this study were classified within their respective groups in Table 1. Using 261 calibrated ^{14}C dates from the Great Hungarian Plain, we constructed a series of cumulative probability density functions (Fig. 1). These show the absolute chronological boundaries and durations of the nine cultural groups.

https://doi.org/10.1017/S0033822200030691

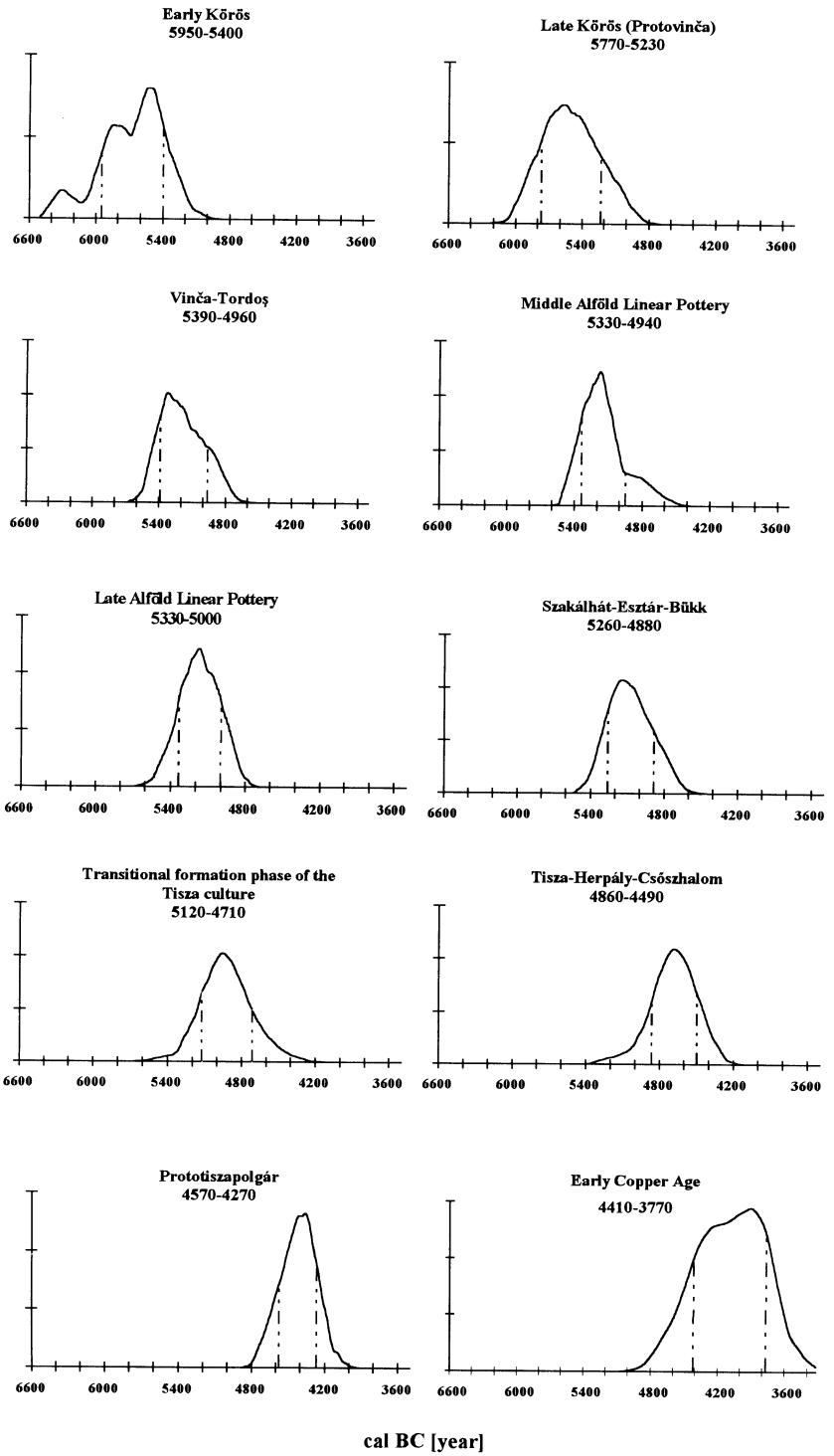

Fig. 1. Smoothed cumulative probability density functions of Neolithic cultures in Hungary. Vertical distance between dotted lines indicates 1 σ confidence interval.

TABLE 1. Chronology of Neolithic Cultures in Hungary

Phase (1 σ) cal BC	Culture or cultural group	No. of samples	Confidence interval (1σ) cal BC
Early (5860–5310)	Körös	14	5950–5400
	Late Körös (Protovinèa)	14	5770–5230
Middle (5330–4940)	Vinča-Tordo	6	5390–4960
	Middle Alföld linear pottery (classical)	5	5330–4940
	Late Alföld linear pottery (Tiszadob)	6	5330–5000
	Szakálhát-Esztár-Bükk	30	5260–4880
Late (4970–4380)	Tisza culture transitional formation	46	5120–4710
	Tisza-Herpály-Csőszhalom	134	4860–4490
	Prototiszapolgár	5	4570–4270
Early Copper Age		8	4410–3760

Our investigations shed light on several archaeological events:

1. The Neolithic period in Hungary began at the turn of the 7th–6th millennia BC, and ended at the end of the 5th millennium BC. We estimate the entire range of the Neolithic in Hungary to be 1500 yr. However, no ^{14}C dates are known for the earliest Neolithic in Hungary; this period may date as early as the 7th millennium BC, and may have persisted for 2 ka.
2. Present data suggest that Neolithic cultures, previously regarded as sequential, often overlap. This is clearly expressed in the Middle Neolithic ALP cultures and its groups. These findings agree with archaeological studies, which also suggest overlapping groups on the basis of ceramic material from the Middle Neolithic.
3. The most probable time scale for the Early Neolithic ranges between 5860 and 5330 BC. The Middle Neolithic most probably occurred between 5330 and 4970 BC, and the Late Neolithic between 4970 and 4410 BC (Fig. 2). The estimated 400–500-yr duration of Late Neolithic tell settlements obtained by typological comparisons is also confirmed by our new ^{14}C data. The newly measured ^{14}C dates representing the end of the Late Neolithic agree with the previously established dates of the Early Copper Age (Bognár-Kutzián 1985).

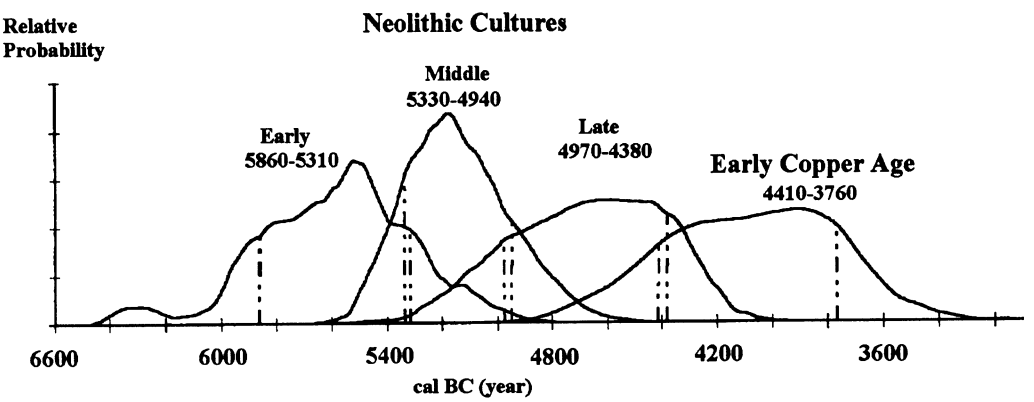

Fig. 2. Diagrammatic representation of the three phases of the Neolithic period

Conclusion

This analysis mirrors only the main chronological trends among Neolithic cultures. It also shows where it will be necessary to gather more dates and refine or complement our current knowledge. Possible improvements include more accurate identification of archaeological contexts, as well as a more detailed distinction between phases within the internal chronology of certain cultures. Special care must be taken to guarantee the physical and chemical purity of samples. Asymmetries in the geographical distribution of ^{14}C samples must also be brought into balance.

Unfortunately, the geographical distribution of ^{14}C measurements in Transdanubia (western Hungary) and the Great Hungarian Plain (eastern Hungary) is asymmetrical. Only 27 ^{14}C dates derive from western Hungary, whereas 261 are available for eastern Hungary. Further, 70% of all ^{14}C dates represent the Late Neolithic period for eastern Hungary.

We have illustrated here that our work aims at laying the foundations of further refinement of already-existing results. This may look like a simple task of technical nature. Absolute dates, however, disguise profound processes that have affected fundamentally the history of research on Neolithic cultures in Hungary.

Acknowledgments

This work was supported by the National Scientific Research Foundation of Hungary (OTKA Grant No. 1212). We gratefully acknowledge the technical assistance provided by Ms. Magdolna Mogyorósi.

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