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Roman Age iron tools from Pannonia

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Abstract
Abstract of PhD thesis submitted in 2015 to the Archaeology Doctoral Programme, Doctoral School of History, Eötvös Loránd University, Budapest under the supervision of László Borhy.

Subject and goals

The goal of my dissertation is the collection and evaluation of iron tools found in the Roman province of Pannonia, using a system of criteria which is in compliance with the international trend of research. With the exception of agricultural implements this subject belongs to the barely investigated part of Hungarian archaeology. In this context, the research of the related objects is relevant by all means. Dealing with this topic is particularly justified by an unpoetic circumstance, namely the persistent corrosion. A significant part of the iron objects are at risk to be destroyed without any suitable documentation. Therefore compiling the catalogue related to my doctoral thesis means data saving at the same time.

In the course of the research focusing on the iron tools known from Pannonia I'm seeking answers for two main issues. On the one hand, which formal and technical features of the tools are the most important? And on the other hand, what sort of economic aspects can be derived from these features, their context and distribution?

The identification and typological division of certain tool types can be accomplished to different degrees. The forms of several implements barely changed during the period between the Iron Age and the Industrial Revolution. If suitable data referring to the circumstances of the finding are not available, then even a simple identification of the Roman artefacts can be hindered. This is the reason why the archaeological context plays such an important role during the analysis of every single object. The exact function and field of use is also uncertain regarding some tools. An important aim of the thesis in such cases is to compare and analyse all the possible interpretations. However, some of the objects appear to be so simple that the accurate manner of their original use cannot be specified in the given circumstances.

Of all the iron tools to be analyzed I am trying to select the types where the conditions of a traditional typological classification are provided. These conditions are given predomininantly with axes, hatchets, *dolabra*s and *ascia*s. Definition of technical and chronological relevance regarding the diversity in shapes is also included in the aims of this thesis. During data

procession I intend to focus mainly on the comparison with types already known, while determining how much the processes that can be observed in Pannonia are similar to or different from the characteristics of other provinces of the Roman Empire. What kind of exterior influences should be taken into account and what are the parallel local particularities? Individual types of tools will also be investigated from the point of view of the sizes that are technically significant, hoping that the sufficiently abundant data available will provide results that can be statistically evaluated.

Aspects of economic history, to be defined from the technical specifications and distribution of the tools as well as the circumstances of their finding, are considered another important element of the research done for this thesis. It is also an important aim of my research to take account of the detectable special features related to certain types of provenances such as military facilities, urban or rural settlements, villas and internal fortifications. I intend to examine the objects found in special circumstances such as among grave goods or in a hoard as intricately as possible. Special attention has been given to archeological data related to the particular places of occurrence and the results of some occasional interdisciplinary researches. The significance of these methods is increasingly great and their role cannot be emphasized enough.

The analysed material and methods

As a result of the data collection realised for my thesis I have catalogued a total of 2401 iron tools from the territory of Pannonia. Despite my efforts to involve a research area as extensive as possible, I could only reach the already published finds from the areas lying beyond the borders of Hungary. For different reasons I had to do without the recording of some of the objects preserved in Hungarian museums, but I tried to take account of the irregularities thus occurring all through my research. Due to lack of time it was not possible to review all the iron tools kept in museums, which could have prevented the artefacts, linked to another era or wrongly inventoried or even unlisted, from being overlooked. Therefore during my research data collection was realised by studying inventories and other records. Thus the procedure was necessarily restricted but it still led to a satisfactory result from the overall point of view, in my opinion. It is rather difficult to estimate the number of objects hidden in some way from the expert eye. Judging from the experience gathered during the random check of boxes that included miscellaneous iron tools in bulk, it is safe to say that there is a significant number of other implements yet to be catalogued. Most of these must be of the lesser known types or less typical examples. This factor is bound to be of importance regarding the relatively small amount of the known examples of certain kinds of tools. Heavy corrosion and inadequate or lacking restoration has a strong negative influence on the recordability of the objects.

Some compromises in documentation had to be made owing to the vast number of tools having been studied. It was not possible to make a drawing of every single object, so a decision was made to use a digital camera as a faster and more precise recording method. The huge quantities of data to be stored and managed also accounted for the use of a computer database. The first version of Microsoft Access proved to be extremely helpful in managing the data related to particular types of tools.

The structure and results of the dissertation

In the first part of the thesis particular types of tools are presented broken down according to their field of use. In some cases this led to a somewhat arbitrary classification since it is impossible to decide without any ambiguity what kind of material some implements were supposed to work with. At the same time other tools like compasses, *dolabra*s or drills offer several different interpretations. While processing the types of tools the greatest possible attention was given to ancient written and visual resources, especially to data regarding Pannonia.

The beginning of the Roman rule did not seem to draw a clear line from the point of view of smithery. The native Celtic population had both the necessary knowledge and the tools, the shapes of which did not distinguish them from those of the Roman era. The integration and significance of Celtic blacksmiths in Roman Pannonia is clearly represented by tombstones depicting an anvil, a hammer or pincers as some of these stones also show a female figure wearing native clothes. The only archaeologically excavated and published workshop known is in Petőháza, while in the case of the villa in Örvényes there is some uncertain data of the excavation report and the implements found in one of the rooms suggest the practice of the aforementioned activity. This profession must have been present in all the major camps and settlements. The lack of the relevant workshops is primarily due to the fact that the area is scarcely excavated. Of the hoards found in Pannonia two assemblages, the one in Mannersdorf and the other in Tatabánya-Felső-rét-föld, included a high number of smithery tools, the complexity and specificity of which, regarding the particular work procedures, proved a high technical level of craftsmanship.

Casting bronze and other goldsmith activity consist the other field of metallurgy, with their tools being also predominantly made of iron. N. Sey collected and processed the data relevant to the known workshops in Pannonia in her thesis, and according to these data it is clear that there were hardly any implements recovered from the different sites. The range of iron tools pertaining to this trade is relatively small, thus it is normally difficult to define them precisely. In the case of hammers it was easy to distinguish the group of the smaller ones that must have been used by goldsmiths. However, the relevant chisels, punches, prickers and files are usually difficult to determine. Many of them are so simple from the point of view of shape that it is not easy to differentiate them from the similarly formed tools of other crafts. It is easier to identify any implements based on the series of iron tools they make a part of, if the series is found in a well-defined context. Examples of this are Budaörs-Lagermax, Balatonlelle-Kenderföld and Szob-Hidegrét, where it is clearly justified by the numerous tools that metal work was practised at these places, even though the exact site of the workshop is not known.

The large quantities of implements used for woodwork and found in Pannonia are all diverse and varied. Apart from tools related to woodfelling and thus related indirectly to agriculture, these include the more delicate implements of carpentry and joinery. The Romans significantly changed the landscape of Transdanubia, which involved deforestation, among other things. Written sources also report similar processes that took place at the end of the 3rd century AD. Based on complex researches of recent years it can be safely presumed that the emperor's government aimed at increasing the cultivated land and its yield of grain – mainly to the south

of Lake Balaton – during the late antiquity. Obviously, this could not have been achieved without the suitable implements. The tools that must have been used are certainly those pertaining to woodwork and are found primarily among axes and *dolabra*s. Hatchets and axes with square poll and rectangular extensions were replaced by elongated polls towards the end of the Roman era. This new version was more frequent in the inner parts of the empire than along the *limes*. Hence there are quite a number of these among the finds of the internal fortifications, especially at Keszthely-Fenékpuszta. According to all indications the spread of the type in question might well be linked to the processes mentioned previously. The transformation of the traditional *dolabra* form into a pickaxe with opposing blades seems to have occurred during similar changes. The *ascia* was also significantly transformed during the Roman period, though it was unlikely to have had an important role in the deforestation. The original form of a collar-like socket with a hammer part and a refracted blade gave gradually way to another version with a small poll and a subtly curved blade similar to that of the weeding hoe.

As a significant proportion of the implements deriving from Pannonia is comprised of tools for woodwork, it allows us the conclusion that wood, both as a building material and as a material for everyday domestic objects, was of prevailing importance. The assemblage found in Budapest-Szél utca included all the essential tools of a Roman carpenter. The first hoard from Mannersdorf certainly showed the woodcarving implements needed to make a Roman chariot. Available information is insufficient because scarcely any original wooden objects have survived under the climatic conditions of the area in question. Regarding the procedures applied indirect conclusions can be drawn from some data. Thus it was revealing that certain well-researched sites such as Ács-Vaspuszta, Budaörs-Lagermax, Komárom/Szőny-Vásártér produced relatively few iron nails. This leads to the presumption that the period was characterised by the application of wooden joints (without any kind of iron nail or clamp). The drifts included in the Aquincum find mentioned before had been used precisely for these types of joints.

There are very few data concerning the nature and volume of quarrying and stonemasonry done by Romans in Pannonia. Some traces suggesting quarries have been found mainly in the proximity of Aquincum and Brigetio and it is also clear that the stones used for buildings and graves were carved locally. This is testified by the depiction of stonemasonry tools on several gravestones deriving from Aquincum. The number of known implements for stonemasonry is nonetheless relatively low. The small number of pickaxes, hammers and wedges used in quarries is, from a certain point of view, in relation to the fact that a systematic research of Roman quarries has hardly ever been carried out. Mention should also be made here of compasses and trowels used in building sites. Tools like these have almost exceptionally been found in romanised context.

A relatively small quantity of the instruments used for cloth making is represented by iron objects, while two recently identified types of these do bear a great siginificance regarding the whole economic history of Pannonia. By having identified pin-beaters and weft-beaters it was possible to prove the use of vertical two beam looms in the area in question. Supposedly the latter types must have been the ones used to make the sacks in which the increasing amount of grains was exported. Thus these types of instruments can well be considered the indicators of the economic reform mentioned earlier.

Some types of cards and scissors serve as evidence for another field of cloth making, wool industry. Based on the distribution of finds mostly villas must have been the centres of this activity. The cap mentioned by Vegetius as *pilleus Pannonicus* might have been the product of this industry.

According to all indicators the most significant role was played by agriculture in the economic life of Pannonia. As proven above, this is the only economic sector that might have gained some importance in the whole empire during the later period of the Roman era. Objects pertaining to agricultural activities have been discussed in detail by R. Müller earlier, and the picture outlined by him has not changed considerably in the light of the results of the past two decades. At the same time it has become possible to add some new supplementary data to this work.

In order to break the soil of newly acquired arable lands ploughs were used, many types of which might have been in service. According to new data the number of known plough-drawing chains has increased while the proportion, observed by R. Müller showing that only few ploughs were supplied with a coulter or a chain, has not changed essentially. It means that the heavy-duty wheeled ploughs equipped with coulters and asymmetric or asymmetrically fitted ploughshares as well as a mouldboard, did not generally spread. Their importance might have increased in the late Roman era, possibly having been used in a wider area owing to the developments mentioned earlier. The significance of grain growing is well represented by the fact that the iron tool found in the highest number in Pannonia is the sickle which served to harvest the grain. Among its types the prevailing one is a large version with a backward, carved blade fixed by rivets and pricks onto the handle. Dating and spreading of this type of tool cannot be separated within the Roman era although there have been more frequent examples found in the southern part of Transdanubia.

Many of the facts resulting from studying the tools according to their provenance are worth mentioning. Concerning the internal fortifications, for instance, the view that these facilities played a significant role as economic centres along with their defensive function can be perfectly supported. Iron tools found in the Roman camps along the *limes* – especially in those of the Danube Bend – prove at the same time that the military units stationed at these places together with their families settled down in a significantly self-sufficient manner.

The cultivation of grain assumed a leading role also in the life of the villas. The importance of this sector was clearly visible during the research done at the Nemesvámos-Baláca complex, which is the most extensively studied site holding the largest number of tools. These provenances also bear a tangible significance in the cloth making industry. Furthermore it must be noted that the forges, too, and most of the tools related, that we have excavated so far, all came to light connected to villas.

The number of iron tools deriving from rural settlements has started to increase owing to the excavations of the past 20 years. Types of implements linked to the surviving native population can be better identified in relation to the provenances excavated so far. For instance, angular sickles and axes with cases have been found.

The group of tools buried as grave goods is rather restricted; it includes mostly pin-beaters, awls and prickers. The pin-beaters are primarily found in women's graves while awls come to light from men's graves, mainly from around the legs. In some cases we even found miniature tools. Several of the few excavated axes were found in children's graves.

Because of the small number of findings in *canabae* and *vici* beside urban and military settlements it is difficult to obtain a proper view. It is clear, however, that they must have lived a thriving economic life.

Most of the hoards in the area of Pannonia can only be discussed in a limited manner as the circumstances of how exactly they came to light is obscure. Data can be gained regarding also the dates of particular tools based on the characteristic object types of the datable assemblages, such as the one in Budapest-Keled-utca or the findings in Tokorcs. The hoards of Mannersdorf, Budapest-Szél utca and Tatabánya-Felső-rét-föld contained the entire tool set of a particular craft, therefore they have outstanding scientific importance. In other cases we deal with mass finds revealing the level of development of agricultural tchnologies. An example of this is the one in Vindornyafok where a scythe with a tempered blade was found as well as the parts of a heavy-duty wheel plough.

The Roman iron tools found in Pannonia have significantly contributed to the data concerning the economic life of the area. The function of certain types of tools has been clarified and the their spreading within the particular types of provenances has been investigated. More and more data reveals the fact that in the field in question Pannonia shows a considerably different picture from that of the western part of the empire or Italia. Another important duty for the future is to lay sufficient emphasis on the focused, interdisciplinary study of the particular details, self-supporting economic units and minor regions as opposed to the greater picture.

In conclusion it might be worth underlining the fact that the use of database – elements of which are otherwise still in need of development – while writing this thesis made it clear that possibilities of research in this field can be considerably improved by applying the methods of information technology. An online, multilingual database, with a unified system of aspects, commonly uploaded, managed and taken care of by the researchers concerned would represent a real breakthrough in processing and researching the characteristics of the particular types of tools.

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