Textile Manufacture in Messapia

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One of the main domestic occupations in any society in Antiquity was that of textile production, from the working of the raw material through the different stages resulting in the end-product itself, the textile. In recent years textile research has gained momentum and has, in some instances, been used to define the economic role textile production had in society.[1]

Current research uses two approaches in the study of ancient textile production. On the one hand, the analysis of the textile tools, in particular loom weights, makes it possible to calculate the warp density and the thread tension provided by a specific set of loom weights.

On the other hand, the study of mineralised, carbonised or calcified textile remains found exclusively in funerary contexts makes it possible to understand directly textile production connected in a specific site. The joint effort of these two approaches allows us to trace the evolution of techniques and technology connected to the influence of the *poleis*.[2]

The springboard for this research has been, without a doubt, the experimental archaeology conducted in Denmark at the *Centre for Textile Research* (CTR), University of Copenhagen and the *Centre for Historical-Archaeological Research and Communication* (CHARC) at Lejre. This has made it possible to gather essential information on the techniques used in spinning and in ancient textile production. Thanks to the study of the parameters of textile tools, for example, it is possible based on the width and the weight of spindle whorls and loom weights found in archaeological contexts, to calculate within a range the quality and the typology of worked textiles.

In calculating the type of textile that can be produced with a specific loom weight, first of all, it is necessary to estimate how many threads that can be attached to it. This depends on the weight of the thread since the sum of the tension applied to the threads, calculated in grams, must correspond to the weight of the loom weight, to which they are attached. Thus, it is not the diameter of the thread itself that determines the required tension but the applied tension which indicates how many threads that can be attached to the loom weight, even though, in general, the wider the diameter of the thread, the more tension it will require.[3] If, for example, we have a loom weight that weighs 200g, we can attach 10 threads requiring a 20 g tension or 20 threads requiring a tension of 10 g. The width of the loom weight determines the number of threads that can be attached to it and in consequence the necessary applied tension. However, it is the relationship between loom weight and the width of a loom weight that determines the textile that is to be produced, as the weight of a loom weight determines the number of threads that can be attached to it and the width establishes the number of threads per cm.

The present contribution focuses on a few Messapian sites where loom weights and remains of textiles have been found, placing them within a more general framework of

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Fig. 1: Loom weights with impression of a fibula.

concurrent contexts in southern Italy. In particular, the loom weights studied adhere from domestic contexts of the sites of Cavallino, San Vito dei Normanni e Muro Leccese, whereas the studied textile remains were found at Oria, Vaste and Muro Leccese.

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A key site for understanding the evolution of the organisation of the Messapian territory is Cavallino, a site that has provided numerous loom weights from domestic contexts dated from the 6th to the beginning of the 5th century BC.[4] The study included 175 loom weights, which were recorded and analysed both from a technical standpoint as well as a decorative. As regards the latter, some loom weights show decorative elements, the so-called *puntinato* decoration, which involves small dots impressed into the clay before firing, and crosses and circles also occur (fig. 1). Even if the reason for the decoration of loom weights remains an open question, if it is personalised or refers to symbols of a particular social status, or if it has to do with the positioning of the loom weights on the loom, it is interesting to note that some decorations are trans-cultural. For instance, the impressed fibula decoration attested to in Messapia at the site of Cavallino and Muro Leccese,[5] also occurs at Selinous in Sicily.[6] Some loom weights show inscriptions, an

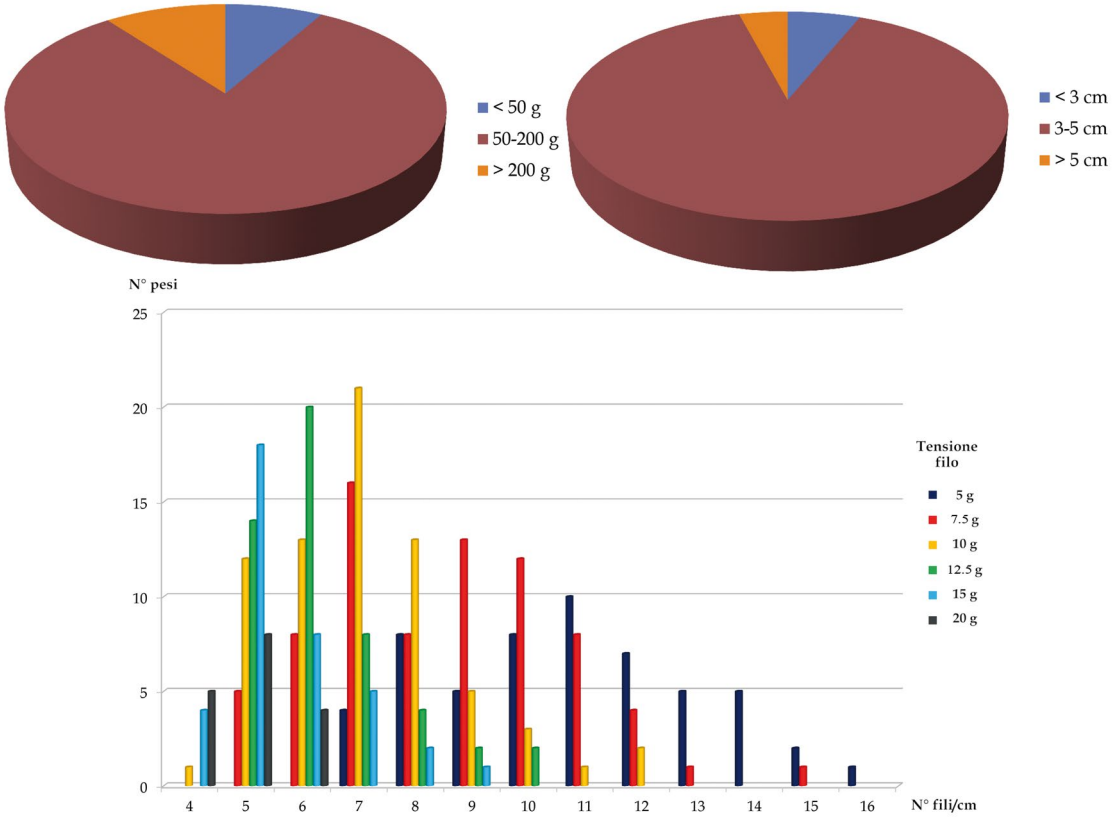

Fig. 2: Dimensions of the loom weights and histogram of fabrics based on the samples found at Cavallino.

example at Cavallino has the alphabetic sign 'A' incised on one face, another shows a possible dedicatory inscription.[7]

Of the loom weights at Cavallino 97 samples were intact and have a weight of between 50 and 200g and a width of 3–5cm.[8] If the CTR method is applied to this documentation, it is possible to calculate, within a maximum range, the density and tension applied to warp threads. The Cavallino loom weights would have applied a tension of 5–20g, which implies a fine or very fine textile depending on the diverse requirements, which the textile was produced for. Concurrently, it seems that the warp was of a relatively low density between 4–5 and 15–16 threads per cm, depending on the tension applied (fig. 2).

Also San Vito dei Normanni, the 'Grande Edificio' excavated by Grazia Semeraro[9] yielded from the residential complex dated to the middle of the 6th to beginning of the 5th century BC, truncated pyramidal loom weights with one suspension hole. The loom weights were recovered in the superficial layers and 39 of these were analysed. With respect to Cavallino they show a more mixed picture weighing between 20–85g.[10]

In addition to the loom weights another type of object, cylindrical in shape and with an oblique perforation, was recovered at Cavallino, San Vito dei Normanni and Muro

Fig. 3: Drawing and replicas of spools of the type found at Cavallino and San Vito dei Normanni.

Leccese.[11] These spools, (rocchetti) were perhaps used as small loom weights, In order to investigate their function further, replicas, based on the dimensions of those found at San Vito dei Normanni and Cavallino, were made by the present author (fig. 3). These have a weight of 20–45 g and a width of 1.5–3 cm. There has been much discussion about their possible function, if these 'rocchetti' were used as small loom weights, in the manufacture of textile decorative elements, or for starting borders attached to the upper loom beam.[12] Experimental archaeology performed together with a colleague at CTR demonstrated that 'rocchetti' would have been suitable for the technique of warp-twining since the oblique perforation creates an automatic stop for the thread thus facilitating the twining procedure.[13] We do not know why these objects disappear at the end of the early Iron Age.

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The systematic analysis of the textile tools and fragments of cloth found in Messapia has shed light on textile production from contexts dating from the Iron Age to the Hellenistic period and has made it possible to compare the data with the results from other sites pertaining to culturally diverse areas of south Italy.

The loom weights analysed thus far were recovered at Cavallino, San Vito dei Normanni and Muro Leccese, The methodologies developed by CTR,[14] have been applied to all the analysed samples, and on textile tools from all the contexts of south Italy studied to date. Their application in those cases, in which a complete set was found in situ, has made it possible to determine the width of the fabric produced: a set of truncated pyramidal weights with a single suspension hole, from a late Archaic dwelling at Kaulonia suggested a weave 90 cm wide,[15] and a set of truncated pyramidal weights with two perforations from the square building of the Heraion near the river Sele, suggested a weave set up for a finished cloth of about 1 meter in width.[16] A set of

discoid weights with two suspension holes found in a 3rd century BC farm at San Biagio alla Venella was probably used to weave a 80 cm wide fabric.[17]

In Messapia, although similar contexts do not occur with which to define the width of any fabric, it is still possible to determine the general ranges related to textile production, as is the case for Cavallino,[18] or to identify one or more sets of loom weights used inside the dwellings.

In this regard, the material from San Vito dei Normanni is extremely interesting because here the presence of two different groups, which may be linked to diverse chronologies, or, more likely, to the weaving of fabrics of different qualities, seems to emerge. The presence of more than one set of weights in domestic contexts was also found at Kaulonia, where three groups of loom weights were identified for different productions,[19] as well as in the so-called *Casa dei Pithoi* at Serra di Vaglio[20] and in the Anaktoron at Torre di Satriano,[21] where two isolated sets were found.

Returning to San Vito dei Normanni, despite the limited number of intact samples, it has been possible to isolate two sets. One of which is of extremely limited dimensions and weight, with a width of 3–4 cm and a weight of 46–87 g (fig. 4a), while the other shows significantly higher values (fig. 4b). Due to these data, the smaller set, with regard to a loom set-up, could have worked in a warp by providing a tension of only 5–7.5 g, while the second one would have given a tension of 10–15 g. In both cases, however, the density of the warp is relatively low as in the case at Cavallino, between 5 and 10 threads/cm in the first set, and between 7 and 11 threads/cm in the second set (fig. 4a. 4b).

These results are comparable with those obtained from a study undertaken in the last three years of the textile tool material from the late Archaic context of Muro Leccese.[22] The loom weights have a width of 6–6.5 cm and a weight of 230–260 g. The thread tension applicable to this group of weights is between 10 and 15 g, with a density that is once again low, between 5 and 9 threads/cm, depending on the tension considered (fig. 5a).

Even the most numerous weights found in the Hellenistic contexts of Muro Leccese provide interesting information, especially in comparison with those of the Archaic settlement of Cavallino. The general ranges identified correspond to 150–350 g for the weight and to 4–6.5 cm for the thickness (fig. 5b). Thus, their sizes are generally larger and heavier than those of Cavallino and a tension of between 10 and 20 g would have been applied to the yarn stretched with these weights, as such being comparatively higher. Despite this, even in the Hellenistic contexts of Muro Leccese the loom weights point to a low warp density, with a number of threads/cm between 4 and 15 depending on the tension.

To better understand why there is this homogeneity in the low density of the warps and what could be produced with the loom weights of the various contexts, a highly significant discovery are pieces of mineralised textile found in some 4th century BC burials of Vaste and Muro Leccese as well as an imprint of cloth from a 9th century BC context from Oria.

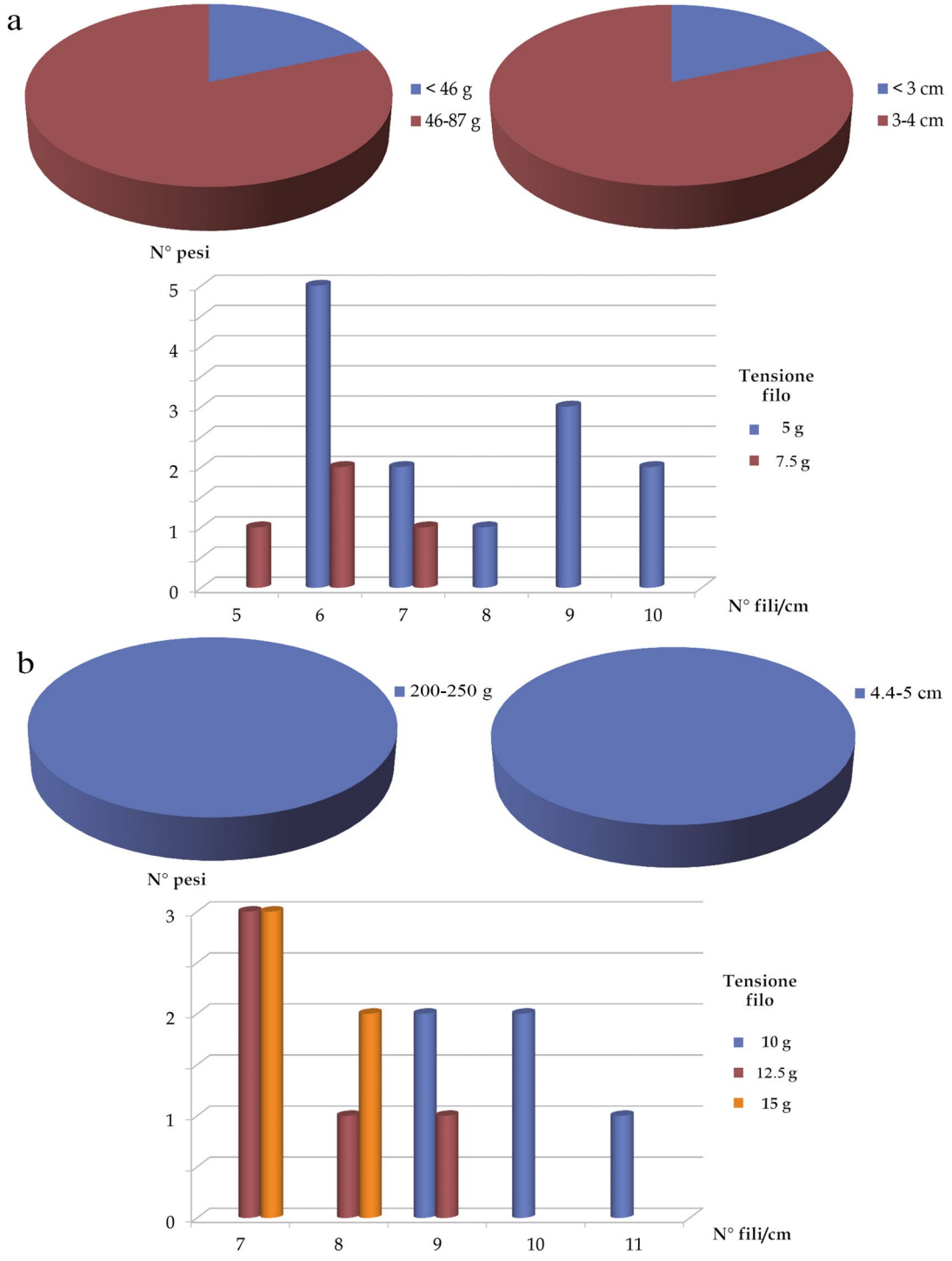

Fig. 4: Dimensions of the loom weights and histograms of fabrics based on the samples found at Vaste.

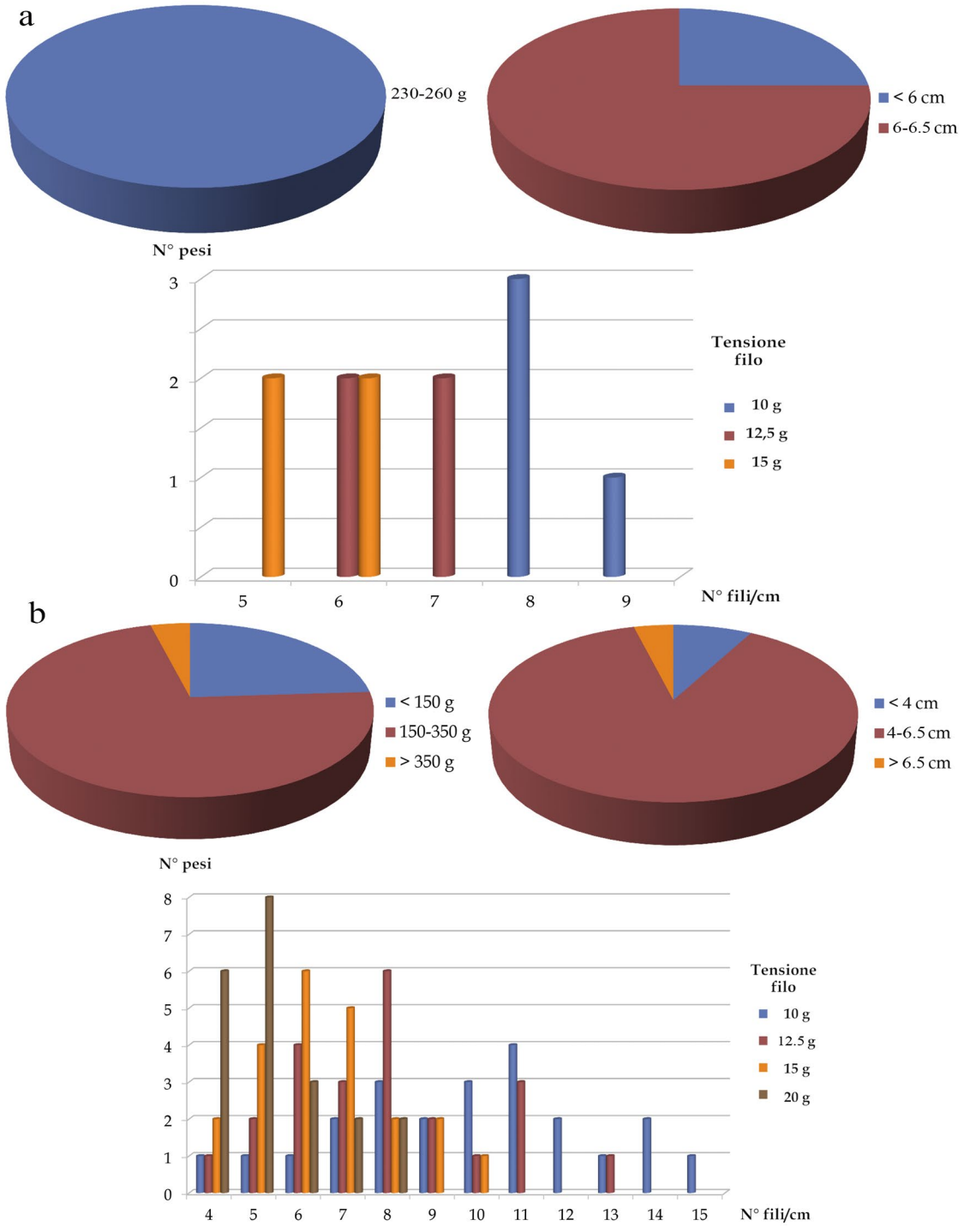

Fig. 5: Dimensions of the loom weights and histograms of fabrics based on the samples found at Muro Leccese.

These textiles produced during the Iron Age are balanced or unbalanced tabbies and twills. A tabby is a woven cloth where the threads of the warp intersect perpendicularly and alternately, with those of the weft. It is balanced when the warp and the weft have the same density that is the same number of threads per cm. Twills are instead more complex cloths and do not have the same diffusion as the tabbies. To date, twills have in fact never been found in Greece, while they are well attested to in Italy, as well as in Austria, Switzerland and Spain.[23]

The imprint of Oria is a negative, involuntarily affixed to the outer part of a locally produced undecorated crater (fig. 6). This find, as yet unpublished, is very important both in terms of the dating, but also because, thus far, it is the only evidence of an imprint of cloth, found on pottery in Italy. The impression shows a tabby folded in several places.

The negative of the fabric was analysed with a polarized light-microscope, which gives an accurate measurement of the warp and weft densities, as well as measuring the average diameter of the yarn used (fig. 6). The number of threads/cm of both the warp and weft is 12–14, while the thread diameter is of 0.4–0.5 mm. Although the depth of the impression is, in some parts, visible, it has not been possible to determine the thread twist.

As a general point of view, it can be highlighted that the fabric of Oria was of a fairly fine quality with a relatively low warp density, virtually corresponding to the results obtained from the study of the loom weights discussed above.

The textiles found at Vaste and at Muro Leccese belong to the Hellenistic period. Fragments of mineralised cloth were found on iron fibulae in Fondo Melliche at Vaste, in tomb 555 and in two deposits, 562A and 585 (fig. 7).[24] These are very small fragments, the largest of which is just over 2 cm wide. They were all found in contexts dated to the second half of the 4th century BC. Despite their extremely small size, they provide indispensable information for a full understanding of the production techniques and the fabrics produced.

Cloth found in archaeological contexts has usually been preserved through calcification, carbonisation or, more frequently, mineralization, which occurs when the fabric is in contact with metal objects, as is the case for the Messapian textiles. The corrosion of bronze, copper or, as in this case iron, involves the transfer of metal onto natural fibres, which decompose, but keep the morphology and the external dimensions almost unaltered.[25]

Returning to Vaste, the three textile fragments are unbalanced, weft-faced tabbies. The weft-faced tabby has a low density in the warp and a decidedly higher number of threads/cm in the weft.[26] This type of cloth never appears, at least to date, in contexts prior to the foundation of the Greek *poleis*, while it is well attested in Greece, even in the Iron Age. The spread of these tabbies is common not only to Messapia, but also to other indigenous contexts: the examples of the Ripacandida textiles, dated from the mid-6th to the mid-4th century BC can be mentioned,[27] and also a calcified cloth found on two slabs of a tomb at Paestum together with mineralized cloth on several fibulae.[28]

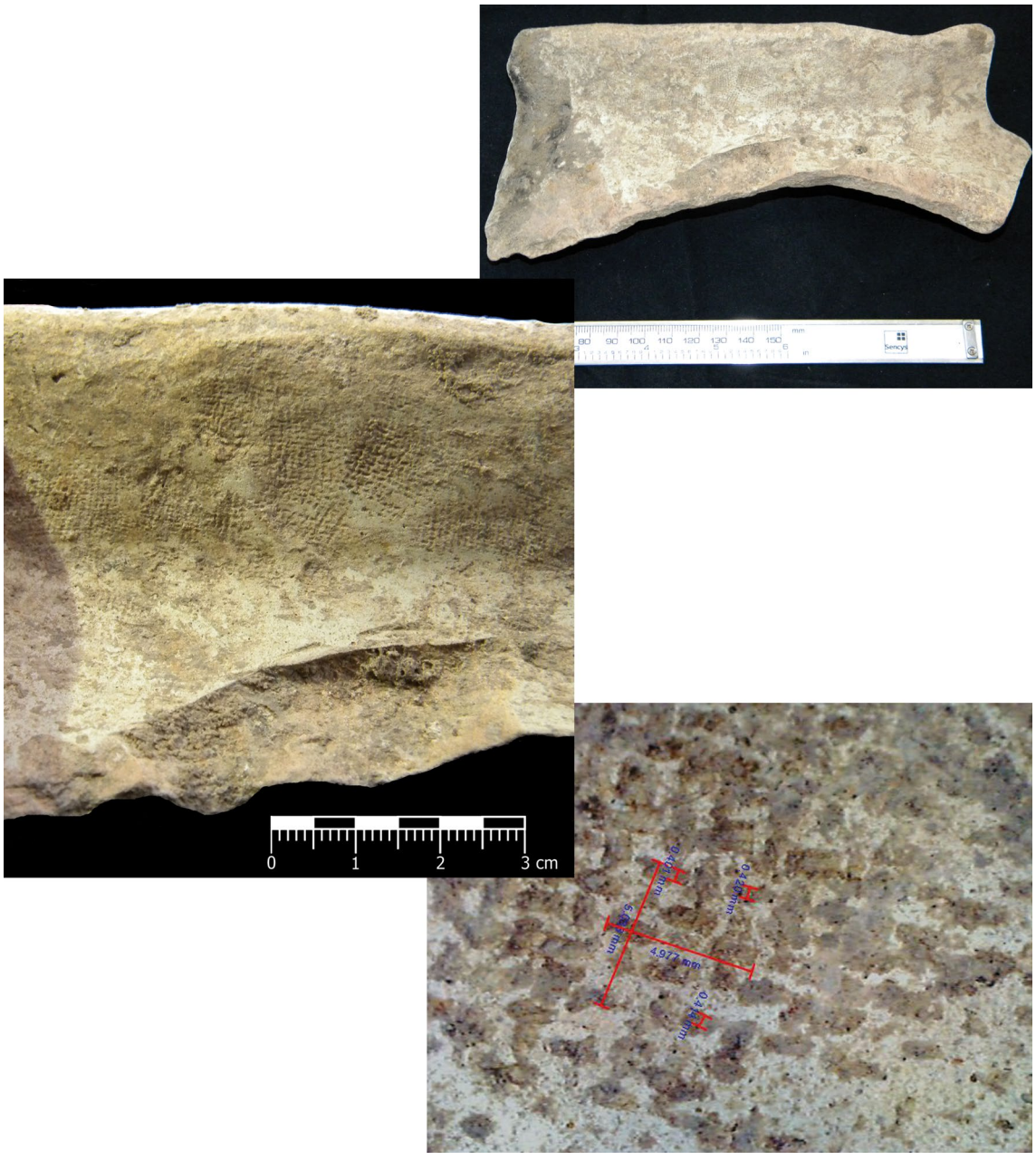

Fig. 6: Imprint of cloth from Oria.

Examination of the samples using a polarized light microscope established that the tabby found in tomb 555 at Vaste has 20–22 threads/cm in the warp and 36–38 threads/cm in the weft (fig. 7). No selvedges are preserved, so it is impossible to make a definitive identification of the direction of the warp and weft. However, since the warp usually has a lower density than the weft it is therefore possible to distinguish them. The subsequent step involved measuring the average diameter of the yarn, which measures 0.20 mm

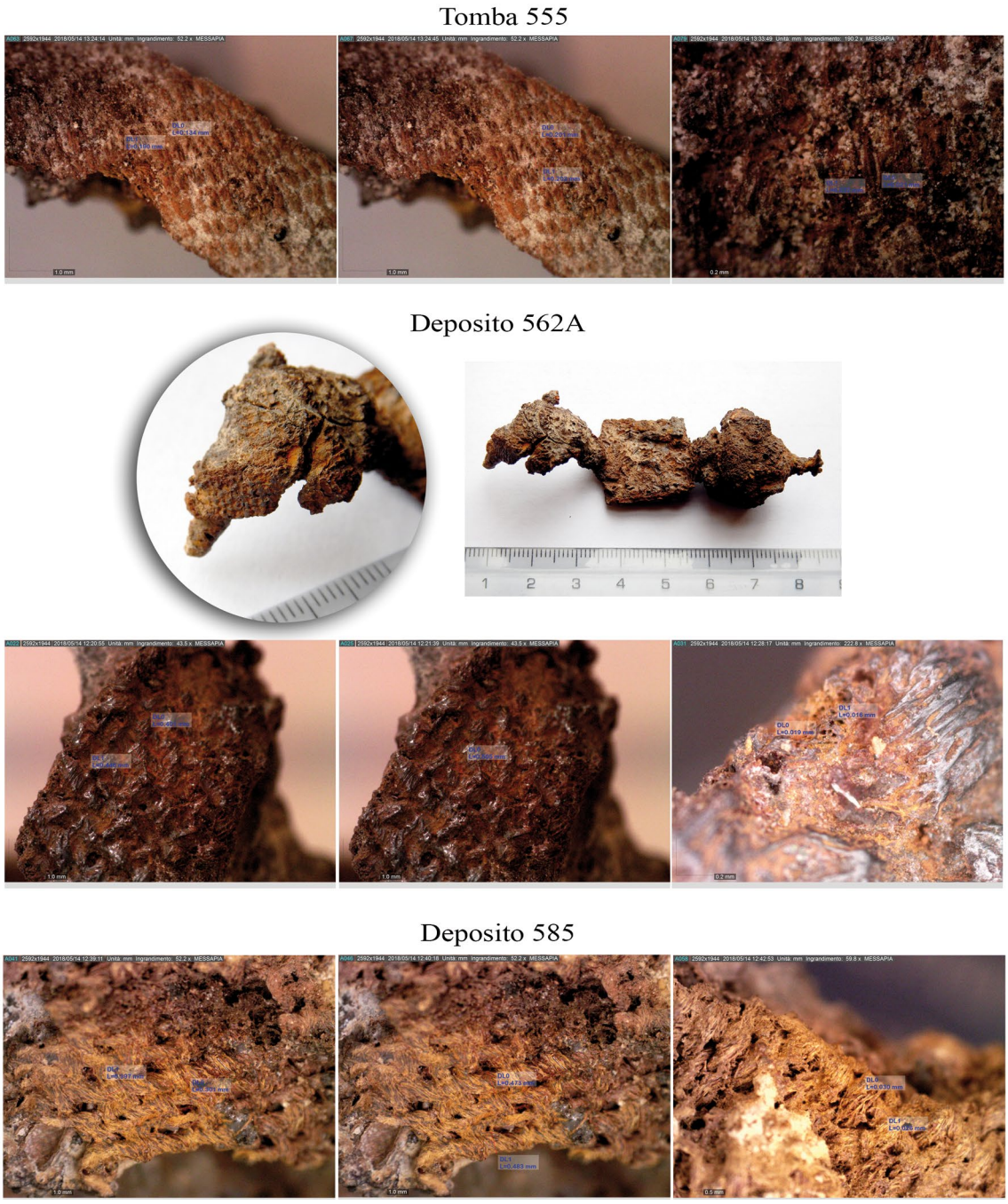

Fig. 7: Mineralised cloth from Vaste.

for the warp and 0.13–0.19 mm for weft, which are much more numerous. The yarn is Z-twisted both in the warp and in the weft, but twisting is more evident in the warp threads and is barely visible in the weft.

Fig. 8: Mineralised cloth from Muro Leccese.

Moreover, the other two preserved samples have similar characteristics but show a thicker yarn (fig. 7): the tabby of the 562A deposit has 13–14 threads/cm in the warp and 23–24 in the weft, with 0.50 mm thread in the warp and 0.40–0.45 mm in the weft; the fabric from the deposit 585, counts 18–20 threads/cm in the warp and 24–25 in the weft, with threads of 0.45–0.50 mm in the warp and 0.30–0.40 in the weft. In both cases it was not possible to determine the yarn twist.

However, the three pieces of textile fragments found at Vaste, probably a funerary shroud, are in wool of exceptional quality, whose fibres have, at first glance, a diameter of between 10 and 30 microns. The assessment of the fibre quality is based on the measurement of the diameter of 100 hairs per yarn and on statistical evaluations resulting in a distribution histogram. The only study so far conducted in south Italy using a Scanning Electron Microscope (SEM) is on a calcified textile from Paestum, in which the diameter of the fibres never exceeds, except in two cases, 40 microns. Comparing the results of Vaste with these, it is evident that the quality of the wool is excellent. This approach from an archaeozoological point of view can also be very useful, in shedding light on the selection of the breeds and the quality of their fleece. In any case, further investigations on the Messapian textiles will be done with a SEM.

Moreover, the textile found in 2017 in a funeral deposit at Muro Leccese is a weft-faced tabby (fig. 8). The mineralised fragment is found on an arrow point, which presents traces of the tendons on the tang, which were used to tie it to the shaft. In this case, therefore, it should not be a piece of the outfit. The textile of Muro Leccese has 11–12 threads/cm in the warp and 16–17 in the weft, with 0.45 mm thread in the warp and 0.45–0.50 mm in the weft. Also in this case it is possible to verify how the quality of the wool is excellent, with fibres of about 20 microns.

It emerges from these first studies that the Messapian fabrics are of a good quality, made with a relatively fine yarn and probably with wool of an excellent quality, as raw material. The low density of the warps, which corresponds with the data processed through the analysis of the loom weights, mainly suggests the production of weft-faced tabbies.

Therefore, it is possible, to begin to shed light on the techniques used in textile production, but still a lot remains to be done, since we have no information about decoration or colouring. The chance discovery in a semi-chamber tomb of the 4th century BC partially looted at Ordona,[29] of a textile finely decorated with geometric patterns in excellent condition, demonstrates how rich the decoration of some funerary costumes could be and how restricted our knowledge about productive aspects is.

This initial research makes it possible to compare, in terms of quality, the different productions. At the moment, the sample found at Taranto shows the best quality based on the analysis of both loom weights and the textile itself, stored at the Archaeological National Museum of Taranto, which allows us to confirm the quality of the cloth,[30] well attested to in the Archaic period thanks to a rich literary, epigraphic and numismatic tradition but which is still poorly investigated.

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Notes

[1] We thank the session organisers Professors D'Andria and Semeraro for their kind invitation to present our work at the conference.
[2] For a recent view see Gleba et al. 2018.
[3] Experiments have shown that optimal results are obtained with a density of between 10 and 30 threads per loom weight. (Mårtensson et al. 2009; Andersson Strand 2012; 2013; 2014; Andersson Strand et al. 2015). However, research conducted in South Italy with re-calculations of the database show diverse values and inferior density; Meo c.d.s.
[4] Preliminary data are presented in Landenius Enegren 2015.
[5] One example is exhibited in the Municipal Museum of Muro Leccese.
[6] Quercia – Foxhall 2014, 95 fig. 6.
[7] Pancrazzi 1979, 190 fig. 73,8; Santoro 1982, 166 f. For a discussion of inscribed loom weights see Agostiniani et al. 2015, 66–69 with further ref.
[8] Landenius Enegren 2015, 133.
[9] Semeraro 2009; 2014; Semeraro – Monastero 2011.
[10] Landenius Enegren 2015, 134 f. fig. 14.
[11] For Cavallino and San Vito: Landenius Enegren 2015, 131 fig. 7. 135 fig 16; for Muro Leccese: Meo 2011, 19.
[12] Gleba 2008, 145 fig. 100, n. 1; Landenius Enegren 2015, 135.
[13] I thank Ulrika Mokkdad for her expert help in the experiment and Anna Waern-Sperber for productive discussions. For the technical aspects see Staermose-Nielsen 1999, 52 f. fig. 29A.
[14] See footnote 2.
[15] Luberto – Meo 2017.
[16] Ferrara – Meo 2016; 2017.
[17] Meo 2015, 315–319.
[18] See above.
[19] Luberto – Meo 2017.
[20] Preliminary data are given in 'A Focus on Textile Production in Lucania in the Hellenistic Period', published in the proceedings of this congress.
[21] Quercia 2018.
[22] Meo in press.
[23] Gleba 2017.
[24] D'Andria 1990, 80. 107–109. 132.
[25] Chen et al. 1998.
[26] I thank Giovanni Mastronuzzi and Valeria Melissano for their kind availability during the analyses of the textile fragments from Vaste, stored in the Municipal Museum.
[27] Gleba et al. 2018.
[28] Meo – Gleba 2017.
[29] Catalli et al. 2018.
[30] Meo 2018. Taranto was also important for its shellfish purple-dye production; Meo 2017.

Image Credits

Fig. 1. 6: H. Landenius Enegren. – Fig. 2. 4–5. 7–8: F. Meo. – Fig. 3: H. Landenius Enegren; drawing: F. Malinconico.

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