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PER ASPERA AD ASTRA: AN ORGANIZATION OF THE LABORATORY OF METHODS OF NATURAL SCIENCES AT THE INSTITUTE OF ARCHAEOLOGY AS OF THE UKRSSR IN THE 1960s

Abstract. The purpose of the article *is to highlight the process of establishing of the laboratory of natural science methods at the Institute of archaeology AS of the UkrSSR in the 1960s basing on archival sources from the Scientific archive of the Institute of archaeology NAS of Ukraine.* ***The Research Methodology.*** *Both general research methods and special methods of humanitarian and historical researches as the historiographic analysis, source critique and problem chronological method were applied by the author.* ***The scientific novelty*** *of the article consists in the fact that there are no publications on this topic and an initial period of the laboratory activity of natural science methods of the IA AS of the UkrSSR is unexplored.* ***The Conclusions.*** *In contrast to central archaeological research establishments of the USSR where forming of research infrastructure for applying methods of natural science in archaeology started in the 1950s, in Kyiv at the IA AS of UkrSSR this process began only in the middle of the 1960s despite an announce of the plans in 1956. Although the administrations of AS of the UkrSSR and the Institute supported the work in this field, but the laboratory of spectral analysis could not get things going for more than five years. The main technical equipment was bought by the IA AS of the UkrSSR as far back as in 1964 but because of the lack of free rooms, the need for qualified staff and bureaucratic delays of that period, which did not make it possible to solve problems rapidly, which appeared during the installation of new devices, researches did not start until the end of the decade. This situation changed only in the middle of the 1970s when the Institute of archaeology AS of the UkrSSR moved to a new building. But it was much better with applying geophysical methods in the survey of archaeological sites. Owing to V. P. Dudkin's activity, who tested new equipment in the second half of the 1960s, a magnetic survey of the Trypillian settlement Maidanetske was completed in the first half of the next decade. In some period of time, despite the initial delay, the IA AS of the UkrSSR made progress in the use of research methods of natural science in archaeology.*

Key words: *history of archaeology, the Soviet archaeology, methods of natural science in archaeology, laboratory of natural science methods, Institute of archaeology AS of the UkrSSR.*

PER ASPERA AD ASTRA: СТВОРЕННЯ ЛАБОРАТОРІЇ ПРИРОДНИЧОНАУКОВИХ МЕТОДІВ У ІНСТИТУТІ АРХЕОЛОГІЇ АН УРСР У 1960-і рр.

Анотація. Метою роботи *є висвітлення історії створення лабораторії природничо-наукових методів у Інституті археології АН УРСР у 1960-і рр. на основі матеріалів з Наукового архіву ІА НАН України.* ***Методологія.*** *У дослідженні використано як загальнонаукові, так і спеціально-наукові – притаманні гуманітарним загалом та власне історичним дослідженням, зокрема, методи історіографічного аналізу, джерельної критики, проблемно-хронологічний.* ***Наукова новизна*** *статті полягає у тому, що публікації, присвячені означеній темі, відсутні повністю, а початковий етап діяльності лабораторії природничо-наукових методів ІА АН УРСР залишається невивченим.* ***Висновки.*** *На відміну від центральних археологічних установ СРСР, де науково-дослідна інфраструктура зі застосування природничо-наукових методів в археології почала створюватися в 1950-і рр., у київському ІА АН УРСР цей процес розпочався тільки в середині 1960-х рр., хоча був внесений до плану розвитку Інституту ще у 1956 р. Хоч керівництво АН УРСР та НДІ підтримували застосування в археології методів природничих наук, однак налагодити нормальну роботу лабораторії спектрального аналізу не вдавалося протягом більше ніж п'яти років. Так, основне обладнання було придбане ІА АН УРСР ще 1964 р., проте через брак робочих приміщень, дефіцит кваліфікованих кадрів, а згодом й інші бюрократичні зволікання, які не давали змоги оперативно розв'язувати проблеми, що виникали при налагодженні нових приладів, розпочати відповідні дослідження не вдавалося майже до кінця десятиліття. Ситуація змінилася тільки в середині 1970-х рр., коли Інститут археології АН УРСР переїхав до нових приміщень. Краще йшли справи зі застосуванням методів геофізики при розвідці археологічних пам'яток. Завдяки зусиллям В. П. Дудкіна, який у другій половині 1960-х рр. випробував нове обладнання, у першій половині 1970-х рр. за його допомогою вдалося зробити магнітну зйомку трипільського поселення Майданецьке. А згодом – у другій половині 1970-х–1980-ті рр., незважаючи на первинну затримку, ІА АН УРСР вдалося досягти значних успіхів у сфері застосування методів природничих наук в археології.*

Ключові слова: *історія археології, радянська археологія, природничонаукові методи в археології, лабораторія природничонаукових методів, Інститут археології АН УРСР, 1960-і рр.*

The Problem Statement. A history of the Soviet archaeology of the 1950s – 1960s as well as the whole post-war period has not been studied enough. The same situation is observed in the Ukrainian archaeology history. But during this period maths methods and methods of natural sciences were introduced into archaeology as results of the scientific and technical revolution. When in Leningrad and Moscow a proper infrastructure was created in the 1950s, in Kyiv this process began only in the middle 1960s and lingered too much. At the same time this topic is practically unstudied and there are no publications devoted to the applying of methods of natural sciences at the Institute of Archaeology of AS of the UkrSSR. However, new methods and digital technologies are now introduced into archaeology, that's why, the analysis and summary of the previous experience may make this process more effective and to help avoid previous mistakes.

The Analysis of Recent Researches. There have been no special monographs on the Soviet and Ukrainian archaeology of the 1950s and 1960s yet. But this period is analyzed in general by Leo Klejn in his book 'The Phenomenon of the Soviet Archaeology'. There are only few pages dedicated to this time where applying the methods in archaeology is mentioned too (Klejn, 1993, pp. 24–27, 48–50). This book was updated by the author and translated into a few foreign languages including English but the section about the methods of natural sciences was not changed (Klejn, 2012, pp. 75–77). Nothing is written in the monograph about events in Kyiv because Leo Klejn was working in Leningrad at that time. It should be noted that this book is based on Leo Klejn and coauthors' article published

in English at the beginning of the 1980s where only few paragraphs are about this topic (Bulkin, Klejn, Lebedev, 1982, pp. 282–283).

Recently the books dedicated to the history of the main archaeological research establishments such as the Institute of Archaeology NAS of Ukraine, the Institute of Archaeology RAS and the Institute for the history of material culture RAS (former the LBIA AS USSR) have been published. There are chapters on the history of departments specializing in this field to which the Department of bio-archaeology (Potiekhina, 2015) in Kyiv, the Laboratory of natural science methods in Moscow (Kuzminykh, 2019), the Laboratory of archaeological technology and its radiocarbon group (Zaitseva, 2013) and the group of spectral analysis (Egor'kov, 2013) in Leningrad / St.-Petersburg belong. There are articles dealing with a history of similar laboratories at Moscow state university (Ryndina, 2006; Ryndina & all, 2015).

Concerning the chapter on the history of the Department of bio-archaeology of the IA NAS of Ukraine, there is no information on the laboratory of natural science methods which was established at the Institute in the middle 1960s. Only the history of anthropological researches in Ukraine including an activity of the group of physical anthropologists is described there. Nothing is mentioned about the Institute laboratories in the chapter dedicated to the general history of the IA NAS of Ukraine in the 1950s – 1960s (Abashyna & Kolesnykova, 2015, pp. 42–52). The book dedicated to the 60th anniversary of the Institute contains brief information on the Sector of research methods of natural sciences, conservation and restoration of archaeological materials which operated there at the beginning of the 1990s and was organized on the base of the Laboratory of physical and chemical methods (60 rokiv, 1994, pp. 75–79). But the initial stage of the Laboratory history is not mentioned in this publication.

The purpose of the article is to cover the history of the Laboratory of methods of natural sciences foundation at the IA AS of the UkrSSR in the 1960s based on archival sources. Because there are no publications dedicated to the beginning of natural sciences methods application at the Institute and details about necessary infrastructure formation have not been revealed.

Documents on this topic are stored at the Scientific archive of the IA NAS of Ukraine (SA IA NASU). They include annual reports on the work of the Institute in the 1950s – the beginning of the 1970s (Fund 62, list (opis) 1 and 1-dod), reports on the work of the Laboratory staff in 1967 (SA IA NASU, f. 62, op. 1, d. 648) and in 1969 (SA IA NASU, f. 62, op. 1-dod, d. 1969/2) and the Minutes of the Academic council in 1961 (SA IA NASU, f. 62, op. 1-dod, d. 1961/3). Information from these documents is enough to throw light on the establishing of a special unit for applying methods of natural sciences in archaeology.

The Main Material Statement. A necessity to apply widely math methods and methods of natural sciences such as X-ray radiography, pollen analysis, radiocarbon dating for studying artifacts and buildings was defined in editorials of the central Soviet archaeological journal "The Soviet Archaeology" in 1953 (Zadachi, 1953a, p. 21; Zadachi, 1953b, pp. 10–11). At the same time the second article described shortcomings in the field of methodic of office studies:

"*If a methodology of field archaeological researches satisfies all requirements of modern science development with some exceptions but it may not be said the same about the methods and techniques of the office studies. Even at large archaeological establishments such as the Institute for the history of material culture or the Institute of Archaeology of the Academy of Sciences of the UkrSSR a laboratory study of materials is reduced to restoration, taking photos, drawings and description of findings. Chemical analysis of pottery and items from metal and other materials, sampling of micro-sections and studying of micro-structure*

of ancient tools, radio-examination and other similar ways of archaeological materials analysis, which may give a lot for a study of ancient production, are not usually applied or if they are applied it happens rarely and at random. Pollen analysis and radiocarbon dating have not yet become widespread in archeological works. Archaeological plants and other organic remains from excavations are not examined enough" (Zadachi, 1953b, p. 10).

On the opinion of the authors of the article, it was caused by the absence of necessary technical infrastructure for this kind of works at the archaeological establishments and researches were forced to ask special institutions, which were some times non-academic, for any analyses. It might be very difficult or even impossible. That's why, "*an organization of technological laboratories, equipped by modern instruments, at the archaeological institutes, where archaeologists may make the main types of required laboratory tests, is an essential condition for the further development of archaeological science in the USSR and reaching the leading position in all directions of the world science*" (Zadachi, 1953b, p. 11).

Approximately at the same period – in the first half of the 1950s a practical realization of this task started and the central Soviet archaeological establishments were provided by the necessary research infrastructure. Leningrad branch of the Institute for the history of material culture AS of the USSR (Leningrad branch of the Institute of Archaeology AS of the USSR (LBIA AS USSR) after 1959) was the first one. There the Sector of archaeological technology was renewed in December of 1951. The next year it obtained the status of the laboratory. The organization of this unit, where researches on spectral, petrographic and dendro-chronological analyses started soon but with an intake of specialists from other institutes, was supported by the president of the Academy of Sciences of the USSR Alexander Nesmeyanov. He paid attention to wide opportunities which might be realized at the turn of the Humanities and the natural sciences (Zaitseva, 2013, pp. 261–262).

Moscow State University was the first establishment in the city where special-purpose archaeological laboratories were organized in 1953 (Ryndina & all, 2015, p. 293). In the beginning there were no rooms for new units but they appeared next year when the historical faculty received one more building (Ryndina, 2006, p. 5). Organization of similar specialized units started at the Institute of archaeology AS of the USSR a little bit later. A few work teams of natural sciences methods (dendrochronology, archaeomagnetism, metallography, spectroscopy and petrography) attached to the laboratory of the office processing were formed in 1958 but several similar groups had been working there since the end of previous decade. In 1967 all of them were merged into the Laboratory of natural science methods of the IA AS of the USSR on the decision of the Presidium of the AS of the USSR (Kolchin & Sher, 1969, pp. 84–85). But from the very outset the work of this type was supported by academician Boris Rybakov who was the director of the Institute (Kuzminykh, 2019, p. 99).

And what was the situation with the applying of natural sciences methods in Soviet Ukraine at that time? It should be noted that the Institute of archaeology suffered more than the above mentioned central archaeological institutions of the USSR both as a result of the political repressions of the 1930s and as a result of WW II. That's why, it was necessary to recruit the staff and to renew material resources. But even in this difficult situation there was a desire to apply new research methods in Kyiv. Thus, in the Report on the scientific and research activity of the IA AS of the UkrSSR in 1956 it is written that the Institute submitted a petition to the Presidium of the AS of the UkrSSR for the organization of new structural units including the chemical laboratory during the 6th five-year plan and this idea was accepted (SA IA NASU, f. 62, op. 1-dod, d. 1956/2, pp. 1–2). But realization of this was delayed.

This issue was resumed again at the IA AS of the UkrSSR only in five years. On March 24, 1961, when the Academic council was discussing the perspective plan of the archaeological science development in the UkrSSR in 1962 – 1965, L. Slavin and V. Dovzhenok spoke on the necessity to organize the Laboratory of archaeological technology at the Institute in the nearest future (SA IA NASU, f. 62, op. 1-dod, d. 1961/3, pp. 3–4 of the Minute №6[1]). As a result in the Proposal to the project of the perspective plan of the archaeological science development in the UkrSSR in 1962 – 1965 it was written:

"It is necessary to organize the laboratory of archaeological technology attached to the Institute for studying important issues of material production technology in the prehistoric epoch. Without this further successful development of archaeology is impossible on the modern stage of scientific knowledge" (SA IA NASU, f. 62, op. 1-dod, d. 1961/3, p. 6 of the Proposal).

This issue was risen again in the Report from 1962 where it is mentioned that the Institute was unable to apply new technical methods of field and laboratory researches actively because laboratory facilities were dispersed and a technical equipping level of archaeological works mechanization was very low. This situation demanded to reorganize an approach to archaeological works in the UkrSSR. A possible way of it was to enhance the Laboratory of archaeological technology attached to the Institute and to make easier providing analyses (chemical, dendrochronological spectroscopic and radiocarbon) at special labs of the republic and outside (SA IA NASU, f. 62, op. 1-dod, d. 1962/2, p. 31).

Finally, in 1964 the situation began to move and the process of the Laboratory organization started at the IA AS of the UkrSSR. Special equipment such as spectrometer, generator, etc., was bought and its installation was scheduled at the beginning of the next year (SA IA NASU, f. 62, op. 1-dod, d. 1964/1, p. 30). But it was realized very slowly.

The problem was that the equipment for the Laboratory of archaeological technology, which cost 7 000 rubles, was ordered in 1963 when the Institute had enough space for it. But after the move to the new building located in Kirova street, 4 in 1960 the working area was being reduced. At the moment of delivery of the technique there was no necessary space. And then the Administrative department of the Presidium of the AS of the UkrSSR did not give the working area which was essential to the Institute but the Presidium asserted a claim that the valuable equipment was not in use. Kyiv archaeologists were only able to write in the Report in 1965 that the IA AS of the UkrSSR obtained one of the last positions on the laboratory equipment among research establishments of the USSR. But it was decided to go on the organization of the Laboratory of archaeological technology which started in 1964. The plan was to buy equipment for geophysical survey next year (SA IA NASU, f. 62, op. 1, d. 564, pp. 34–36).

In 1965 the Institute started to form the nonstructural department of archaeological technology but had a strong need in laboratory staff (SA IA NASU, f. 62, op. 1, d. 564, p. 29). Only in 1966 the equipment was installed at the Laboratory of the office processing that resulted in the lack of working area there. That year the IA AS of the UkrSSR bought a device for magnetic survey and started its field tests. It should be noted that this situation was not only with the Laboratory of archaeological technology or the Laboratory of office processing, but also with the photo-laboratory of the Institute. Its condition was described in the Report in 1966:

[1] The pages in this archival file have not been numbered. The author worked with photocopies of each single minute and has no access to the archive now because of the COVID-19. That's why, page numbers are given separately for each single minute.

"*The photo-laboratory of the Institute of archaeology is a half-homebrew enterprise with outdated equipment. Its space is not enough not only for a studio, but also for a processing lab. Only one employee works there who is not physically able to provide not only quality, but also quantitative execution of orders* (SA IA NASU, f. 62, op. 1, d. 564, p. 26).

The problem with the staff for the Laboratory of archaeological technology had been partly solved in 1967 when two specialists in exact sciences methods in archaeology were invited to work at the Institute. V. P. Dudkin was a geophysicist and V. D. Malishevskiy was a specialist in spectrography (SA IA NASU, f. 62, op. 1, d. 626, pp. 26–27). But experimental works in spectral analysis were not started that year because of absence of necessary equipment. However, the engineer of the Laboratory V. D. Malishevskiy did certain work in 1967. He reviewed works of spectrographists from the IA AS of the USSR (LBIA) and was studying a situation with a spectral analysis of artifacts in the IA and LBIA AS of the USSR during twenty days of a business trip. Also V. D. Malishevskiy performed a preventive maintenance of spectral equipment, adjusted and prepared it for a work. Another his activity was a review on methods and technologies of spectral analysis of ferrous and nonferrous metals (its archaeological aspect) and a field work in expedition which lasted for 90 days (SA IA NASU, f. 62, op. 1, d. 648, p. 1).

A geophysicist, junior research fellow V. P. Dudkin wrote two articles, made office processing and prepared a report on archaeological survey in the South of Kyiv region in 1966. He took part in the expedition of the Institute of geophysics to collect samples for dating of archaeological sites and did geophysical surveys in different regions of Ukraine what is written below. His another work done that year was the repair and adjustment of electrical prospecting equipment after the end of the field season (SA IA NASU, f. 62, op. 1, d. 648, p. 2).

Both experiments on search and development of iron analysis methods and series of spectral analyses had not been started in 1968 because the Institute received a spectroprojector, which was essential, only in December. New specialists came to the Lab that year. N. N. Pryschep was a specialist in spectroscopy. And a senior research fellow V. I. Bidzilia became a research supervisor (SA IA NASU, f. 62, op. 1, d. 660, p. 25).

V. P. Dudkin worked on two topics: "Experimental works on study of physical features of archaeological objects" and "Development of electrical prospecting method under conditions of a complex structural site". But again the absence of necessary equipment was an obstacle for experimental measurements on the first topic (SA IA NASU, f. 62, op. 1, d. 660, pp. 12–13).

In 1969 experiments on spectral analysis of ferrous metals and slags were not made. This time it was caused by the absence of special generator and analytical balance. V. D. Malishevskiy described the situation in the annual report:

"*In the first quarter of this year it was planned to make experiments on search and debugging of spectral analysis methods of iron artifacts and to start analysis of mass series of that items. Because of absence of the special generator which was essential for these tasks and impossibility to construct it at the Lab I wrote a staff report to the administration on February, 12 of this year. There I asked to allot 100 rubles from a salary fund for non-staff personnel for construction of this generator elsewhere. There are no other ways to buy it because this device is non-serial. My request was rejected because of 'absence of money for salary of non-staff members'. Thereby, the performance of task on the analysis of iron artifacts was impossible.*

In the second and the next quarters I planned the work on spectral analysis of bronze items, iron and copper ores, ceramic material and clays. Preparing samples of mentioned

archaeological materials for work it is obligatory to make precision weighing and to apply other methods of samples preparation for analysis. But the laboratory has not have analytical scales of requisite class yet. I had been submitting applications to buy the scales routinely since 31.03.1967 but they were not realized and turned over to Academsnab. Only in December of this year, finally, it might be really bought.

Because of the above mentioned and hardships with funding (very poor) of necessary purchases for the needs of the Laboratory these planned topics have not been realized either" (SA IA NASU, f. 62, op. 1-dod, d. 1969/2, p. 3).

But despite of this V. D. Malishevskiy made a significant work in 1969. He inventoried monographs and periodicals of the Soviet and foreign authors on the topic of applying different methods of natural and technical sciences in archaeology. The specialist with N. N. Pryschep designed and constructed a semiconductor generator of d.c. arc that enables precise spectral analysis of cooper and bronze alloys. V. D. Malishevskiy visited the Institute of history AS of the AzSSR in Baku and the Institute of metallurgy AS of the GSSR and other establishments in Tbilisi to buy special standards for spectral analysis of bronze. He made a series of qualitative analyses of samples on requests, took part in preparation of an exposition of the Archaeological museum and worked in several archaeological expeditions. Moreover, certain equipment and materials were bought for the Lab and at the end of the year a chemical and technological study of two series of pottery was made on the requests of V. O. Kruts and N. M. Shmahliy (SA IA NASU, f. 62, op. 1-dod, d. 1969/2, pp. 1–2).

A geophysicist V. P. Dudkin did the planned work on applying geomagnetic and electrical survey in 1969 (SA IA NASU, f. 62, op. 1-dod, d. 1969/1, p. 32). In particular, he developed the methodology of geomagnetic complex applying on archaeological settlements, formed, maintained and adjusted searching equipment, made geomagnetic survey on the seven expeditions of the Institute verifying experimentally developed methods and completed the article "Certain Issues of Methods of Geophysical Survey in Archaeology" in volume of 3,5 quires (SA IA NASU, f. 62, op. 1-dod, d. 1969/2, p. 4).

It should be noted that the work of the Laboratory staff on the application of methods of exact and natural sciences in archaeology (this title is mentioned in the Report) was realized in frames of the topic 'Methodological and methodical issues of archaeological science' along with Yu. N. Zakharuk's theoretical research. In all 4 workers including 1 research fellow, Ph.D. Yu. N. Zakharuk, 3 junior research fellows and a laboratory assistant (the Lab staff) worked on this issue (SA IA NASU, f. 62, op. 1-dod, d. 1969/1, p. 44).

The delay in the beginning of works of the Laboratory of spectral analysis was pointed as one of shortcoming of the Institute work in the Report on the control of the Institute plan of research work execution in 1969. There it was recommended to improve the situation and to start this type of study on the base of laboratories of other research institutes of the AS of the UkrSSR (SA IA NASU, f. 62, op. 1, d. 678, p. 3). Furthermore, the issue on the current situation and perspectives in the work of the Laboratory of spectral analysis were discussed at the meeting of the Institute administration (SA IA NASU, f. 62, op. 1-dod, d. 1969/1, p. 31).

The issue on the laboratory facilities of the Institute of archaeology was also discussed at the meeting of the Presidium of the AS of the UkrSSR. In particular, B. Ye. Paton stated that it was scheduled to the next five-year plan (1972) to construct a new building of the Institute which would last for 2 – 3 years, in other words it would be completed not earlier then in 4 years. But all this time it was necessary to develop laboratory researches at the Institute which had no laboratory facilities. That's why, the existed laboratory facilities of the AS of the UkrSSR

had to be used as yet. It ought to write down a resolution what particular laboratories of what institutes would be reserved for the IA AS of the UkrSSR and would execute required works (SA IA NASU, f. 62, op. 1-dod, d. 1969/1, p. 4). This did not happen fast either.

In the reports on the work of the IA AS of the UkrSSR in 1970 and 1971 a poor condition of the laboratory facilities was mentioned among other shortcomings. There were no qualified staff and no working area. And also it was written that opportunities to apply methods of exact and natural sciences in archaeology were not realized on the base of laboratory facilities of institutes of the AS of the UkrSSR (SA IA NASU, f. 62, op. 1, d. 704, pp. 37–38; SA IA NASU, f. 62, op. 1, d. 733, pp. 47–48).

The situation on the laboratory changed at the IA AS of the UkrSSR only in the middle 1970s after removal to new buildings at the territory of former Vydubychi Monastery in Kyiv. In 1974 the Laboratory of natural sciences methods was a part of the Sector of natural sciences methods and office processing of material (Abashyna & Kolesnykova, 2015, p. 53). That time the Institute provided researches in the field of history of ancient ferrous metallurgy, paleobotanic, paleozoology, dendrochronology, the dating of archaeological materials was made jointly with the Institute of geochemistry AS of the UkrSSR using radiocarbon method and with the Institute of geophysics using paleomagnetic method (Artemenko, 1978, p. 18).

The geophysical group of the Institute had great achievements in the second half of the 1960s – the beginning of the 1970s. Thus, in the summer of 1966 its staff tested a differential magnetometer MND-3 of Groshev's system on different archeological sites to find limits of usage and finding power of this type equipment. They worked on the settlement of the Cherniakhiv culture near Zavadovka village of Korsun-Shevchenkivskyi district, Cherkassy region, on the late Trypillia culture settlement near Maiaky village of Biliaivka district, on the ancient Greek city Tira in Bilhorod-Dnistrovskyi and on the settlement of Humelnytsa culture near Nahorne village of Izmail district.

Final works of that season took place in Kyiv region. In particular, a magnetic survey of a part of the late Trypillia culture settlement was made near Pidhirtsi village and a new dwelling which had been unknown before was detected at the territory of the settlement. Using the magnetometer a new Trypillia culture settlement was discovered on the plateau near the Ancient Rus' settlement next to Stari Bezradychi village. Another survey was made on a spur of plateau by Dereviane village of Kaharlyk district (Dudkin, 1970, pp. 272–274).

In 1967 V. P. Dudkin's group tested electrical dipole axial profiling method on different archaeological sites. At the first stage works were made on the settlement of Usatovo culture near Maiaky village of Odesa region, on the Roman age settlement by Furmanivka village of Kiliia district at the second stage they took place on the necropolis of the ancient Greek city Olbia (Dudkin, 1971).

Also in 1967 a magnetic survey was made by proton magnetometer M-20 on the multilayer site by Chapaevka village, over a Trypillia dwelling next to Stari Bezradychi (Kyiv region) and over a pottery furnace by Liubymivka village (Dnipropetrovsk region) (Zagniy & all, 1971, p. 203).

To check a structure and sizes of the Trypillia giant settlements discovered by K. V. Shyshkin on aerial photographs V. P. Dudkin made a magnetic survey at the territory of the expected settlement Maidanetske in 1971 – 1974. Optical mechanical magnetometers of types M-23 and M-27 were used in the area of 180 ha (Koshelev, 2005, p. 251)

The Conclusions. Thereby, the beginning of the establishment of research infrastructure for applying methods of natural sciences in archaeology started in Kyiv only in the middle

of the 1960s whereas in Moscow and Leningrad the same processes took place in the 1950s. But an idea to organize a relevant laboratory at the IA AS of the UkrSSR was made public as far back as in 1956. At the same time in general the leadership of the AS of the USSR and the AS of the UkrSSR and administrations of archaeological research institutes supported the application of natural sciences methods in archaeology. But despite of this, even after buying equipment for the laboratory of spectral analysis its normal work was not being organized at the IA AS of the UkrSSR during more than 5 years. It was caused by a lack of working area, absence of qualified staff and other bureaucratic impediments which made impossible rapid solving of problems with adjustment of the new equipment. This situation changed only in the middle of the 1970s when the Institute of archaeology moved to a new building.

It was much better with applying geophysical methods in the survey of archaeological sites. The research fellow of the IA AS of the UkrSSR V. P. Dudkin tested new equipment in field in the second half of the 1960s. In the first half of the next decade the magnetic survey of the Trypillia settlement Maidanetske was completed by him and a hypothesis about a large size of the site was finally confirmed.

It might be stated that, despite the initial delay, the IA AS of the UkrSSR made progress in applying of natural science research methods in archaeology in the second half of the 1970s – 1980s. But nowadays these laboratory facilities have been completely lost and researches are done only in the field of anthropology while all necessary technological analyses are done by representatives of other establishments or by foreign colleagues.

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