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TEX-TEC – a record of textile tools at the Natural History Museum Vienna

Introduction

At the first presentation of the project “Textile Tools and Textile Technologies” (Grömer and Schierer 2019), two categories of objects for the research were defined: spindle whorls and clay weights. Spinning threads, and combining two of them to a twined, more resilient yarn is a simple and easily understandable procedure – although it might be difficult to learn. Splicing, an

ancient, and perhaps the earliest, method creating threads, requires no tools (Leuzinger and Rast-Eicher 2011).

On the other hand, all techniques summarised under the term “weaving” should be considered more carefully. In the Neolithic, Bronze Age and Iron Age, people produced not only fine woven cloth on a loom, but also twined fabric and coarse textiles, which were



Fig. 1: Objects of the study from the archives of the Natural History Museum Vienna (Image: Benedict Seidl, © NHM Vienna)

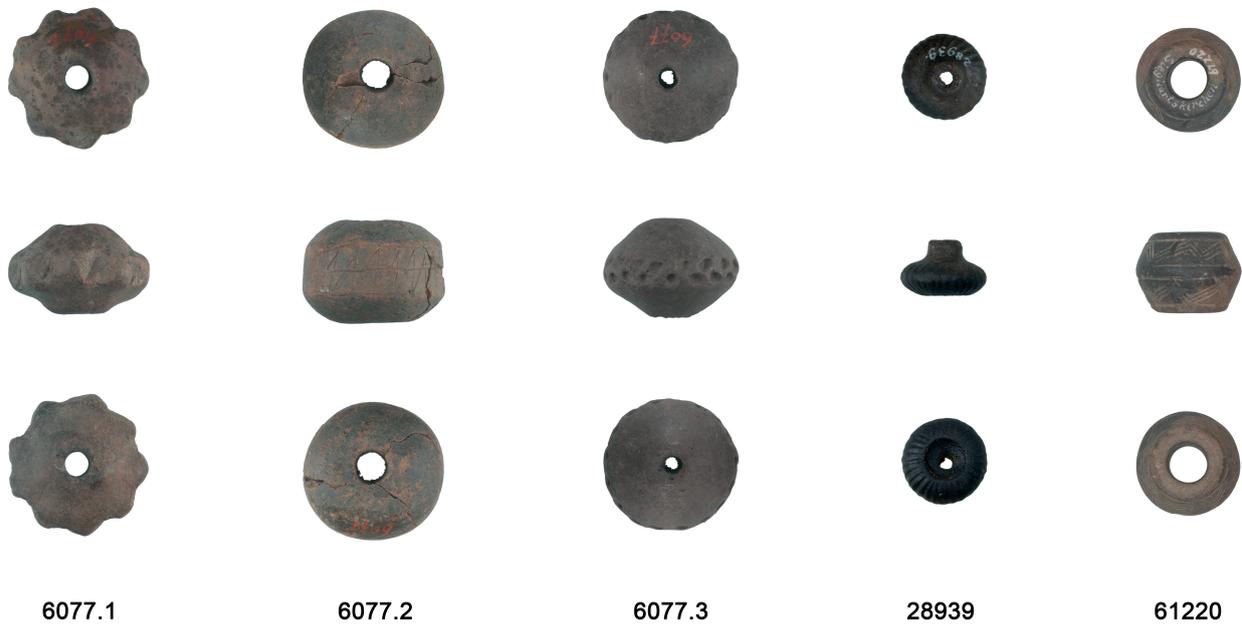


Fig. 2: Examples of spindle whorls from various sites in Austria (Image: Benedict Seidl, © NHM Vienna)

used as household equipment, gear for farming, and animal husbandry, on at yet unknown devices. Many looms do not leave any archaeological traces.

After going through the archive of the Natural History Museum Vienna at the start of the project, a large number of different objects were included in the study (fig. 1): needles, needle boxes, spools, combs, scissors, and other objects of so far unexplained use, but with a presumed connection to textile production (Grömer and Schierer 2019).

The study

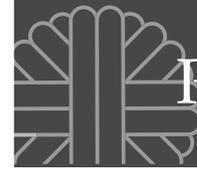
Following other examples of cataloguing spinning and weaving tools (Iancu 2023), this study concentrates on working with objects excavated in the 19th century in the former Austro-Hungarian Monarchy and stored in the archive of the Natural History Museum Vienna (Austria). For a rough overview, it was necessary to look into every drawer and every shelf, searching for tools, that may have been used to produce textiles. So far, 44 storage compartments, each consisting of eight subdivisions, which are again divided into seven drawers and three to five open shelves, have been checked. In approximately 3,500 drawers and shelves, more than 1,500 objects assigned to textile production

are stored. Of these, 900 are spindle whorls (fig. 2) and some 500 are clay weights (fig. 3). Further objects can be dedicated to the other mentioned groups of (perhaps weaving) tools.

More than 4,000 photos of these objects have been taken. Apart from the project TEX-TEC this set of photos and the following ones will be part of the planned digitisation of the whole archive of the Natural History Museum Vienna (Austria).

Simultaneously, the added notes, written in an old form of handwriting, known in German as *“Kurrentschrift”*, were translated. Also, the old entries in the inventory books had to be transcribed into modern typeface. This work is not yet finished, but will be of great importance for scientific studies in the future. With some exceptions, the entries of the scientists in the 19th century were not unambiguous. This means that words such as “object of clay”, “clay ball”, or “sinker for fishing net” were used. The technical terms “pyramid” (pyramidal) and “cone” (conical) are not always used in a modern definition.

Now the research and categorising the types of the objects follow the outlines of the CTR in Copenhagen (Denmark) (Andersson Strand 2011) as closely as possible, but two new categories were added. To get



an idea of the width of a possible loom, the width of the hanging clay weights is also measured: on the level of the hole and at the maximum width when the weight is discoid rounded, and the minimum width, when the weight is pyramidal (especially when the base is rectangular).

It should be pointed out here, that the neutral wording “clay weight” should be used instead of “loom weight”, because as mentioned above, many weights can be seen as connected with the textile production but were probably not used on a loom.

One aim of the project TEX-TEC is to combine the finds/objects with textile techniques, as has been tried in various earlier studies (Quillien and Sarri 2020). Replicas of the weights, considered to belong to a weaving context, will be used in experiments. Hopefully, further studies will lead to new perceptions about the usage. A warp-weighted loom

is one possible way to create a fabric (Demant 2017), but otherwise (heavy) weights may be used standing or hanging in a different manner (Ulanowska 2018). Particular attention is to be paid to the use of (loom) weights when producing textiles in sprang technique and cloth in twining weave.

Another aim of the project is to generate a large amount of data and an overview of the distribution of artefacts (Kneisel 2020).

Statistics

Objects from 68 archaeological sites in Europe are stored in the above mentioned 44 storage compartments in the archive. In Austria there are 48 sites where textile tools have been found. More than ten spindle whorls were found at six sites in Austria – for example, Steinberg bei Ernstbrunn, Großweikersdorf bei Tulln among others, and at



Fig. 3: Examples of clay weights from various sites in Austria kept at the Natural History Museum Vienna (Image: Benedict Seidl, © NHM Vienna)

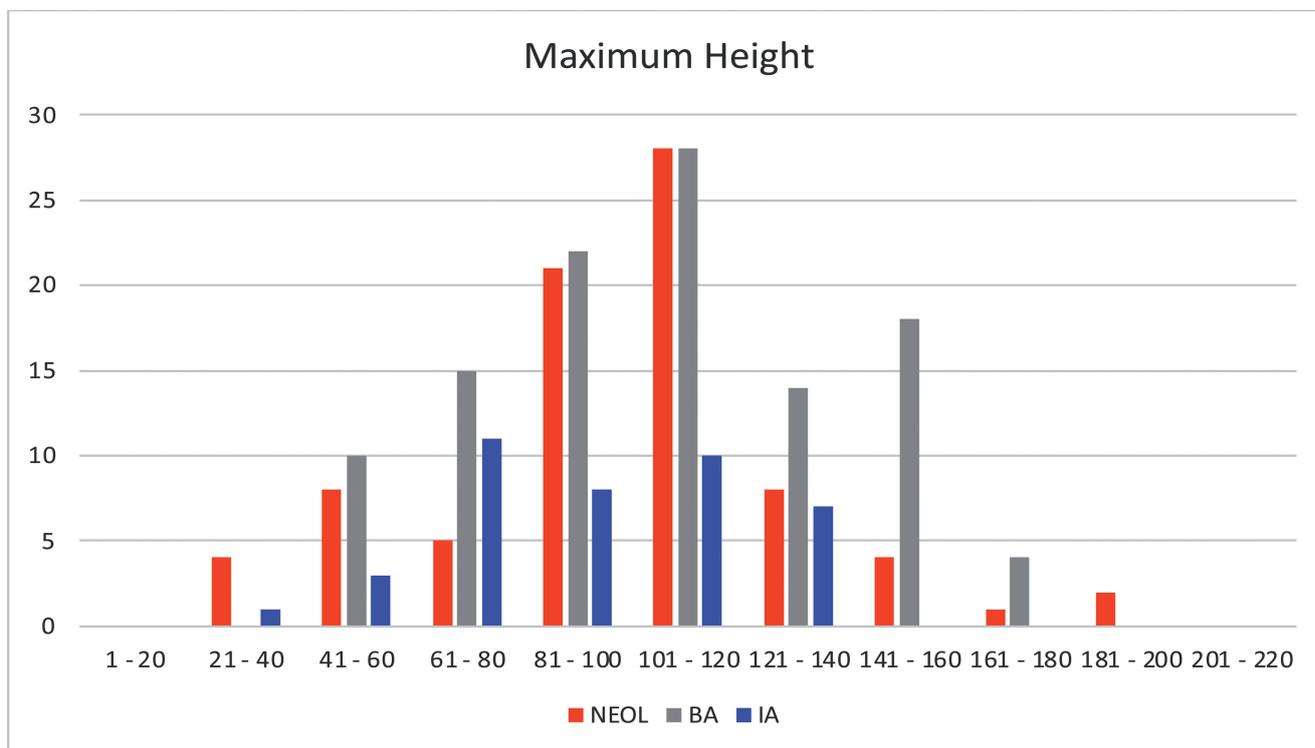


Fig. 4: Clay weights in the archives of the Natural History Museum Vienna: Statistical distribution of maximum height in millimeters; Statistics among weights from sites in Central Europe, Neolithic, Bronze Age and Iron Age (Image: Ingrid Schierer)

14 sites in Europe – for example, Butmir (Bosnia and Herzegovina), Vučedol (Croatia), in the lake dwellings.

A team of students started to carefully mould selected, decorated spindle whorls with soft plasticine in order to obtain 3D images of the decoration.

Up to now, 236 clay weights have been drawn and measured. Find category, type, shape, weight in grams, maximum diameter, maximum height, width, diameter of the hole in millimetres, its position and its shape, the state of preservation of the clay weights, and existing decorations have been recorded. At a later stage, after digitisation is completed, the list with all data will be available online.

The weight of most objects from the Neolithic and the Bronze Age ranges between 401 g and 600 g. The majority of objects weighing between 1,000 g and 1,500 g dates to the Bronze Age (fig. 4).

The maximum height of the clay weights can be determined at 101 mm and 120 mm. The largest diameters in the Neolithic range from 41 to 60 mm and from 61 to 80 mm in the Bronze Age (fig. 5). At present, the information regarding distribution of weight, height, and diameter in the Iron Age is incomplete.

Most of the clay weights have a pyramidal truncated shape (47). Discoid rounded (42) and conical (41) clay

weights have almost the same frequency. The types spherical rounded (ten), spherical ovoid (seven), and cylindrical long are heavily outnumbered, three spools could be registered, and four weights were addressed as “special shape”.

It can be expected that weights with the same inventory number belonged together and were used at the same time. Only one layer consisting of five, six, up to ten or more pieces may represent a loom that stood in this spot. Ten sites show one layer of loom weights – in this case the term is justified – and at least at four archaeological sites more than one layer of loom weights was excavated.

The total weight of some layers was about 600 g, 1,000g, 2,000 g (3x), 3,000 g (2x), 4,600 g, 5,800 g, and 8,300 g. For some layers the weight was averaged. It ranges from 137 g, 143 g, 296 g, 310 g, 324 g, 357 g, 379 g, 406 g, 409g, 450 g, 490 g, 517 g, to 1,188 g. Further studies will be necessary to find out the significance of this data.

First results

Very often **two weights** were found in one spot. It is unknown why. If it can be assumed that really only two weights were used, then the reason must be considered. This will also be a topic for further studies. As a first consideration, they could have been used

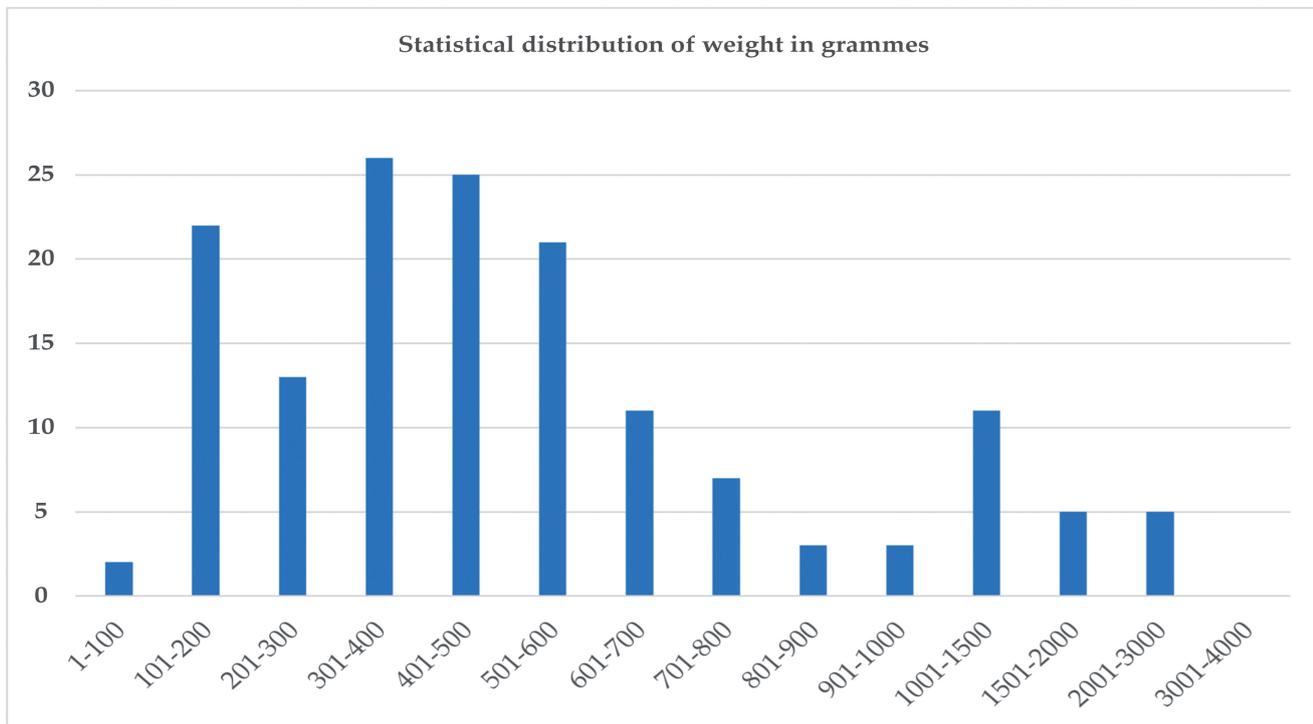
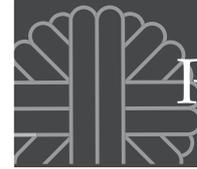


Fig. 5: Clay weights in the archives of the Natural History Museum Vienna: Statistical distribution of weight in grams (Image: Ingrid Schierer)

for weaving a narrow band, using one weight for the even warp threads and one for the odd warp threads. Two weights – especially when they are heavy – at one find context, could have been also used for producing fabrics in twining techniques.

There is no satisfactory solution for the evidence of **single weights**. At eight sites it can be supposed that they were found in settlements; single weights in graves make more sense. But up to now no figures can be given regarding the distribution of single (loom?) weights in settlements.

A very interesting challenge is presented by the so called “giant” weights. They occur mostly individually and weigh about 2,500 g to 3,500 g and more. These single giant weights cannot have hung on a loom with others. There are experiments (Ariis 2020) on weaving with three of them combined and attached on a stick. There are also contemporary, ethnological observations in Africa (Keiblinger, private video, n. d.), where one single giant weight stands on the ground and the weaver pulls the warp horizontal with his/her body. Such a use is also conceivable for prehistory.

Only a few weights are decorated. The decorations are simple, consisting of circles and simple imprints. The crosses and dents on the top of the weights are a different matter. They occur mainly on pyramidal truncated objects. This kind of marking must have

had some significance. The crosses and impressions on a single weight among other unmarked weights of the same type could be seen in connection with a special weaving pattern. The marking makes sense when such a single weight bears only a small number of warp threads and creates a pattern by changing its place during the working process. This is only a speculative idea that may help to understand the purpose of these markings. Another suggestion is that the marked weight was a model for producing similar loom weights. Weight, height, and shape can be taken as a prototype for a large number of weights. But if that was the point, why are only pyramidal truncated objects marked with crosses and dents?

Brief outlook

Interpreting textile tools (especially the clay weights) depends on knowledge of textile technology. Studying textile tools is not possible without studying the production process of fabric; both must go hand-in-hand (fig. 7). Due to preservation conditions, textile artefacts are often found in regions far away from the archaeological sites where the weights were found. The small amount of textile artefacts and/or their small size also hinders a full overview of patterns and of (so far unknown) operating processes on the vertical warp-weighted loom, the horizontal backstrap loom, or

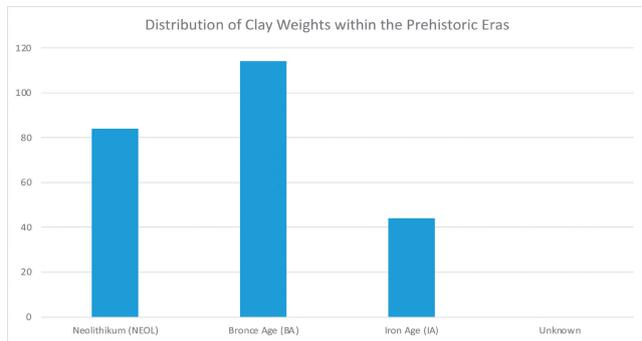


Fig. 6: Clay weights in the archives of the Natural History Museum Vienna, distribution according to different time periods (Image: Ingrid Schierer)

any other device for textile production. Experimental archaeology is an important method employed to discover procedures in practice.

Another open question is the striking evidence of areas where only spindle whorls were found and documented, and areas where only clay weights were found and recorded. This fact suggests trade and a specialised economy from the Neolithic period onwards.

The objects examined in the archive of the museum are old finds from the 19th century. In most cases the circumstances of their discovery are unknown. Modern excavations, where the documentation is more informative, are to be consulted and must be compared with the old finds. The project TEX-TEC is, at first, restricted to the archive of the Natural History Museum Vienna (Austria) but should not stop there. Even the small number of measured and

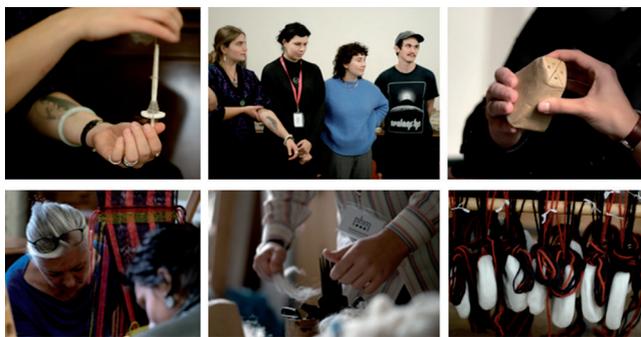


Fig. 7: In addition to the documentation of the archaeological artefacts in the NHM archive, the TEX-TEC team also provides workshops regarding the use of textile tools and the understanding of the fabric production (Images: Benedict Seidl, NHM and Birgit Glocker)

pictured objects brings interesting facts to light. The more data, the more accurate the statistics will be. The discrepancy between the generic assumption that the weights are discoid-rounded in the Neolithic and pyramidal or pyramidal-truncated later is particularly apparent. From the Neolithic onwards a variety of shapes exists; significant differences in size and weight can be recorded up to the Bronze Age. This fact may imply a wide range of interlacing techniques and patterns. In this context, experiments may reveal hitherto unknown techniques. It is commonly known that the width of a loom weight is a determining factor for the width of the whole loom and in the width of the fabric (Mårtensson 2009); discoid-rounded weights hang closer together than broad pyramids. This fact was taken into consideration and a new item named “width/breadth” was added to the measurements. But the fact that weights with a wide base and therefore with a greater distance to the neighbouring ones exist must be included in future research.

For the next academic year, the plan is to continue taking pictures and taking measurements in the other storage compartments of the archive, entering the data into a database. It will be some time before the study will be available online.

Acknowledgements

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