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NEBELIVKA – REDISCOVERED: A LOST CITY

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Abstract

In addition to Maidanetske and Talianki, Nebelivka belongs to the mega-sites, which have been excavated on a large scale. While detailed ^{14}C analyses verify multiple phases at the first two mentioned settlements, this has not yet been the case for Nebelivka. A new analysis, which differentiates between *termini post*, *ad* and *ante quem* for the data from the site, documents the flourishment and the early breakdown of the settlement there. Instead of a mega-site, at which the settlement concept was used over a long-term, here we are dealing with a "lost city". The reasons for this are still unclear. However, this is what distinguishes Nebelivka from Maidanetske and Talianki.

Keywords: Trypillia, mega-sites, radiometric dating, Chalcolithic

Introduction and leading questions

The mega-sites of the Tripolye societies play a major role in the discussion of urbanization processes and urbanity, on the one hand, and the question of social processes in larger communities on the other. For example, they are mentioned in one of the most recent major narratives on "world history" in the context of cities and here as an example of "cities" of non-state communities[1].

In this respect, it is not surprising that particularly the three largest and most intensively excavated mega-sites in the Sinyukha River Basin are emphasized in the discussion. Even if the investigations in Talianki and Maidanetske are still being continued, numerous archaeological and environmentally relevant sources, besides those from Nebelivka, are also already available for Talianki and Maidanetske[2].

Due to their spatial structure, we are definitely dealing with mega-sites with different characteristics:

- With its 235 ha and 1445 verified houses, Nebelivka is relatively large, on the one hand, but it has a barely settled inner area, on the other hand, and, apart from the ring corridor, it hardly has the otherwise typical concentric house rings.
- With its 320 ha, Talianki is the largest of the three settlements in terms of area and has a formidable settlement of 2200 proven houses: both concentric house rings next to the ring corridor and the settlement of the inner area with quarters have been proven.
- With its 200 ha, Maidanetske is a large site, which features the highest degree of settlement with 3000 proven houses.

For all three large settlements, substantial ^{14}C data as well as Bayesian calibrations are available[3]. In the studies on Talianki and Maidanetske, the depositional processes were taken into account when evaluating the radiometric

1 Graeber/Wengrow 2021, 288-297.

2 Gaydarska 2020; Kruts 2012; Kruts *et al.* 2013; Kruts/Korvin-Piotrovskiy/Rizhov 2001; Kruts *et al.* 2008; Müller *et al.* 2017; Müller/Videiko 2016; Ohlrau 2020; Shatilo 2021; Videiko/Rassmann 2016.

3 Millard 2020; Müller *et al.* 2016; Müller *et al.* 2017; Nebbia *et al.* 2018; Ohlrau 2020; Shatilo 2021.

dates so that a distinction was made between *termini post quem*, *ad quem* and *ante quem* for different structures. For both settlements, a division of stages could be performed, which, based on the radiometric dating, enables a view of the development of the number of houses and local settlement processes. In the case of Maidanetske, this was also confirmed by stratigraphy, as well as ceramic typochronology that correlates with the ^{14}C dates.

In the submitted radiometric analyses for Nebelivka until now, considerations of the depositional processes and a qualification of the data according to *post*, *ad* and *ante quem* were not incorporated. The presented results did not provide the possibility to reconstruct the settlement processes in Nebelivka within the reconstructed temporal duration. Archaeological assemblages, namely contexts with layered deposits of pottery, were also not considered during the construction of various models. As until now Nebelivka ceramic assemblages were not published in detail, there integration into detailed analyses was and is not possible yet.

In order to achieve comparability of the three megasites with regard to the assessment of internal settlement processes, we will handle the radiometric data from Nebelivka in a similar manner as carried out for Maidanetske and Talianki. Emphasis will be placed on the following questions: Can a source-critical examination of only the radiometric data from Nebelivka enable a chronologically and spatially differentiated settlement history of the large settlement? Would this possibly contribute to an explanation of the different topographical appearances of the three settlements?

Archive and methods

94 radiometric dates are available from Nebelivka[4]. Due to the status of publications, they can easily be integrated into the situation of the respective features. For instance, the systematic presentation of the layers of the test pits, to which the respective radiometric samples can be assigned, is exemplary[5]. In most cases, the find material has not been processed, so that it is not possible to associate the dates to the find inventories. However, this does not play a role here for our questions.

Accordingly, we have assigned the dates based on their stratigraphic relationships to the three already mentioned categories (*post*, *ad*, *ante*). Some specific restrictions can appear with regard to the quality of the samples, e.g. reservoir effects of carnivores or old wood effects, e.g. in *Quercus*. This was noted in the ^{14}C file (supplement 1). If necessary, recourse is made to the respective information while finding the results in order to validate them.

A reduction to *termini ad quem* leads to the reduction of the number of useable ^{14}C dates to 73, whereby the undefined sample material or the possibly problematic material has not yet been sorted out. The dates are more or less evenly spread over the entire settlement area of Nebelivka.

In light of our research questions, we aimed to determine the basic tendencies of the spatial-chronological distribution of domestic activities in Nebelivka. Thus, the following procedures were chosen:

1. Selection of the *termini ad quem* for the analysis.

2. Calibration of the radiometric data with Oxcal 4.0 according to the Intcal 2020 curve[6]. In addition to the 2-Sigma probability, the 1-Sigma probability and the median are calculated.

3. Mapping of the median of the radiometric dates in the settlement plan according to main wiggle plateaus and slopes of the calibration curve (these are: 4050 (-3975)–3950 BCE; 3950–3800 BCE; 3800–3700 BCE; 3700–3630 BCE; 3630–3500 BCE; after 2900–1700 BCE) in order to record the focal points of the respective activities in the respective contexts.

4. Interpretation of the observations. To this end, the main points of distribution are shown graphically and discussed with different parameters (e.g. lifespan of houses).

Here, the chosen methodological approach and the resulting analysis are only one component of the various procedures that we are currently using in a larger compilation of radiometric dates from Tripolye contexts. The results will be compared with further archaeological data on excavated features and artefacts in a future study.

Results

The spatial distribution of the medians of the *termini ad quod* dates according to the respective sections of the calibration curve provides a differentiated picture. The similarities and the differences can be described according to a differentiation of external occupancy (outside of the ring corridor), the occupancy of the outer house row of the ring corridor, of the inner row of the ring corridor and that of the internal settlement (within the ring corri-

4 Millard 2020.

5 Gaydarska/Nebbia/Chapman 2020.

6 Bronk Ramsey 2009; Reimer 2020.

Tab. 1. The number of occupancies in Nebelivka for individual areas of the calibration curve (cp. supplement 1)

Interval BCE	Mega-site areal	Outer raw	Inner raw	Inner area	Others
		ring corridor			
4050–3950		3	1	1	
	M8		1		
	M17	1			
	M15	1			
	M2	1			
	M6			1	
3950–3800		9	18	6	mega
	M8	1	7		
	M9	2			
	M10	1	1	2	
	M27/3/4		2		
	M13	1	1	2	
	M15	2			
	M2/3	2	3 (pit, big mega)	2	big mega, pit
	M4		3		
	M5		1		
3800–3700		8		1	mega
	M6	1			
	M7	1			
	M8	1			
	M17	1			
	M10/18	1			mega
	M13			1	
	M15	2			
	M2	1	(pit)		pit
3700–3630		2			
	M8	1			
	M10	1			
3630–3500				(indfeat)	Industrial feature
< 2900		1			mega big, mega
	M2/3	1			big mega
	M11				mega
sum		23	19	8	5

dor). Additionally, special spatial and functional units are observed, for example, a kiln or mega-structures[7].

The following outline emerges for spatial and chronological occupancy trends at Nebelivka (cf. Tab. 1; Fig. 1):

• From ca. 4050–3950 BCE, the few usable dates indicate an occupancy of the outer and inner ring corridors and the inner area.

7 Furthermore, we differentiate more technically radial segments according to the catchment areas of the mega-structures. However, these do not play a role in the further evaluation (cf. Tab. 1).

• From ca. 3950–3800 BCE, settlement of the outer and inner ring corridor as well as the inner area takes place. The large mega-structure is documented. The establishment of houses is twice as common in the inner ring corridor as in the outer ring corridor.

• From ca. 3800–3700 BCE, only the outer ring corridor is still settled, whereas the inner ring corridor is not settled and only one house lies in the inner area at the southern entrance. A smaller mega-structure is documented.

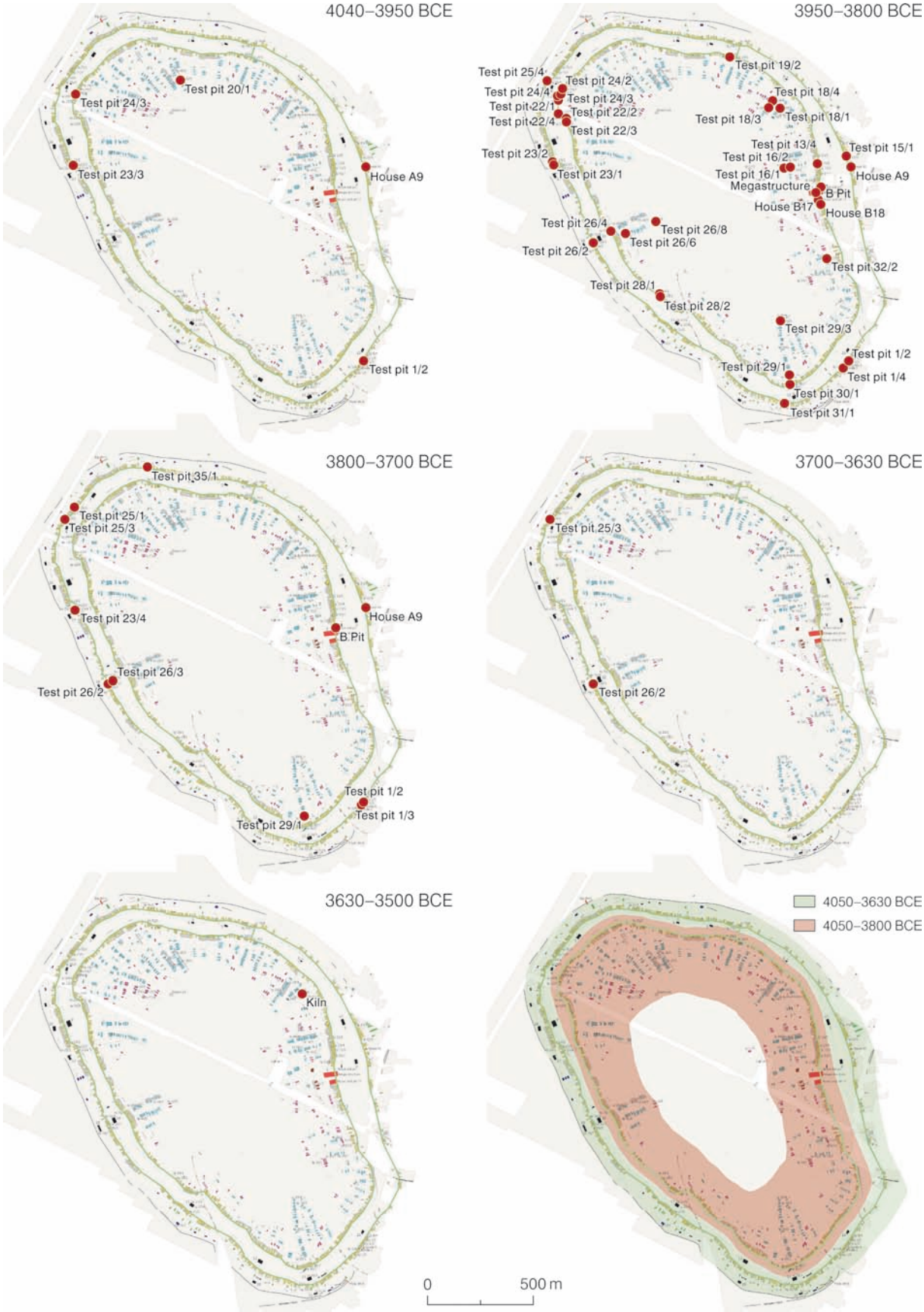

Fig. 1. Nebelivka. Radiometric dates of *termini ad quem* and the settlement model (graphic: Ralf Opitz, UFG Kiel)

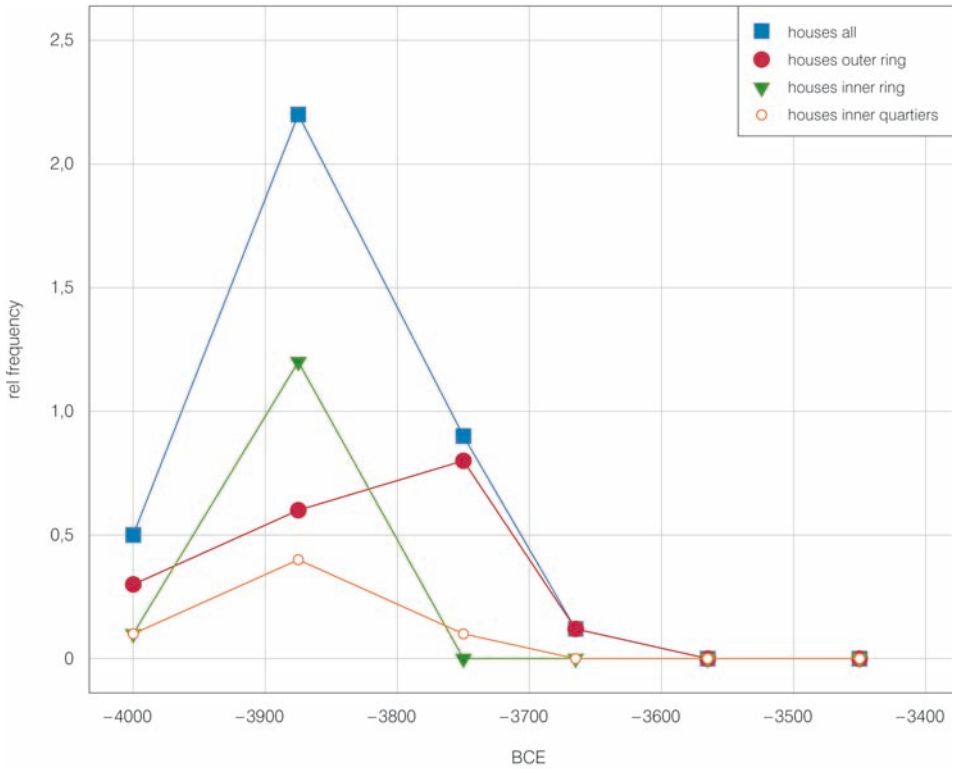

Fig. 2. Nebelivka. The relative number of houses (conversion of the dated houses on a linear time scale) (graphic: Johannes Müller / Ralf Opitz, UFG Kiel)

• Also from ca. 3700–3630 BCE, at a time when hardly any activity is verified, there are two houses in the outer ring corridor that are documented by radiometric dating.

Interpretation

The interpretation of the identified tendencies is simple at first. The oldest house building activities in Nebelivka at ca. 4000 BCE prove that the basic concept of a ring corridor and the inner settlement that does not adhere to concentric rules is known: the few early ^{14}C dates are available from all three areas. After ca. 3950 BCE, the settlement of the inner concentric circles of the ring corridor and the inner area of the mega-site occurs – but also the settlement of the outer circle of the ring corridor. This focus of house building activities changes after 3800 BCE with a new spatial concept: the establishment of new houses is almost exclusively limited to the outer concentric circle of the ring corridor. Even the few house constructions at the end of the occupancy time after ca. 3700 BCE (and before 3600 BCE) are built in the outer circle of the ring corridor.

If we convert the absolute number of dates in the time segments into relative numerical values (per ten years), the high proportion of building activities is particularly clear for the second half of the 40th and during the 39th century BCE. Subsequently, a decrease follows in the 38th century BCE and an end of the activities during the 37th century BCE (Fig. 2).

With these relative dates, we are additionally able to calculate the absolute number of houses in Nebelivka (1445)[8] with a simple model. First, we assume an average lifespan of 50 years for the houses[9]. When calculating the number of houses, the respective determined domestic house activities per 50 years were considered, added together, and finally divided by the total number of geophysically determined houses and then multiplied again with the relative value per 50 years[10]. According to the results, ca. 75 simultaneously existing houses were recorded for 4000 BCE, ca. 330 for 3875 BCE, ca. 135 for 3750 BCE and 28 for 3675 BCE (Fig. 3).

The graph also presents the variation if assuming an average lifespan of 25 and 75 years for the houses, so that a margin of error can be seen. If we continue to assume that there were 5–10 residents per house, then ca. 375–750 persons lived in Nebelivka around 4000 BCE, ca.

8 Cf. Hale 2020, 129 tab. 4.2.
9 Cf. Diachenko 2016.- Millard 2020, 256.- Ohlrau 2020, 233-236.
10 (0.5x2) + (2.2x3) + (0.9x2) + 0.12 + 0.06 = 9.58; 1445 houses / 9.58 = 150.8; 0.5 x 150.8 = 75.4 houses; 2.2 x 150.8 = 331.8 houses, etc.).

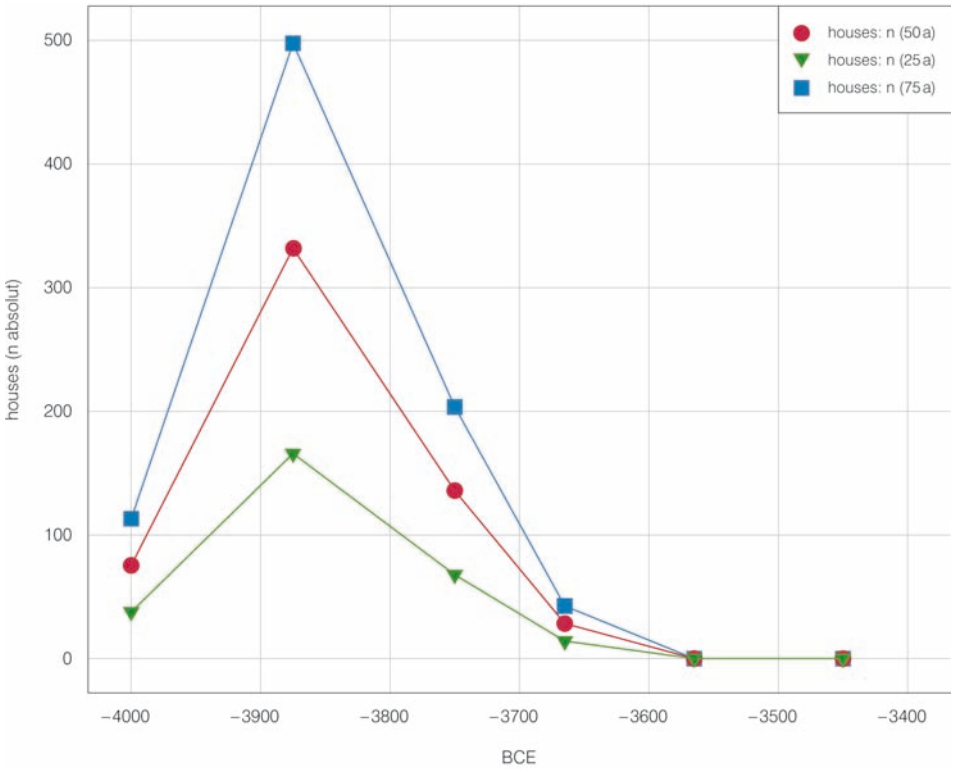

Fig. 3. Nebelivka. The absolute number of houses (n) for the assumed use of the houses for 25, 50 and 75 years (a) (graphic: Johannes Müller / Ralf Opitz, UFG Kiel)

1650–3300 persons around 3875 BCE, ca. 675–1350 persons around 3750 BCE and still 140–280 persons around 3675 BCE (Fig. 3).

With regard to the simultaneous houses, the calculated maximum number roughly corresponds to the results of Millard 2020 (256). Due to the qualitative differentiation of the radiometric dates according to the depositional qualities, it was now also possible to determine the spatial and temporal dynamics of developments at Nebelivka.

The traditional typochronological identification of the so far published ceramics of the Nebelivka group does not contradict the allocation of the ^{14}C dates of the two initial phases of the settlement between 4020-3800 BCE.

Nebelivka, Maidanetske, Talianki

Due to the previously known radiometric dates, the three large settlements coexisted for a long period of time, even if Nebelivka began earlier than Maidanetske and Talianki and the latter were occupied longer[11]. By means of a structural comparison of the spatial-chronological processes at Talianki and Maidenetske, which were analysed and described elsewhere[12], the following can be stated:

- In all three settlements, the oldest dates are located at the outer boundary of the mega-sites. In Maidanetske, these dates are from the enclosure, in Talianki from the outermost concentric house row and in Nebelivka also from the outer house row. Unfortunately, it was not possible to gain radiometric dates from the outer enclosure at Nebelivka. Nevertheless, as in Maidanetske, an early construction of the outer boundaries of the settlement area can also be assumed here.
- In all three settlements, the radiometric dates indicate that both the concentric house circles and the inner quarters existed as a fundamental concept and could be settled. Both the investigations of Mila Shatilo in Talianki and our spatial distribution of the ^{14}C dates in Nebelivka reveal that empty areas were settled in the concentric rows of houses. This was also likely the case in Maidanetske.
- While corresponding settlement processes in Talianki and Maidanetske all included concentric circles and quarters, this is no longer the case after 3800 BCE in the

11 Cp. Shatilo 2021, 152, fig. 55 – Nebbia *et al.* 2018.

12 Ohlrau 2020; Shatilo 2021.

inner area of Nebelivka, but only in the outer areas of the settlement.

From our point of view, the latter captures the crucial difference between Talianki and Maidanetske, on the one hand, and Nebelivka on the other: In all three cases, we observe a basic settlement planning concept right from the start of the settlements. While the settlement processes in Talianki and Maidanetske are intensified over time, these are already discontinued in Nebelivka after a few generations. The activities are limited to the periphery of the settlement, while the inner area no longer plays a role.

Nebelivka: a lost city?

As a consequence, we can deduce that in contrast to Maidanetske and Talianki, Nebelivka was discontinued earlier. The original concept of a large settlement at Nebelivka, which pre-programmed an urban development with the creation of the 235 ha settlement area, the ring corridor and the quarters, was abandoned for reasons still unknown to us.

The population increase in Maidanetske around 3800 BCE, which occurred after the main disintegration at Nebelivka, could indicate greater mobility between the mega-sites. Therefore, it is possible that other mega-sites could have profited in their development from the demise of Nebelivka.

The cause of Nebelivka's decline can, for example, be sought in the economic sphere. At first, no major differences can be detected between the three mega-sites considered here. The isotope values of domestic animals indicate that at least some of the animals in Nebelivka, in contrast to Maidanetske, still found more wooded areas in the surroundings[13]. Analyses of molluscs directly from archaeological features in Nebelivka, however, also verify a cleared landscape[14]. A pollen profile from the nearby canyon at Nebelivka[15] covers, according to the five accepted ^{14}C dates, the period between 4400 and 3500 BCE. The pollen diagram indicates light forest cover before settlement with a mixed oak forest interspersed with pines. However, the settlement time of Nebelivka falls in a hiatus in the pollen profile between 4100 and 3600 BCE, so that a further clearing and the appearance of settlement indicators, including micro-charcoal, are not documented. A sparse forest is also proven for the time after the settlement. In principle, other palaeoecological analyses point to a sustainable economy, which led, among other things, to the development of anthropogenic black soils[16]. For Nebelivka, this cannot be verified, since the mega-site was abandoned relatively early.

Nebelivka was lost. Therefore, it never reached the same population density as Talianki or Maidanetske, on the one hand, and did not have such a long period of settlement on the other. In the 38th century BCE, we observe ca. 1500 simultaneously existing houses at Maidanetske, in Nebelivka only ca. 135. This possibly shows differences in settlement – how it was originally conceived, enabling a corresponding densification of the residential areas (in Maidanetske), and a settlement (Nebelivka), which originally had a very similar concept, but whose housing densification never took place due to reasons yet unknown.

In future the closer analyses of Nebelivka ceramic assemblages (in preparation) will enable a better comparison between typological reasoning and the frame of scientific dating.

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Supplement 1. Nebelivka. Classified radiocarbon dates

Full information on https://www.jma.uni-kiel.de/en/research-projects/data-exchange-platform.
Source: Millard 2020; classification terminus ad quem due to stratgraphies/context information.

Categories: Location Labcode ^{14}C date BP sample material 1 sigma beginn median end date BCE terminus ad quem (1=ad; 0=non ad).

B Pit OxA-29598 5046±34 bone Bos distal humerus -3945 -3868 -3789 1; OxA-29599 5014±34 bone sheep-goat metatarsal fragment -3933 -3799 -3713 1; Poz-72466 4020±35 bone lar rib shaft frag -2573 -2532 -2476 0; Poz-72467 4960±40 bone cow astragalus GL84.5 DB 53.5 -3775 -3729 -3655 1.- House A9 Poz-32549 5010±40 bone -3931 -3793 -3711 1; Poz-32552 5030±40 charred grain cereal -3944 -3844 -3716 1; Poz-32553 5180±60 daub -4156 -3995 -3820 1; Poz-32550 4040±35 pot -2622 -2552 -2488 1.- House B3 Poz-32551 3310±35 pot -1615 -1576 -1534 1.- House B17 OxA-29667 5075±32 bone unidentified -3949 -3866 -3804 1; OxA-29600 5044±35 bone unidentified -3945 -3866 -3786 1;OxA-29601 5099±34 bone Bos mandible fragment -3961 -3864 -3806 1.- Mega-structure OxA-31745 5021±23 bone unidentified -3936 -3843 -3770 1;OxA-29440 5116±31 bone domestic cattle tibia -3969 -3870 -3811 1; OxA-29439 5085±32 bone domestic cattle metacarpa -3955 -3864 -3805 1; Poz-72464 3410±35 bone equus sp. Calcaneum -1744 -1700 -1632 1.- Outside mega-structure OxA-29441 5077±32 bone domestic cattle pubis -3951 -3865 -3804 1.- Kiln Poz-72468 4850±40 bone -3701 -3635 -3533 1.- Pit next to Kiln Poz-72469 5020±40 bone cow femur zone 4 -3940 -3816 -3713 1.-Test pit 1/1 OxA-29575 5076±35 bone Bos scapula -3950 -3866 -3804 0.- Test pit 1/2 OxA-29345 5150±31 charcoal Quercus sp. -4037 -3966 -3947 1; OxA-29576 4991±36 bone large mammal vertebra -3894 -3761 -3660 1; OxA-29577 5033±36 bone large mammal vertebra -3944 -3856 -3772 1.- Test pit 1/3 OxA-29663 5008±32 bone large mammal bone fragment -3908 -3788 -3711 1.- Test pit 1/4 OxA-29578 5069±31 bone unidentified -3946 -3867 -3804 1.- Test pit 13/2 OxA-29579 5130±34 bone Bos humerus shaft -3980 -3939 -3814 0.- Test pit 13/3 OxA-29580 5089±35 bone large mammal thoracic rib -3957 -3865 -3805 0.- Test pit 13/4 OxA-29664 5064±30 bone Bos third phalange -3945 -3869 -3802 1; OxA-29346 5093±30 charcoal Quercus -3958 -3862 -3806 0.- Test pit 13/5 OxA-29665 5086±30 bone large mammal long bone shaft -3955 -3863 -3805 0.- Test pit 15/1 OxA-29581 5062±37 bone ? sheep-goat femur shaft -3945 -3867 -3800 1.-Test pit 16/1 OxA-29582 5103±34 bone fragment of sheep-goat metapodial -3962 -3865 -3808 1.- Test pit 16/2 OxA-29347 5041±30 charcoal Fraxinus -3943 -3871 -3786 1; OxA-29348 5110±31 charcoal Fraxinus -3965 -3865 -3810 1.- Test pit 18/1 OxA-29583 5026±35 bone medium-sized mammal rib -3942 -3842 -3715 1.- Test pit 18/2 OxA-29584 5061±35 bone large mammal long bone shaft -3945 -3868 -3800 0.- Test pit 18/3 OxA-29585 5076±35 bone large mammal long bone shaft -3950 -3866 -3804 1.- Test pit 18/4 OxA-29586 5032±35 bone unidentified -3944 -3856 -3771 1.- Test pit 19/2 OxA-29587 5119±34 bone unidentified fragment -3972 -3877 -3811 1.- Test pit 19/4 OxA-29588 5074±34 bone unidentified -3949 -3866 -3804 0.- Test pit 20/1 OxA-29349 5196±31 charcoal Quercus -4042 -4008 -3970 1.- Test pit 20/3 OxA-29589 5089±33 bone large mammal rib fragment -3957 -3864 -3805 1.- Test pit 22/1 OxA-29590 5050±35 bone large mammal rib fragment -3945 -3868 -3793 1.- Test pit 22/2 OxA-29591 5065±34 bone Bos radius shaft -3945 -3868 -3802 1; OxA-29666 5114±31 bone Bos mandible fragments -3968 -3868 -3811 0.- Test pit 22/3 OxA-29592 5096±35 bone Sus mandible with incisor -3960 -3865 -3806 1.- Test pit 22/4 OxA-29593 5025±35 bone Bos proximal femur -3941 -3839 -3715 1.- Test pit 23/1 OxA-29594 5025±34 bone large mammal distal femur -3941 -3841 -3715 1.- Test pit 23/2 OxA-29595 5053±35 bone large mammal vertebra fragment -3944 -3868 -3796 1.- Test pit 23/3 OxA-29596 5171±34 bone Bos middle phalange -4039 -3982 -3957 1.- Test pit 23/4 OxA-29597 4977±34 bone unidentified -3786 -3743 -3660 1.- Test pit 24/2 OxA-31635 5035±23 bone undetermined -3939 -3879 -3784 1; OxA-31636 5078±23 bone large ruminant long bone -3951 -3862 -3805 1; OxA-31637 5067±23 bone undetermined -3945 -3868 -3804 1.- Test pit 24/3 OxA-31639 5047±23 bone undetermined rib -3942 -3878 -3794 1; OxA-31638 5044±23 bone cattle horncore shaft fragment -3942 -3879 -3792 1; Poz-72470 5180±40 bone cattle horncore shaft fragment -4042 -3992 -3958 1.- Test pit 24/4 OxA-31640 5033±24 bone cattle radius -3939 -3877 -3781 1.- Test pit 25/1 OxA-31641 4982±23 bone large ruminant long bone -3782 -3744 -3710 1.- Test pit 25/3 OxA-31642 4980±32 bone sheep-goat radius -3789 -3745 -3660 1; OxA-31663 4969±31 bone sheep-goat radius -3777 -3734 -3659 1; Poz-72471 4910±35 bone sheep-goat radius -3708 -3687 -3643 1.- Test pit 25/4 OxA-31664 5047±21 bone pig temporal -3941 -3880 -3795 1; OxA-31665 5029±22 bone undetermined -3936 -3878 -3780 0.- Test pit 26/2 OxA-31666 5010±22 bone cattle femur -3906 -

3789 -3713 1; OxA-31667 5016±24 bone probably pig mandible -3932 -3801 -3715 1;Poz-72472 4925±35 bone probably pig mandible -3756 -3694 -3646 1.- Test pit 26/3 OxA-31668 5028±22 bone cattle cari in fragments -3936 -3877 -3779 0; Poz-72473 4970±40 bone cattle cari in fragments -3786 -3739 -3656 1.- Test pit 26/4 OxA-31670 5025±32 bone small ruminant undetermined -3941 -3844 -3715 1; OxA-31754 5088±35 bone small ruminant undetermined -3956 -3865 -3805 1; OxA-31669 5028±21 bone undetermined -3935 -3878 -3780 1; OxA-31709 5053±25 bone large ruminant long bone -3944 -3875 -3796 0.- Test pit 26/5 OxA-31710 5083±26 bone cattle astragalus -3952 -3861 -3806 0.- Test pit 26/6 OxA-31711 5110±25 bone large ruminant rib frag -3964 -3861 -3812 1.- Test pit 26/8 OxA-31712 5109±25 bone large ruminant rib frag -3963 -3861 -3812 1.- Test pit 27/2 Poz-72715 4610±40 bone sheep-goat jaw -3496 -3438 -3350 0.- Test pit 27/4 OxA-31731 3521±29 bone undetermined -1894 -1833 -1774 1.- Test pit 28/1 OxA-31732 5103±23 bone small ruminant long bone -3960 -3857 -3811 1.- Test pit 28/2 OxA-X-2619-13 5056±33 bone undetermined -3945 -3869 -3798 1.- Test pit 29/1 OxA-31733 5060±23 bone large ruminant, undetermined -3945 -3872 -3800 0; OxA-31734 5106±22 bone large ruminant, undetermined -3961 -3857 -3812 0; OxA-31735 5070±33 bone small ruminant undetermined -3947 -3867 -3804 1; OxA-31770 5012±31 bone small ruminant undetermined -3931 -3794 -3712 1; OxA-31736 5091±23 bone large ruminant vertebra -3954 -3857 -3809 1; OxA-31737 5070±24 bone probably large ruminant -3947 -3866 -3804 1.- Test pit 29/3 OxA-31738 5122±24 bone cattle femur -3971 -3924 -3817 1.- Test pit 30/1 OxA-31739 5064±23 bone large ruminant, probably -3945 -3869 -3802 1; OxA-31740 5083±22 bone small ruminant long bone -3952 -3859 -3807 0.- Test pit 31/1 OxA-X-2619-34 5032±34 bone undetermined -3944 -3858 -3772 1.- Test pit 31/2 OxA-31741 5121±34 bone small ruminant long bone -3974 -3890 -3811 0.- Test pit 32/1 OxA-31742 5063±24 bone small ruminant long bone -3945 -3870 -3801 0; OxA-31743 5058±24 bone small ruminant long bone -3945 -3873 -3799 1.- Test pit 35/1 OxA-31744 4986±24 bone undetermined -3786 -3749 -3710 1.

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