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A Stitch in Time

Essays in Honour of Lise Bender Jørgensen
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Preface

The idea for this festschrift began with Antoinette Rast-Eicher, who compiled the list of contributors and participated in the early stages of producing the volume. Unfortunately she was unable to contribute to the main work with the volume due to other commitments. However, we want to thank her for her initiative.

This book could not have been printed without the financial support from Sparebanken Midt-Norges gavefond til Norges Teknisk-Naturvitenskaplige Universitet; Department of Historical Studies, Gothenburg University and the Department of Historical Studies, Norwegian University of Technology and Science. Dr Kristin Bornholdt Collins consulted on language-related issues and assisted with proofreading and revision, and we are grateful for all her help and language support through the various stages of producing the book. We would also like to thank Ragnhild Berge for helping us in Trondheim; Lena Hammarlund for consultations on terminology; Ulla Mannering for tracking down photographs of Lise; and Karina Grömer for providing an excellent opportunity to present the book.

There is no Tabula Gratulatore in this book; this is due to Lise’s vast network of colleagues and friends within so many fields and countries. How could we possibly reach them all, and where would the line be drawn? It therefore seemed preferable to concentrate on the actual content, and to produce a worthy tribute honouring Lise for decades of hard work and her important role as a pioneer in textile research. It comes with heartfelt gratitude, admiration and best wishes from all of her colleagues and friends, naming none but including all.

With this festschrift, the editors, authors, colleagues, friends and all the individuals at supporting institutions wish Professor Lise Bender Jørgensen a somewhat belated Happy 65th Birthday. The opportunity to present the book at the 2014 NESAT conference was too good to be missed.

Gothenburg and Drammen, 2014-03-03
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Of Lise Bender Jørgensen’s many valuable contributions to archaeology, her catalogues of Scandinavian (1986) and North European (1992) archaeological textiles are among the most significant and long lasting. At the time of writing, little was known about the prehistoric textiles of Italy and comparative material from South Europe included less than ten Italian sites where textiles have been found. Since the more than two decades following Bender Jørgensen’s publications, archaeological textiles of Italy number in hundreds if not thousands, filling a gap in the European textile corpus. As a tribute to and continuation of Bender Jørgensen’s groundbreaking work, this contribution provides an overview of the archaeological textiles of Italy known today from prehistory through the Roman period.

Italian archaeological textiles
Although various conditions of textile preservation are present in Italy, textiles surviving in their original and complete form are quite rare (Rottoli 2005). The largest corpus consists of linen textile fragments found in various Neolithic and Bronze Age sites in the north of the peninsula, where they have been preserved by the alkaline conditions of the Alpine lakes. Wool textile fragments, on the other hand, have been recovered from burials, where they were conserved in waterlogged environments. A few Iron Age clothing articles were recovered from an Alpine glacier (Dal Ri 1996; Bazzanella et al. 2005). Meanwhile, charred or carbonized textiles of the Roman period have been preserved as a result of the eruption of Vesuvius (D’Orazio et al. 2000). The vast majority of archaeological textiles in Italy, however, has been preserved in association with metal objects and survive in the shape of often minute, mineralized traces.

The following overview of Italian archaeological textiles is certainly far from exhaustive, but it demonstrates the large number of textiles that have survived in Italy, allowing researchers to examine the corpus of extant material in relation to its technical and functional parameters. The focus is on recent finds and only the analysed textiles will be presented in detail, although many more fragments, particularly those preserved on metal artefacts, await study (for a more extensive catalogue and bibliography of the pre-Roman material, see Gleba 2008).

Neolithic (6000-2300 BC)
Some of the oldest textiles in Italy have been found in the submerged Neolithic settlement of La Marmotta in Lake Bracciano, 14C-dated to 5480-5260 BC.
The threads and textiles are presumably made of flax. Although final analyses of the material have not been published, the finds demonstrate that flax-based textile technology appears to have been present in Italy by the early Neolithic.

**Bronze Age (2300-1000 BC)**

The vast majority of the prehistoric Italian textiles come from northern Italy and have been dated to the third and second millennia BC (Rast-Eicher 1997; Bazzanella et al. 2003).

Charred linen tabby fragments woven in S2z yarn as well as numerous cordage examples were found at Lucone di Polpenazze, dated dendrochronologically to the Early Bronze Age (Bazzanella et al. 2003:186-193). The thread count of the textiles is approximately 10-12 threads/cm in both warp and weft. Some of the fragments preserve fringes and one has been mended in antiquity. A recently excavated fragment also preserves a possible starting border in rep, which is 10-12 threads wide and has about 24 threads per cm in weft (Fig. 1; Gleba & Baioni in press).

More than 20 fragments of what appears to be the same open tabby textile made of z-twisted plant fibre (exact nature remains to be identified) were found folded at Valle delle Paiole, and are dated to the Early-Middle Bronze Age (Bazzanella et al. 2003:198). The thread count ranges 3-6 threads/cm.

![Fig. 1 Linen textile from Lucone di Polpenazze, Early Bronze Age (Photo: Margarita Gleba, reproduced with kind permission of the Soprintendenza per i Beni Archeologici della Lombardia).](image-url)
Numerous textiles found at Molina di Ledro have been cited extensively for their technical complexity and similarity to the Swiss Neolithic textiles (Bazzanella et al. 2003:161-174; Bazzanella & Mayr 2009). Unfortunately, they were not excavated stratigraphically and are hence rather broadly dated to the Middle-Late Bronze Age. The majority of the surviving fragments are of fine linen tabby woven of S2z-twisted yarn, with diameters 0.4-0.6 mm. One of the textiles is decorated with tiny seeds sewn on like beads (Bazzanella & Mayr 2009:52-54). At least two of the fragments are narrow strips over 2 m long and were found rolled-up in bundles (Bazzanella et al. 2003:161 no. 5 and 162 no. 6; Bazzanella & Mayr 2009:41-46). The ground weave of one of these strips is tabby but the two ends of the cloth had been woven with a pattern of concentric abutting lozenges formed with a technique similar to twill.

The earliest Italian textile entirely made of wool was found in the Terramara of Castione dei Marchesi, and is broadly dated to the Middle-Late Bronze Age. The fragment is a tabby woven in z-twisted wool, with 8/6 threads/cm and thread diameter of 1.3 mm (Fig. 2; Bazzanella et al. 2003:200). The wool fibre has been analysed and is composed of very fine underwool and a few much coarser hairs reaching up to 90 microns in diameter, demonstrating that the sheep had not yet achieved a high degree of selection for particular wool quality (Rast-Eicher 1997, 2003, 2005:127, and 2008:136; Gleba 2012:3647-3648).

Fig. 2 Wool textile from Castione dei Marchesi, Middle-Late Bronze Age (Photo: Margarita Gleba, reproduced with kind permission of the Soprintendenza per i Beni dell’ Archeologici Emilia-Romagna).
In addition to these organically preserved examples, mineralized textiles are known from several sites, again mostly from northern Italy. A tabby is preserved on a weapon from a hoard reportedly discovered between Montemerano and Saturnia, and dated to the Early Bronze Age based on the typology of the object (Gandolfo 1981:362-365). A linen textile has been identified on a Bronze Age bronze object from Olmo di Nogara (Rottoli 2005:79; Castiglioni et al. 2005). Another mineralized textile was preserved on a fibula at Somma Lombardo, dated to the Late Bronze Age (Castiglioni 1995; Rottoli 2005:79).

One of the few prehistoric textile finds from southern Italy is a metal weapon with traces of an open tabby woven in S2z-twisted hemp yarn with thread diameter of 0.2-0.45 mm, found in Tomb 6 at Gricignano d’Aversa and dated to the Final Eneolithic-Early Bronze Age (Bazzanella et al. 2003:210).

The majority of surviving Italian Bronze Age textiles appear to be balanced tabbies in linen, woven in S2z yarn, the latter being characteristic for the Early and Middle Bronze Age Swiss textiles. The technique of yarn production may need to be reappraised, as recent evidence shows that the yarn during the Neolithic and Bronze Age in Switzerland was made by splicing and plying spliced yarns together, like in Egypt, rather than by draft spinning (Leuzinger & Rast-Eicher 2011). Other plant fibres, including hemp and tree bast, were used for woven and non-woven textiles. The only surviving wool textile is a coarse tabby made in thick z-twisted yarn. Textiles could be decorated with more complex weaving techniques, fringes and applied seeds. Rep borders are typical for the tabby textiles from the Neolithic and Bronze Age periods excavated in northern Italy and in Switzerland (Médard 2006, 2010).

Iron Age (tenth-first centuries BC)
In the first millennium BC, textile finds are more evenly distributed throughout the Apennine peninsula.

Northern Italy
Several finds of organically preserved textiles from northern Italy provided much new information regarding Iron Age textile technology in the area, which was inhabited by Etruscan, Venetic and, later, Celtic peoples. Six nearly complete articles of clothing, two pairs of leggings and a pair of inner shoes, were found in a glacier at Vedretta di Ries/Riesenferner, and 14C-dated dated to 795-466 BC (Fig. 3; Dal Ri 1996; Bazzanella et al. 2003:179-182 and 2005; Rottoli 2005: 73). Different weaving techniques were employed in the making of these textiles: the under-leggings are made in s/s tabby with 18/7 threads/cm, the over-leggings are in diagonal or herringbone Z2s/Z2s twill with 8/7 threads/cm, while the shoes are in 2/2 Z/s twill with 12/8 threads/cm. The
Vedretta di Ries textiles were sewn together, in some cases from several pieces of different fabrics. Numerous mends are also clearly visible, indicating the reuse of textiles that once constituted larger garments.

Another relatively recent find is a wool sock or a shoe lining measuring 15x7 cm from the urban excavations of Largo Europa in Padova, dated to the fifth century BC (Maspero 1998:63, fig. 20). It is a rather coarse tabby with c. 10/14 threads/cm, woven in z-twisted yarn. Wool analysis has shown that the textile was made of very fine fibre with hairs and kemp completely absent (Gleba 2012:3650).

Contemporary with the textile from Padova and from the same cultural area is a wool textile fragment from the site of Este, Via Gambina, dated to the sixth-fourth century BC (Fig. 4). This textile fragment measuring 8x12 cm is another relatively coarse balanced tabby with c. 10/10 threads/cm, woven in z-twisted yarn. In contrast to the Padova example, the wool of this textile has a coarser quality, suggestive of a different type of wool and possibly sheep (Gleba 2012: 3653).

Some of the most spectacular Italian Iron Age textile finds have been found over the past decades at Verucchio, in the northern Adriatic region of Italy. Among
them are virtually complete male and female garments including mantles and tunics in wool. The publication of the textiles found in male Tombs 89 and 85 has provided the first glimpse of this sensational material (Stauffer 2002, 2003, 2004 and 2012; Ræder Knudsen 2002, 2012); textiles from the female tombs are being currently analysed. The eighth-century BC Tomb 89, also known as the Tomba del Trono, a richly appointed cremation burial of an important male personage, contained over 160 textile fragments that were preserved by the cremation process, as well as two mantles and what was probably a tunic-like garment, which survived almost intact. The mantles are of very fine wool (cf. Gleba 2012: 3650), woven in 2/2 twill, with groups of s and z spun single yarns in both directions (‘spin-pattern’) and coloured red, with borders dyed blue. The thread counts in both tunics average 22-26/12-16 threads/cm. The tunic-like garment, also made of wool, was woven in 2/2 twill with 19-20/14-16 threads/cm. It was also ‘spin-patterned’ and dyed red with red borders. Both mantles have elaborate borders made by the tablet weaving technique and featuring a triangle motif and three horizontal lines (Ræder Knudsen 2002 and 2012; also see in this volume). Among the numerous fragments preserved in the cremated remains, most of them twills with varied spin effect, there are some pieces that are very fine and dyed red or blue. One of the fragments is decorated in soumak technique and another is looped (Stauffer 2003). The presence of hundreds of amber and glass beads and other decorative elements indicates that many of
these textiles were luxuriously decorated. Some of the Verucchio textiles bear traces of regular folding (Stauffer 2012:250), confirming that Etruscan artistic representations of garments, like those seen in the painted tombs of Tarquinia (cf. Steingraber 1986 and 2006), are accurate depictions of contemporary practices.

Numerous mineralized textiles are also known (Gleba 2008:48). For example, at Monte Bibele, fourth-third century BC Celtic burials yielded mineralized textile fragments on 26 metal objects from 15 burials (Moulhérat 2008). The yarns are invariably z-twisted and occasionally S-plied. Thread counts range from 6/8 to 36/40 threads/cm. Textiles include balanced and weft-faced tabbies, as well as a few 2/2 twills. The materials include wool, linen and mixed. The predominance of z/z tabbies at the site corresponds well to contemporaneous Gaulic sites in Central Europe, indicating standardization of textile production (Moulhérat 2008:94).

Central Italy
Large numbers of textile finds are known from central Italy, an area associated with Etruscan, Faliscan, Picene and Latin cultures, although few of these have been analysed. Rich Etruscan burials in particular have produced numerous textiles.

Bender Jørgensen described in her catalogue (1992:105-106) the material from Sasso di Furbara near Cerveteri, a large number of wool textile fragments which were retrieved in 1953 at the Caolino necropolis after being found by construction workers in a wooden monoxile boat, interpreted as a cenotaph (Masurel 1982; Mames & Masurel 1992). The boat was 14C-dated to the eighth century BC, which is consistent with the stylistic dating of the materials found in the surrounding necropolis (Brusadin Laplace & Patrizi Montoro 1982). More than 60 fragments survive, which were differentiated by Masurel into seven fabric types. The textiles are currently conserved under glass at the Pigorini Museum in Rome, Italy. The textiles preserve some of their original colour and recent dye analysis of a few samples identified likely use of madder and woad.

Textiles made of animal and plant fibre were excavated in several tombs at Casale Marittimo, dated to the eighth - sixth centuries BC (Esposito 1999:41 fig. 31, 68-69 fig. 65, 71 fig. 67 and 93-94). In Tomb G, an iron dagger and an axe were wrapped in wool rep, while food offerings were covered with linen tabby with 10/10 threads/cm woven in – unusually – S-plied or possibly spliced yarn, a remnant of the Bronze Age technology. In Tomb A, a bronze cinerary urn contained textile remains that probably served as wrapping for cremated bones.

Mineralized textiles were found on two iron spear counterweights from Tombs 1 and 4 at Poggio Aguzzo, Murlo in central Italy dated to the early seventh century BC (Tuck 2009). The textile from Tomb 4 is a relatively balanced tabby woven in single-spun z-twisted yarn of medium twist. The yarn measures c.
0.4-0.5 mm in diameter in both systems. The thread count is about 18-20 threads/cm in both systems. Tomb 4 contained two iron spear counterweights, each preserving traces of a textile. One of these is a twill, most likely a simple 2/2 twill. The thread measures about 0.4 mm in both systems and is single, medium z-twisted. The thread count in both systems is about 20 threads/cm. The second textile is a tablet weave made using at least 17 tablets alternating 3Z3S with about 12 tablets/cm (Fig. 5). The threads are single z-twisted and measure about 0.3 mm in diameter.

A mineralized fragment of plain z/z tabby weave was found adhering to the bottom of an oinochoe of a sixth-century BC Italo-Corinthian style attributed to Orvieto (Hayes 1977: 144). This completely calcified fragment is probably part of a cloth on which the jug was placed or in which it was wrapped. The Etruscan city of Chiusi produced another completely calcified textile fragment found inside a clay burial urn, now in the Royal Ontario Museum, Canada (Hayes 1977:144). The latter fragment is unusual in being of a very fine weave described as ‘twined’. A sixth-century BC bronze bowl from another Etruscan city, Veio, currently at the Newark Museum, USA, has a z/z tabby imprint on the bottom (Carroll 1973). Numerous mineralized textiles are known from the cemeteries of the Etruscan cities of Tarquinia, Veio, Vulci and Faliscan Civita Castellana (Gleba 2008:55-56).

A cloth (presumably linen) measuring 10.6 x 9.4 cm was found inside a bronze and silver box containing cremated bones in Tomba del Duce at Vetulonia, 650-630 BC (Torelli 2000: 582 no. 130). Another large fragment of linen was found at Volterra, Portone, dated to the fourth-first century BC (Fiumi 1976:65), while fragments of light tabby with yellowish borders and remains of gold thread from the same site come from unknown contexts.

One of the largest and probably the most famous specimen of Etruscan cloth is the so-called Zagreb mummy, preserved by the dry climate of Egypt (Fig. 6; Flury-Lemberg 1986, and 1988:344-357, 496; van der Meer 2007). The cloth survives in twelve 35 cm wide strips, which originally comprised a part of a linen book, liber linteus. It is believed that the book was taken to Egypt c. 150 BC and after some time torn into strips to be used as mummy wrappings. The textile itself, however, was 14C-dated to 390±45 BC (Srdoč & Horvatiničić 1986) and may have been produced in the region of Perugia. The textile is a close-woven warp-faced tabby, with 23/12 threads/cm. This type of weave is unusual and may indicate particular requirements of the linen books.

Several calcified textiles from second-century BC tombs at Strozzacapponi, near Perugia, have recently been tested for dyes and shellfish purple was identified in three samples (Fig. 7; Gleba & Vanden Berghe in press). The textiles appear to have been folded and placed in the travertine urns or a ceramic vessel. The cremated remains of the deceased were either placed on the folded textile or
Fig. 5 Detail of a mineralized tablet-woven textile from Tomb 1 at Poggio Aguzzo, Murlo, seventh century BC (Photo: Margarita Gleba, reproduced with kind permission of Anthony Tuck, Poggio Civitate Excavation Project).

Fig. 6 Liber linteus zagrabiensis, the linen book of Zagreb, third-second century BC (© Zagreb Archaeological Museum, reproduced with permission).
Fig. 7 Calcified textile fragment from Tomb 24 at Strozzacapponi, Corciano, second century BC (Photo: Margarita Gleba, reproduced with kind permission of the Soprintendenza per i Beni Archeologici dell’Umbria).

Fig. 8 Textile from Cogion-Coste di Manone, Tuscania, fourth century BC (© University of Pennsylvania Museum of Archaeology and Anthropology, reproduced with permission).
wrapped in it. Heavy mineralization precludes technical analysis but it is likely that the textiles were made in wool and likely woven in rep.

Another rep fragment, found in 1899 and recently rediscovered in a museum, comes from a Faliscan chamber tomb at Cogion – Coste di Manone, in the territory of ancient Falerii, modern Civita Castellana (Fig. 8; Gleba & Turfa 2007). The fragment is dated to the later fourth century BC based on two Faliscan red-figured cups associated with the tomb. The fragment presents a twisted jumble of golden brown threads measuring 11x5 cm in size. It is a fine s/s tabby with 10/60 threads/cm. A small part of the textile, now separated from the larger fragment, has a portion of an edge in which the denser system is folded over and sewn with a thicker dark yarn which is Z2s. The fact that it is woven in s-twisted yarn and is made of unusually fine wool (Gleba 2012:3653-3654) suggests that the textile may have a non-local origin.

A fragment of asbestos textile supposedly from the Etruscan area is currently in the collections of the British Museum (Granger-Taylor 1982:23 note 2). The fragment is a relatively coarse tabby 13x14 cm with possibly one selvedge preserved. The yarn is s-twisted, about 1-2 mm in diameter. The thread count is about 5-6 warp threads/cm and 4 weft threads/cm. Asbestos is derived from a mineral amphibole and has a unique quality of withstanding extremely high temperatures (Pionati Shams 1987:3-11), a trait that was noticed and used in antiquity. Thus, in the first century AD, Pliny the Elder (36.19-21) calls it live or incombustible linen and praises its usefulness for making funeral shrouds, napkins, lamp wicks and fishing nets.

From the Latin area, published finds are significantly less numerous. Tomb 41 at Borgo le Ferriere (ancient Satricum), dated to the fifth century BC, contained a metal object with two layers of fine z/z weft-faced tabby with 11 threads/cm in warp and 60-80 threads/cm in weft (Gnade 1992:115 and fig. 35). An important recent discovery is a mineralized tablet-woven fragment with a complex geometric pattern from the ninth-century BC cemetery of Santa Palomba near Rome (Fig. 9; De Santis et al. 2010). The find indicates that by the Early Iron Age, tablet-weaving technique was not only known but also well established in central Italy.

**Southern Italy and Sicily**

Significantly fewer textile finds are known from southern Italy and Sicily, and none are published for Sardinia. This, however, is unlikely to reflect the actual lack of finds but rather lack of publication.

Several bronze objects at Pontecagnano, including two axe-heads, a bowl and a tripod, found in the eighth-century BC tomb 928, have traces of textile adhering to them (d’Agostino 1977:14, 60). Other textiles are preserved on three iron
fibulae from Tomb 3284, and on a large iron fibula from Tomb 4870. Tomb 1697 had not only fine tabby traces on iron spits but also numerous small rings and bronze buttons that were probably attached to a sumptuous dress of the deceased. Tabby and twill traces are also noted on metal fibulae from the nearby sites of Eboli, Sala Consilina, and Massa Lubrense, dated to the seventh-sixth centuries BC. Other mineralized fragments, dated between the eighth and fourth centuries BC have been noted at Vico Equense, Cales, San Marzano sul Sarno, Cuma, Capua, Fratte and Paestum in Campania; San Salvatore, Montescaglioso, Difesa San Biagio, and Pisticci in Basilicata; Rutigliano and Bitonto in Puglia; and Torre Galli in Calabria (see Gleba 2008:61).

At Canosa, in Puglia, Tomba degli Ori dated to the third-second century BC contained organic textile fragments of extremely fine quality with traces of gold thread. At least three qualities of weft-faced tabby have been noted (De Juliis 1984:329-330, 339). Other examples of gold thread have been found in Taranto, dated to the second-first centuries BC (De Juliis 1984:330, 339-340).

As in the case of southern Italy, few textiles from Sicily have been analysed but their presence has been noted, indicating that many examples survive. For example, numerous iron knives and daggers found in tombs at Vassallaggi were wrapped in bands of textile and usually deposited inside a crater or other vessel (Orlandini 1971). A small rope fragment on a sixth or fifth-century BC iron object from Colle Madore is interesting in that its fibre has been identified as hemp (Terranova & Lo Campo 1999). Hemp was also identified as the fibre of a z/z tabby, found in a fifth-century BC burial at Himera (Di Scalafani et al. 2005). Finally, at Marsala, a Punic shipwreck dated to the third century BC
produced large quantities of string and rope made of esparto grass, including strings of medium to thick plait, plaited cord and a rope piece 30 m long ending in an eye-splice (Frost 1981). Esparto is not native to Italy and its presence suggests that the ship was kitted out in Iberia.

Iron Age textiles in Italy represent a wide spectrum in terms of the weaves utilized and include z/z and spin patterned 2/2 twills, z/z balanced and weft-faced tabbies and one s/s weft-faced (?) tabby. While there is a prevalence of z-twist, spin-patterning is quite common. Tablet weaving, used to decorate borders of various garments, is quite common and is already well developed at the beginning of the period. The material is predominantly wool, but linen was also utilized and other fibres such as hemp and asbestos have been identified. Already in the early part of the period there is evidence of familiarity with sophisticated dyeing techniques.

**Roman period (first century BC-fourth century AD)**

While much is known about the textiles produced in Italy during Roman times from the written sources (e.g. Vicari 2001), Roman textiles excavated throughout Italy have not been systematically catalogued, making it difficult to provide here a detailed survey. In particular, the large number of textiles found on sites buried by the Vesuvian volcanic eruption of AD 79, still remain largely unpublished (see Bender Jørgensen 1992:109), although some of the material from Pompeii has been recently analysed (Médard, Borgard & Moulhérat 2011). Sheep wool and flax linen were identified as the two main materials. Linen textiles have s-twisted yarn while wool textiles are woven in z-twisted yarn. Linen textiles are all tabbies while wool textiles include a variety of tabbies and twills. A much wider spectrum of materials, including Angora wool, cotton, sea-silk, hemp, broom and kapok, was previously published for other textile material from the site, although the lack of find inventory numbers and unclear methods of identification render these data rather problematic (D’Orazio et al. 2000). Some of the old finds have recently been published by the DressID project and include the supposedly earliest knitted textile made of purple-coloured silk, raw sea-silk fibres, a wool 2/2 twill fragment with an in-woven gamma shape and a calcified fragment preserving traces of purple colour and gold thread (Paetz gen. Schieck et al. 2014). Asbestos textiles have also been mentioned (see Bender Jørgensen 1992:109).

Many other Roman sites, primarily burials, in Italy yielded textile fragments of diverse nature, although they are generally fewer than Iron Age examples due to changes in burial customs, whereby fewer metal objects that would favour textile mineralization were included with the dead.

Bender Jørgensen noted the linen shroud with fringes found in a funerary urn of the mid-first century AD, excavated in 1928 at Ponte Fratta on the Rome-Ostia
road (Soler Villabella 1937) and recently re-analysed (Mitschke & Paetz gen. Schiek 2012:117-121). The cloth survives in its entirety, measuring 183x72.5 cm, and has 14-17 threads/cm in both systems. It is decorated with two purple wool stripes in one corner, and self bands and long fringes at the borders (Fig. 10). The linen warp and weft threads of the ground weave measure 0.2-0.3 mm in diameter and are s-twisted; the coloured wool weft threads are 0.8-1 mm in diameter and z-twisted. The new analysis suggests Egyptian origin of the cloth (Mitschke & Paetz gen. Schiek 2012:120). Similar ‘towel-like’ Roman cloths from the Lateran Basilica are conserved in the Vatican Museums (Soler Villabella 1937:80).

Numerous coins from various first-third century AD funerary contexts in Rome produced traces of linen tabbies in s-twisted yarn (Giuliani et al. 2011). Meanwhile objects of personal use in metal preserve wool tabbies and even silks.

The rather unique Roman mummy of an eight-year-old girl found in a second-century AD grave at Grottarossa near Rome, was buried with linen wrappings of various qualities, woven in z-twisted yarn, indicating local production (Ascenzi et al. 1996:215). In addition, silk fragments of a possible tunic were identified. Another second-century AD burial of a young girl, Crepereia Tryphaena, found at Valerano south of Rome, contained mineralized traces of linen tabby (Portoghesi 1983). Meanwhile, a man found in a third-century AD grave in Brescia, was wrapped in z/z tabby (Castiglioni & Rottoli 2004). Recent examination of several burials from the catacomb of Sant’ Agnese in Rome identified silk textiles among the materials used to dress the dead of the third century AD (Mitschke & Paetz gen. Schiek 2012:121-124). The same study also identified two kinds of rare silk block damask among the textiles buried with man in Tomb 7 found under the floor of the church of San Sebastiano on Via Appia, dated to the late second-early third century AD (Mitschke & Paetz gen. Schiek 2012:125-130). The silks were likely imported from Syria.

**Fig. 10** Details of a linen shroud from Ponte Fratta, mid-first century AD: a) purple wool weft stripes; b) close-up of the ground weave (Photo: courtesy of Sylvia Mitschke, rem/ CEZA).
Thanks to a micro-excision approach, one of the best-investigated Roman burials from Italy is the so-called 'Lady of the Sarcophagus', dated to the early third century AD (Rossignani et al. 2005). Several thousand tiny textile fragments were documented. At least five different textile types were identified, including: A) z/z tabby with 16/41-43 threads/cm; B) z/z tabby with 20-22/26-29 threads/cm; C) z/z and s/s tabbies with 30-40 threads/cm in both systems; D) s/s tabby with 12/12 threads/cm; and E) 2s/2s tabby with 17.5/4.5 threads/cm (Maspero & Rottoli 2005:74). The burial also contained numerous fragments of a very fine reticulum made in gold thread.

Sarcophagus found in Piazza Mateotti of Modena contained remains of tabbies, identified as silk (Tusa 1948:35 note 1). One of the samples had a thread count 35/32 threads/cm, while others 20/18 threads/cm. In addition the burial contained extremely fine, spun gold threads, with their organic core no longer identifiable.

Many Italian gold thread finds of the Roman period, primarily from Rome, have been well analyzed and published (Bedini et al. 2004). All of these were made with metal strips z-twisted around some organic core, which in most cases does not survive. The gold thread has been used for weaving, sprang, embroidery and twisting techniques. Among the more unique finds is an almost complete hairnet or reticulum made in sprang technique, an item also known from Pompeian frescoes. To these should be added several finds from the so-called tomb of St Peter at the Vatican, Rome, which include gold thread with a wool core dyed red as well as gilded copper thread with vegetal core (Guarducci 1965: 30, 182 nos. 2-4, fig. 9, pl. 43). Several other finds of gold thread of imperial date have been found in the Vatican necropolis (Guarducci 1965:33). Similar finds are mentioned in old excavations reports of burials in Perugia (Guarducci 1965:32, 34). Another find of Italian provenance but currently located in the National Museum in Copenhagen, Denmark, consists of three small fragments of gold weaving (Gleba 2008). A relatively large piece of ribbon woven with gold thread has been found in the barrel vault number 5 of the ancient port of Roman Herculaneum (D’Orazio & Martuscelli 1999: 177 no. 202).

Late Antique textiles woven in tapestry are known from Italian churches, as for example the silk damask dalmatic from the Sant’ Ambrogio in Milan, discussed by Bender Jørgensen (1992:109-110). The National Museum of Ravenna preserves several examples of silk taqueté from the church and tomb of San Giuliano in Rimini, dated to the fourth-sixth century AD (Stauffer 2000).

From non-burial context, a textile fragment measuring 13.7x7cm was excavated in 1982 in a waterlogged reclamation fill (bonifica) in the Retratto locality of Adria (De Min 1986). Based on thousands of pottery fragments, the fill is dated to the late first century BC – early first century AD. The textile is made in what is probably a weft-faced tabby with approximately 8 warp threads/cm and 28 weft
threads/cm. The warp yarn is z-twisted with a hard twist and measures 0.6-0.7 mm in diameter. The weft yarn is also z-twisted with medium-hard twist but is finer and measures 0.3-0.4 mm in diameter. The textile was originally dyed using madder and possibly some other red dye.

Last but not least, numerous cordage fragments and a fragment of z/z tabby made of wool have been excavated from a rare shipwreck context at Pisa San Rossore, dating from Etruscan-Roman times (Lentini & Scala 2002, 2005). Cordage materials include hemp, *Hybiscus sp.*, *Calotropis sp.*, *Musa sp.*, *Asclepias sp.*, *Gossipium sp.*, *Spartium junceum*, *Lygeum spartum*, *Chamerops umilis*. Some linen textiles, used as caulking, were found during early excavations of ships in the lake of Nemi (Soler-Vilabella 1937:74). Textiles reused as caulking were also found in the Roman shipwreck of Comacchio (Castelletti et al. 1990).

The major change observable during the Roman period is a wider range of the materials used to make textiles, including silk. Tabbies - balanced and weft-faced, z/z and s/s - seem to have dominated, but twills were still widely used. Z-twist was still dominant, but s-twist occurred more frequently than in the preceding periods, particularly in linen tabbies and in silk. Tablet weaving, generally used to create starting borders when weaving on a warp-weighted loom, is virtually absent and may possibly be explained by the fact that, by the early Empire, the warp-weighted loom was being displaced by the vertical two-beam loom (Wild 1970:69). Tapestry and other complex weaving techniques, on the other hand, are known to have been popular in Roman times, although few actual examples survive in Italy. Sprang and other twining techniques were used for the precious gold-thread hairnets.

**Conclusions**

As the material presented above illustrates, sophisticated technologies were being utilized by ancient inhabitants of the Italian peninsula for textile production by the Bronze Age, and by the Early Iron Age Italic populations were familiar with diverse fibres, dyes and weaving techniques. In Roman times, Rome (and Italy) was a major centre of the Western world, which not only produced textiles on a large scale but also imported a variety of exotic materials from as far away as India and China (cf. e.g. Vicari 2001; Liu 2013; Albaladejo Vivero 2013; Droß-Krüpe 2013). Despite the fact that the majority of extant textiles have not been analysed systematically, some conclusions can be drawn on the basis of the corpus reviewed above.

In terms of materials, as elsewhere in continental Europe according to Bender Jørgensen (1992: 114), plant fibres dominated during prehistory, but appear to have been somewhat supplanted by wool by the first millennium BC. In addition to the primary materials of flax linen and wool, a variety of other fibres were utilized in textile production in ancient Italy. These include: hemp, esparto,
various tree basts and mineral asbestos. By Roman times, silk and cotton made their appearance, imported over vast distances from Asia. This variety reflects not only availability of raw materials – whether locally or through exchange – but also the knowledge of technologies to convert them from their raw state to usable fibre.

While plied yarn is characteristic for the Bronze Age – possibly due to the splicing technique used to make linen yarn - single yarns are most common during the first millennium BC, when wool fibre predominates. Z-twisted yarn appears to be prevalent throughout all periods but it is not exclusive. During the Early Iron Age, there is a clear tendency to combine yarns of opposite twists to create spin-patterned textiles, such as those of Verucchio and Sasso di Furbara. The reason for this may be aesthetic, but it also reflects the knowledge of technique and appreciation of the subtlety of spin pattern. During Roman times, linen in s-twisted yarn was possibly imported from Egypt.

If one considers the quality of textiles as reflected by their thread counts, i.e. density of threads per cm, the majority of the Bronze Age textiles have a relatively narrow range, between 10 and 20 threads/cm and the textiles are relatively balanced, i.e. they have similar numbers of threads in warp and weft. During the Early Iron Age, the thread counts increase to 30-40 threads/cm, with even higher numbers in some cases, demonstrating a wider variety of qualities. This reflects not only the more advanced raw materials and more developed skills in their processing, spinning and weaving techniques, but also possibly a wider range of specialized functions that textiles were being produced for, as well as a developing creativity and aesthetic appreciation of the textile craft. By Roman times, textiles had become more standardized on the one hand, likely due to the much more industrial level of their production, while on the other, very high quality luxury textiles were being produced and imported, such as silks.

A variety of techniques were used to create textiles, including loom weaving, tablet weaving, soumak, sprang and other types of twining. The loom weaves include a variety of tabbies and twills. Tabbies, characterized by plied yarn in one or both systems and defined by Bender Jørgensen (1992:122) as ‘Döhren type’, are characteristic for the Neolithic/ Bronze Age Italian finds. Plain linen z/z tabby seems to be prevalent in Italy during the Iron Age and Roman period, just as in the eastern area of Central Europe (Bender Jørgensen 1992:125). Many of the Roman tabbies are not balanced and weft-faced tabbies are especially common.

Although regarded as an Iron Age feature of textile technology, twill developed during the Bronze Age (Bender Jørgensen 1992:120; Rast-Eicher 2005:128) and by the Early Iron Age, complex twills were ubiquitous throughout Europe. The sophistication of Early Iron Age twills points to a well-established and settled technology. Prominent among them is Bender Jørgensen’s (1992:122)
‘Vače type’, a spin-patterned twill in single yarns. This technique is probably illustrated in the numerous Etruscan artistic representations showing a variety of plaids, diagonals, chevrons, diamonds and elaborate borders, and, to a certain extent, is one of the defining features of Etruscan textiles.

Borders woven in tablet technique are found on textiles from the rich Iron Age burials in Italy (Verucchio, Sasso di Furbara) as well as in Central Europe (Hallstatt, Austria; Hochdorf and Hohmichele, Germany). The recent find of a complex tablet-woven textile in a ninth-century BC tomb at Santa Palomba near Rome (De Santis et al. 2011), demonstrates that the technology was already well developed in Italy in the Early Iron Age.

Sophisticated dyeing techniques were also known in Italy at least since the Early Iron Age. Among the identified dye sources are woad, madder, some type of yellow dye and shellfish purple. In the later periods, gold thread was used for decorative purposes.

The overview presented here not only fills in an important gap in our knowledge of Italian archaeological textiles but also demonstrates that Bender Jørgensen’s general conclusions regarding textile development in Europe are still valid, once again confirming the importance of her contributions to textile archaeology.

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