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FIELD SURVEY AND MATERIALS

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NEW RADIOCARBON DATES FOR THE CRIŞ SITE OF SACAROVCA I (MOLDOVA)

ABSTRACT

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Four new AMS radiocarbon dates shed new light on the chronology of one of the easternmost sites of the Criş culture. The conventional dating efforts had yielded indecisive results, while the new results correspond well to the typo-chronological position of the site (Criş IV) and the chronology of other sites with similar finds. The comparison with the nearby para-Neolithic sites demonstrated that the establishment of the para-Neolithic way of life (foragers equipped with pottery) in the region happened several centuries before the spread of early farmers of the Criş culture into Moldova.

Keywords: Early Neolithic; radiocarbon dating; Bayesian modelling; early farming colonization; indigenous foragers

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INTRODUCTION

The current consensus for the initial agricultural settlement of Moldova and south-west Ukraine follows the broader, regional model for south-east Europe (Dergaciov and Larina 2015; Larina 1994). It is mostly seen as a phenomenon of the propagation of societies of a particular type that first appeared in Greek Thessaly and later spread out in temporally decreasing steps (Biagi *et al.* 2005; Whittle 1996). This process was brought to the territory of modern-day Moldova by the people of Criş culture in sixth mill. BCE (Dergaciov and Larina 2015). However, its exact chronology remains unclear in detail.

Sacarovca1 is the reference site for the Criş culture between the Prut and Dniester rivers (Fig. 1: A). At present, it is the only excavated site located at the easternmost fringe of the extension of the Criş culture, which was studied by complex investigation with an application of scientific approaches, thanks to the effort of Olga Larina and Valentin Dergaciov (Dergaciov and Larina 2015).

This paper aims to publish four new AMS radiocarbon dates for the site of Sacarovca I and to shed new light on the chronology of the early Neolithic in Moldova.

METHOD AND SAMPLING

The samples were dated in the Laboratory for the Analysis of Radiocarbon with AMS (LARA) at the University of Bern, employing the MICADAS equipment (Szidat *et al.* 2014).

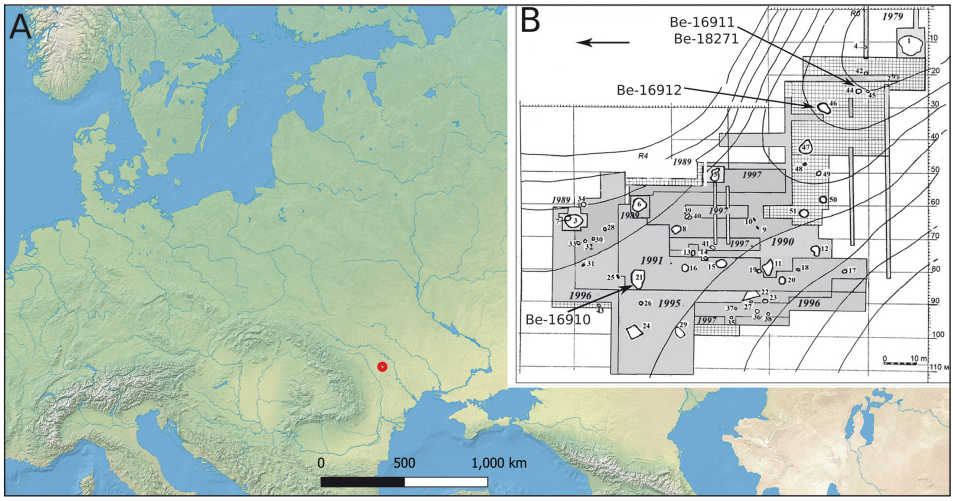

Fig. 1. A: location of Sacarovca 1 on the map of Europe, topo: Natural Earth; B – sampled objects on the plan of Sacarovca 1 (after Dergaciov and Larina 2015, fig. 11 with modifications)

Collagen extraction was performed according to Szidat *et al.* (2017), which was extended by an additional ultrafiltration step.

Radiocarbon dates were calibrated using the online calibration program OxCal 4.4.4 (Bronk Ramsey and Lee 2013) using atmospheric data from Reimer *et al.* (2020).

Samples comprise four *Cervus elaphus* bones (identifications by A. David and O.P. Siekerska, with thanks): two fragments of metacarpi, a chunk of a femur and a piece of an unidentified long bone. The selected samples come from three features of the site (Fig. 1: B): Pits 21 (1 date), 44 (2 dates), and 46 (1 date). These pits yielded abundant lithic and ceramic assemblages alongside notable archaeozoological and palaeobotanical collections.

RESULTS

Three novel dates (Be-16910, Be-16911, Be-18271) form a consistent group encompassing 5617-5479 calBCE, 2σ, while a single date (Be-16192, 5481-5373 calBCE, 2σ) is slightly later (Table 1, Fig. 2). In order to find out whether certain dates are statistically simultaneous, we used the R_Combine function of OxCal. If they could be combined (the X^2 meets a certain threshold), we can say that the group of dates is statistically concurrent. It is in this sense that we study the combinations of dates for Sacarovca 1. Namely, the former three dates can be combined into the time-slot (5613-5482 calBCE, 2σ). The obtained results are consistent with the available radiocarbon dates for Sacarovca 1. The fact that the Berlin date can be successfully combined both with the three earlier AMS dates as well as with the latest date (while these four dates cannot be combined when treated as a group of their own) underlines the increased precision of AMS dating (saying nothing about the Kyiv laboratory's "direct" date on a potsherd, which calibrates to encompass at least 600 years). Another charcoal date (Ki-13899) is a bit earlier than the rest of the dates. It can be explained by a likely "old wood" effect. Thus, it is possible that complexes of Sacarovca 1 were inhabited for a prolonged period. Namely, pit 46 is slightly younger than objects 21 and 44.

DISCUSSION

The chronology of the Starčevo-Körös-Criş cultural complex is defined by over 400 relevant dates. Early work in the inner Balkans put initial settlement activities by agricultural colonists associated with this cultural complex at *ca.* 6200 y. BCE, but a recent reanalysis showed this event likely occurred no earlier than *ca.* 6050 y. BCE (Krauss 2016, 212). This event is viewed as a rapid initial settlement represented by a homogenous material culture across the region (Biagi *et al.* 2005). The territory of Moldova was settled by these early farmers relatively late in the course of their expansion, namely during the III-IV stages of the Criş culture (Dergachev and Dolukhanov 2007; Larina 1994). These oc-

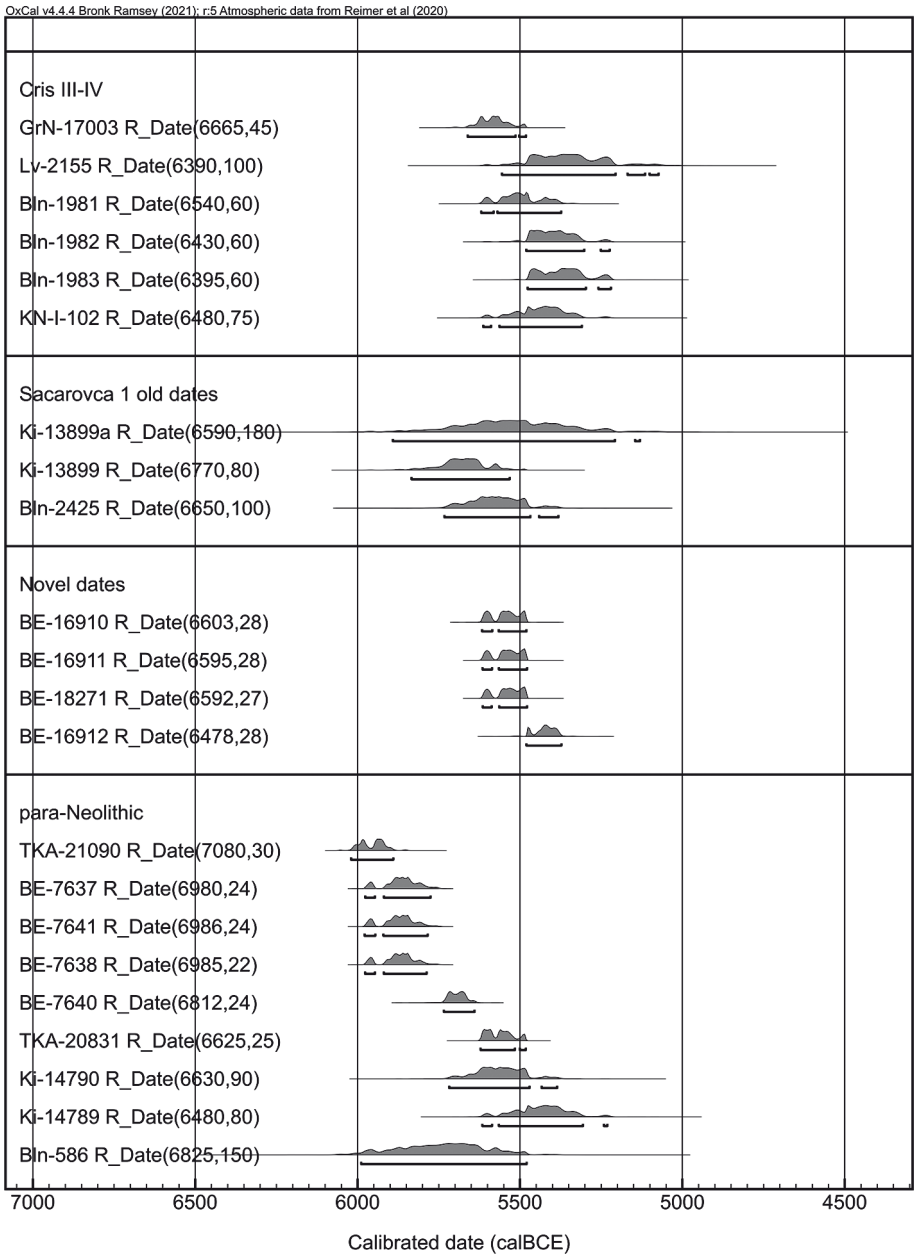

Fig. 2. Comparison of selected dates for Cris III-IV and Buh-Dniester para-Neolithic with novel dates. For captions and references: see Table 2

Table 1. Novel radiocarbon dates for the site of Sacarovca 1

Lab N.	Provenance	Sample	Date, BP	Std. d.
BE-16910	object 21	Fr-t of metacarpus	6603	28
BE-16911	object 44	Fr-t of femur	6595	28
BE-18271	object 44	Fr-t of a long bone	6592	27
BE-16912	object 46	Fr-t of metacarpus	6478	28

Table 2. Comparative material for Fig. 2

Site	Lab N	Date, BP	std.d.	Material	Reference
Trestiana	GrN-17003	6665	45	?	Mantu 2000
Trestiana	Lv-2155	6390	100	?	Mantu 2000
Carcea-Viaduct	Bln-1981	6540	60	?	Biagi *et al.* 2005
Carcea-Viaduct	Bln-1982	6430	60	?	Biagi *et al.* 2005
Carcea-Viaduct	Bln-1983	6395	60	?	Biagi *et al.* 2005
Valea Rosii	KN-I-102	6480	75	?	Biagi et al. 2005
Hlynske I	TKA-21090	7080	30	potsherd	Haskevych *et al.* 2019
Melnychna Krucha, SU2	BE-7637	6980	24	bone	Kiosak *et al.* 2021
Melnychna Krucha, SU2	BE-7641	6986	24	bone	Kiosak *et al.* 2021
Melnychna Krucha, SU2	BE-7638	6985	22	bone	Kiosak *et al.* 2021
Melnychna Krucha, SU2	BE-7640	6812	24	bone	Kiosak *et al.* 2021
Baz'kiv Ostriv	TKA-20831	6625	25	potsherd	Haskevych *et al.* 2019
Gard, lower layer	Ki-14790	6630	90	potsherd	Tovkailo 2014
Gard, lower layer	Ki-14789	6480	80	potsherd	Tovkailo 2014
Soroca-II	Bln-586	6825	150	charcoal	Markevich 1974
Sacarovca 1	Ki-13899a	6590	180	potsherd	Covalenco 2017
Sacarovca 1	Ki-13899	6770	80	charcoal	Covalenko 2017
Sacarovca 1	Bln-2425	6650	100	charcoal	Dergaciov, Larina 2015

cupations and their associated material culture had first been labelled the "Buh-Dniester Neolithic" (Markevich 1974; Yanushevich 1989), but then their affinities with actual Criş were extensively demonstrated (Larina 1994).

The final Criş sites are poorly represented in the radiocarbon dataset. The novel dates, when compared to the existing data, show that Sacarovca 1 is neither the latest nor it is exceptionally early. It fits nicely in the designated time-slot for the late Criş culture (Fig. 2). Taking into account that the Starčevo-Körös-Criş cultural complex is unlikely to have survived much longer than 5400 BCE (Meadows 2019), the chronology of the Sacarovca 1 complexes seems reasonable and expected from a general historical view of the development of early farming communities in the region.

Another essential issue to consider is the comparative chronology of the easternmost Criş sites and the sites of local foragers equipped with pottery (the "Buh-Dniester" para-Neolithic). The proponents of the Balkan impulse for the Neolithization of Ukraine insisted that the "Buh-Dniester culture" sites had arisen as a "barbaric periphery" of the Criş culture during its III and IV stages (Zaliznyak 1998). In particular, ceramics of so-called Pechera style were thought to emerge under the influence of the Criş ceramic technology. Early work on the direct dating of potsherds seemed to indicate the appearance of the ceramic vessels in the forest-steppe Eurasian belt by the mid-7th mill. BCE (Zaitseva *et al.* 2009). However, it was mostly based on totalling the organic content of a sampled potsherd (TOCC approach; Meadows 2020) for "direct" radiocarbon dating. Averaging carbon content in organic remains of different origins can be highly misleading. Recent redating programs moved the first appearance of pottery in the forest-steppe of east Europe into 6th mill. BCE (Courel *et al.* 2021). In the light of a revision of the Rakushechny Yar site sequence (Dolbunova *et al.* 2020), the sites in Moldova appeared to be the crucial link between early potters of Eastern Europe and the ceramists from the Balkans.

The new dates of Sacarovca 1 firmly put its existence in the 57-55th centuries BCE. It is partially later than a single conventional date on charcoal for the Soroca-II para-Neolithic site, definitely later than radiocarbon dates obtained for the para-Neolithic stratigraphic unit of Melnychna Krucha (Kiosak *et al.* 2021) in the Southern Buh river valley, some 200 km to the east (Fig. 2). The "direct" dates on "Buh-Dniester" potsherds yielded divergent results. The only two consistent dates (from the lower layer of Gard, Ki-14790 and Ki-14789; Fig. 2) encompass 5719-5232 calBCE. However, they are in reverse stratigraphic order with the dates obtained for the upper layer of the same site (Tovkailo 2014). The "direct" dating of Criş import in the Buh-Dniester site of Hlynske I yielded unacceptably old results (TKA-21090; Haskevych *et al.* 2019), while dating of another potsherd with some analogies in Criş materials from Bazkiv Ostriv (TKA-20831, 6625±25 BP) returned a result comparable with the chronology of Sacarovca 1 – 5622-5483 calBCE, 2σ, although this potsherd was attributed not to the Pechera style but to the earlier, Skybyntsi style of para-Neolithic pottery (Haskevych *et al.* 2019).

Thus, we can conclude that para-Neolithic sites in the valleys of the Southern Buh and Dniester were settled prior to the expansion of early farmers of the Criş culture during its stages III and IV into the territory between Dniester and Prut. Probably, there were also para-Neolithic sites, which could be contemporaneous with this colonisation event. This chronological framework questions the commonly accepted interpretation of the origin of Pechera-style pottery, namely its origin under the influence of Criş culture potters. Due to their high standard deviations, conventional dates can be highly misleading when solving the issue of the contemporaneity of two samples. The higher precision of AMS dates is needed in order to fine-tune the chronological picture of the first half of 6th mill. BCE in the North-West Pontic region.

CONCLUSION

The new radiocarbon dates demonstrate a prolonged (with at least two phases) habitation in the Neolithic settlement of Sacarovca 1. In general, the site was settled in the 57-55th centuries BCE. When seen in the regional context, this chronology corresponds well with the absolute chronology of the Criş culture and contradicts a typo-chronological synchronization with neighbouring older para-Neolithic sites. This observation will hopefully stimulate further discussions regarding the pathways of Neolithisation in Eastern Europe. It underlines the connections between Balkan "classic" Neolithic and the pottery-bearing sites of the Ukrainian Steppe.

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