

EASTERN EXODUS OF THE GLOBULAR AMPHORA CULTURE PEOPLE

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Editor's Foreword

Globular Amphora culture settlements make one of the most important systems of circulation of cultural patterns in the border zone between the drainage areas of the Baltic and Black Seas. One aspect of this problem, namely the „eastern exodus” mentioned in the title, has seemingly rich historiography. Under closer scrutiny, however, it reveals many intuitive opinions based on weak and insufficiently explored sources. This belief lay behind the present issue of the „Baltic-Pontic Studies”. The papers presented in this issue open new areas of discussion of the problems in question. For the first time, the discussion is set against an incontrovertible scale of absolute chronology. This issue anticipates a broader synthesising presentation to be published in the not too distant future.

Editorial comment

1. All dates in the *B-PS* are calibrated [see: *Radiocarbon* vol.28, 1986, and the next volumes]. Deviations from this rule will be point out in notes.

2. The names of the archaeological cultures (especially from the territory of the Ukraine) are standarized according to the English literature on the subject [e.g. Mallory 1989]. In the case of a new term, the author's original name has been retained.

3. The place names located in the Ukraine have been transliterat from the versions suggested by the author (i.e. from the Belorussian, Ukrainian, Polish or Russian originals).

Sławomir Kadrow, Marzena Szmyt

ABSOLUTE CHRONOLOGY OF THE EASTERN GROUP OF GLOBULAR AMPHORA CULTURE¹

In this article we intend to present an initial analysis of first radiocarbon dates obtained for Globular Amphora culture (GAC) features from eastern Europe (see in this volume: Maleyev, Selected. . . ; Maleyev, Pryshchepa, Grave. . . ; Shelomentsev-Terskiy, Settlement. . . ; Shmidt, Szmyt, Ritual. . . ; Charniauski, Materials. . .). Basic information on the datings used is given in Table 1. By way of a spatial context we present a series of six ¹⁴C datings (including three new ones) for GAC materials from south-eastern Poland [see in this volume: Ścibior, Koman, Grave. . . ; Gołub, Grave. . . and Globular. . .] and two recently obtained dates for a feature of the Middle Dnieper culture from Belarus [see in this volume: Kryvaltsevich, Grave. . .].

I. ABSOLUTE DATING OF GAC FEATURES FROM EASTERN EUROPE

The calibration of the ¹⁴C datings was carried out with the use of two computer programs: (1) *Radiocarbon Calibration Program, 1993 ver. 3.03, Quaternary Isotope Lab, University of Washington* by M. Stuiver & P. Reimer (US) and (2) *Radiocarbon Calibration <calKN> April 1993, Dendro and Archaeological Wiggle Matching* by Bernhard Weninger of Cologne University (Germany).

1. The program by M. Stuiver and P. Reimer [cf. Stuiver, Reimer 1993], similarly to another program called *Probabilistic Calibration of Radiocarbon Time Scale, Silesian Technical University, Gliwice, Poland, ver. 4.0, 1989*, by D.J. Michczyńska & M.F. Pazdur, is based on probabilistic interpretation of measurements. It means that for each dated sample a number of more or less probable readings of its calendar age are determined. Date ranges and corresponding areas of probability are given in two versions, precisely, at two probability thresholds (in M. Stuiver and P. Reimer's program — 68.3% and 95.4%).

¹ This article is financed by Committee for Scientific Research (project No 1 HO1G 018 10).

List of ^{14}C datings

No	Site	Lab. No	Date BP	Material	Culture	Literature
1.	Tovpyzhyn	Ki-5011	4310 \pm 45	bones	GAC	Maleyev, Pryshecha, in this volume
2.	Tovpyzhyn	Ki-5010	4270 \pm 50	bones	GAC	Maleyev, Pryshecha, in this volume
3.	Vorvulintsy	Ki-5008	4220 \pm 70	bones	GAC	Maleyev, in this volume
4.	Loshniv	Ki-5006	4150 \pm 55	bones	GAC	Maleyev, in this volume
5.	Ivanye	Le-5021	4090 \pm 70	bones	GAC	Maleyev, in this volume
6.	Ivanye	Ki-5141	4030 \pm 50	bones	GAC	Maleyev, in this volume
7.	Krasnaselsky	Gd-9249	4080 \pm 140	bones	GAC	Charniauski, in this volume
8.	Dovge	Ki-5009	4040 \pm 60	bones	GAC	Maleyev, in this volume
9.	Turinschina	Gd-10082	4000 \pm 80	bones	GAC	Shmidt, Szmyt, in this volume
10.	Peresopnitsa	Ki-5075	3910 \pm 50	bones	GAC	Shelomentsev-Terskiy, in this volume
11.	Sandomierz 78	Gd-2452	4370 \pm 70		GAC	Ścibior, Ścibior 1990
12.	Klementowice IV	Kn-1255	4300 \pm 40	charcoal	GAC	Kowalczyk 1969
13.	Klementowice IV	GrN-5046	4175 \pm 30	charcoal	GAC	Kowalczyk 1969
14.	Świerszczów 27	Ki-5433	4170 \pm 35	bones	GAC	Ścibior, Koman, in this volume
15.	Krasnystaw 8	Ki-5841	4120 \pm 30	bones	GAC	Gołub, in this volume
16.	Łopiennik 1	Ki-5434	4010 \pm 30	bones	GAC	Gołub, in this volume
17.	Prorva 1 grave 1	Le-5020	4150 \pm 80	charcoal	Middle Dnieper culture	Kryvaltsevich, in this volume
18.	Prorva 1 grave 1	Ki-5140	4060 \pm 45	charcoal	Middle Dnieper culture	Kryvaltsevich, in this volume

The results of calibration of radiocarbon dates, obtained with the program discussed above, are shown in Table 2. The maximum time of GAC settlement in eastern Europe determined in this way (including all the ranges at the probability level of 95.4%) covers the range of 3100-2200 BC.

2. B. Weninger's program [cf. Weninger 1986], thanks to a built-in statistical test, gives for each sample only one, the most probable, calendar age with a corresponding standard error. A significant new feature of this program allows to „fit” a series of dates from a specific archaeological context in the proper wiggles of the calibration curve [cf. Manning 1995:126-133]. Hence, this program allows to determine the age of dated samples with significantly greater precision.

Table 2

Calibration after Stuiver, Reimer 1993

Lab. No	BP	68,3% – 1 sigma		95,5% – 2 sigma	
		Ranges	Probability	Ranges	Probability
Ki-5011	4310±45	3026-3023	01	3095-3092	00
		3014-2980	27	3081-3068	02
		2968-2952	10	3045-2857	90
		2932-2883	02	2810-2789	03
		2766-2764	60	2779-2756	04
				2738-2732	00
				2722-2708	01
				2646-2644	00
Ki-5010	4270±50	2998-2994	02	3032-2978	09
		2922-2856	55	2972-2950	03
		2810-2787	15	2938-2833	46
		2782-2756	18	2814-2686	40
		2739-2732	03	2650-2638	02
		2722-2707	07		
		2646-2644	01		
Ki-5008	4220±70	2893-2836	30	3006-2984	01
		2813-2689	65	2923-2615	93
		2649-2639	05	2615-2573	05
Ki-5006	4150±55	2870-2828	20	2884-2572	97
		2822-2808	07	2510-2495	03
		2793-2774	09		
		2758-2718	20		
		2712-2662	26		
		2654-2625	14		
		2609-2601	03		
		2585-2585	00		
Le-5021	4090±70	2843-2811	13	2878-2806	16
		2751-2743	02	2802-2769	05
		2728-2723	01	2762-2468	79
		2701-2647	22		
		2642-2553	41		
		2524-2486	16		
		2483-2473	03		
Ki-5141	4030±50	2621-2611	06	2841-2812	04
		2599-2589	05	2745-2745	00

Lab. No	BP	68,3% - 1 sigma		95,5% - 2 sigma	
		Ranges	Probability	Ranges	Probability
		2580-2468	89	2726-2724 2695-2647 2641-2403 2377-2349	00 06 87 02
Gd-9249	4080±140	2873-2807 2796-2772 2760-2715 2715-2467	17 05 10 68	3007-2983 2958-2954 2924-2199	01 00 99
Ki-5009	4040±60	2828-2821 2664-2654 2627-2608 2602-2468	03 05 10 83	2863-2810 2785-2783 2757-2736 2734-2720 2707-2645 2644-2403 2377-2349	07 00 02 01 10 77 02
Gd-10082	4000±80	2826-2824 2657-2655 2624-2609 2600-2586 2584-2402 2379-2345	01 01 05 05 79 11	2859-2810 2757-2738 2733-2720 2706-2645 2644-2271 2250-2229 2217-2211	05 01 01 06 86 02 00
Ki-5075	3910±50	2467-2398 2389-2326 2324-2311 2297-2293	48 42 07 03	2550-2556 2486-2484 2473-2264 2263-2226 2223-2204	03 00 87 07 03
Ki-5011 + Ki-5010	4310±45 + 4270±50	3013-3006 2924-2889 2791-2789	10 87 03	3030-2968 2935-2880 2798-2782	24 69 07
Le-5021 + Ki-5141	4090±70 + 4030±50	2854-2826 2656-2642 2618-2566 2540-2501	19 10 41 30	2864-2811 2744-2726 2697-2675 2667-2476	19 02 04 75
Gd-2452	4370±70	3096-3091 3083-3065 3053-2893	02 08 90	3334-3316 3314-3211 3194-3178	01 13 01

Lab. No	BP	68,3% - 1 sigma		95,5% - 2 sigma	
		Ranges	Probability	Ranges	Probability
				3173-3151 3136-2877 2806-2801 2770-2761	02 82 00 01
Kn-1255	4300±40	3010-2982 2962-2953 2925-2879 2805-2804 2769-2762	21 05 69 01 05	3077-3072 3040-2858 2810-2790 2778-2756 2738-2732 2722-2708 2646-2644	00 88 04 06 00 02
GrN-5046	4175±30	2875-2837 2813-2807 2797-2772 2759-2716 2715-2689 2649-2639	26 04 18 29 17 07	2885-2827 2822-2665 2665-2663 2654-2629 2608-2601	24 66 00 09 01
Ki-5433	4170±35	2873-2835 2814-2807 2796-2773 2759-2717 2714-2677 2649-2638	24 04 15 26 23 07	2885-2825 2825-2656 2656-2624 2610-2600 2585-2585	23 65 10 02 00
Ki-5841	4120±30	2842-2812 2748-2744 2727-2724 2699-2647 2642-2618 2614-2596 2593-2575 2507-2501	19 01 01 35 17 11 11 03	2869-2809 2790-2773 2759-2716 2711-2569 2512-2493	21 03 10 61 05
Ki-5434	4010±30	2565-2516 2489-2470	73 27	2656-2654 2622-2610 2600-2588 2581-2445 2419-2411	00 02 02 95 01
Kn-1255 +	4300±40 +	2898-2877 2800-2780	45 47	2912-2869 2807-2773	45 41

Lab. No	BP	68,3% – 1 sigma		95,5% – 2 sigma	
		Ranges	Probability	Ranges	Probability
GrN-5046	4175±30	2712-2708	08	2720-2701	13
Le-5020	4150±80	2874-2826	20	2894-2549	93
		2824-2807	07	2525-2485	06
		2796-2772	10	2485-2473	01
		2759-2716	18		
		2714-2655	25		
		2655-2623	13		
		2610-2600	04		
		2587-2582	02		
Ki-5140	4060±45	2828-2821	03	2853-2811	08
		2664-2654	06	2756-2740	01
		2627-2608	13	2731-2721	01
		2602-2545	39	2704-2646	02
		2527-2473	39	2643-2466	77
Le-5020 + Ki-5141	4150±80 + 4060±45	2862-2814	32	2869-2806	26
		2735-2728	03	2774-2721	12
		2695-2680	08	2701-2566	53
		2665-2631	22	2540-2502	09
		2629-2578	34		

Calibration results of individual ^{14}C dates are shown in Table 3. The impact of the results is lessened by large standard errors of absolute age measurements of samples (out of 16 dates as many as 13 have errors exceeding 30 years, including one with an error of 140 years). Generally speaking, the period of eastern GAC settlement, documented by radiocarbon datings, covers c. 2930-2380 BC and when standard errors are taken into account the period is extended to 2990-2310 BC at the maximum. These dates apply fully to the Volhynia-Podolia agglomeration of GAC (mainly to its Volhynia part). For the GAC group from south-eastern Poland respective age brackets are 2990-2520 BC and 3070-2480 BC. In this context traces of GAC settlement in the drainage of the Neman and upper Dnieper appear rather late — c. 2660 BC (Krasnaselsky) and 2480 BC (Turinshchina). Two datings obtained for a feature of the Middle Dnieper culture from Prorva mark the period of 2550-2740 BC (cf. however remarks below).

The results of the „wigggle-matching” analysis justify several specific conclusions.

a. Two datings from Tovpyzhyn [see Maleyev, Pryshchepa, Grave. . .] concerning the same feature and the same skeleton (Ki-5010 and Ki-5011), analyzed jointly, yield a point in time around 2895 BC.

b. Two datings from Ivanye [see Maleyev, Selected. . .] concerning the same

Table 3

Calibration after Weninger 1993

No	Site	Lab. No	Date BP	Std. dev.	cal BC
1.	Tovpyzhyn	Ki-5011	4310	45	2931±56
2.	Tovpyzhyn	Ki-5010	4270	50	2837±84
3.	Vorvulintsy	Ki-5008	4220	70	2788±98
4.	Loshniv	Ki-5006	4150	55	2741±106
5.	Ivanye	Le-5021	4090	70	2597±126
6.	Ivanye	Ki-5141	4030	50	2527±64
7.	Krasnaselsky	Gd-9249	4080	140	2657±190
8.	Dovge	Ki-5009	4040	60	2544±84
9.	Turinschchina	Gd-10082	4000	80	2476±12
10.	Peresopnitsa	Ki-5075	3910	50	2382±74
11.	Sandomierz 78	Gd-2452	4370	70	2987±87
12.	Klementowice IV	Kn-1255	4300	40	2980±47
13.	Klementowice IV	GrN-5046	4175	30	2772±81
14.	Świerszczów 27	Ki-5433	4170	35	2769±86
15.	Krasnystaw 8	Ki-5841	4120	30	2655±93
16.	Łopiennik 1	Ki-5434	4010	30	2522±39
17.	Prorva 1/gr. 1	Le-5020	4150	80	2736±119
18.	Prorva 1/gr. 1	Ki-5140	4060	45	2548±78

grave and the same skeleton (Ki-5141 and Le-5021), analyzed jointly, yield a point in time around 2568 BC.

c. When taken as a sequence, the datings of GAC features in Volhynia, viz. Tovpyzhyn (Ki-5010 and Ki-5011), Ivanye (Ki-5141 and Le-5021) and Peresopnitsa (Ki-5075) [see Shelomentsev-Terskiy, Settlement. . .], provided that their sequencing is correct, „fit” into the calibration curve in the following way: Tovpyzhyn = c. 2900 BC, Ivanye = c. 2580 BC, Peresopnitsa = c. 2420 BC.

d. Two datings from Klementowice (Kn-1255 and GrN-5046) [Kowalczyk 1968; Halicki 1970:308-311; Breunig 1987:170], analyzed jointly, determine the age of two pieces of charcoal from the same GAC grave. Because they do not „fit” into the calibration curve together, it has to be assumed that the samples come from two different pieces of burnt wood. „Fitting” into the calibration curve is possible on the assumption that the samples’ age differs by at least ten years. Then we will obtain the following results: Kn-1255 = 2895 BC, GrN-5046 = 2885 BC. Assuming larger differences in age also yields favourable results.

e. A similar situation was revealed by a joint analysis of two datings of a Middle Dnieper culture grave from Prorva (Ki-5140 and Le-5020) [see Kryvaltsevich,

Grave. . .]. Both samples contained charcoal from the timbering of grave pit. Here, provided that both datings are correct, two hypotheses can be adopted:

(ea) the samples come from wood fragments from two different trees [see Kryvaltsevich, Grave. . ., Fig. 2] and the time difference between them was at least 30 years; then Ki-5140 = c. 2620 BC, Le-5020 = c. 2650 BC;

(eb) samples were taken from wood coming from the same tree, but one of them from a portion of the tree lying closer to the core (older date) while the other from a portion lying closer to the bark (younger date).

II. ABSOLUTE CHRONOLOGY OF EASTERN GAC AGAINST THE BACKGROUND OF DATINGS OF OTHER CULTURE COMPLEXES

The set of calendar age datings allows us to tentatively relate the eastern group of GAC to the absolute chronologies of selected groups that are spatially or temporally close to GAC.

Against the background of dates for various parts of the GAC oecumene, complexes from eastern Europe fit into the classical period of development of that culture, both in the Polish and western groups [see in this volume: Szmyt, Globular. . ., Fig. 3]. GAC settlement appeared in Volhynia somewhat later than in south-eastern Poland but, as it seems, it lasted longer. GAC features from the interior of the forest zone (Krasnaselsky, Turinshchina) can be synchronised with younger complexes from Volhynia.

The beginning of the Volhynia-Podolia concentration of GAC settlement took place in the same time as the functioning of the late-Tripolye Sofievka type on the middle Dnieper in the period from 2950 to 2740 BC [Kadrow 1995; Kovalyukh, Videiko, Skripkin 1995]. GAC structures in the forest-steppe zone existed at the same time as groups of the Corded Ware culture (Prof. J. Machnik, personal communication). In the steppe zone, at the same time, groups of the Yamnaya culture developed [see Szmyt, Globular. . ., Fig. 4] which at that time were expanding to the west.

In the forest zone of eastern Europe, GAC population appears in the time corresponding to the late phase of the Usyaty culture in the interfluvial area of the Western Dvina and Lovat [cf. Szmyt, Globular. . ., Fig. 4] and the Middle Dnieper culture (cf. Table 2 and 3).

CONCLUSIONS

In the light of the presented information, the period of eastern GAC settlement, documented by radiocarbon dating, covers about 500 years. This conclusion is clearly in contradiction with frequently expressed views about the short-lived nature of GAC in eastern Europe [cf. in this volume: Szmyt, Globular ...].

Translated by Piotr T. Żebrowski

ABBREVIATIONS

AAC	– Acta Archaeologica Carpathica, Kraków.
AO	– Arkheologicheskiye otkrytiya, Moskva.
BPS	– Baltic-Pontic Studies, Poznań.
JIES	– The Journal of Indo-European Studies, Berkeley.
KSIA	– Kratkiye soobshcheniya Instituta Arkheologii, Moskva.
KSIA AN USSR	– Kratkiye soobshcheniya Instituta Arkheologii AN USSR, Kiev.
MIA	– Materialy i issledovaniya po arkheologii, Moskva.
SA	– Sovetskaya Arkheologia, Moskva.

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