

C14 DATES AND ABSOLUTE CHRONOLOGY OF CUCUTENI-TRYPILLIA: WHAT AND HOW DO WE ACTUALLY DATE?

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What happened?

For a long time, the Cucuteni-Trypillia cultural complex was dated using traditional methods. About 60 years ago, the era of isotopic dating began. Today, the number of dates from the sites of this cultural complex is measured in the hundreds. It seemed that this quantity must inevitably turn into quality. The possibilities of dating and their availability were to open a new era in the work with the archaeological sites of Cucuteni-Trypillia.

Instead, archaeologists got a real headache. Variability of dates within a single settlement or even a single object can now shake faith in stratigraphy and typology. And these are precisely the methods on which the relative chronology of a complex cultural complex was built for more than a hundred years. It has more than 70 local options, types. The relationship between them was carefully built precisely on the archaeological material.

In the last decade more dates have been made for Cucuteni-Trypillia than in the previous 50 years. However, the picture obtained using the latest AMS dates is markedly different from created before. As a result, talks about the “crisis of traditional periodization” of Cucuteni-Trypillia started (Harper et al. 2023).

But in reality, everything is not as hopeless as it seems at first view. To understand the current state of affairs, it is worth recalling the history of the introduction of C14 chronology for Cucuteni-Trypillia. And then take a closer look at exactly what and how to date with this method. To understand what is happening in what we can call “the Game of Dates” it may be useful to turn to history. In the history of C14 dating of Cucuteni-Trypillia, it is now possible to distinguish at least three stages.

Stage one: the Beginning

The first stage took place approximately between 1964-1989. It was the time of obtaining the first dates (Passek 1964). The number of dates increased slowly. Confidence intervals of 70-100 years now look just terrible. The dates were not calibrated (Телерін 1985). But at the same time, each new date was rigorously tested by archaeologists. They paid attention to the context of the find, the accompanying material. At the same time, they had considerable experience working with ceramics.

This experience has been measured by decades of working with huge collections. And it was at this time that they improved the existing periodization of Trypillia using traditional methods (Виноградова 1983; Дергачев 1980; Збенович 1980; Мовша 1985; Шмаглій 2001; Круц, Рижов 1985; Рижов 1993; Цвек 1985). The development of this period took into account the achievements of previous studies, as well as the absolute dates of C14 (Videiko 1999). This is how the periodization appeared, the crisis of which will be talked about forty years later. We will remind that the basis for these conversations were AMS dates without thorough consideration of the archaeological context.

The second stage and the sad fate of the Kyiv laboratory

The second stage began in the early 90s. It is related to the activities of the Kyiv laboratory and the financing of dating in international projects. Then, for the first time, bones began to be used en masse as samples for dating of sites (Kovalyukh, Videiko, Skripkin 1995). A method of using pottery sherds as samples was also developed (Ковалюх, Скрипкін, Відейко 2007). All this helped to increase the number of available samples. Large series of dates have been made for Trypilia culture sites of different periods (Szmyt 1999; Szmyt, Cherniakov 2000; Videiko 2003; Videiko, Petrenko 2003; Відейко, 2005). When working with dates, mathematical methods were used (Kadrow 1995).

At this time, there was a transition from conventional to calibrated dates (Відейко 1989). This changed the absolute chronology of Cucuteni-Trypillia. The then established limits of approximately 5000-3000 BC still remain unchanged. The absolute chronology was generally agreed with the archaeological periodization (Бурдо, Відейко 1998; Відейко 2003; Відейко 2004; Kotova, Videiko 2004). Dating was not so massive when compared to the last decade. However, even then there were more cases when C14 dates did not correspond to archaeological realities.

Some dating anomalies discovered at that time were quite “global” and did not concern only Cucuteni-Trypillia. Let’s remember at least the reservoir effect. But this problem was solved then. Other anomalies in the dates never found a scientific explanation at the time. Even then it became clear that certain standards are needed in the selection of samples, both in terms of quality and quantity. It was clearly visible how the dates made using charcoal and bone differ. The difference in the dating of samples from different parts of the skeleton could be no less. Variations in the dates obtained from different species of animals were noticeable.

But then, instead of putting order in the selection of samples and looking for a scientific explanation for the anomalies, the Kyiv laboratory was blamed for these anomalies. In the archaeological literature, “Kyiv dates” have become almost synonymous with low quality. At the same time, they were contrasted with the dates of other European laboratories (Гаскевич, 2014).

The problem of “Kyiv dates” disappeared due to the cessation of dating of Cucuteni-Trypillia samples in this laboratory around 2010. Note that then dating stopped simply due to lack of funding.

“The Great Game of Dates”: causes and consequences

The third stage in the C14 dating of Cucuteni-Trypillia started after 2010. Then a number of large-scale international research projects began on the territory of Romania, Moldova and Ukraine. They involved archaeologists from Great Britain, Germany, Poland, Romania, Moldova and Ukraine (Gaydarska 2020; Muller, Videiko 2016; Rybicka et al. 2020; Shatilo 2021). Each project provided for large-scale C14 dating. Along with the new projects, many new researchers came to the archeology of Cucuteni-Trypillia. They

had to get acquainted with the periodization of Cucuteni-Trypillia and massive finds of ceramics already in the process of research. Such a combination of opportunities and experience could not fail to have certain consequences.

The scale of the planned C14 dating was different. In the case of the Nebelivka and Mayanetske mega-sites, there were dozens of datings (in the future, more than a hundred) (Millard 2020; Muller et al. 2016). For some other projects, the number of dates for individual sites was within a dozen (Rybicka et al. 2020; Krol, Rybicka 2022; Shatilo 2021). All dates were ordered from European laboratories. Among the main performers, as can be seen from the publication of dates, were laboratories in Oxford, Poznań and Gliwice.

Animal bones were mainly used as samples during this period. In some cases, grain, coal, pottery and burnt plaster of buildings were dated. Already at this stage, archaeologists became dependent on the quality of the samples. This happened due to the decision to reconstruct the internal chronology of mega-settlements.

To implement this decision, it was necessary to take samples from dozens of structures located in different parts of huge settlements (Nebelivka — 238 ha, Maidanetske — about 200 ha). It was physically impossible to excavate many dozens of houses or pits in several field seasons. And then it was decided to take samples using test trenches with sizes from 1.0×1.0 to 1.0×6.0 m (Gaydarska, Nebbia, Chapman 2020). The number of bones from such trenches was minimal. Therefore, it was necessary to date what was found.

The task was accomplished and archaeologists managed to obtain a significant number of dates. And here it suddenly turned out that dates from one settlement span from 200-400 to 600 or more years. Even the application of mathematical methods for processing definitions did not make it possible to narrow this range (Millard 2020; Muller et al. 2022).

It turned out to be difficult to compare the obtained results with archaeological realities (fig. 1). Firstly, the number of finds of pottery from small test-trenches was insignificant. In the same way, the number of dishware forms discovered at the same time, which could be identified, turned out to be small (fig. 1/C, D). The difference between the number of finds in shafts, pits and among the remains

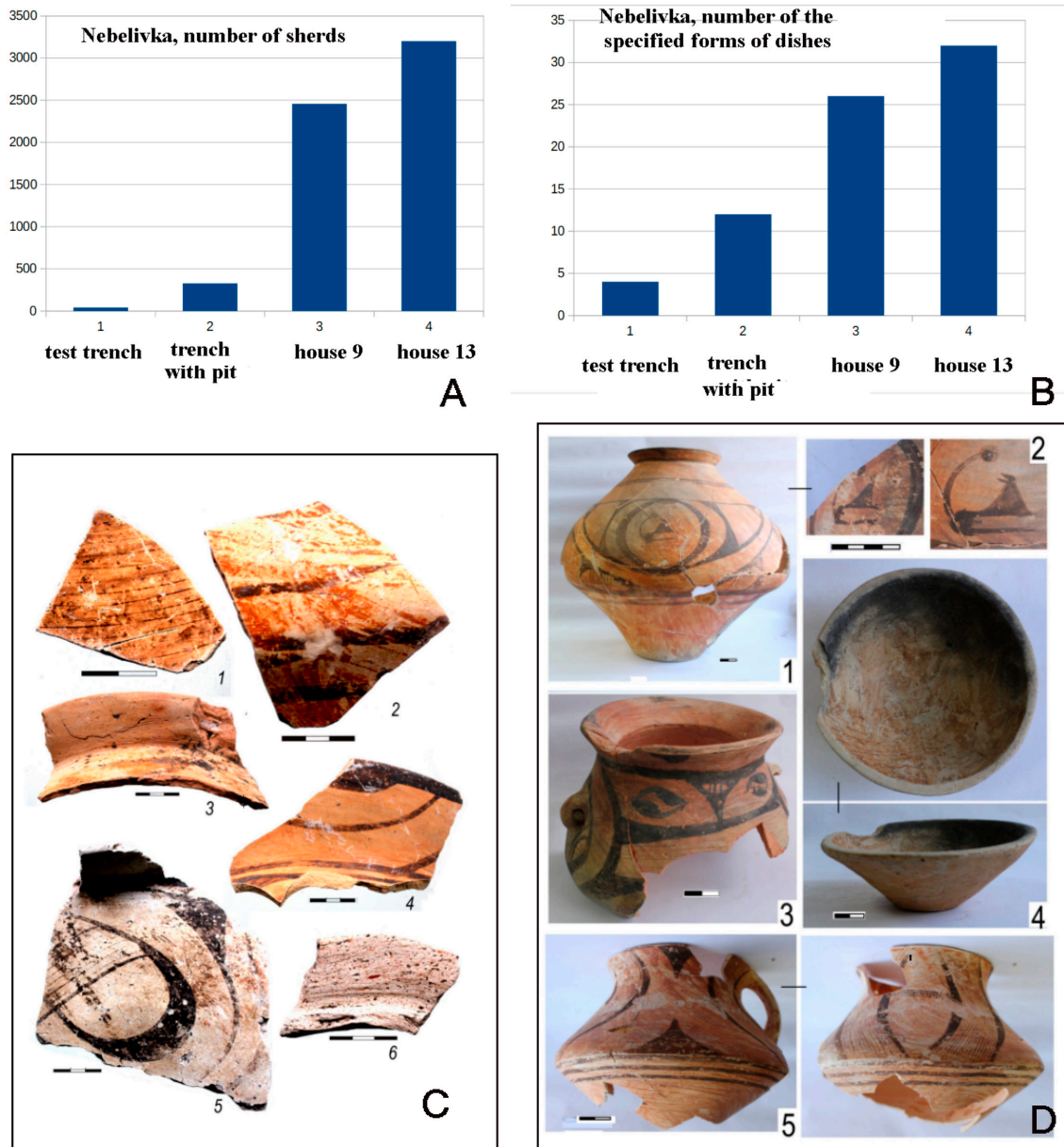


Fig. 1. Nebelivka, stage B2 of Trypillia (4050-3950 BC): statistics on excavated objects and samples of pottery finds: A - statistics by fragments; B - statistics by identified forms of dishes; C - finds from the test trench; D - finds from house N-17.

of houses looks impressive on the example of excavations in Nebelivka (fig. 1/A, B). Such a difference excludes not only reliable statistical calculations. It excludes a normal comparison of ceramics as a whole. The probability of finding exactly those that would confirm another anomalous date among a dozen ceramic fragments is also insignificant. Here are the problems that arose with the overly

“long chronology” of the megasite, which is based on C14 dates on the example of Nebelivka. Yes, a version was recently proposed according to which this settlement existed between 4040-3500 BC. It is based on the mathematical processing of about a hundred already published dates (Muller et al. 2022). This means that the history of this settlement is 540 years old.



Fig. 2. Maidanetske, Trypillia C1 stage (3800-3630): samples of pottery.

From the point of view of archaeological periodization of Trypillia Culture, this covers stages B2, C1 and the beginning of C2. At first view, there is nothing impossible in this. But this statement must be supported by archaeological evidence. This means that archeologists should have found certain pottery samples in sites dated to the appropriate time. There are no problems with stage B2. Without exception, all finds of ceramic dishes published so far are attributed to this period (fig. 1). However, the ceramics of the C1 and early C2 stages are not represented at all in the objects from which the samples were taken.

For phase C1, large collections of ceramics were obtained from this region. About 40 objects have been fully investigated in Maidanetske, more than 60 in Talianky. These two sites are located up to 30 km from Nebelivka. In the case of their coexistence (which is precisely what the 540-year-old history based on C14 dates suggests), there should have been an exchange of pottery samples. The difference between these products is clearly visible (fig. 2). Even more noticeable is the difference between Nebelivka pottery and Kosenivka-type sites, which present the beginning of the C2 stage in the region (fig. 3).

This situation can be explained by the lack of contacts between neighbors due to constant enmity. But this argument does not seem satisfactory. Quite a lot of ceramic products identified as “imports” were found in Maidanetske. They come from several local groups of the Trypillia culture: Chechelnyk, Petreni, Brînzeni (Шмаглий, Видейко, 2001-2002, рис. 41-44). They are all located much further from Majdanetskyi than Nebelivka.

This is important because in the completely excavated objects in Nebelivka there are no finds of this kind at all. The fact that researchers, publishing exotic versions of the “long history” of the mega-site, did not look for explanations in archeology. This is the presence of experience in working with local ceramic materials. The same applies to topics about the relationship in time of different local groups of Tripillia Culture (Harper et al. 2023, fig. 4).

Previously, similar anomalies in C14 were explained by unreliable “Kyiv dates”. And the Kyiv laboratory worked with samples from the same settlements as the others. If so, then it’s time to start talking about anomalous dates for Cucuteni-Trypillia from 2012-2019 done at



Fig. 3. Kosenivka local group, beginning of Trypillia stage C2 (3630-3500 BC), samples of pottery.

Oxford, Poznań, Berlin, Gliwice. If we add anomalies in the dating of human bones, which are made when studying DNA (Сохацький та ін. 2007, etc.), then this list of “bad laboratories” will have to be extended to the American continent.

But are these labs to blame? They are forced to work with the samples they received from archaeologists. The real reason may lie in the selection of materials for dating. The published dates for Nebelivka contain sufficiently complete information about the samples used. Animal bones, coal (including charred plant grains), ceramics were used (Millard 2020). In addition to several unidentified species, about 16 types of bones from different parts of the skeleton of domestic and wild animals got to the laboratories. The charred remains are represented by three different types of plants.

If you look at this picture, the question arises, what exactly was investigated in this case. This list of specimens would decorate a special study about the life of animals and plants about six thousand years ago. Special research in this direction has already given very interesting results regarding the diet of domestic animals (Makarewicz et al.

2022), or the use of organic fertilizers in the cultivation of cereals (Schlütz et al. 2023). But no, we are still talking about studying the chronology of an ancient site. Then the question arises: what was actually studied in the laboratories? The distribution of samples between different laboratories and its possible consequences also need a separate study.

What we can do about it

Perhaps the above in relation to the selection of samples is the first explanation for the anomalous dates. Such a situation can hardly be considered normal. Is it possible to do something about it? The answer is: probably, yes, maybe.

First of all, both the procedure for selecting samples for dating and the work with the archaeological context should be improved. I don't mean the depth at which the sample was found, there is no problem with that. Information about the sample must include information about the accompanying material. And this material should be enough for comparison. It follows from the above that the practice of extracting samples from small test trenches should be stopped. It is worth setting standards for the type of sam-

ples. These must be bones of a certain species of animal. And these bones must belong to a certain part of the skeleton. This will make it possible to investigate and compensate for deviations, as is done with the reservoir effect. The same is true of human bones.

Geological features of the territory also are important. The Cucuteni-Trypillia settlements are located in different geological conditions. In the territory of their distribution there are sedimentary and volcanic rocks. Related anomalies should also be investigated by specialists. Solving problematic issues with samples requires joint research by archaeologists and laboratory specialists. It is worth abandoning the practice of using dates based on samples from small trenches. First, it is difficult to standardize these samples by species of animals, parts of the skeleton. Secondly, the test trenches do not provide enough pottery finds to verify the C14 dating results.

In order to investigate the real situation, it is necessary to start dating only fully investigated objects. It can be the remains of buildings, pits. It is from here that it is possible to obtain both a standard set of samples and large series of findings for comparison. For each object, it is possible to carry out a series of dates on all possible

types of samples. Comparing the results can bring researchers closer to understanding the phenomenon of anomalous dates. Only after such research will it make sense to order tens or hundreds of dates. At the same time, the risks of false conclusions regarding the absolute chronology of Cucuteni-Trypillia and archaeological periodization will be minimized.

It would be true if the standards of sample selection were established by the joint efforts of archaeologists and representatives of laboratories. What will be the interest of the laboratories, the question arises. The interest is simple: whoever finds a conscious explanation for anomalies and explains what to do with them, will have a chance to get many customers and their money in addition to scientific laurels.

Archaeologists who are currently investigating the chronology of Cucuteni-Trypillia and dealing with anomalous dates are faced with a choice. They can blame the laboratory for all problems. They can continue to create exotic variants of chronology (Nebbia et al. 2018) and talk about the “crisis of traditional periodization” of Cucuteni-Trypillia (Harper et al. 2023) or to do both these things. But a real study of the problem for all participants in this process may look more interesting and promising.

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Datele C14 și cronologia absolută a culturii Cucuteni-Trypilia: ce și cum datăm de fapt?

Cuvinte-cheie: Cucuteni-Trypilia, cronologie absolută, C14, laboratorul din Kiev, date anormale, ceramică, periodizare.

Rezumat: În ultimul deceniu, pentru cultura Cucuteni-Trypilia au fost obținute date C14, care depășesc de câteva ori numărul total, căpătat în ultimii 50 de ani. Cu toate acestea, tabloul obținut în urma folosirii ultimelor date AMS diferă semnificativ de periodizarea elaborată pe baza materialelor arheologice. Ca urmare, a început discuția despre o „criză a periodizării tradiționale” a culturii Cucuteni-Trypilia. Unul dintre motivele anomaliilor poate fi selectarea materialelor pentru datare. De exemplu, pentru datele de la Nebelivka au fost folosite oase de animale, cărbune (inclusiv boabe de plante carbonizate) și ceramică. Pe lângă mai multe specii neidentificate, laboratorul a primit aproximativ 12 soiuri de oase din diferite părți ale scheletului animalelor domestice și sălbatice. Rămășițele carbonizate constau din trei specii diferite de plante. Această listă de exemplare ar îmbogăți un studiu special al vieții animalelor și plantelor existente în urmă cu aproximativ șase mii de ani. Studiile speciale în această direcție au dat deja rezultate foarte interesante în ceea ce privește alimentația animalelor domestice (Makarewicz et al. 2022) sau utilizarea îngrășămintelor organice la cultivarea cerealelor (Schlüt et al. 2023). Totuși, tipul de probe trebuie să fie standardizat în așa fel, ca oasele să fie de la un anumit tip de animal. De asemenea, ele trebuie să aparțină unei anumite părți a scheletului. Acest lucru va face posibilă studierea și compensarea abaterilor, așa cum se face cu efectul de rezervor. Același lucru este valabil și pentru oasele umane. Valorile se bazează pe caracteristicile geologice ale teritoriului. Pentru a investiga situația reală, este necesar să începă datarea doar a siturilor investigate complet, dar nu a celor cercetate prin sondaje. Astfel, vor fi minimizate riscurile unor concluzii eronate privind cronologia absolută a culturii Cucuteni-Trypilia și a periodizării ei arheologice.

Lista ilustrațiilor:

Fig. 1. Nebelivka, Trypillia B2 (4950-3950 a. Chr.). Statistici ale obiectelor excavate și mostre de descoperiri ceramice: A - statistica fragmentelor; B - statistica formelor vaselor identificate; C - descoperiri dintr-un șanț de probă; D - descoperiri din locuința N-17.

Fig. 2. Maidanetske, Trypillia C1 (3800-3630 a. Chr.). Mostre de ceramică.

Fig. 3. Grupul local Kosenivka, începutul Trypillia C2 (3630-3500 a. Chr.). Mostre de ceramică.

C14 даты и абсолютная хронология Кукутень-Триполья: что и как на самом деле датируем?

Ключевые слова: Кукутень-Триполье, абсолютная хронология, C14, Киевская лаборатория, аномальные даты, керамика, периодизация.

Резюме: В последнее десятилетие дат для Кукутень-Триполья получено на порядок больше, чем за предыдущие 50 лет. Однако картина, полученная с использованием новейших AMS дат, заметно отличается от периодизации, созданной на основе археологических материалов. Как следствие, начались разговоры о «кризисе традиционной периодизации» Кукутень-Триполья. Одна из причин аномалий может быть в селекции материалов для датировки. Например для дат по Небелевке были использованы кости животных, уголь (в том числе обугленные зерна растений), керамика. Кроме нескольких неопределенных видов

в лаборатории попали около 12 разновидностей костей из разных частей скелета домашних и диких животных. Обугленные остатки представлены тремя разными видами растений. Этот список образцов украсил бы специальное исследование о жизни животных и растений около шести тысяч лет назад. Специальные исследования в этом направлении уже дали очень интересные результаты относительно диеты домашних животных (Makarewicz et al. 2022) или использования органических удобрений при культивировании злаков (Schlütz et al. 2023). Следует стандартизировать тип образцов. Это должны быть кости определенного вида животных. Эти кости должны принадлежать к определенной части скелета. Это позволит исследовать и компенсировать отклонения, как это сделано с резервуарным эффектом. То же касается человеческих костей. Значения имеют геологические особенности территории. Чтобы исследовать реальную ситуацию, необходимо начинать датировать только полностью исследованные объекты и отказаться от образцов из шурфов. При этом будут минимизированы риски ошибочных выводов относительно абсолютной хронологии Кукутень-Триполья и археологической периодизации.

Список иллюстраций:

Рис. 1. Небелевка, Триполье В2 (4050-3950 гг. до н.э.): статистика по раскопанным объектам и образцам керамических находок: А - статистика по фрагментам; В - статистика по выявленным формам блюдец; С - находки из пробной траншеи; D - находки из дома N-17.

Рис. 2. Майданецкое, Триполье С1 (3800-3630 гг. до н.э.): образцы керамики.

Рис. 3. Косеновская локальная группа, начало Триполья С2 (3630-3500 до н.э.), образцы керамики.

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