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## From Magical Valorization to Radiocarbon Chronology. Changes in Determining Age of Prehistoric Artifacts

### ABSTRACT

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Changes in determining age of prehistoric artifacts are closely linked to the search for objective grounds for reconstructing the history of human culture. In the Middle Ages, the origin of archaeological finds was explained by natural forces. For instance, it was thought that the Earth gives birth to vessels and keeps the bones of mythical creatures. For the religious worldview, it was the Bible that constituted the basis for perceiving the world. Chronology of ancient monuments referred to biblical events. Findings of antediluvian animals and plants were described. The existence of an antediluvian man was discussed. The age of these findings was estimated to reach several thousand years BC. Scientific methods of studying the chronology of prehistory developed in the mid-19<sup>th</sup> century, after the introduction of system of three ages by C.J. Thomsen. It was thought that social evolution was an objective source of cultural change, corresponding with K. Darwin's ideas. Improvement of methods for determining the age of archaeological artifacts took place in the second half of the 20<sup>th</sup> century, thanks to C<sup>14</sup> dating. Despite the conviction of archaeologists of the objectivity of radiocarbon chronology, it raises many objections and controversies. This proves that there is no single research method leading to objective knowledge about prehistory.

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Archaeological sources are recognized as the primary medium of information about the past. In traditional approach they are said to have an ability to reflect objective truths about the activity of prehistoric man, while non-classical archaeology uses source knowledge in the process of creating frameworks and contextual explanations. Concepts such as trace and artifact, which are the remnants of cultural events, are used there. Archaeological sources comprise all the material remnants of the past, *i.e.* artifacts (man made tools, buildings, vessels *etc.*) and ecofacts (man's impact on the environment, *e.g.* animals bred, plants cultivated, *etc.*). Each process of extracting information from artifacts and ecofacts is burdened with interpretation of a researcher, so it is not cognitively neutral (Minta-Tworzowska 2012, 137–157).

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Things become meaningful only after they have been incorporated into social structure and human intentions. As artifacts they express fundamental truths about their creators and rules of social, political and cosmological order of their world. In addition to solidarity they bring into all things, they enable us to obtain one more related result: the accumulation or embedding of the past. Landscapes filled with artifacts form a network of interrelated times and temporal rhythms, affirming a variety of meanings that are ascribed anew to things by new people in new spatial and chronological contexts. The biography of a neolithic megalith may serve as an example of a multiply interpreted artifact.

This monument, ever since its erection five thousand years ago, has always carried some meaning. It has been encountered by Bronze Age warriors, Iron Age farmers and medieval merchants and knights. They all had their own ideas and views on the age and purpose of the megalith. Today the prehistoric item continues to mean something to tourists, archaeologists or filmmakers. Because of its durability, it is subject to infinite analyses through uninterrupted confrontation with spectators in different historical contexts. This openness to interpretation allows the megalith to establish links with any historical moment and any culture which has its own image of the world and the passing of time (Olsen 2013, 81).

Among the most ancient societies and primitive peoples, age determination did not have a linear, cause-and-effect order but it was subject to mythologization based on superhuman causality (Chmurzyński, Wierciński 2012, 560). There was no general, Indo-European notion of time. Each time, however, it was important to indicate specific events and time preceding or following some event. Attention was paid to individual phases of the passing time to which certain values were ascribed. Measurement of time among Indo-European peoples came down to distinguishing certain stages. The “solar motion” was included in the daily cycle, but it was the night that was most likely considered the beginning of the day. Longer chronological periods were measured with lunar cycles, which were then defined as individual months in today’s sense (Danka, Kowalski 2000, 220). Observation of things and beings led to the feeling of synchronicity of phenomena. The observed changes were compared to model cosmic events, natural rhythms and breakthrough events such as volcanic eruptions, catastrophic droughts, and violent overflows of land and

sea waters (Chmurzyński, Wierciński 2012, 552). The development of ancient religious thought led to the designation of major eras in the history of mankind, which always begin with some important event. The most important of them was the world era, distinguishing the year of creation of the world, deduced by various thinkers on the basis of biblical texts. For Julius of Africa, living in the 3<sup>rd</sup> century BC, it was the year 5500 BC (the Alexandrian era); for the Egyptian monk Pandora it is 5439 BC (Antiochian era); for the chronologist J. J. Scaliger, living in the 16<sup>th</sup> century, it is 3950 BC. In 1648, J. Usher, Archbishop of Armagh in Ireland, decided that it was 4004 BC. This date was also accepted by J. B. Bossuet in his “Speech on Universal History” of 1681 (Łątkowski, Janikowska 1992, 179). Even in the beginning of the 19<sup>th</sup> century, the conviction of biblical basis of chronology of culture influenced the tendency known as “short archaeology”, which encompassed the history of mankind in several centuries BC. Older artifacts were compared to younger ones, or their origin was ascribed to forces of nature (Abramowicz 1967).

The first Polish descriptions of funeral finds were characterized by magical and religious valorization of prehistoric artifacts. Their age was not subject to scrutiny because they were assumed to have a telluric origin. Such views were presented at the beginning of the 15<sup>th</sup> century by Jan Długosz. He wrote that

Poland has two miraculous things (...) in the fields of Nochowa village near the city of Szrem, in the diocese of Poznan, and in Kozielsk village near the city of Łekno, there are pots of all kinds underground, made exclusively by art of nature without any human help, of various shapes, similar to those for domestic use: weak and soft as long as they rest in the ground and their native nest, but when excavated, in the wind or in the sun they become harder. (...) their fertility never weakens, although the earth is not opened. These pots are not born only in one place (...) but in many parts of the Kingdom of Poland (Łopaciński 1899).

In the following centuries, up to the 19<sup>th</sup> century, contradictory interpretations of the origin of fossils and archaeological finds were upheld. For some, they were freaks of nature under the influence of rock-forming forces, others recognized these findings as confirmation of biblical catastrophes. Towards the end of the 18<sup>th</sup> century, a diluvial theory was developed, which assumed the annihilation of many living creatures during the biblical flood. This concept was created by

Georges Cuvier, a French anatomist and paleontologist, who rejected the existence of a “fossil man” ([https://pl.wikipedia.org/wiki/Historia\\_paleontologii](https://pl.wikipedia.org/wiki/Historia_paleontologii)). Also chronology of events in the prehistory was assessed from a biblical perspective. In 1781, Krzysztof Kluk published a work entitled “Finding, knowing and enjoying useful fossils”. He described prehistoric changes in Poland on the basis of religious valorization of natural history:

The Earth, both before the Deluge and nowadays, has had seas, rivers, lakes, many springs, and underground caves full of water, which filled with water during the Creation when land and water were being separated (...). These waters enlarged rivers, lakes and seas, hence the floods, hence a larger amount of water in the air, and hence more violent rains (...). Hence the words in (...) the Bible that windows of Heaven were opened. Seas, rivers and lakes overflowed, underground waters were springing (...). In this deluge it was necessary that the land (...) disappeared to some extent (...). Water (...) had a greater force: it took fertile grounds from mountains and valleys (...), it spread and mixed them up, and when it receded (...), it left layers of the ground we now see (...). Settling these layers, it settled with them various dead or decayed bodies, Trees, Plants, Conchae, Fish, Bones (...). So the deluge greatly changed the Earth: it lowered old mountains and made new ones, mixed the soil, creating another crust, scattered different things and buried them in the layers of the ground (...). In the Northern Lands, for example in the Spitsbergen, they dig up Elephant bones and Palm trees buried by the deluge, which do not originate from this land (...). If the Southern Lands are higher than the Northern ones, then surely the water tide must have been to the north, and therefore the things of Southern Lands can be found in the North (Kluk 1781, 28).

The dominant tendency to shorten natural and cultural chronology in accordance with religious belief and biblical canon (Abramowicz 1967, 113) was still supported by some scholars in Poland at the beginning of the 19<sup>th</sup> century. The report of the Warsaw Society of Friends of Science of April 14, 1822 states that the remains of extinct elephants were found in our lands, “originating, just like Siberian elephants, from antediluvian era” (Abramowicz 1967, 111). The principle of uniformity, formulated by Charles Lyell, stated that the conditions in ancient times were essentially similar or the same as nowadays. Concepts analogous to Lyell’s ideas were also applied to the history of man. In many ways, he was to resemble the man of today (Renfrew,

Bahn 2001, 24). The foundations of European culture go back to Greek or Roman traditions reinforced by Christianity (Abramowicz 1970, 17).

At the beginning of the 19<sup>th</sup> century, the necessity to study Slavic antiquities was justified to members of the Vilnius University in the following way:

It would harm the Honorable Members of the Vilnius Academy, to assume their fear that the excavation of idolatrous monuments may shake the tenets of their 10-century old faith. We are delighted to study the preserved remains of the fruits of, albeit idolatrous, minds. In ancient India, Greece, and Italy, we do not repeat their mistakes, but we are even strengthened in the truths of the Divine Legislator” (Abramowicz 1967, 26). To match our chronology with Mediterranean antiquity, scholars referred to the epic entitled “Works and Days” by Hesiod. He divided the history of mankind into five stages: “Golden Age – a generation of people who had everything that was good (...); Silver Age – a generation resembling the previous one in neither height nor mind (...); Bronze Age – powerful and severe generation (...); Age of the Heroes – (...) divine family of heroes, and, finally, the Iron Age – a generation of iron, steadfast in its efforts and concern (Renfrew, Bahn 2002, 20).

Polish scholars in the first half of the 19<sup>th</sup> century attributed native antiquities to Germanic, Scandinavian or Slavic peoples, while chronology-wise, the “funeral urns and old armor, stone axes, oilers and lacrymatories, small statues of gods and sacrificial knives” were to come from the “Golden and Bronze Age” (Abramowicz 1970, 54).

Problems concerning the inability to precisely date the monuments were solved by detailed classification of artifacts (Abramowicz 1967, 101) and using “savage men” discovered by modern travelers for comparison (Abramowicz 1970). In spite of great research enthusiasm, the outcomes of this attitude did not foster the state of knowledge about chronology of indigenous antiquities. Instead they generated further discussions, which can be found, for instance, in the correspondence between the donors of findings with the authorities of the Poznań Society of Friends of Science. Wojciech Konewka from Greifswald in 1878 described his collection in order to hand it to the Poznań Society of Friends of Science:

My collection is rather modest and consists of stone tools found in tombs or in the soil of Pomerania and on the island of Rügen. These tools are: axes, polished and unpolished axes, wide and narrow chisels, daggers, knives, straight and curved flint tools, heads of lances and arrows, perforated

hammers, all made in an unknown way. In addition, there are around 20 cooper or bronze tools. I have only three funeral urns and 4 smaller clay tools. Upon a long study, I believe that these stone items I have mentioned above have no connection with our ancestors, *i.e.* the Slavs. The famous Nilsson the Swede, whose writings I find valuable, proved that all the stone tools found in the northern countries (...) should be attributed to savage peoples at the lowest level of civilization. Even now a savage tribe in Patagonia uses the same tools as we dig up from the ground every year. They are so similar as if they were made by one and the same hand at one and the same time. In the 5<sup>th</sup> century of pre-Christian era, copper, *i.e.* bronze, was known in this land; and around the 5<sup>th</sup> century after Jesus Christ iron was known here. The Goths could have brought copper, but nothing in their numerous old songs and poems indicates stone weapons (...). According to this assumption, very important collections are located in the northern countries, especially in Copenhagen (Kaczmarek *et al.* 2013, 51–52).

Publication of a guide to the Copenhagen Museum of National Antiquities by Ch.J. Thomsen in 1837 provided new conceptual tools useful for advancing the knowledge of European prehistory. Most scholars accepted the division of the Stone, Bronze, and Iron Age (Renfrew, Bahn 2001, 25). In Poland, however, the influences of Catholic doctrine on the chronology of human development were strong. Stefan Pawlicki in 1871 attacked the very basis of archaeological classification: system of three ages, where he probably saw a dangerous possibility of evolutionism. He wrote at the time that

Northern archaeologists are eager to divide antiquities into stone, bronze, and iron ones. The first to introduce such a division was Thomsen, a Dane (...), and his pattern was used by materialists to develop all human education. They say that humanity started to develop from stone culture, which is divided into two ages, of unpolished and polished stone. Later, there was a bronze age, and finally iron age (...). All these divisions are based on a false principle and in terms of the system they are worth as much as a book collection arranged according to covers, not the content of the books (Abramowicz 1967, 142).

The rational acceptance of the basis of periodicalization of prehistory according to technological changes rather than the Old Testament chronology found support among the most eminent representatives of the young generation of 19<sup>th</sup> century prehistorians. In 1872 article, Jan Zawisza supported scientific interpretation of the findings:

In all countries, at the initial stage of their research archaeologists pondered merely over superficial signs, only deeper geological investigations led them to traces of the first human inhabitants of the antediluvian, or pre-ice age, along with traces of antediluvian animals: cave bears, rhinoceroses, lions, hyenas, mammoths, reindeer and many more. So far in our country scholars have described findings occurring on the surface of the ground, graves, cemeteries, castles, and only carefully crafted stone, bronze and iron tools and vessels have drawn the attention of our scholars. In other Western and especially Scandinavian countries, archaeology has merged with geology, (...) in pliocene, post-pliocene, dilluvia, alluvia (...) and subsequent layers, up to historical times” (Abramowicz 1967, 139).

Positivist archaeology formed the concept of the source, focusing on “cultural objects”, referred to as “traces”, “finds”, “remnants”, “monuments”, allowing to reconstruct the objective past. Representatives of this school were the most important creators of chronological systems for prehistoric Europe (Minta-Tworzowska 2012, 139). As an example of the development of detailed archaeological classification may serve the attempts to periodize the Bronze Age. Its divisions into periods and sub-periods resulting from the systematics of sources have been the subject of research for many generations of prehistorians since the end of the 19<sup>th</sup> century. Among them, the work of Swedish archaeologist Oscar Montelius was particularly influential. He is the founder of a fundamental typological method based on the criterion of complexity, which was the determinant of the chronological succession of a given phenomenon, and indicator of the developmental stage (age). The resulting image of prehistory is in fact an arrangement of successive chronological sequences (phases, periods, ages), consisting of increasingly complex cultural groups, which are set in a specific chronological continuity (Minta-Tworzowska 2015, 155). On the basis of these assumptions, two systems of division of the Bronze Age have gained the greatest recognition in Central Europe: the Montelius system in its final version of 1903 for the Scandinavian countries and northern parts of Central Europe, and Paul Reinecke system, formulated between 1899 and 1925 for the rest of Central Europe and vast parts of southern and south-eastern Europe. In both cases, several major Bronze Age periods were distinguished, with Montelius’ period IV, V and VI corresponding to the early stages of Reinecke’s Halstatt period. These two systems were



and still are subject to more precise and dense time divisions. In this way, the amount of eleven sub-periods of the Bronze Age was reached, each on average one century long. According to K. Jązdowski, such a dense periodization can be carried out precisely enough where the transformation of the forms of artifacts enabling dating was quick and frequent. In lands where there was no such a rapid change of types of artifacts and where their numbers was small, *e.g.* in Poland, especially in its central and north-eastern parts, the division into fewer sub-periods is more justifiable (Jązdowski 1981, 290).

Discussions on the chronology of prehistory changed radically after the introduction of the radiocarbon method to archaeology. In 1949 an American chemist Willard Libby announced his  $C^{14}$  dating technique. It provided the scholars with a tool to unambiguously determine the age of organic artifacts and findings accompanying them, without referring exclusively to the typology of artifacts and the synchronous historical method. Determining the date was no longer one of the main effects of research, which allowed us to ask questions that were related not only to chronology, but also to cultural processes. It was considered that traditional archaeology was based on historical clarification. The new archaeology, inspired by philosophy of science, operated within the processes explaining changes in economic and social systems, which cannot be compared with the classical systems of Oskar Montelius, Paul Reinecke and Hermann Müller-Karpe (Renfrew, Bahn 2002, 36–37). As an example of modern understanding of periodization of cultural phenomena may serve the scheme of the chronology of processes in the Tarnobrzeg Lusatian culture, formulated by Sylwester Czopek: (1) at the end of the Bronze Age there was a displacement of people from the “West” from the Upper Silesia-Lesser Poland group; (2) during Ha C there probably occurred first “Eastern” infiltrations from the pre-Scythian or early-Scythian horizon, which solidified the former changes and had a broader territorial scope; (3) at the same time there occurred an adaptation of Halstatt cultural traits; (4) “neighborhood” relations developed with Scythian and Traco-Scythian cultures at the turn of the Ha D and La Tene period; (5) elements of Pomeranian culture arrived in the early La Tene period (Czopek 2008, 164–165).

Determining the rhythm of cultural transformations in prehistory has become the basis for an alternative understanding of the ethos, *i.e.* moral and aesthetic aspects of a given culture, the search for its



ideological and institutional foundations, in accordance with the principles of intercontextual archaeology (Kadrow 2012, 224). These concepts show how far the transformation of periodization of ancient artifacts has reached in recent centuries. As late as in the 18<sup>th</sup> century the findings were said to have magical origins (Abramowicz 1967), which changed in the 19<sup>th</sup> century thanks to Darwin's theory of evolution and the C.J. Thomsen's three-age system (Renfrew, Bahn 2002, 24–25). The understanding of chronology and mechanisms of cultural change at the beginning of the 20<sup>th</sup> century was justified by the normative conception of Gordon Childe:

We find certain types of monuments – vessels, tools, jewelry, funeral rites, forms of dwellings constantly coexisting. Such a set of regularly linked features is called a cultural group or simply a culture. We assume that this set is a material expression of what would today be called a tribe (Kadrow 2012, 233).

Traditional archaeology equated archaeological culture and culture in general (Minta-Tworzowska 2012, 139–140).

Modern processual and intercontextual approaches, enriched with the results of physicochemical analyzes and measurements of the age of findings by the C<sup>14</sup> method (Walarus, Goslar 2004, 12–13), give an impression of objectivity of archaeological knowledge, but in fact they have generated new controversies and scientific discussions over the chronology of prehistory. Physicochemical dating introduced changes to previous chronological findings, which sometimes caused conflicts in the scientific community. The strength of the former beliefs of archaeologists was so great that the argument of “objective” age measurement was not convincing. The next controversy concerned the divergence of the results obtained by different methods and based on different assumptions (*e.g.* evolutionary ones – typological method), or images of nature of phenomena occurring in the world (*e.g.* conviction of constant proportion between the number of C<sup>14</sup> and C<sup>12</sup> in the atmosphere). There was a need to develop methods for making corrections in the results, *e.g.* by constructing the so-called calibration curves that allow for a conversion of the results of age measurements into calendar years when you adopt certain confidence intervals. Despite the improvement of the technique and rationalization of the age determination of prehistoric artifacts, these problems prove how significantly the so-called independent, objective dating methods

are anchored in previous beliefs and evaluations. From the perspective of new theoretical currents in archaeology it is an argument in favor of the view that there is no single research method leading to objective knowledge about prehistory (Rączkowski 2012, 395).

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